Deepwater Port License Application
Blue Marlin Offshore Port (BMOP) Project

Volume IIa – Offshore Project Components Environmental Evaluation (Public)
Topic Report 6: Wildlife and Protected Species

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Deepwater Port License Application
Blue Marlin Offshore Port (BMOP) Project

Volume I:	General (Public), including Deepwater Port License Application and Appendices (*under separate cover*)
Volume IIa:	**Offshore Project Components Environmental Evaluation (Public)** **(*herein*)**
Volume IIb:	Onshore Project Components, Environmental Evaluation (Public) (*under separate cover*)
Volume III:	Technical Information [***Confidential***] (*under separate cover*)
Volume IV:	Company and Financial Information [***Confidential***] (*under separate cover*)

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ABBREVIATIONS AND ACRONYMS

Applicant	Blue Marlin Offshore Port LLC
BA	Biological Assessment
BCC	birds of conservation concern
BIA	Biologically Important Area
BMOP	Blue Marlin Offshore Port
BMP	Best management practice
BOEM	Bureau of Ocean Energy Management
bph	barrels per hour
BSEE	Bureau of Safety and Environmental Enforcement
CALM	catenary anchor leg mooring
CFR	Code of Federal Regulations
dB	decibel
dB Lpk	decibels peak
dB rms	decibel root mean squares
dB SEL	decibel sound exposure level
DPS	Distinct Population Segment
DWP	Deepwater Port
DWPA	Deepwater Port Act
EC	East Cameron (OCS Area)
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
FFWCC	Florida Fish and Wildlife Conservation Commission
FMC	Fishery Management Council
FMP	Fishery Management Plan
FR	Federal Register
FWCA	Fish and Wildlife Conservation Act
GMFMC	Gulf of Mexico Fishery Management Council
GOM	Gulf of Mexico
HAPC	Habitat Area of Particular Concern
IBAs	Important Bird Areas
IUCN	International Union for the Conservation of Nature
LCL	lower confidence limit
LQ	living quarters
MARAD	Maritime Administration
MBTA	Migratory Bird Treaty Act
mg/L	milligrams per liter
MLV	mainline valve
MMPA	Marine Mammal Protection Act

MP	milepost
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
NMFS	National Marine Fisheries Service
NMFS GARFO	NMFS Greater Atlantic Regional Office
NOAA	National Oceanic and Atmospheric Administration
NOAA Fisheries	National Oceanic and Atmospheric Administration Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NTL	Notice to Lessees
OBIS-SEAMAP	Ocean Biogeographic Information System Spatial Ecological Analysis of Megavertebrate Populations
OCS	Outer Continental Shelf
PLEM	pipeline end manifold
Project	Louisiana Offshore Petroleum Export Facility
PSOs	protected species observers
PTS	permanent threshold shift
ROW	right-of-way
SAFMC	South Atlantic Fishery Management Council
SAV	Submerged aquatic vegetation
SEAMAP	Southeast Area Monitoring and Assessment Program
SEL	sound exposure level
SEMARNAT	Secretariat of Environment and Natural Resources of Mexico
TSS	total suspended solids
TTS	temporary threshold shift
UCL	upper confidence limit
U.S.	United States
USACE	United States Army Corps of Engineers
USCG	U.S. Coast Guard
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish & Wildlife Service
USGS	U.S. Geological Survey
VBT	Vent Boom Tripod
VLCC	Very Large Crude Carrier
WC	West Cameron (OCS Area)
WCA	water-column-associated

PROJECT FAST FACTS

General Project Terminology	
Applicant	Blue Marlin Offshore Port LLC
Project Name	Blue Marlin Offshore Port (BMOP)

BMOP Location and General Information	
Nederland Terminal (NT)	The location where the oil for BMOP originates. This is the existing Sunoco Partners Marketing & Terminals L.P. facility located in Nederland, Jefferson County, Texas
New 42-inch Pipeline	37.02 miles of 42-inch pipeline from NT to Station 501
Existing Mainline from Cameron parish Louisiana to WC 509	Cameron Parish, Louisiana Louisiana State Blocks: WC 11, 20, 21 OCS Blocks: WC 21, 44, 43, 58, 79, 78, 95, 114, 113, 132, 133, 148, 169, 170, 183, 196, 205, 212, 213, 224, 230, 241, 245, 246, 255, 258, 259, 266, 269, 276, 275, 277, 282, 408, 431, 432, 433, 456, 459, 482, 483, 484, 508, 509
Deepwater Port Location (Platform – CALM Buoys)	West Cameron Block 509 (WC 509) West Cameron 508 (WC 508) East Cameron 263 (EC 263)
Deepwater Port Water Depth	156 to 162 feet water depth
Loading Capacity	80,000 barrels per hour (bph)

BMOP Deepwater Port Components	
Existing Stingray Pipeline (Mainline)	One existing 36-inch Outer Diameter (OD) pipeline, approximately 104 miles long from Station 501 in Cameron Parish, Louisiana to WC 509. This line consists of the existing 36-inch OD subsea line from WC 509 to Station 701 and the existing 36-inch OD onshore line from Station 501 to Station 701.
Deep Water Port (DWP)	The offshore loading facility site located in WC 509, WC 508, and EC 263. The facilities consist of the existing WC 509 Platform Complex; two new PLEMs and CALM Buoys in WC 508 and EC 263; two new Crude Oil Loading Pipelines from the WC 509 Platform Complex to the PLEMs and the flexible hoses attached to the CALM Buoys. The WC 509 Platform Complex will be converted from gas service to oil and gas service. The converted platforms will support oil export and natural gas transportation.
WC 509 Platform Complex (509 Complex)	The existing WC 509 Platform Complex consists of three platforms and two Vent Boom Tripods (VBT). The WC 509A Platform is the natural gas gathering platform. This will also house the 36-inch riser and pig barrel of the crude oil Mainline. The WC 509B Platform currently is the natural gas compression and control platform. It houses natural gas compressors, separators, the Control Room and Platform Complex's utilities. The WC 509B Platform will continue to house the natural gas separation facilities and the Platform Complex's utilities. It will also house the crude oil Control Room, metering facilities, and pig barrels for the two Crude Oil Loading Lines. The WC 509C Platform is the Living Quarters (LQ) platform and will continue in that role. The WC 509 VBTs are utilized to bridge the natural gas vent piping to a point approximately 660 feet from the 509B Platform and will continue in this role for any planned and emergency natural gas blowdowns.

BMOP Deepwater Port Components	
WC 148 Platform	The existing WC 148 Platform will be converted from natural gas transportation service to oil transportation service. All gas piping facilities on the deck will be removed and replaced with new pipe and a new Mainline Valve (MLV). This valve will be able to be remotely operated.
Catenary Anchor Leg Mooring (CALM) System	There will be two floating Calm Buoys installed approximately 4,710 feet and 6,085 feet from the WC 509B Platform. The CALM Buoys will be installed with a minimum of 5,000 feet separation. Each Buoy will be moored in place with 6 or more anchor chains connected to engineered anchors installed at locations around the Buoy. Flexible hoses will be connected from the PLEMs to the Calm Buoys. Floating flexible hoses will also be connected to the CALM Buoy and, during loading, the opposite end will be connected to the ship. CALM Buoy No. 1 will be installed in WC 508 and CALM Buoy No. 2 will be installed in EC 263.
Crude Oil Loading Pipelines	Two 36-inch diameter pipelines from the existing WC 509B Platform to the PLEMs.
Pipeline End Manifold (PLEM)	One PLEM will be installed on the seafloor at each CALM Buoy. Each PLEM will be connected to a 36-inch Crude Oil Loading Pipeline from the WC 509B Platform and a CALM Buoy floating above the PLEM. The two PLEMs will be in WC 508 and EC 263.
VLCC or other Crude Carrier	Very Large Crude Carriers (VLCCs), Suezmax, Aframax or other large capacity seafaring vessels.
Meter for Measuring Departing Crude Oil	The DWP will have two-meter stations with associated prover and lab facilities. One of the meter stations will be located at the new BMOP Pump Station adjacent to the NT and one will be located on the offshore crude export platform (WC 509B Platform).
Pre-fabrication Yards	Existing yards will be used along the northern Gulf of Mexico (GOM) coast.
Support Facility	An onshore support base will be established at an existing port facility to provide the necessary security to support the DWP operations.

BMOP Onshore Pipeline Components	
BMOP Pump Station	The onshore metering, pumping, and pig launcher station will be located in Nederland, Texas, adjacent to the existing NT.
Onshore Crude Oil Pipeline	A new, approximate 37.02-mile, 42-inch OD pipeline connecting the existing NT in Jefferson County, extending across Orange County, Texas to the existing 36-inch OD Mainline at Station 501 in Cameron Parish, Louisiana.
Station 501	The existing NGPL/Stingray interconnect facility (Station 501) will be abandoned and demolished. A new pig receiver and launcher will be installed to connect the new 42-inch OD onshore pipeline with the existing 36-inch OD onshore Stingray Mainline.
Station 701	The existing compressor Station 701 in Cameron Parish, Louisiana will be demolished. All existing natural gas equipment will be removed from the Station except for several large 10,000-barrel storage tanks. Approximately 1,000 feet of new 36-inch pipe, surge tanks, surge valves, and a new MLV will be installed. The existing 10,000-barrel tanks located at Station 701 will be converted to surge relief tanks.
Stingray ANR Tap Removal Site	BMOP will remove the tap and install 36-inch pipe in its place.

BMOP Onshore Pipeline Components	
Mainline Valves (MLV)	Six new MLVs will be installed within the permanent pipeline right-of-way (ROW) of the new build pipeline. MLVs will also be installed at the BMOP Pump Station, Station 501, and Station 701. These valves will be used for isolation and spill control purposes.
Pipeline Pig Launchers and Receivers	Pig Launchers/Receivers will be located at the BMOP Pump Station, Station 501, and the DWP. These are utilized for cleaning the pipelines and running intelligent devices to assess pipeline integrity.
Access Roads and Canals	The Project will utilize existing access roads and canals. One new temporary access road and four new permanent access roads will be required.
Pipe and Contractor Yards	BMOP will utilize existing facilities along the northern GOM coast, U.S. or international locations for manufacturing pipe and for fabricating the PLEMs, CALM Buoys, and end connectors. Pipe coating activities will be performed at existing facilities along the northern GOM coast. Selection of the marine contractor will be completed after the MARAD filing; however, the successful contractor(s) will utilize existing fabrication and logistical facilities located along the northern GOM coast.

PROJECT ENVIRONMENTAL EVALUATION ASSESSMENT CRITERIA

Environmental Evaluation Assessment Criteria		
Criteria	**Values**	**Definition**
Outcome	**Direct**	***Direct effects*** are "caused by the action and occur at the same time and place" of the Project (40 CFR § 1508.8).
	Indirect	***Indirect effects*** are "caused by an action and are later in time or farther removed in distance but are still reasonably foreseeable. Indirect impacts may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems" (40 CFR § 1508.8). Indirect impacts are caused by the Project, but do not occur at the same time or place as the direct impacts.
	Cumulative	***Cumulative impact*** is "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR § 1508.7).
Type	**Adverse (Negative)**	***Adverse*** would cause unfavorable or undesirable outcomes for the natural or social environment. Negative impacts result in a net loss to the resource.
	Beneficial (Positive)	***Beneficial*** impact would cause positive or desirable outcomes for the natural or social environment. Beneficial impacts result in a net benefit to the resource.
Duration	**Short-term (Temporary)**	***Short-term (or temporary)*** impacts are those that would occur only during a specific phase of the proposed Project, such as noise during construction or certain installation activities. Short-term impacts would end at the time, or shortly after, construction activities ceased. The duration of most short-term impacts would be a few hours to a few days.
	Long-term	***Long-term*** impacts would occur either continually or periodically throughout the life of the Project (e.g., operational air emissions, stormwater discharge), or would last for years after an impact-producing activity occurred (e.g., removal of wildlife habitat).
Magnitude	**Negligible**	***Negligible*** impacts are generally those that might be perceptible, but in certain cases may be undetectable.
	Minor	***Minor*** effects are those that could be perceptible but are of very low intensity and may be too small to measure.
	Moderate	***Moderate*** impacts are more perceptible, can often be quantified, and may approach the thresholds for major impacts.
	Major	***Major*** impacts, based on their context and intensity (or severity), have the potential to meet the thresholds for significance set forth in CEQ regulations (40 CFR § 1508.27). Major impacts warrant additional attention in a NEPA analysis and a review of potential mitigation measures that would fulfill the policies set forth in NEPA, which include avoiding, minimizing, or mitigating major impacts.
Likelihood	**Unlikely**	Low probability.
	Potential	Potential or probable.
	Likely	Certain.

6.0 WILDLIFE AND PROTECTED SPECIES

6.1 PROJECT OVERVIEW

Blue Marlin Offshore Port LLC (the Applicant) is proposing to develop the Blue Marlin Offshore Port (BMOP) Project (Project) in the Gulf of Mexico (GOM) to provide crude oil transportation and loading services for crude oil produced in the continental United States (U.S.). A Project overview map is provided in **Figure 6-1**. The Deepwater Port (DWP) will be utilized to load the transported crude oil onto very large crude carriers (VLCCs) (and other crude oil carriers) for export to the global market. The Applicant is filing this application for a license to construct, own, and operate the DWP pursuant to the Deepwater Port Act (DWPA) of 1974, as amended, and in accordance with U.S. Coast Guard (USCG) and U.S. Maritime Administration (MARAD) implementing regulations.

The primary purpose of the Project will be to provide for safe and reliable long-term supply of crude oil for export to the global market. Oil for export will be transported out of the existing Sunoco Partners Marketing and Terminals, L.P. terminal and storage facility in Jefferson County, Texas (Nederland Terminal or NT). This terminal is connected to multiple crude oil pipelines connecting to production from across the U.S. In addition, an affiliate of the Applicant owns the Stingray Pipeline System and has confirmed that its subsea pipeline and offshore platforms are suitable for converting to facilitate crude oil export from a DWP in the northern GOM. The Applicant has the exclusive right to lease or purchase the Stingray Pipeline System for use in the Project.

The DWP will be located in federal waters within and adjacent to the Outer Continental Shelf (OCS) in West Cameron Lease Blocks (WC) 509 and 508 and East Cameron (EC) Block 263. Following the existing Stingray pipeline, the DWP will be approximately 99 statute miles off the coast of Cameron Parish, Louisiana, with an approximate water depth of 162 feet. Crude oil will be routed from pumps at Nederland, through a new 42-inch outer diameter (OD) onshore pipeline to the existing Stingray Mainline at Station 501, and from there through the existing Stingray Mainline to the DWP. The crude oil will be metered at the BMOP Pump Station at the NT and on the existing WC 509B Platform and routed through two Crude Oil Loading Lines to Pipeline End Manifolds (PLEMs) located on the seafloor below two Catenary Anchor Leg Mooring (CALM) Buoys located in WC 508 and in EC 263. From each PLEM, the crude oil will be routed to its respective floating CALM Buoy through submerged flexible hoses. VLCCs (or other large seafaring crude oil vessels) will moor at a CALM Buoy, retrieve and connect the floating crude oil hoses connected to the CALM Buoy and the crude oil will then route from the Buoy to the VLCC for loading. Up to 365 VLCCs (or other crude oil carriers) will load per year.

In summary, the BMOP facilities consist of the pumps and meters at NT; a new approximate 37-mile, 42-inch OD pipeline; the existing 36-inch OD Mainline; an existing fixed, manned platform complex at WC 509; an existing platform at WC 148; two new Crude Oil Loading Pipelines; and two new PLEM and CALM Buoys located in WC 508 and EC 263. A schematic of the proposed DWP is provided in **Figure 6-2**. The crude oils that would be exported range from light to heavy grade crudes from the existing the NT facility.

Topic Report 6 identifies and discusses the wildlife and protected species where the offshore Mainline and DWP will be located, the potential impacts of construction and operation of the DWP (the Mainline will be converted from natural gas to oil service), and measures that will be implemented to reduce and mitigate potential Project-related impacts. Characterization of the wildlife and protected species potentially impacted by construction and operation of the offshore components of the Project is based on publicly available data.

To avoid and minimize potential impacts to the marine environment during construction and operation of the Project, the Applicant will implement construction and operation best management practices (BMPs). In addition, to avoid and minimize potential impacts from spills, BMOP will adhere to Energy Transfer's Sea Robin Oil Spill Response Plan (O-726), modified to include BMOP.

6.1.1 Abandonment and Conversion of Existing Facilities

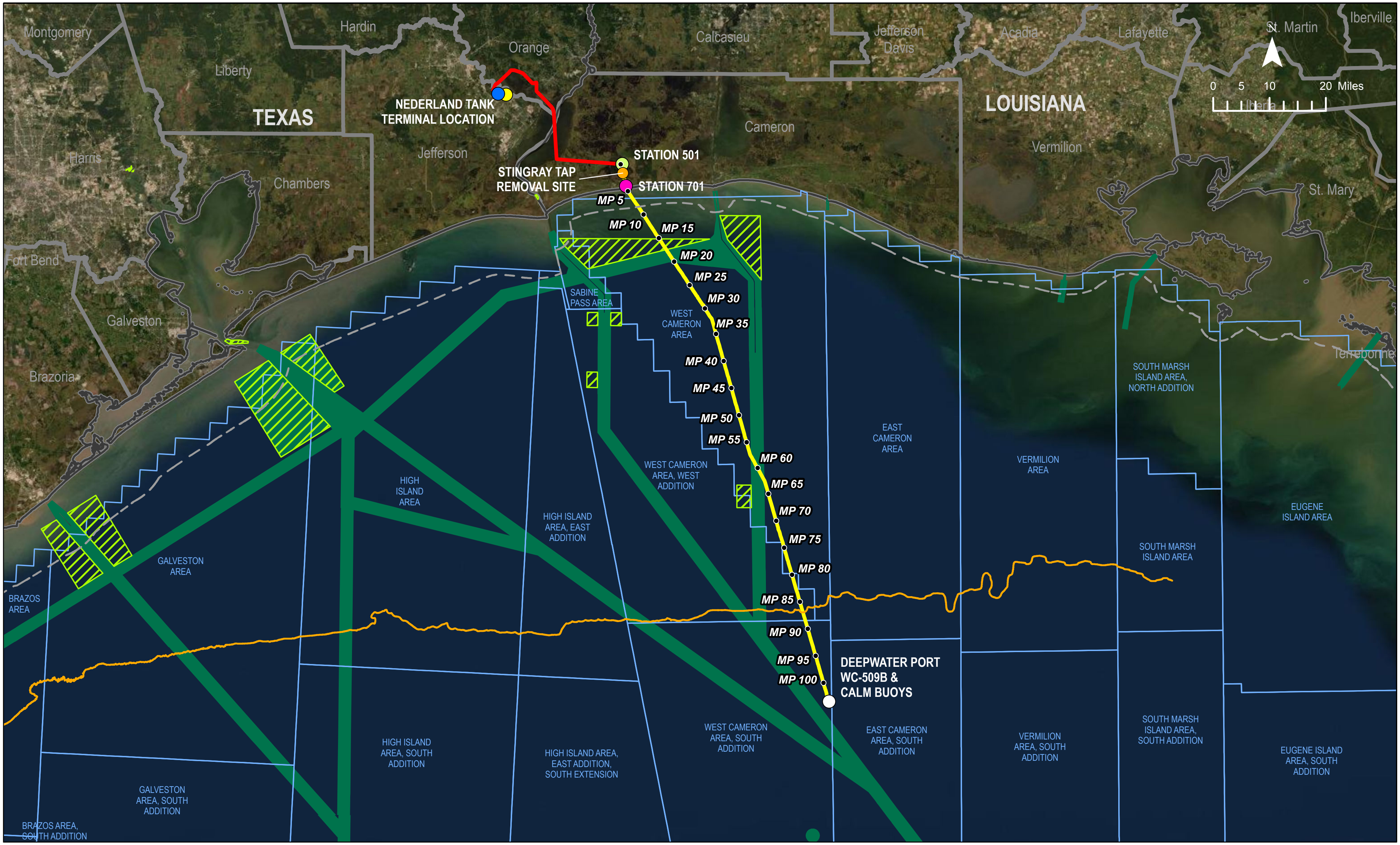
The Stingray Pipeline is currently comprised of a 36-inch pipeline (Mainline) that is fed natural gas and natural gas liquids by multiple lateral pipelines from various suppliers and producers. Stingray transports natural gas and liquids on the Mainline from the WC 509 Platform Complex to the onshore compressor station facility (Station 701) near Holly Beach in Cameron, Louisiana, and northward approximately four additional miles to the Natural Gas Pipeline Co. (NGPL)/Stingray interconnect (Station 501). The Stingray facilities from WC 509 to Station 501 will be abandoned through a FERC 7(b) Order and converted to use as DWP facilities (the filing has been made for abandonment). The Applicant intends to use all existing records and inspection data and perform additional engineering studies to obtain the appropriate agency approvals for converting all existing, reusable facilities. This includes updating the facilities to meet current regulations and guidelines, where appropriate. Abandonment under FERC 7(b) will be considered complete when the Mainline is completely isolated from all-natural gas sources and all-natural gas and produced liquids have been removed from the pipeline. This work will be completed by Stingray. Stingray will assign the existing right-of-way (ROW) Grant (and associated facilities—platforms at WC 148 and WC 509) to BMOP or another affiliate of ET for use in the BMOP Project. The Applicant intends to operate the new facilities under 49 Code of Federal Regulations (CFR) Part 195.

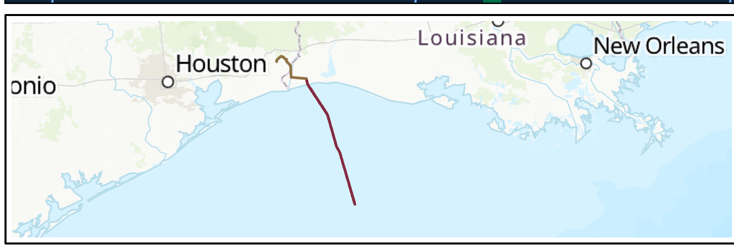
Conversion of the Stingray facilities involves converting service to crude oil and changing flow direction in the Mainline; converting the platform at WC 148, herein referred to as the WC 148 Platform, to crude oil service from natural gas service; and converting the platform complex at WC 509, herein referred to as the WC 509 Platform Complex, to crude oil and natural gas service.

6.1.2 Major Offshore Project Components

All facilities for the proposed BMOP Project will be designed, constructed, tested, operated, and maintained in accordance with the U.S. Department of Transportation (USDOT) regulations in 49 CFR Part 195 (Transportation of Hazardous Liquids by Pipeline) and other applicable federal and state regulations. The Project will consist of both onshore supply components and offshore/marine components. Offshore components are described below and depicted in **Figure 6-1**.

BMOP PROJECT - FIGURE 6-1 - PROJECT OVERVIEW MAP





LEGEND

- EXISTING OFFSHORE PIPELINE MILEPOSTS
- STINGRAY TAP REMOVAL SITE
- NEDERLAND TANK TERMINAL LOCATION
- NEDERLAND PUMP STATION
- STATION 701 (TO BE CONVERTED TO OIL SERVICE)
- STATION 501 (TO BE CONVERTED TO OIL SERVICE)
- DEEPWATER PORT WC-509B AND CALM BUOYS
- EXISTING PIPELINE TO BE CONVERTED TO OIL SERVICE
- PROPOSED ONSHORE PIPELINE (NEW BUILD)
- DEPTH CONTOUR -108'
- STATE WATERS BOUNDARY
- SAFETY ANCHORAGES
- PROTRACTION AREA
- SHIPPING FAIRWAY
- COUNTY / PARISH
- STATE BOUNDARY

BLUE MARLIN OFFSHORE PORT PROJECT
PROJECT OVERVIEW MAP

COUNTY/PARISH:	VARIOUS	***DRAWN BY:***	CA
STATE:	TX/LA	***CHECKED BY:***	CW
DATE:	2020/09/17	***PROJECTION:***	NAD 1983 UTM Zone 15N

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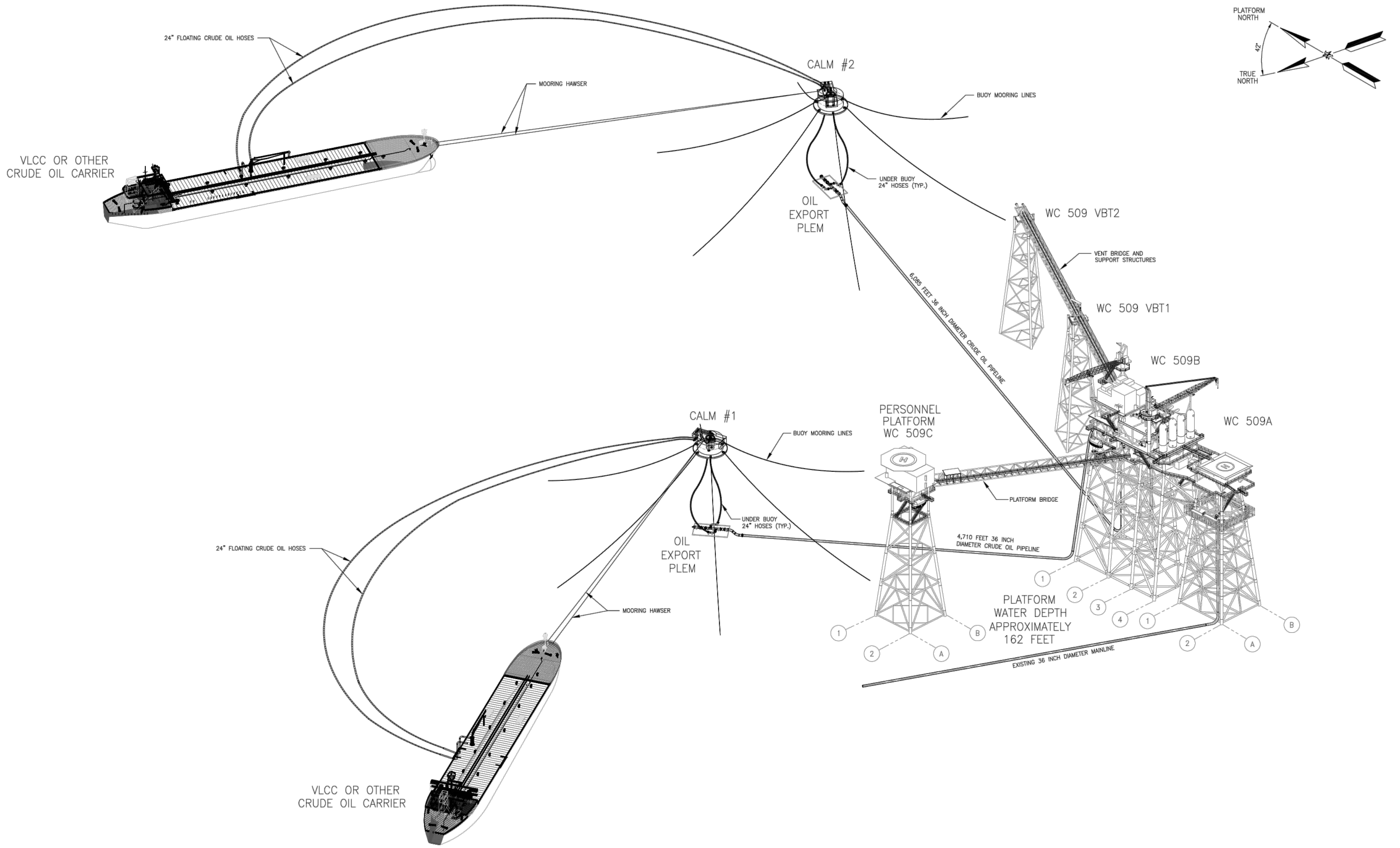
BLUE MARLIN OFFSHORE PORT PROJECT
FIGURE 6-1

DWG:	0802-01-005	***SHEET:***	1 OF 1

FIGURE 6-2 - BMOP DWP SCHEMATIC WITH VLCCs



Conversion of Existing Facilities

- The existing Station 501 is located at approximate MP 37 of the new 42-inch pipeline in Cameron Parish, Louisiana. All existing natural gas-related equipment owned by BMOP will be removed from the Station and new pipeline facilities will be installed. The new 42-inch pipeline will tie into the existing 36-inch Mainline at the site. The conversion of Station 501 will be expanded to include:
    - New pig receiver for the new 42-inch pipeline termination;
    - New pig launcher for existing 36-inch Mainline; and
    - New MLV.
- The existing compressor Station 701 in Cameron Parish, Louisiana, will be demolished. All existing natural gas equipment will be removed from the Station except for two 10,000-barrel storage tanks. The new facility will maintain office space, a natural gas interconnect, and surge tanks. Approximately 1,500 feet of new pipe, surge tanks, surge valves, and a new MLV will be installed. The existing 10,000-barrel tanks located at Station 701 will be converted to surge relief tanks.
- The existing ANR Tap (Stingray Tap Removal Site) is located at approximately Stingray Mainline MP 1.61 on the Stingray Mainline in Cameron Parish, Louisiana (approximate MP 38.6 on the BMOP pipeline system). BMOP will install a 36-inch OD pipe segment following removal of the tap.
- The existing Mainline from Station 501 to the WC 509 Platform Complex will be converted to crude oil service.
- The WC 148 Platform will be converted to crude oil service and a new mainline valve installed.
- The existing WC 509 Platform Complex will be converted from a gas transmission facility to a dual-purpose gas transmission and crude oil export facility. The existing equipment that will remain at the Platform Complex will include:
    - Existing natural gas piping and risers on WC 509A Platform;
    - Natural gas Vent Boom on WC 509 VBTs;
    - Natural gas separation facilities on WC 509B Platform;
    - and
    - Heliport and helicopter fuel tank on WC 509A Platform.

New Offshore Facilities

- Two new CALM Buoys installed, one in WC 508 (CALM Buoy No. 1) and the other in EC 263 (CALM Buoy No. 2). The CALM Buoys will be anchored to the seafloor via an engineered mooring system capable of accommodating mooring forces exerted by a VLCC or other large seafaring vessels during loading operations. Two 24-inch diameter floating hoses will be connected to each CALM Buoy. The hoses will be approximately 1,500 feet long and used for loading operations.
- Two new PLEMs installed and anchored on the seafloor under the CALM Buoys. Two 24-inch undersea flexible hoses will be connected to each PLEM and associated CALM Buoy.
- Two Crude Oil Loading Pipelines, approximately 4,710 feet long to PLEM / CALM Buoy No. 1 and 6,085 feet long to PLEM / CALM Buoy No. 2, installed from the WC 509 Platform Complex to the PLEM and CALM locations, one for each PLEM and CALM Buoy (see **Figure 6-2**). The pipelines will be installed with the top of pipe at least three feet below the natural seafloor.
- New MLV on WC 148 Platform;
- Two new 36-inch risers connected to the Crude Oil Loading Pipelines on WC 509B Platform;

- New control room on WC 509B Platform;
- Three new pig barrels, one on the WC 509A Platform and two on WC 509B Platform;
- Meter station for crude oil on the WC 509B Platform;
- New living quarters (LQ) and heliport on WC 509C Platform;
- Surge valves and tank on the WC 509B Platform; and
- New ancillary equipment for the 509 Platform Complex (e.g., power generators, instrument/utility air system, fuel tanks, ac units, freshwater makers, firewater system, seawater and freshwater system, sewage treatment unit, fuel gas system, diesel system, closed drain system, open drain system, hydraulic power unit, hypochlorite system, cranes, communications tower and system, radar) to support operation of the offshore facilities.

<u>Offshore Support Facilities</u>

Support facilities for the Project will include:

- Safety Zone - The Applicant is requesting that the USCG Captain of the Port establish a Safety Zone around the entire DWP operations area. The Safety Zone will only be open to entry for VLCCs or other crude oil carriers prepared for connection for loading of crude oil, and the necessary service vessels supporting that process.
- Anchorage area – Existing USCG-designated anchorage areas will be utilized for VLCCs (or other crude carriers) awaiting mooring at a CALM Buoy or if they must disconnect from the CALM Buoys for safety reasons.
- Support vessel mooring area – A designated Service Vessel Mooring Area will be established in proximity to the offshore WC 509 facilities.
- Temporary pre-fabrication yards – Component fabrication will occur at multiple existing fabrication facilities within the GOM coastal region.
- Support facilities – Facilities within the GOM coastal region providing support for offshore operations and maintenance activities (e.g., helicopters, supply vessels, work boats, equipment suppliers, and maintenance workers).

6.2 EXISTING ENVIRONMENT

6.2.1 Marine Mammals

Within the Texas portion of the BMOP Project area, the Coastal Plain of Texas can be characterized as an area of diverse modern environment, the result of substantial changes in paleoenvironmental conditions over the last 12,000 years. This region consists of relatively flat coastal prairies north of extensive coastal marshes underlain by unconsolidated, Mesozoic and Cenozoic sedimentary strata that slope down towards the Gulf Coast. These strata, however, only outcrop within the interior sections of the Coastal Plain, while Tertiary and Pleistocene deposits are found in the southeastern portions of the Coastal Plain that border on the GOM. Elevations within the coastal plain range between mean sea level and 8.53 m (28 ft) above mean sea level.

The Coastal Plain has a long history of natural environmental change. In addition to the rise and fall of sea level, a variety of processes (i.e., shoreline erosion and estuarine deposition, headward stream erosion, chenier accretion and strand plain development, and marsh and lagoon deposition) have affected the location, size, and distribution of active and relict natural systems (e.g., fluvial and deltaic, barrier-strand plain-chenier, and bay-estuary lagoon systems) present within the Coastal Plain.

During the Pleistocene, the Texas portion of the study area experienced four principal glacial episodes, each separated by interglacial periods. Sea level was approximately 137.2 m (450 ft) lower during periods of maximum glaciation than sea level during interglacial periods. Sea level during these interglacial periods approximated present-day sea level. During periods of maximum glaciation, then extant river systems transported vast amounts of suspended mud and sand from remote areas of Texas to deltas within broad embayments, creating sandy point bars deposited in shifting meander loops and natural levees along riverbanks. The final glacial period ended by about 18,000 years B.P. and sea level began to rise. Between 18,000 and 4,500 years B.P. point bar sand and overbank mud began filling the entrenched river valleys; rivers continued to meander within their entrenched valleys. The continued rise of sea level filled the lower reaches of the Sabine Valley with brackish and marine deposits.

After the sea level rose again to essentially modern levels, ca. 3000 B.P., floodplains and channels flooded and formed a series of bays, estuaries, and small-scale meander ridges and microrelief features, namely small depressions and pimple mounds, that became fully developed by approximately 2000 years ago. Overall, continental margins of the northern Gulf record numerous phases of shelf edge and slope retreat and erosion (Edwards, 2000; Galloway et al., 2000).

The primary physiographic features associated with the Louisiana portion of the BMOP Project region are the coastal marshes and cheniers that border the GOM, the large lakes scattered throughout the area, and the coastal prairies found in the northern portion of the Project region. More specifically, the Project is positioned near the interface of the Holocene-age chenier plains of the West Gulf Coastal Plain physiographic province and the older Pleistocene Terrace Complex. This region is comprised of isolated Pleistocene outcrops surrounded by flat coastal wetlands and chenier plains. The landscape is dominated by marsh and mudflats that have aggraded to slightly above sea level and by wooded areas confined to the localized higher elevations. The landscape also is interspersed with tidal channels, rivers, ponds, and lakes that are scattered throughout the area. With the exception of Pleistocene outcrops, the region surrounding the proposed Project corridor formed during Holocene times (i.e., within the past 12,000 years).

Chenier plains are characterized by a series of narrow, elevated landforms parallel to the coast that represent relict beach ridges that were created by the accretion and reworking of marine sands and shells along former GOM shorelines. Erosion by wave action winnowed the coarse sediments to form the cheniers during the Holocene epoch. These environments are undergoing some of the highest erosion and subsidence rates in the nation, resulting in shoreline retreat and wetland loss (Penland et al., 2005). Much of the material that forms these chenier plains was derived from sediments associated with the Red River delta.

The Red River deltaic complex marks the southern edge of the Pleistocene-age terrace complexes; this deltaic plain extends over much of southwestern Louisiana and to just west of the Calcasieu River. The Red River delta formed by approximately 70,000 years ago and is included in the Prairie Complex. Red River deltaic plain deposits overlie much of the near-shore Gulf marine deposits, although near-shore marine deposits can be found as outcrops in isolated areas near the Project area. Within the marine deposits are a series of barrier ridges that display parallel to the coast accretion ridges. The outcrops of marine deposits are the remnants of beach ridges, some of which formed before the Red River delta covered the area.

6.2.1.1 Gulf of Mexico Species

Approximately 22 different species of marine mammals are known to occur in the GOM (Würsig, 2017; Mullin, 2017). One of these, the West Indian manatee, is a sirenid that mainly occurs in the waters of Florida but can occasionally be found off the shores of Texas, Louisiana, Mississippi, and Alabama. The remaining species are cetaceans (members of the whale and dolphin families). All marine mammal species are protected under the Marine Mammal Protection Act (MMPA), and some are afforded additional protection under the Endangered Species Act (ESA). Of the 22 species of marine mammals found in the GOM, 19 are not listed under the ESA (See **Table 6-1**). Most of these species are considered to be oceanic (Mullin, 2017; **Table 6-1**), inhabiting deep waters of the continental slope and areas seaward, and would not be expected to occur within the Project area or vessel transit routes Additional discussion regarding marine mammals is provided in the MMPA Assessment in **Appendix E** (Volume IIa). Marine mammals occurring in the GOM that are federally listed under the ESA are discussed in Section 6.2.1.3.

TABLE 6-1
Potential Occurrence of Non-ESA Marine Mammals in the Project Area

Species[a]	Habitat[b]	Occurrences by Water Depths[c] (feet)			Presence in Project Area[d]
		Mean	Max	Min	
Blainville's beaked whale (*Mesoplodon densirostris*)	Oceanic	4,236	10,686	2,612	Unlikely
Melon-headed whale (*Peponocephala electra*)	Oceanic	4,596	10,508	2,703	Unlikely
Risso's dolphin (*Grampus griseus*)	Oceanic	3,789	11,286	361	Unlikely
Common bottlenose dolphin (*Tursiops truncatus*)	All[e]	1,024	9,678	334	Known
Pantropical Spotted dolphin (*Stenella attenuata*)	Oceanic	3,911	11,444	919	Unlikely
Atlantic Spotted dolphin (*Stenella frontalis*)	Shelf/Oceanic[f]	591	1,188	331	Known
Spinner dolphin (*Stenella longirostris*)	Oceanic	2,710	8,284	902	Unlikely
Striped dolphin (*Stenella coeruleoalba*)	Oceanic	5,374	10,518	1,325	Unlikely
Clymene dolphin (*Stenella clymene*)	Oceanic	5,551	10,056	2,257	Unlikely
Fraser's dolphin (*Lagenodelphis hosei*)	Oceanic	4,868	7,024	823	Unlikely
Dwarf sperm whale *(Kogia sima*)	Oceanic	5,479	1,1227	1,112	Unlikely
Pygmy sperm whale (*Kogia breviceps*)	Oceanic	5,479	11,227	1,112	Unlikely
Killer whale (*Orcinus orca*)	Oceanic	6,122	9,245	2,402	Unlikely
Pygmy killer whale (*Feresa attenuate*)	Oceanic	7,890	1,1227	2,930	Unlikely
False killer whale (*Pseudorca crassidens*)	Oceanic	4,268	10,807	548	Unlikely
Short-finned pilot whale (*Globicephala macrorhynchus*)	Oceanic	3,228	6,896	1,814	Unlikely
Cuvier's beaked whale (*Ziphius cavirostris*)	Oceanic	6,184	10,567	3,868	Unlikely

TABLE 6-1
Potential Occurrence of Non-ESA Marine Mammals in the Project Area

Species[a]	Habitat[b]	Occurrences by Water Depths[c] (feet)			Presence in Project Area[d]
		Mean	Max	Min	
Gervais' beaked whale (*Mesoplodon europaeus*)	Oceanic	4,236	10,686	2,612	Unlikely
Rough-toothed dolphin (*Steno bredanensis*)	Oceanic	5,157	10,807	419	Unlikely

Notes:

[a] Species found in Central Gulf of Mexico Planning Area (Mullin, 2017; Fulling et al., 2003; Würsig, 2017; NOAA stock assessment reports).

[b] Habitat from Mullin (2017) based on water depths; coastal = 66 feet, shelf = 66-667 feet, oceanic = > 667 feet.

[c] Water depths from Maze-Foley and Mullin (2006) and Würsig, (2017).

[d] Unlikely to occur = outside the species range or occurrences during surveys in the region have been only outside water depths in the Project area; Likely to occur = regular sightings during regional surveys; Project activities in water depths and habitats frequented by the species; Known to occur = documented occurrences in or near the Project area (based on Fulling et al., 2003; Würsig, 2017; Roberts et al., 2016).

[e] GOM has oceanic stocks, continental shelf stocks, coastal stocks; in total they frequent all habitats and water depths; water depths provided are for surveys of waters >328 feet.

[f] Atlantic spotted dolphins are found in shallower waters; water depths in this table are for surveys of water depths > 328 feet.

6.2.1.2 Non-Listed Species Likely to Occur in the Project Area

This section is limited to the discussion of offshore non-endangered marine mammals protected by the MMPA and likely to occur in the Project area (See **Table 6-1**). Federal ESA-listed and state-listed marine mammals are discussed in Section 6.2.1.3.

Atlantic Spotted Dolphin

Atlantic spotted dolphins occur throughout the warm temperate, subtropical, and tropical waters of the Atlantic Ocean and GOM. The National Marine Fisheries Service (NMFS) or National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries), has divided Atlantic spotted dolphins in U.S. waters into three stocks for management purposes: the northern GOM stock, the Puerto Rico and U.S. Virgin Islands stock, and the western North Atlantic stock. The current population size for the northern GOM stock is unknown because the most recent survey data are more than 10 years old (Waring et al., 2016); however, Hayes et al. (2019) reported an estimate for the GOM continental shelf of 37,611 based on 2000-2001 surveys. Atlantic spotted dolphins are not listed under the ESA, and the northern GOM stock is not considered strategic under the MMPA (Waring, 2016). A strategic stock is defined by MMPA as one for which the level of direct human-caused mortality exceeds the potential biological removal level, is listed under ESA, or is declining and likely to be listed in the foreseeable future. Threats to this species include entanglement in fishing gear, ocean noise, human harassment and feeding activities (NOAA Fisheries, 2020a).

In the GOM, the Atlantic spotted dolphin occurs primarily on the continental shelf in waters 33 to 656 feet deep but most often near the 656-foot isobath (Waring et al., 2016). They are usually found in groups of fewer than 50 individuals but have been observed in groups up to 200 (NOAA Fisheries, 2020a). Published results of GOM cetacean surveys indicate they are commonly observed in shelf waters offshore of Louisiana and Texas with recent documented sightings within 20 miles of the offshore Project footprint (OBIS-SEAMAP, 2020; Rappucci et al., 2019a,b; Halpin et al., 2009; Garrison, 2013. Fulling et al. (2003) reported an estimated density of 0.07 Atlantic spotted dolphins per square mile in western GOM waters 66 to 656 feet deep.

Common Bottlenose Dolphin

Common bottlenose dolphins are found in temperate and tropical waters around the world. They inhabit a wide variety of habitats, including harbors, bays, gulfs, and estuaries, as well as nearshore coastal waters, deeper waters over the continental shelf, and even far offshore in the open ocean throughout the GOM (NOAA Fisheries, 2020b). A total of 61 stocks of common bottlenose dolphins have been identified in U.S. waters; NMFS considers 46 of the stocks found along the Atlantic Coast and GOM to be strategic. Within the northern GOM, bottlenose dolphin populations are divided into coastal stocks, bay/sound/estuary stocks, a continental shelf stock, and an oceanic stock (Waring et al., 2016). The bay/sound/estuarine stocks are restricted to inshore waters and include about 32 stocks in the GOM. The fidelity of these animals to these particular areas appears to be quite strong (Würsig, 2017). GOM coastal stocks are those bottlenose dolphins found between the shoreline and the 66-foot isobath and include three separate stocks - eastern, northern, and western - with the boundary between the northern and western coastal stocks being the Mississippi River (Waring et al., 2016). The GOM continental shelf stock is defined as those dolphins found in water depths of 66 to 656 feet and the GOM oceanic stock is found in water depths exceeding 656 feet. Bottlenose dolphins within the offshore BMOP Project area are considered to be either from the western coastal stock or the continental shelf stock. The Sabine Lake and Calcasieu bay/sound/estuary stocks are also in the area, with the onshore portion of the Project traversing Sabine Lake.

Data collected from aerial surveys conducted during the spring, summer, and fall of 2011 and the winter of 2012 estimate the population of the western coastal stock at 20,161 (Waring et al 2016). The best available abundance estimate for the northern GOM continental shelf stock of bottlenose dolphins is 51,192 (Waring et al., 2016). The common bottlenose dolphin is not listed as threatened or endangered under the ESA, and neither of these two stocks are considered strategic or depleted under the MMPA (Hayes et al., 2019).

Published results of GOM cetacean surveys indicates that they are commonly observed in the region with documented sightings within 20 miles of the offshore Project footprint (OBIS-SEAMAP, 2020; Rappucci et al., 2019; Halpin et al., 2009; Garrison, 2013). Mullin et al. (1990) provided estimated bottlenose dolphin densities of 0.36 to 0.60 per square mile in north Texas coastal waters (within 23 miles of shore) with concentrations near passes, and 0.21 to 0.44 dolphins per square mile in Louisiana coastal waters with concentrations in bays and inshore waters. Fulling et al. (2003) subsequently reported an estimated density of 0.24 bottlenose dolphins per square mile in western GOM waters 66 to 656 feet deep. Bottlenose dolphins are not common in Sabine Lake but are sometimes observed; Ronje et al. (2018) conducted surveys in the lake in 2016 and observed over 100 bottlenose dolphins, all in the southern portion of the lake, Sabine Pass, and GOM waters immediately adjacent to the pass.

Bottlenose dolphins can be found traveling individually or in groups, with the groups constantly changing, breaking apart, and then reforming. Their diet consists of fish, squid, and crustaceans, and they use a variety of techniques to pursue and capture prey, including passive listening and high frequency echolocation. Threats to this species include entanglements in fishing gear, habitat alteration, biotoxins, and human interaction (noise, pollution, feeding) NOAA Fisheries, 2020b).

6.2.1.3 Federally Listed Marine Mammals

Marine mammals that sometimes occur in the northern GOM and are listed as threatened or endangered under the ESA are listed in **Table 6-2**. There is currently no designated critical habitat for any of these marine mammal species in the northern GOM.

TABLE 6-2
Potential Occurrence of ESA Marine Mammals in the Project Area

Species	Status	Potential to Occur in Project Area During[a]	
		Operations	Construction
West Indian manatee (*Tricheceus manatus latirostris*)	Threatened	Possible but unlikely	Possible but unlikely
Fin whale (*Balaenoptera physalus*)	Endangered	Very unlikely	Very unlikely
GOM Bryde's whale (*Balaenoptera edeni*)	Endangered	Possible but unlikely	Possible but unlikely
North Atlantic right whale (*Eubalaena glacialis*)	Endangered	Very unlikely	Very unlikely
Blue whale (*Balaenopter musculus*)	Endangered	Very unlikely	Very unlikely
Sei whale (*Balaenoptera borealis*)	Endangered	Very unlikely	Very unlikely
Sperm whale (*Physeter microcephalus*)	Endangered	Possible but unlikely	Possible but unlikely

Notes:
[a] Potential based on distribution, habitat, and frequency of sightings as descried below.

West Indian Manatee

The U.S. Fish and Wildlife (USFWS) listed the West Indian manatee as endangered in 1967 (32 FR 4061) but altered the status of the species to threatened in 2017 based on notable increases in the population (82 FR 16668). Critical habitat was established for the West Indian manatee in 1976 (41 FR 41914). Currently designated critical habitat consists of areas of seagrass beds and springs on and along southwestern peninsular Florida and Florida's Atlantic coast. In 2010, USFWS (75 FR 1574) found that revisions to critical habitat boundaries are warranted but they have yet to do so.

USFWS (2014) reported in their stock assessment that there was no statistically robust estimate of the total population size for the West Indian manatee but provided a minimum population size of 4,834 animals based on 2011 surveys. Martin et al. (2015) subsequently provided a population estimate of 6,350 animals for the West Indian manatee. Primary threats to the West Indian manatee include coastal habitat loss and fragmentation, collisions with boats, entanglements in fishing gear, and others (USFWS, 2001; FWS, 2019).

Manatees live in marine, coastal areas that have brackish and freshwater systems where they feed on seagrasses and other aquatic vegetation and restrict most movements to water depths of 1.5 to 33 feet (Miksis-Olds and Donaghay, 2007). During the winter months manatees congregate in warmwater refugia on the Florida peninsula, and during summer, they expand their range. On occasion, they are seen as far west as the nearshore waters of Texas. Fertl et al. (2005) reviewed documented sighting of manatees west of Florida and reported 147 historical Louisiana occurrences and 66 occurrences in Texas. Trends in sighting data suggest recent increases in use by manatees of near-shore and inshore coastal areas of western Florida, Alabama, Mississippi, Louisiana, and Texas (Reid, 2020); however, despite this trend, sightings in western Louisiana and eastern Texas are still very rare such that its presence in the Project area is possible but unlikely to occur during construction or operation.

Bryde's Whale

The Bryde's whale is a small baleen whale of the Family Balaenopteridae, also called rorquals. The subspecies that occurs in the GOM is referred to as the Gulf of Mexico Bryde's whale, which is considered one of the most endangered whales in the world (NOAA Fisheries, 2020c). It is the only baleen whale that is a resident of the northern GOM (Würsig, 2017). The population of the Bryde's whale is estimated to be 30,000 to 40,000 worldwide (Würsig, 2017) and is not listed under the ESA. The GOM Bryde's whale was determined to be an endemic subspecies in 2014 (Rosel and Wilcox, 2014) and was then listed as endangered in 2019 largely because of the small population size and restricted range (84 FR 15446). No critical habitat has been designated. Surveys conducted in 2009 resulted in a population estimate of 33 individuals (Waring et al., 2016; Waring et al., 2017). Threats to the Gulf of Mexico Bryde's whale are vessel strikes, ocean noise, energy development, and oil spills (NOAA Fisheries, 2020c).

GOM Bryde's whales appear to be currently restricted to the shelf break in the northeastern GOM (Rosel et al., 2016), where a Biologically Important Area (BIA) has been designated for them in the DeSoto Canyon. Soldenvila et al. (2017) reviewed 1992-2015 GOM marine mammal surveys and reported minimum, median, and maximum water depths of verified Bryde's whale sightings of 607, 725, and 1,115 feet respectively. Of the 50 identified whale sightings, all were off the Florida coast in the northeastern GOM, with 40 being within the BIA. Given the Gulf of Mexico Bryde's whale distribution, concentration on the northeastern GOM, and occurrence along the shelf break in water depths of 607 feet or greater, the presence of these marine mammals in the Project area during construction or operations is considered very unlikely.

North Atlantic Right Whale

The North Atlantic right whale was listed under the ESA as endangered in 1970 (35 FR 18319). Critical habitat has been designated for the species in two locations along the U.S. Atlantic coast, offshore of Maine to Massachusetts and offshore of Florida to North Carolina (81 FR 4838); no critical habitat has been designated in the GOM. The North Atlantic right whale is considered highly endangered with only about 400 whales remaining. Threats to the species are entanglements, vessel strikes, and ocean noise (NOAA Fisheries, 2020d). North Atlantic right whales primarily occur in Atlantic coastal waters where they migrate seasonally, in the spring, summer, and into fall, many of these whales can be found in waters off New England and further north into Canadian waters, where they feed and mate. Each fall, some right whales travel more than 1,000 miles from these feeding grounds to the shallow, coastal waters of South Carolina, Georgia, and northeastern Florida. The North Atlantic right whale now occurs almost exclusively along the east coasts of the U.S. and Canada. The Project area is outside of the species range (NOAA Fisheries, 2020d) but a very few individuals have been observed in recent years in the GOM (MMC, 2020; Moore and Clark, 1963; Ward-Geiger et al., 2011; Schmidly et al., 1972). These published records from the GOM likely represent occasional wanderings of individual female and calf pairs beyond the sole known calving and wintering ground in the waters of the southeastern U.S. (Hayes et al., 2019). The scarcity of such observations indicates that occurrence of the species in the Project area during construction or operations is very unlikely.

Blue Whale

Blue whales are the largest marine mammal as well as the largest animal in the world and occur in all waters except the Arctic Ocean. Their distribution and migration routes are not well known, especially in waters of the southeast U.S. They feed almost exclusively on krill, using their baleen to filter water and food. The species was listed as endangered throughout its range under the precursor to the ESA in 1970 (35 FR 8491) and remained on the list with passage of the ESA. The blue whale was listed primarily due to population reductions associated with industrial whaling (NMFS, 2018a). The global population of blue whales is thought to be around 10,000 to 25,000 which is an 89 to 97 percent reduction from the 1911 population (NMFS, 2018a). In U.S. waters, NMFS recognizes three stocks, with all blue whales on the east coast, including GOM, being ascribed to the Western Atlantic stock. Lack of data prevents a good estimate of population size or trend for the Western Atlantic stock, but a minimum population size of 440 whales has been reported (Hayes et al., 2019). Primary threats currently facing blue whales are vessel strikes and entanglements in fishing gear.

Western Atlantic blue whales are most frequently sighted in the waters off eastern Canada, with the majority of recent records from the Gulf of St. Lawrence (Sears et al., 1987) and are infrequent visitors in the GOM.

There are only two records of blue whales in the GOM. One was a stranding near Sabine Pass, Louisiana in 1924, the other a stranding between Freeport and San Luis Pass, Texas in 1940 (Davis and Schmidly, 1994; NMFS, 2018a). However, species identification has been questioned in for both cases so blue whale occurrence in the GOM remains unconfirmed (NMFS 2018a). The occurrence of blue whales in the Project area during construction or operations is therefore considered to be very unlikely.

Fin Whale

In U.S. waters, NMFS manages the fin whale as four stocks, with all fin whales in the Atlantic Ocean and GOM considered to be of the western North Atlantic stock. NMFS classifies the stock as strategic due to its ESA listing (Hayes et al., 2019). The species was listed as endangered throughout its range under the precursor to the ESA in 1970 (35 FR 8491) and remained on the list with passage of the ESA. No critical habitat has been designated for the fin whale (NMFS, 2010). The main reason for listing the species was that most populations were depleted by modern whaling, which ended in 1976 (NMFS, 2010c). Current potential threats are cited as collisions with vessels, reduced prey abundance due to overfishing and climate change, the possibility that illegal whaling or resumed legal whaling will cause removals at biologically unsustainable rates and, possibly, the effects of increasing anthropogenic ocean noise (NMFS, 2010c). The best abundance estimate available for the Western North Atlantic fin whale stock is 1,618 derived from the 2011 NOAA shipboard and aerial surveys (Hayes et al., 2019); the level of population data is insufficient, however, for trend analyses (Hayes et al., 2019).

Fin whales are found in relatively deep, offshore waters where they feed on krill, small fish, and cephalopods using their baleen to filter food and water. Most recent sightings in the U.S. during cetacean surveys in the Atlantic have been from offshore North Carolina north to the Canadian border (Hayes et al., 2019). Its distribution and occurrence in the GOM are based on only eight confirmed records: five strandings and three sightings in the GOM (Schmidly and Bradley, 2016; Würsig et al., 2000; Natural Science Research Laboratory. 2020). Two of the strandings were in Texas, one a young whale stranded on the beach in Chambers County in 1951 and the other at Mustang Island, Aransas County, Texas in 2010 (Schmidly and Bradley, 2016). The other sightings appear to be in the northeastern GOM off Mississippi and Florida (Jefferson and Schiro, 1997). Based on the few records of fin whales in the GOM and the whale’s predilection for deep water, it is very unlikely that fin whales would occur in the Project area during construction or operation.

Sei Whale

The sei whale was listed as endangered throughout its range under the precursor to the ESA in 1970 (35 FR 8491) and remained on the list with passage of the ESA. The sei whale was listed primarily due to population reductions associated with industrial whaling. Sei whales occur in subtropical, temperate, and subpolar waters worldwide. NMFS recognizes four stocks in U.S. waters with the Nova Scotia stock including the entire east coast of the U.S. The total population of sei whales in all U.S. waters is unknown; the summer 2011 abundance estimate of 357 sei whales is considered the best available for the Nova Scotia stock (Hayes et al., 2017). However, this estimate is considered conservative due to lack of survey coverage in some areas, and because it did not include an availability-bias correction for animals missed during the surveys. The NMFS stock assessment (Hayes et al., 2017) also indicated a trend analysis has not been conducted due to insufficient data. The primary threats to the species are entanglements, vessel strikes, and ocean noise.

The movement patterns of sei whales are not well known, but they are typically observed in deeper waters of the continental slope, shelf breaks, and deep ocean basins (NMFS, 2011). They are usually observed alone or in small groups of two to five animals. The sei whale is considered extralimital and rare in the GOM with only accidental occurrences (Schmidly and Bradley, 2016). Only four reliable records are available from the GOM (Meade, 1977; Jefferson and Schiro, 1997; Prieto et al., 2012; Schmidly and Bradley, 2016). Strandings have been recorded from eastern Louisiana, the Florida Panhandle, and the Texas coast. Based on the few records of sei whales in the GOM and the whale's predilection for deep water, it is very unlikely that fin whales would occur in the Project area during construction or operation.

Sperm Whale

The sperm whale is the largest toothed whale and the largest toothed creature on Earth. Their large heads contain a giant structure of waxy oil called spermaceti, which they were commercially hunted for in the early 1900s. Commercial hunting drastically reduced sperm whale populations and the species was listed as endangered throughout its range in 1970 (35 FR 18319). No critical habitat has been designated for sperm whales to date. The best estimate of worldwide sperm whale population is between 300,000 and 450,000 individuals (NOAA Fisheries, 2020e). Sperm whales in U.S. waters of the GOM belong to the northern GOM stock of sperm whales. Mullin and Fulling (2004) provided an estimate of 1,665 whales. NMFS (Hayes et al., 2017) reported in the most recent stock assessment a best abundance estimated of 763 northern GOM stock of sperm whales based on surveys conducted in 2009. They also reported that there is not enough precision to estimate population trends and current productivity rates.

Sperm whales occur in marine waters worldwide. They typically occur in groups of 8 to 11 whales. Sperm whales prefer the continental slope waters with depths of 1,640 feet or more (Würsig, 2017) because they feed on deep-diving squid and fishes. Würsig (2017) reported mean, maximum, and minimum water depths for sperm whale sightings during 1991-2001 marine mammal surveys conducted by NMFS in oceanic waters of the GOM at 5,682, 11,358, and 650 feet. Sperm whales overlap strongly with shipping lanes between New Orleans and Houston, industrial seismic activities, and deep-water oil/gas rigs (Azzara, 2012). Although sightings of sperm whales in the GOM are common, they have largely been in very deep areas off the- continental shelf, indicating that presence of sperm whales in the Project area is possible but unlikely to occur during construction or operations.

6.2.2 Birds

6.2.2.1 Bird Use of the Marine Environment

A number of survey programs have been implemented in the GOM during which bird observations were recorded. Fritts et al. (1983) conducted aerial surveys in four study areas in the GOM in 1980-1981 and recorded occurrences of 69 bird species. In the study area located off Louisiana, they observed 25 species of marine birds with gulls and terns making up 96 percent of all bird observations and the most commonly sighted species being laughing gull, herring gull, royal tern, and ring-billed gull.

Hess and Ribic (2000) provided the results of the GulfCet II program, which included 5,229 miles of spring and summer ship-board surveys of birds in shelf and oceanic waters in the northcentral GOM in 1996-1997. A total of 5,918 seabirds were recorded during a spring cruise. Twenty-two seabird species were recorded. Terns, the most abundant group, represented 70 percent of all observed seabirds, followed by storm-petrels (16.7 percent), gulls (7.4 percent), shearwaters (3.0 percent) and jaegers (2.1 percent). Combined, Sulids (gannets and boobies), frigatebirds, phalaropes, and tropicbirds amounted to just over 1 percent of the total seabirds.

Haney et al. (2019) reported the results of ship-based surveys conducted along 9,520 miles of transects across the GOM from Florida to southern Texas during most months from July 2010 through July 2011. The surveys occurred across most of the continental shelf (federal waters only) and oceanic waters as well. They recorded observations of 23,377 birds representing 45 species (See **Table 6-3**). More than 75 percent of all birds observed were gulls and terns with herring gull, royal tern, common tern, black tern, and laughing gull being the most commonly observed species. The mean density of all birds in all transects was calculated to be 0.70 birds per square mile.

TABLE 6-3
Birds Observed during 2010-2011 Ship-Based Surveys in the Gulf of Mexico

Bird Species		Number Observed[a]	Percent of Observed	Ecological Zone[b]
Total Waterfowl Anatidae		**448**	**1.9%**	
	Black scoter (*Melanitta americana*)	1	0.0%	Inshore
	Sea duck (sp. n/a)	447	1.9%	Inshore
Total Shorebirds Charadriidae		**78**	**0.3%**	
	Red phalarope (*Phalaropus fulicarius*)	1	0.0%	Nearshore/Offshore
	Red-necked phalarope (*Phalaropus lobatus*)	21	0.1%	Nearshore/Offshore
	Phalaropus (*Phalaropus* sp.)	56	0.2%	Nearshore/Offshore
Total Frigatebirds Fregatidae		**344**	**1.5%**	
	Magnificent frigatebird (*Fregata magnificens*)	344	1.5%	All
Loons Gaviidae		**51**	0.2%	
	Common loon (*Gavia immer*)	51	0.2%	Inshore/Nearshore
Total Storm-petrels Hydrobatidae		**69**	**0.3%**	
	Leach’s storm-petrel (*Oceanodroma leucorhoa*)	2	0.0%	Nearshore/Offshore
	Storm-petrel sp. (*Oceanodroma* sp.)	5	0.0%	Nearshore/Offshore
	Wilson’s storm-petrel (*Oceanites oceanicus*)	27	0.1%	Nearshore/Offshore
	Band-rumped storm-petrel (*Oceanodroma castro*)	35	0.1%	Nearshore/Offshore
Total Gulls and Terns Laridae		**18,694**	**79.9%**	
	Franklin’s gull (*Leucophaeus pipixcan*)	1	0.0%	All
	South polar skua (*Stercorarius maccormicki*)	1	0.0%	NP
	Great black-backed gull (*Larus marinus*)	2	0.0%	NP
	Roseate tern (*Sterna dougallii*)	2	0.0%	NP
	Skua/large dark jaeger (*Stercorarius sp.*)	2	0.0%	NP
	Long-tailed jaeger (*Stercorarius longicaudus*)	2	0.0%	NP
	Caspian tern (*Hydroprogne caspia*)	4	0.0%	NP
	Small jaeger (*Stercorarius sp.*)	10	0.0%	NP
	Ring-billed gull (*Larus delawarensis*)	15	0.1%	NP
	Brown noddy (*Anous stolidus*)	16	0.1%	Offshore
	Gull-billed tern (*Gelochelidon nilotica*)	18	0.1%	Inshore
	Parasitic jaeger (*Stercorarius parasiticus*)	18	0.1%	Inshore/Nearshore
	Least tern (*Sternula antillarum*)	23	0.1%	Inshore
	Forster’s tern (*Sterna forsteri*)	31	0.1%	NP
	Sooty/bridled-type terns (*Onychoprion* sp.)	36	0.2%	Nearshore/Offshore
	Pomarine jaeger (*Stercorarius pomarinus*)	79	0.3%	Nearshore/Offshore
	Bridled tern (*Onychoprion anaethetus*)	86	0.4%	Nearshore/Offshore
	Bonaparte’s gull (*Chroicocephalus philadelphia*)	90	0.4%	Inshore/Nearshore

TABLE 6-3
Birds Observed during 2010-2011 Ship-Based Surveys in the Gulf of Mexico

Bird Species		Number Observed[a]	Percent of Observed	Ecological Zone[b]
	Gull (*Larus* sp.)	141	0.6%	--
	Tern (Tern sp.)	489	2.1%	--
	Sooty tern (*Onychoprion fuscatus*)	871	3.7%	Nearshore/Offshore
	Northern gannet (*Morus bassanus*)	1,026	4.4%	Inshore/Nearshore
	Sandwich tern (*Thalasseus sandvicensis*)	1,415	6.0%	Inshore/Nearshore
	Herring gull (*Larus argentatus*)	1,531	6.5%	All
	Royal tern (*Thalasseus maximus*)	1,785	7.6%	Inshore/Nearshore
	Common tern (*Sterna hirundo*)	1,905	8.1%	Inshore/Nearshore
	Black tern (*Chlidonias niger*)	2,323	9.9%	Inshore/Nearshore
	Laughing gull (*Leucophaeus atricilla*)	6,772	28.9%	All
Total Pelicans Pelecanidae		**2,694**	**11.5%**	
	Brown pelican (*Pelecanus occidentalis*)	2,693	11.5%	Inshore/Nearshore
	White pelican (*Pelecanus erythrorhynchos*)	1	0.0%	Inshore
Total Tropicbirds Phaethontidae		**8**	**0.0%**	
	White-tailed tropicbird (*Phaethon lepturus*)	1	0.0%	Nearshore/Offshore
	Tropicbird species (*Phaethon* sp.)	2	0.0%	--
	Red-billed tropicbird (*Phaethon aethereus*)	5	0.0%	NP
Total Cormorants Phalacrocoracidae		**106**	**0.5%**	
	Neotropic cormorant (*Phalacrocorax brasilianus*)	6	0.0%	Inshore
	Double-crested cormorant (*P. auritus*)	100	0.4%	Inshore
Total Grebes Podicepidae		**108**	**0.5%**	
	Horned grebe (*Podiceps auritus*)	108	0.5%	Inshore
Total Petrels / Shearwaters Procellaridae		**750**	**3.2%**	
	Pterodroma (*Pterodroma sp.*)	1	0.0%	NP
	Sooty shearwater (*Puffinus griseus*)	1	0.0%	NP
	Black-capped petrel (*Pterodroma hasitata*)	8	0.0%	Offshore
	Shearwater (*Puffinus* sp.)	28	0.1%	--
	Cory's shearwater (*Calonectris diomedea*)	61	0.3%	All
	Great shearwater (*Puffinus gravis*)	66	0.3%	Nearshore/Offshore
	Audubon's shearwater (*Puffinus lherminieri*)	585	2.5%	All
Total Sulids Sulidae		**47**	**0.2%**	
	Sulid (*Sula* sp.)	5	0.0%	--
	Brown booby (*Sula leucogaster*)	7	0.0%	Nearshore
	Masked booby (*Sula dactylatra*)	35	0.1%	Nearshore/Offshore
Total Birds		**23397**	**100.0%**	

Notes:
[a] Results of Haney et al. (2019) from shipboard surveys across most of GOM.

TABLE 6-3
Birds Observed during 2010-2011 Ship-Based Surveys in the Gulf of Mexico

Bird Species	Number Observed[a]	Percent of Observed	Ecological Zone[b]

[b] Ecological zone is that provided by Fritts et al. (1983) based aerial surveys in four areas of the northern GOM: inshore = shoreline out for 3.7 miles approx. depth 36 feet; nearshore is from inshore out to 656-foot isobath; offshore is seaward of the 656-foot isobath (off the shelf); NP is not provided for that species.

Avian surveys in the GOM are ongoing with the BOEM/NMFS/USFWS/USGS Gulf of Mexico Marine Assessment Program for Protected Species (GOMMAPPS). Surveys reported to date have yielded similar species lists and seabird densities to the studies cited above (Wilson, 2018; GOMMAPPS, 2017; Haney et al., 2019). Birds in the offshore Project area are expected to be similar in assemblage and density to those indicated above, with the Project area being in the inshore and nearshore ecological zones.

6.2.2.2 Important Bird Areas

In partnership with Bird Life International, the Audubon Society identifies areas of importance to birds, referred to as Important Bird Areas (IBAs). One such area, the Chenier Plain IBA, encompasses portions of the Project area.

Chenier Plain IBA

Audubon's Chenier Plain IBA encompasses 2,317,766 acres across much of southwest Louisiana and extends out into the GOM to the limits of State waters. It is assigned a global priority. The IBA is home to over 360 species of birds including ducks, egrets, geese, raptors, wading birds, and shorebirds, and is a stopover area for many of the transient birds that winter in Central and South America. Portions of the offshore Project area within State waters are also within the Chenier Plain IBA. A discussion of the onshore Project components within the Chenier Plain IBA is included in Topic Report 5, "Wildlife and Protected Species" (Volume IIb).

6.2.2.3 Threatened and Endangered Birds and Birds of Conservation Concern

Federally Listed Birds

Two species of birds listed under the ESA are sometimes found along the coast of the northcentral GOM. The piping plover (*Charadrius melodus*) and the rufa red knot (*Calidris canutus rufa*), both listed as threatened under the ESA, occur in intertidal habitats in the area. Potential presence of these species is discussed in Section 5.2.3.2 of Topic Report 5 (Volume IIb).

Birds of Conservation Concern

The Fish and Wildlife Conservation Act (FWCA) mandates that USFWS identify species of migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the ESA. These species are known as birds of conservation concern (BCC). BCCs in USFWS's Region 37, which includes much of the northern GOM coastline in Texas and Louisiana west of the Mississippi River, are addressed in Section 5.2.4 of Topic Report 5 (Volume IIb). Those species that may be found in intertidal or marine portions of the offshore Project area are identified in **Table 6-4**.

TABLE 6-4 **BCCs Potentially Occurring in Shoreline and Marine Portions of the Project Area**			
Common Name	**Scientific Name**	**Seasonal Occurrence**	**Habitat in the Project Area**
Audubon's Shearwater*	*Puffinus lherminieri*	Nonbreeding	Offshore, oceanic water
Band-rumped Storm-Petrel*	*Oceanodroma castro*	Fall Migration	Rocky shoreline, offshore
Reddish Egret	*Egretta rufescens*	Year-round	Shoreline, salt marsh, tidal flat, lagoon
Bald Eagle[a]	*Haliaeetus leucocephalus*	Year-round	Shorelines, rivers, swamps
Snowy Plover[b]	*Charadrius nivosus*	Nonbreeding	Shoreline, bare upper beach, sandy flat
Wilson’s Plover	*Charadrius wilsonia*	Year- round	Shorelines, tidal flats, estuaries
American Oystercatcher	*Haematopus palliatus*	Year-round	Shoreline, tidal flat, mudflat, salt marsh
Lesser Yellowlegs	*Tringa flavipes*	Nonbreeding	Marshes, mudflats, shoreline
Whimbrel	*Numenius phaeopus*	Nonbreeding	Shorelines, mudflats, marsh
Long-billed Curlew	*Numenius americanus*	Nonbreeding	Tide flat, salt marsh
Hudsonian Godwit	*Limosa haemastica*	Spring migration	Mudflat, marsh, tidal flat
Marbled Godwit	*Limosa fedoa*	Nonbreeding	Shoreline, tidal flat, mudflat
Red Knot (*roselaari* spp.)	*Calidris c.roselaari*	Nonbreeding	Shoreline, intertidal marine, inlet, estuary, bay
Short-billed Dowitcher	*Limnodromus griseus*	Fall migration	Shorelines, mudflats, marsh, tidal flat
Least Tern[b]*	*Sternula antillarum*	Breeding	Shorelines
Gull-billed Tern*	*Gelochelidon nilotica*	Year-round	Shoreline, marsh, plowed field, offshore
Sandwich Tern*	*Thalasseus sandvicensis*	Year-round	Shoreline, coastal water, offshore
Black Skimmer	*Rynchops niger*	Year-round	Shoreline, mudflat
Notes: Source is USFWS, 2008 [a] Delisted under the ESA. [b] Non-listed subspecies or population of Threatened or Endangered species. * --Relatively common in marine waters of the region.			

6.2.3 Sea Turtles

Five of the world’s seven species of sea turtle are found within the GOM (See **Table 6-5**). All are listed under the ESA as either threatened or endangered and are under the joint jurisdiction of NMFS and USFWS. USFWS has lead responsibility on the nesting beaches, while NMFS is the lead agency in the marine environment. The following sections describe the distribution in, and use of, the marine habitat by sea turtles and the potential occurrence in marine portions of the Project area. Their use of shoreline habitats for nesting is discussed in Topic Report 5 (Volume IIb). Their use of marine waters is discussed below.

TABLE 6-5 **Sea Turtles of the Gulf of Mexico**			
Common Name	**Scientific Name**	**ESA Status**	**Potential Occurrence in Project Area[b]**

Green sea turtle North Atlantic DPS[a]	*Chelonia mydas*	Threatened	May
Hawksbill sea turtle	*Eretmochelys imbricata*	Endangered	Unlikely
Kemp's ridley sea turtle	*Lepidochelys kempi*	Endangered	Known
Loggerhead sea turtle	*Caretta*	Threatened	Known
Leatherback sea turtle	*Dermochelys coriacea*	Endangered	Known

Notes:

[a] Some green turtles of the South Atlantic stock may be found in the GOM (NMFS 2020); Foley et al. (2007) reported 4 percent of turtles in a small-scale study in St. Josephs Bay, Florida were of the South Atlantic DPS.

[b] Unlikely to occur = is outside the species range or occurrences during regional surveys have been only outside water depths frequented by the species; May occur = regular sightings during regional surveys; Project activities in water depths and habitats frequented by the species; Known to occur = documented occurrences within 20 miles of the Project (OBIS SEAMAP, 2020; Rappucci et al., 2019; Halpin et al., 2009; Garrison, 2013).

All five sea turtle species nest on coastal beaches although as discussed in Topic Report 5 (Volume IIb), suitable nesting habitat is not available near the onshore Project area. After hatching, the hatchlings migrate to oceanic waters (marine waters off the shelf with depths exceeding 656 feet) where they remain for several years. Juvenile Kemp's ridleys, loggerheads, greens turtles, and hawksbills subsequently return to the neritic environment (coastal marine and estuarine waters < 656 feet deep); leatherbacks remain in the oceanic waters. Adults tend to remain in the neritic zone their entire lives (Kemp's ridleys), move back and forth between the neritic and oceanic zones (loggerheads), or spend their entire lives in the oceanic zone with the exception of females nesting in the terrestrial zone (leatherbacks).

All five sea turtle species could occur within the vicinity of the offshore Project area; however, they occur at very low densities in this part of the GOM. McDaniel et al. (2000) analyzed NMFS aerial survey data from September-November 1992-1994 and found significant differences in sea turtle abundance across the GOM with the highest densities occurring in south Florida, decreasing but remaining high on the west coast of Florida, but decreasing greatly in the north central GOM (Alabama-Mississippi-Louisiana) before increasing again in south Texas. Relative abundance was found to be 60 times greater on the Florida coast and 20 times greater in south Texas as compared to the northcentral GOM where sea turtle relative abundance (turtles/mile^2) was found to be near zero. With regards to water depths, McDaniel et al. (2000) found sea turtle abundances proportionately higher in nearshore than offshore waters in western GOM subzones, with the greatest density found in water depths of 0-60 feet. Sea turtles have also been found to be attracted to, or associated with, offshore oil and gas platforms. Lohoefener et al. (1990) studied this association within seven areas offshore of Louisiana and concluded that the distribution of sea turtles east of the Mississippi River was positively associated with platforms (closer to platforms than expected) but randomly located with respect to platforms in the study areas west of the river.

Green Sea Turtle

The green turtle was listed under the ESA in 1978, with breeding populations in Florida and along the Pacific Coast of Mexico listed as endangered, and all other populations listed as threatened (43 FR 32800). Major factors contributing to its status were reported to include human encroachment and associated activities on nesting beaches; commercial harvest of eggs, subadults, and adults; predation; lack of comprehensive and consistent protective regulations; and incidental take in fisheries. The green sea turtle has a circumglobal distribution, occurring in tropical and subtropical waters worldwide, and to a lesser extent in temperate waters. A total of 11 Distinct Population Segments (DPSs) are recognized (Seminoff et al., 2015; 81 FR 20058), with those in the northern GOM being included in the North Atlantic DPS (81 FR 20058). Threats to green sea turtles include fishing entanglements, harvesting for food, loss of nesting habitat, ocean pollution, and disease (NOAA, 2020).

Adult and juvenile green turtles occur nearshore as well as in bays and lagoons, on reefs, and especially in areas with seagrass beds. Adults migrate from foraging areas to nesting beaches and may travel hundreds or thousands of miles each way. After emerging from the nest, hatchlings swim to open ocean, where they live for 5-7 years until they reach a certain size and age, where they travel back to nearshore areas. In U.S. Atlantic and GOM waters, green turtles are found in inshore and nearshore waters from Texas to Massachusetts, the U.S. Virgin Islands, and Puerto Rico (NOAA, 2020). However, BOEM (2018) surveys suggest that green sea turtles prefer the nearshore waters of the northeastern GOM and are not abundant in the northcentral GOM where the Project is located. Their abundance in the northwestern GOM has most often been found to be considerably lower than that of loggerheads and Kemp's ridleys (Fuller et al, 1987; Lohoefener et al., 1988; BOEM, 2020b). NMFS (2020b) provided an estimated density of 0.062 green turtles per square mile. They have occasionally been reported in Sabine Pass (Landry et al., 1996). Green turtles may occur in the marine waters of the offshore Project area during construction or operation but given the low densities and relative scarcity of historical sightings it is unlikely.

Hawksbill Sea Turtle

The hawksbill sea turtle was listed as endangered throughout its range under the ESA on June 2, 1970 (NMFS and USFWS, 2013). The hawksbill has no designated critical habitat in the GOM; however, terrestrial and marine critical habitat has been designated in Puerto Rico. In their most recent status review NMFS and USFWS (2013) recommended that the species not be delisted or reclassified. Within the GOM almost all hawksbills originate on beaches in Mexico and migrate during other life phases primarily to the waters off Texas and Florida but are sometimes been found in waters of all the GOM states (NOAA, 2020). The recent trend of nesting populations in Mexico is upward (NMFS and USFWS, 2013). These turtles primarily feed on sponges that live on coral reefs (NOAA, 2020). Hawksbill sea turtles are not abundant within coastal Louisiana waters although there are historical sightings (Fuller et al., 1987). They are the least abundant turtle in the region, with NMFS (2020b) reporting a density of near 0.0 in the northwestern GOM. Hawksbill turtles may occur in the proposed Project area based on their range; however, they are unlikely to occur in the Project area based on their habitat preferences and the results of historic surveys in the area. Hawksbill turtles occur in varying habitats at different life stages but are frequently found in healthy coral reefs (NOAA, 2020). Threats to hawksbill sea turtles include fishing entanglements, harvesting for food, illegal wildlife trade, habitat loss, vessel strikes, and ocean pollution (NOAA 2020).

Kemp's Ridley Sea Turtle

The Kemp's ridley sea turtle was listed as endangered throughout its range under the ESA on December 2, 1970 (NMFS and USFWS 2015, 33 FR 18320). No critical habitat has been established for the species. The Kemp's ridley turtle is also internationally listed as critically endangered. Kemp's ridley juveniles can typically be found in deep waters of the GOM where they feed on small fish, crabs, and mollusks that cling to floating sargassum algal mats. Adults tend to be found in estuaries, in particular in or near shallow seagrass habitats nearshore habitats where they feed on crabs and fish (NOAA 2020). Kemp's ridleys have documented occurrences within 20 miles of the Project (OBIS SEAMAP, 2020; Rappucci et al., 2019a,b; Halpin et al., 2009; Garrison, 2013). They are the most abundant sea turtle in Louisiana waters (Fuller et al., 1987 where inshore waters appear to be important to them and they are found year-round. NMFS (2020b) reported a density estimate of 2.315 Kemp's ridley sea turtles per square mile in continental shelf waters of the northwestern GOM. They are known to frequent Sabine Pass (Landry et al, 1996) and may utilize Sabine Lake. Identified threats to Kemp's ridley sea turtles include entanglements in shrimp gear, harvesting of eggs, and marine pollution and trash (NMFS, 2020b).

Loggerhead Sea Turtle

The loggerhead sea turtle was listed as threatened throughout its range under the ESA on July 28, 1978. Threats to loggerheads include harvesting for food, entanglement in fishing and shrimping gear, marine pollution, noise, and habitat loss and degradation (NOAA 2020). NMFS (76 FR 58868) split the species into nine DPSs in 2011, with some classified as threatened and some as endangered. The Northwest Atlantic Ocean DPS of loggerhead turtles occurs within the GOM and is listed as threatened under the ESA. NMFS issued a final rule in August of 2014 to designate critical habitat for the Northwest Atlantic Ocean DPS of the loggerhead sea turtle within the Atlantic Ocean and the GOM (79 FR 39855). Designated areas include 38 occupied marine areas containing one or a combination of habitat types: nearshore reproductive habitat, winter area, breeding areas, constricted migratory corridors, and/or Sargassum habitat. The Project area is located in the designated critical habitat areas for sargassum (Unit LOGG-S-2). West of the Mississippi River, Unit LOGG-S-2 extends from the 33-foot isobath off Texas and Louisiana south to the limits of the U.S. Exclusive Economic Zone (EEZ), encompassing all of the offshore Project area.

Loggerheads typically occur in warmer waters of the continental shelf but have been found in a wide variety of locations such as coral reefs, rocky areas, bays, estuaries, and lagoons (Fuller et al., 1987). They are highly migratory and travel large distances within their lifetimes, especially during their juvenile life stage where they are often found in deep, open ocean waters. Adults make migrations from their foraging areas and nesting grounds. Like other sea turtles, juveniles are often found on floating sargassum algal mats that provide food and shelter (NOAA 2020). The loggerhead is one of the most abundant sea turtles in the GOM, sometimes being observed most frequently in surveys (Lohoefener et al., 1988) and sometimes second to Kemp's ridleys (Fuller et al., 1987). NMFS (2020b) reported a density of 0.995 loggerheads per square mile in continental shelf waters of the northwestern GOM. Loggerheads have documented recent occurrences within 20 miles of the Project (OBIS SEAMAP, 2020; Rappucci et al., 2019a,b; Halpin et al., 2009; Garrison, 2013).

Leatherback Sea Turtle

The leatherback sea turtle was listed as endangered throughout its range under the ESA on June 2, 1978 and the classification has remained unchanged. No critical habitat has been designated in the GOM, but it has been designated elsewhere in U.S. waters, including the west coast (77 FR 4170) and the U.S. Virgin Islands (44 FR 17710). They occur throughout most of the world's oceans except the Arctic Ocean and the Antarctic ocean and are considered to have seven subpopulations, with leatherbacks in the GOM considered to be part of the Northwest Atlantic subpopulation. NMFS was petitioned in 2017 to consider the Northwest Atlantic subpopulation to be a DPS and to classify it as threatened. NMFS's 90 day finding (83 FR 57565) was that the petitioned action may be warranted but no regulatory actions have been taken to date. In the GOM nesting generally occurs at low levels and is generally restricted to the coasts of Florida and Alabama. Leatherbacks have a wide variety of diet that consists of squid, fish, jellyfish, tunicates, urchins, crustaceans, algae and seaweeds. The main threats to leatherback sea turtles include entanglements in fishing gear, harvesting for food, vessel strikes, disease, habitat loss, and ocean pollution (NMFS, 2020b).

Leatherbacks prefer deeper open ocean waters, over 150 feet deep, but are also occasionally found in estuaries and shallow marine areas in more northern latitudes (Fuller et al., 1987). NMFS (2020b) reported a density of 0.026 leatherback turtles on continental shelf waters of the northwestern GOM. There are documented sightings of leatherback turtles within 20 miles of the Project footprint from recent surveys. While they have been observed in the area, the density at which these turtles are found at in the GOM makes the probability of their occurrence during Project construction relatively low.

6.2.4 Marine Fish

The fish fauna of the GOM is abundant and diverse with documented occurrence of 1,443 finfish species in 700 genera, 223 families, and 45 orders (Hoese and Moore, 1998; McEachran and Fechhelm, 2005; Chen, 2017). This fauna includes large numbers of reef-dependent demersal species such as groupers and snappers; coastal demersal species such as drums and mullets; demersal species like tilefishes and porgies; coastal pelagic species such as herrings and jacks; highly migratory pelagic species such as tunas and billfishes, small and large coastal sharks; and pelagic sharks (McEachran and Fechhelm, 2005; Parsons, 2006; Chen, 2017). Dominant fish species in the northern GOM are discussed below.

Soft Bottom Fishes

The demersal shelf fish fauna can be characterized by substrate type and water depth. Chittenden and McEachran (1976) described the demersal fish fauna in the GOM and noted the occurrence of 372 demersal fish species, with 164 in the northwestern GOM and 347 in the northeastern GOM. They observed a similar relationship between the major shrimp species with bottom type and water depth and named three primary demersal fish assemblages in the northern GOM by the dominant shrimp species found in the same bottom types and water depth. Two of these assemblages occur in the Project area: the white shrimp assemblage in fine sediments and water depths of 11.5-65.6 feet; and the brown shrimp assemblage in coarse sediments and water depths of 65.6-196.9 feet (Gallaway, 1981).

Gallaway (1981) estimated relative abundance of species in these assemblages by their representation in shrimp trawl by catch. The Atlantic croaker (*Micropogon undulatuus*) is the most abundant demersal fish in the white shrimp assemblage and longspine porgy is the dominant species in the brown shrimp areas (**Table 6-6**).

TABLE 6-6
Dominant Fish Species in the Soft Bottom Fish Assemblage based on By-Catch

In the White Shrimp Assemblage[a]		In the Brown Shrimp Assemblage[a]	
Species	**In Bycatch (percent)**	**Species**	**In Bycatch (percent)**
Atlantic croaker (*Micropogon undulatuus)*	30	Longspine porgy (*Stenotomus caprinus)*	39
Atlantic cutlassfish (*Trichiurus lepturus)*	14	Mexican searobin (*Prionotus paralatus)*	8
Silver seatrout (*Cynscion nothus0*	13	Horned searobin (*Bellator militaris*)	6
Star drum (*Stellifer lanceolatus*)	10	Dwarf goatfish (*Upeneus paryus*)	6
Sand seatrout (*Cynoscion arenarius*)	8	Red snapper (*Lutjanus campechanus*)[b]	--
Atlantic threadfin (*Polydactylus octonemus*)	5		
Sea catfish (*Arius felis*)	5		

Notes:
[a] Assemblages per Gallaway, 1981, by-catch data from Chittenden and McEachern (1976) in Gallaway (1981).
[b] Juvenile red snapper although not dominant were noted as abundant (Gallaway, 1981).

Coastal Pelagic Fishes

Coastal pelagic fishes of importance in the GOM include requiem sharks, ladyfish, anchovies, herrings, mackerels, tunas, jacks, mullets, bluefish, and cobia (Chen, 2017). These species are found in the GOM rear-round, with some species, such as Spanish mackerel and king mackerel, found in large schools while others, such as the cobia, occur singly or in small groups. The distribution of most species depends upon water column structure, which varies spatially and seasonally. Coastal pelagic fishes are often divided into two ecological groups, with the first group being the larger predatory species, such as king and Spanish mackerels, bluefish, cobia, dolphin, jacks, and little tunny. Some of the more dominant coastal pelagic species in the northern GOM as identified by Gallaway (1981) are listed in **Table 6-7**.

TABLE 6-7
Common and Important Coastal Pelagic Fish Species

Species in the White Shrimp Assemblage[a]	Species in the Brown Shrimp Assemblage[a]
Atlantic menhaden (*Brevoortia patronus*)	Scads (e.g., *Decapterus punctatus*)
Mullets (*Mugil* spp.)	Sardine (*Harengula pensacolae*)
Anchovies (*Engraulididae*)	King mackerel (*Scomberomorus cavalla*)
Spanish mackerel (*Scomberomorus maculatus*)	Little tunny (*Euthynnus alletteratus*)
	Cobia (*Rachycentron canadum*)

Notes:
[a] After Gallaway, 1981.

Reef Communities

Hard bottom or structure in the northwestern GOM occurs as topographical features along the shelf break (Section 6.2.4.3) and in the form of oil and gas platforms and artificial reefs. Dennis and Bright (1988) provide a detailed characterization of the fish fauna found at hard banks in the northwestern GOM including most of those listed in **Table 6-12**. Fish assemblages at GOM oil and gas platforms have been described by George and Thomas (1979), Gallaway et al. (1979), Gallaway (1981), Gallaway and Lewbel, 1982, and others. Abundant or characteristic species found at these structures are listed in **Table 6-8.**

TABLE 6-8
Common Fish Species on Reefs and Banks in Northwestern Gulf of Mexico

Oil and Gas Platforms		Natural Banks
White Shrimp Grounds	**Brown Shrimp Grounds**	
Sheepshead (*Archosargus probatocephalus*)	Spadefish (*Chaetodipterus faber*)	Barracuda (*Sphyraena barracuda)*
Spadefish (*Chaetodipterus faber*)	Lookdown (*Selene vomer*)	Creole wrasse (*Clepticus parrai)*
Lookdown (*Selene vomer*)	Bluefish (*Pomatomus saltatrix*)	Creole fish (*Paranthias furcifer*)
Blue runner (*Caranx chrysos*)	Sheepshead (*A. probatocephalus*)	Almaco jack (*Seriola rivoliana*)
Other jacks (*Carangidae*)	Gray triggerfish (*Balistes capriscus*)	Angelfish (Chaetodontidae)
Bluefish (*Pomatomus saltatrix*)	Gray snapper (*Lutjanus synagris*)	Butterfly fish (Chaetodontidae)
Gray snapper (*Lutjanus synagris*)	Red snapper (*Lutjanus campechanus*)	Damselfish (Pomacentridae)
	Blue runner (*Caranx chrysos*)	Red snapper (*Lutjanus campechanus*)
	Moonfish (*Vomer setapinnis*)	Groupers (*Mysteroperca*, *Epinephelus*)
	Cobia (*Rachycentron canadum*)	Vermilion snapper (*Rhomboplites aurorubens*)
	Jack crevalle (*Caranx hippos*)	

Stanley and Wilson (1995) studied the distribution of fish at an oil and gas platform in the WC 352 block in 75 feet of water and about 30 miles from the Project area. Fish density was found to be significantly greater within 62 meters of the platform than further out. They observed fish from a total of 19 species were observed around the platform with the most common species being the Atlantic spadefish, blue runner, bluefish, gray trigger fish, greater amberjack, red snapper, and sheepshead.

6.2.4.1 Federally Listed Fish Species

Fish species found in the GOM and listed under the ESA as threatened or endangered are listed in **Table 6-9** and discussed below.

TABLE 6-9
Threatened and Endangered Fish Species in the Northern Gulf of Mexico

Common Name	Scientific Name	ESA Status	Critical Habitat	Presence in Project Area	Project Effects
Giant manta ray	*Manta birostris*	Threatened	S/SW Florida	Very unlikely	NLAA
Oceanic whitetip shark	*Carcharhinus longimanus*	Threatened	None	Very unlikely	NLAA
Smalltooth sawfish	*Pristis pectinate*	Endangered	None	Very unlikely	NLAA
Gulf sturgeon	*Acipenser oxrhynchus desiotoi*	Threatened	E. LA to FL	Very unlikely	NLAA
Dwarf seahorse	*Hippocampus zosterae*	Candidate	None	Very unlikely	NLAA

Giant Manta Ray

The giant manta ray was listed as threatened under the ESA on January 22, 2018 (83 FR 2916); no critical habitat has been designated. The listing occurred due to perceived population decreases with the major causes and threats identified as overutilization for commercial purposes (Miller et al., 2017). The species is harvested for its flesh and for the gill rakers, which are used in traditional medicines. To be eligible for listing, a species has to be at risk of extinction over a significant portion of the range. This risk was identified within the Indo-Pacific and eastern Pacific portions of the giant manta ray's range; because evidence of DPSs was lacking, the species was listed across its range. The species is circumglobal occurring in tropical, subtropical, and temperate waters. In the Atlantic Ocean, they have been observed as far north as New Jersey, and are found throughout the GOM (NMFS, 2020b). Giant manta rays are generally more commonly observed in oceanic waters but are sometimes found feeding in shallow waters less than 33 feet deep (Miller, 2017). Tagging studies have revealed that some giant manta rays are migratory, traveling over 620 miles, while others appear to stay in the same locale (Stewart et al., 2016; Graham et al., 2012; Hearne et al., 2014).

There are no current or historical estimates of the global abundance of giant manta rays (Miller et al., 2017), and no density estimated for the GOM (NMFS, 2020b). A population of 70 or more is known to occur within the Flower Garden Banks National Marine Sanctuary (Miller et al., 2017; NMFS, 2020b), which Stewart et al. (2018) concluded is an important nursery habitat for juvenile manta rays in the GOM. NMFS (2020b) stated in their Biological Opinion for oil and gas lease sales in the GOM, that manta rays mainly inhabit waters outside of where oil and gas activities would occur. Based on available information, the probability of manta rays occurring in the Project area during construction or operation is very low.

Oceanic Whitetip Shark

The oceanic whitetip shark was listed as threatened under the ESA on March 1, 2018 (83 FR 4153). The entire species was listed across its range. No critical habitat has been designated; NMFS reported they could find no areas within the U.S. that meet the definition of critical habitat (85 FR 12898). The oceanic whitetip shark was listed because of significant decreases in global abundance due to overutilization in commercial fisheries and inadequate protective regulations (81 FR 96304). Although not generally targeted (especially in U.S.), they are caught incidentally (bycatch) by pelagic longline fisheries targeting tuna and swordfish, as well as purse seine and gillnet fisheries (Young et al., 2017). It is estimated there may have been as much as an 88 percent decline of the species in the GOM due to commercial fishing (NOAA, 2020n); however, relative abundance of oceanic whitetip shark may have stabilized in the Northwest Atlantic since 2000 and in the GOM/Caribbean since the late 1990s coinciding with the first Federal Fishery Management Plan (FMP) for sharks and subsequent regulations (Cortés et al., 2007; Young et al., 2017). Oceanic whitetip sharks occur in tropical and subtropical waters worldwide. Oceanic whitetip sharks are opportunistic feeders, where their prey ranges from squid and large fish to sea birds and other sharks. They live long lives (up to 36 years) and are slow to mature, with relatively low fecundity, which makes them susceptible to population depletions (NOAA, 2020n). They prefer open ocean waters typically with depths of more than 600 feet, which they utilize from the surface to depths of at least 498 feet (Young et al., 2017), and can be found near the continental shelf in the GOM. Essential Fish Habitat (EFH) for all life stages of the oceanic whitetip shark has been designated in offshore waters of the northcentral and northwestern GOM (NOAA Fisheries, 2017). All designated areas are located seaward of the shelf break. There is insufficient data on local and global populations of oceanic whitetip sharks, and more research is needed to determine population structures and global declines (NOAA Fisheries, 2020n). NMFS (2020b) stated in their Biological Opinion for oil and gas lease sales in the GOM, that oceanic whitetips mainly inhabit waters outside of where oil and gas activities would occur.

Smalltooth Sawfish

NMFS listed the U.S. DPS of the smalltooth sawfish as endangered under the ESA on April 1, 2003, effective May 1, 2003 (68 FR 15674). The non-U.S. DPS was subsequently listed as endangered as well (80 FR 3914). The only critical habitat designated (74 FR 45353) in the U.S. is located along the southwestern Florida shoreline (Charlotte Harbor to Estero Bay) and extreme southern Florida (Marco Island south to Florida Bay). The primary identified threats to the existence of the U.S. DPS were: present or threatened destruction/modification of habitat or range; overutilization for commercial, recreational, scientific, or educational purposes; and inadequacy of existing regulatory mechanisms (66 FR 19414). The species was generally not targeted by commercial fisheries but was historically caught as bycatch in commercial fishing gear (66 FR 19414). Smalltooth sawfish bycatch was commercially landed primarily in Louisiana, with total GOM landings dropping continually from 5 metric tons in 1950 to <0.2 metric tons in 1978 (66 FR 19414). While apparently somewhat common in the northern GOM earlier, numbers of reported observations in the northern and western GOM dwindled from 1970 to 2015, and recent studies document encounters only a handful of records: only three records from Alabama, one in Mississippi, seven from Louisiana, and fifteen from Texas (G. Burgess, unpublished data in Wiley, 2018). Two of the Alabama encounters, the Mississippi record, five of the Louisiana observations, and five of the Texas reports occurred after 2003. Currently, the smalltooth sawfish is thought to occur only off the coast of Florida (NMFS, 2020b; Wiley and Simpfendorfer, 2010). Sawfish generally inhabit the shallow coastal waters of warm seas often very close to shore in muddy and sandy bottoms in sheltered bays, on shallow banks, and in estuaries or river mouths. They are strongly associated with seagrasses, mangroves, and river mouths. Wiley and Simpfendorfer (2010) reported that the vast majority (88.5 percent) of observed sawfish were in water depths of less than 16.4 feet, but there was a significant relationship between depth and fish length; and they and others (e.g. Poulakis and Seitz, 2004; Wiley and Simpfendorfer, 2010) have reported large (>10 feet) sawfish in waters as deep as 239.5 feet. Because the species has been extirpated from most of the GOM, and there have been few recent sightings in the northern GOM; we consider the occurrence of the species in the Project area to be very unlikely.

Gulf Sturgeon

The anadromous Gulf sturgeon (*Acipenser oxrhynchus desiotoi*) is a subspecies of the Atlantic sturgeon (*A. oxyrhynchus*). It was once common in river systems from the Mississippi River east to Tampa Bay, but due to overfishing and anthropomorphic river modifications, has become rare and restricted to rivers from the Pearl River in the west to the Suwannee River in the east. Because the Gulf sturgeon is anadromous, it is co-managed by USFWS and NMFS who listed it under the ESA as a threatened species in 1991 (56 FR 49653). Critical habitat consisting of riverine habitats in a number of rivers and estuarine and nearshore waters from Lake Pontchartrain east to Cedar Key, Florida was designated for the Gulf sturgeon in 2003 (68 FR 13370). In the GOM, mud and sand bottoms and seagrass communities are probably important marine habitats for Gulf sturgeon (GSR/MTT, 1995) where most recorded occurrences are in bays, estuaries, or nearshore waters less than 20 feet deep (68 FR 13373). Although the Gulf sturgeon has been reported as far west as the Mermentau River in Cameron Parish, (GSR/MTT, 1995), the Project area is far enough removed from the fish's current range that it would be very unlikely to occur in the Project area.

Dwarf Seahorse

NMFS received a petition (Center for Biological Diversity, 2011) to list the dwarf seahorse under the ESA in 2011 and announced a 90-day finding on the petition in May 2012 (77 FR 26478). NMFS found substantial scientific or commercial information indicating that the petitioned action may be warranted and indicated that they would conduct a status review of the species to determine if the petitioned action is warranted. To date, there is no publicly available status review and the status of the species remains as candidate throughout its range.

The range of the dwarf seahorse includes the Atlantic coast of Florida and all coastal areas of the GOM, including the coastlines of Mexico and the Caribbean. Its distribution is considered patchy everywhere with generally low abundance. Within the GOM, the species is most abundant in south Florida and the Keys, being widespread but uncommon west of Florida (McMichael et al., 2005). Beck et al. (2000) reviewed collection records for the dwarf seahorse in the GOM and identified 12 records in Texas (Upper and Lower Laguna Madre, Corpus Christie Bay, and Aransas Bay) and 2 records in Louisiana (Timbalier Bay and Chandeleur Sound). Presence of the dwarf seahorse is almost always correlated with moderate to high densities of seagrasses and high salinity (McMichael et al., 2005). Based on the few reported occurrences, low abundance, and lack of seagrasses, it is very unlikely that the dwarf seahorse would occur in the Project area during construction or operations.

6.2.4.2 Species of Concern

NMFS uses the term species of concern to identify species about which they have some concerns regarding status and threats, but for which insufficient information is available to indicate a need to list the species under the ESA. This may include species for which NMFS has determined, following a biological status review, that listing under the ESA is not warranted, pursuant to ESA section 4(b)(3)(B)(i), but for which significant concerns or uncertainties remain regarding their status and threats (73 FR 19978). Fish species of concern in the GOM are listed in **Table 6-10**.

TABLE 6-10
NMFS Fish Species of Concern in the Gulf of Mexico

Species[a]	U.S. Range	Gulf of Mexico	Potential Occurrence
Dusky shark (*Carcharhinus obscurus*)	GOM and Atlantic	Offshore waters 490-3,940 ft[b]	Unlikely

TABLE 6-10
NMFS Fish Species of Concern in the Gulf of Mexico

Species[a]	U.S. Range	Gulf of Mexico	Potential Occurrence
Sand tiger shark (*Odontaspis taurus*)	GOM and Atlantic	Continental shelf waters[c]	May
Warsaw grouper (*Epinephelus nigritus*)	GOM and Atlantic	Reefs in water depths 180-1,700 ft[d]	Unlikely
Speckled hind (*Epinephelus drummondhayi*)	GOM and Atlantic	Hard bottom water depths 80-1,300 ft[e]	May
Alabama shad (*Alosa alabamae*)	GOM	Anadromous, Mississippi R.–Suwanee R[f]	Unlikely
Key silverside (*Menidia conchorum*)	GOM and Atlantic	Saline lagoons, Florida Keys[g]	Unlikely
Opossum pipefish (*Microphis lineatus*)	GOM and Atlantic	Estuarine Florida, Mississippi[h]	Unlikely
Mangrove rivulus (*Rivulus marmoratus*)	GOM and Atlantic	Mangroves southern Florida[i]	Unlikely
Ivory tree coral (*Oculina varicosa*)	GOM and Atlantic	Topographic pinnacles in NE GOM[j]	Unlikely

Notes:
[a] Species list from http://www.nmfs.noaa.gov/pr/species/concern
[b] From Hoffmayer et al. (2014)
[c] From NMFS (2010a)
[d] From NMFS (2009a)
[e] From NMFS (2009b)
[f] From 82 FR 4022
[g] From FFWCC (2011a)
[h] From NMFS (2009d)
[i] From FFWCC (2011b)
[j] From Barnette (2006)

The dusky shark and the sand tiger shark are managed in federal waters under the FMP (NMFS, 2006) for highly migratory species. Both species were previously commercially harvested in the GOM and Atlantic, but commercial harvest is presently prohibited under the FMP. In response to a listing petition, NMFS conducted a status review of the dusky shark (McCandless et al., 2014) and determined that dusky sharks of the northwest Atlantic and GOM constitute a DPS but concluded it does not warrant listing at this time (79 FR 74684). The DPS is found throughout the GOM, but adult sharks are generally found in continental shelf and slope waters with depths of 492 to 3,937feet (Hoffmayer et al., 2014). EFH has been established in most of the GOM (NOAA Fisheries, 2017) seaward of the shelf break (656-foot isobath). The range of the sand tiger shark includes all continental shelf waters of the GOM (NMFS, 2010a) and may therefore occur in the Project area. There is no EFH for the sand tiger shark in the GOM (Carlson et al., 2009; NOAA Fisheries, 2017).

The warsaw grouper and the speckled hind are managed in federal waters under the reef fish FMP (GMFMC, 1981a). The warsaw grouper inhabits reefs on the continental shelf break in water depths of 180 to 1,700 feet (NMFS, 2009a), and would therefore not be expected to occur in the offshore Project area.

Populations of the large grouper have been reduced through by-catch and directed fishing (NMFS, 2009a). NMFS was petitioned to list the warsaw grouper under the ESA but upon review concluded such listing was not warranted (75 FR 59690). The warsaw grouper is commercially harvested offshore of Louisiana (NMFS, 2020). The speckled hind is a small grouper that inhabits reefs and hard bottoms on the continental shelf and slope in water depths of 80 to 1,300 feet but are most common in water depths of 200 to 400 feet (NMFS, 2009b). They would therefore not be expected to occur in the offshore Project area; however juvenile fish do inhabit shallower waters (NMFS, 2009b). Populations of the speckled hind have been reduced through by-catch and directed fishing (NMFS, 2009b). NMFS was petitioned to list the speckled hind under the ESA but upon review concluded such listing was not warranted (84 FR 25687) and that the GOM population was stable. The International Union for the Conservation of Nature (IUCN) lists the global status of both species as critically endangered.

The Alabama shad is an anadromous fish, repeatedly spawning in rivers flowing into the GOM from the Mississippi River east to the Suwanee River in Florida. Alabama shad are found in the GOM, but little is known of the whereabouts; NMFS reported that there are only six records of Alabama shad collected in marine waters of the GOM (82 FR 4022). Because of the distance of the Project area from known spawning rivers, the species is not further discussed.

The current range of the key silverside is endemic to the lower and middle Florida Keys where it occurs in protected saline lagoons and ponds with limited tidal exchange (FFWCC, 2011a). The mangrove rivulus is a small fish found in coastal mangroves, and in the GOM is limited to coastal south Florida (NMFS 2009c; FFWCC, 2011b). Because the Project area is far from their species ranges, these species are not discussed further.

The ivory tree coral or bush coral is a large branching scleractinian coral that has been found in shallow water and waters to depths of over 328 feet with its range extending from the West Indies northward to North Carolina and Bermuda (NMFS, 2010b). In the GOM, its occurrence has primarily been noticed on bottom structural features in the northeastern GOM (Barnette, 2006).

The opossum pipefish is an anadromous fish. It has only rarely been collected from freshwater tributaries in extreme southern Florida, western Florida, and the northern GOM (Gilmore and Hastings, 1983). Some individuals have been collected in the salt marshes of Mississippi, but these populations did not overwinter and were considered extralimital (Gilmore and Hastings, 1983). There are no records of occurrence from the northwestern GOM; as of 1977, there were only 87 specimens have been recorded from the U.S. and most of these were in or around Indian River Lagoon on Florida's east coast (Center for Coastal Studies, 2019).

6.2.4.3 Essential Fish Habitat

EFH established under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. The presence of EFH in the GOM and within the Project area is described in detail in the EFH Assessment provided in **Appendix D** (Volume IIa). Findings of the EFH Assessment are briefly discussed below.

EFH has been established for eight managed fisheries (GMFMC, 2004; NOAA Fisheries, 2017) in the GOM (See **Table 6-11**). One of them, the spiny lobster, only exists in Florida coastal waters south of Tampa and in the Florida Keys and is not discussed further. The stone crab FMP (GMFMC, 1979, 2005, 2005) was repealed in 2011 so the EFH is no longer defined (NMFS, 2012; NOAA Fisheries 2020i). Another, for coral, occurs in the northcentral GOM but only offshore of the Project area, and one, for red drum, occurs only in estuarine portions of the Project area and is discussed in Topic Report 5 (Volume IIb). EFH for three fisheries (shrimp, reef fish, and coastal pelagics) encompass much of the continental shelf in the northcentral GOM including all of the offshore Project area. The highly migratory species fishery includes a large number of species, including many species of tuna, billfish, and sharks, with EFH for most species being off the shelf and outside the Project area, but EFH for a number of shark species encompasses portions of the shelf and the Project area.

TABLE 6-11
Essential Fish Habitat for Managed Species in the Gulf of Mexico

Fishery	Northcentral GOM[a]	In Offshore Project Area[a,b]
Coral	Yes	No
Shrimp	Yes	Yes
Spiny lobster	No	No
Red drum	Yes	No[c]
Coastal pelagics	Yes	Yes[d]
Reef fish	Yes	Yes
Highly migratory species	Yes	Yes

Notes:
[a] EFH as depicted by NOAA EFH mapper at: https://www.habitat.noaa.gov/application/efhmapper/index.html
[b] No indicates it occurs in the region but outside the Project area – generally only found in estuarine areas or on the continental slope or beyond.
[c] Onshore portions of the Project traverse red drum EFH.
[d] Group includes numerous species; Project area is within EFH for some species and outside of EFH for other species.

Coral EFH

EFH for corals includes the total distribution of coral species and life stages throughout the GOM including: coral reefs in the North and South Tortugas Ecological Reserves, East and West Flower Garden Banks, McGrail Bank, and the southern portion of Pulley Ridge; hard bottom areas scattered along the pinnacles and banks from Texas to Mississippi at the shelf edge and at the Florida Middle Grounds; the southwest tip of the Florida reef tract; and predominant patchy hard bottom offshore of Florida from approximately Crystal River south to the Florida Keys.

In the northcentral GOM, coral Habitat Areas of Particular Concern (HAPC) consist of isolated topographic features of high relief located along the shelf break (NOAA Fisheries, 2020). Outer Continental Shelf (OCS) oil and gas leasing blocks encompassing many of these topographic features are provided protective measures (no seafloor disturbance) by a BOEM lease stipulation (NTL 2009-G39). Additional details on HAPC are provided below. All coral EFH is located more than 30 miles from the Project area (see **Table 6-12**).

Shrimp EFH

Shrimp EFH includes all estuaries in the GOM from the U.S. and Mexico border to Fort Walton Beach, Florida, and from those estuarine waters out to depths of 100 fathoms (600 feet) in the northcentral GOM (GMFMC, 2016). Therefore, the entire Project area is located within shrimp EFH. Commercially important species in the shrimp fishery include white shrimp (*Penaeus setiferus*), brown shrimp (*Penaeus aztecus*), pink shrimp (*Penaeus duorarum*), and royal red shrimp (*Pleoticus robustus*). The offshore Project area is located within areas identified as benthic habitat use areas for post larval and juveniles of brown shrimp and post larval and juveniles, subadults, and adults of white shrimp (GFMFC, 2016).

TABLE 6-12
Named Banks within 50 Miles of the Project

Bank[a]	Coral EFH[b]	HAPC[c]	BOEM Topographic Feature[d]	Distance to Project[e]	Water Depth (feet)[f]	
					Surrounding	Crest
East Flower Garden	Yes	Yes	Yes	47.1	328-394	49
28 Fathom Bank	Yes	Yes	Yes	45.8	328-394	170
Rankin Bank	Yes	Yes	Yes	42.3	361-459	171
29 Fathom Bank	Yes	Yes	Yes	34.7	361-459	171
MacNeil Bank	Yes	Yes	Yes	39.6	282-308	203
Bright Bank	Yes	Yes	Yes	39.7	361	121
Geyer Bank	Yes	Yes	Yes	39.6	623-689	121
Elvers Bank	Yes	No	Yes	41.4	591	197
McGrail Bank	Yes	Yes	Yes	35.7	361-427	148
Bouma Bank	Yes	Yes	Yes	40.9	295-328	197
Sonnier Bank	Yes	Yes	Yes	33.5	164	56
Rezak Sidner Banks	Yes	Yes	Yes	48.1	394-492	180-197

Notes:
[a] Two other unnamed banks within 50 miles of the Project area are coral EFH but not HAPC or BOEM topographic feature stipulation areas; both are 45-50 miles from the Project area.
[b] Coral EFH per https://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper
[c] HAPC per https://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper
[d] BOEM Topographic Feature per BOEM Notice to Lessee (NTL) 2009-G-39.
[e] Distances are from WC 509 Platform Complex to limits of coral EFH
[f] Water depths from Table 4-4 of BOEM (2012).

Stone Crab EFH

Stone crab EFH (GMFMC, 2005) was previously established in the GOM to include all estuaries from the U.S. and Mexico border to Sanibel, Florida, from estuarine waters out to depths of 10 fathoms (60 feet) and additional waters off the coast of Florida. In 2011, the FMP was repealed and EFH for stone crab is longer defined (NMFS, 2012; NOAA Fisheries 2020i).

Red Drum EFH

Coastal Pelagics EFH

for coastal migratory pelagic species includes all estuaries from the U.S. and Mexico border to south Florida and from these estuarine waters out to depths of 100 fathoms (600 feet). Coastal pelagic species include king mackerel, Spanish mackerel, and cobia. These are important recreational and commercial fisheries in the GOM, although there have been recent moratoriums on commercial harvests of king mackerel in the western GOM. The EFH designated for the coastal migratory fishery encompasses the entire offshore Project area.

Reef Fish EFH

Reef fish EFH (GMFMC, 2005) includes all estuaries in the GOM and adjacent coastal waters out to depths of 100 fathoms (600 feet). The reef fish fishery includes numerous species of snappers, groupers, tilefish, and jacks, with commercially important species in the northcentral GOM including red snapper, gray snapper, vermilion snapper, yellowedge grouper (*Hyporthodus flavolimbatus*), and tilefish (*Lopholatilus chamaeleonticeps*). The entire offshore Project area is located within portions of the GOM designated as EFH for reef fish (NOAA, 2020a).

Highly Migratory Species EFH

The highly migratory species fishery includes over 40 species of tunas, billfish, and sharks (NOAA Fisheries 2017). Portions of the offshore Project area are located within EFH for the skipjack tuna (*Katsuwonus pelamis*), bull shark (*Carcharhinus leucas*), scalloped hammerhead shark (*Sphyrna lewini*), spinner shark (*Carcharhinus brevipinna*), blacknose shark (*Carcharhinus acronotus*), bonnethead shark (*Sphyrna tiburo*), and Atlantic sharpnose shark (*Rhizoprionodon terraenovae*) (NOAA Fisheries, 2017; NOAA Fisheries, 2020a).

Habitat Areas of Particular Concern

HAPCs are defined as subsets of EFH that exhibit one or more of the following traits: rare, stressed by development, provide important ecological functions for federally managed species, or are especially vulnerable to anthropogenic (or human impact) degradation. They can cover a specific location (a bank or ledge, spawning location) or cover habitat that is found at many locations (e.g., coral, nearshore nursery areas, or pupping grounds).

Currently, two types of HAPCs have been established in the GOM: HAPC for the bluefin tuna that encompasses the same area as EFH for the bluefin tuna and a number of topographical features located along the shelf break. The bluefin tuna HAPC encompasses all GOM waters in the EEZ beyond the 100-meter (338-feet) bathymetric contour and as such is seaward and outside of all portions of the Project area.

The topographical feature HAPC are discussed above regarding coral EFH and those within 50 miles of the Project area are identified in **Table 6-12**. None of these topographical features are within 30 miles of the Project area.

6.2.4.4 Ichthyoplankton

Ichthyoplankton are an important part of the zooplankton community as they are a food source for each other and other organisms. The distribution of ichthyoplankton is related to where adult fish spawn as well as to ocean currents and sea-surface temperatures (Rowe, 2017). NMFS' Southeast Area Monitoring and Assessment Program (SEAMAP) has been collecting ichthyoplankton data across the GOM since 1982. Analysis of 230 samples collected with bongo nets within 30 miles of the DWP reveals a mean abundance of 3,719 eggs/million gallons and 9,741 ichthyoplankton/million gallon. Densities of the most common species in the samples are provided in **Table 6-13**. Species shown are those where 50 or more larvae are found on average per million gallons of seawater sampled.

TABLE 6-13
Most Common Ichthyoplankton Found Within 30 Miles of the DWP

SEAMAP ID	Common Name	Mean Number of Larvae per Million Gallons
Gobiidae	Goby	1,820
Bregmaceros	Codlet	1,790
Synodontidae	Lizardfish	894

TABLE 6-13
Most Common Ichthyoplankton Found Within 30 Miles of the DWP

SEAMAP ID	Common Name	Mean Number of Larvae per Million Gallons
Engraulidae	Anchovies and Sardines	707
Micropogonias undulatus	Atlantic croaker	486
Symphurus	Tonguefish	417
Unidentified	N/A	345
Syacium	Large-toothed flounder	216
Ophididae	Brotulids and Cusk-eel	179
Diaphus	Lanternfish	173
Syacium papillosum	Dusky flounder	126
Chloroscombrus chrysurus	Atlantic bumper	114
Bothidae	Left-eye flounder	113
Lutjanidae	Snapper	111
Opisthonema oglinum	Atlantic thread herring	91
Opistognathidae	Jawfish	80
Serranidae	Groupers/sea basses	75
Euthynnus alletteratus	Little tunny	69
Etrumeus teres	Round herring	58
Citharichthys	Flatfish	55
Myctophidae	Lanternfish	53

6.2.5 Invertebrates

Benthic Infauna

Composition of the benthic communities in the GOM is influenced by the nature of the seafloor and its sediments, as well as salinity, water depth, and distance from shore. The seafloor of the northwestern GOM is composed of mud and sand, perhaps 50 percent of the seafloor sediments of the continental shelf are muddy, and more than 40 percent are sandy with some gravel (Briones undated). Holland et al. (1980) reported the soft bottom communities in the general area of the Project are dominated by polychaetes (40 percent), crustaceans (34 percent), and molluscs (19 percent).

Hard-bottom communities are scattered across the GOM but are far less common than soft-bottom environments. These hard-bottom communities consist of shallow and deepwater corals, pinnacles, topographic feathers, artificial reefs, and chemosynthetic communities. Generally, polychaete worms, crustaceans, and mollusks dominate benthic communities on the OCS, with sporadic concentrations of sponges and soft and hard corals (BOEM, 2016a).

The Applicant conducted a geophysical and hazard survey of the proposed DWP area in May of 2020. The survey results are included in Appendix D of Volume III (*Confidential*). The area of the DWP consists of soft bottom sediments. The upper sediment layer consists of generally well layered, parallel bedded sediments which are interpreted as predominantly clays and silts. This stratigraphy is interrupted periodically by cut and fill channel complexes with margin depths just beneath the seafloor. The seafloor itself has sporadic drag and trawl scars and numerous pockmarks. There is no hard bottom within the Project area or within the survey footprint.

Commercially Important Invertebrates

The GOM commercial fisheries are some of the most productive in the world. The NMFS GOM Region (offshore West Florida Alabama, Louisiana, Mississippi, and Texas) produces 16 percent of all U.S. commercial landings in both size (pounds) and value (NOAA Fisheries, 2018). Shrimp was the most valuable fishery in 2018 in both Louisiana and Texas landings; oyster was the fourth most valuable fishery in Louisiana and second in Texas; blue crab was the fifth most valuable fishery in Louisiana and fourth most valuable fishery in Texas. Shrimp and blue crabs are found throughout the GOM including the Project area. Oysters are only found in coastal and estuarine waters and are generally not found in the offshore portion of the Project area.

6.3 ENVIRONMENTAL CONSEQUENCES

This section includes a discussion of the potential impacts that could result from the construction and operation of the offshore components of the Project. The study area within which potential impacts were assessed includes the area that would be affected physically by Project activities during construction and operation. As described in **Table 1-19** in Section 1.9.2 (Evaluation Criteria) of Topic Report 1, “Project Description, Purpose, and Need” (Volume IIa), the Project’s potential effects on offshore wildlife and protected species have been evaluated based on their potential to:

- Violate a legal standard for protection of a species;
- Degrade the commercial, recreational, ecological, or scientific viability or significance of a biological resource;
- Measurably change the population size (density) or change the distribution of an important species in the region;
- Introduce new, invasive, or disruptive species in the proposed Project area; and/or
- Reduce quality and/or quantity of EFH as defined by the Magnuson-Stevens Fishery Conservation and Management Act, causing adverse effects, such as direct or indirect physical, chemical, or biological alteration of the waters or substrate, and loss of or injury to planktonic organisms and their habitat, and other ecosystem components.

Activities associated with the construction, operation, and decommissioning of the DWP and associated pipeline that could have environmental consequences on wildlife and protected species are included in **Table 6-14**. The following sections provide further information and discussion of potential environmental consequences. Additional detail on potential effects on EFH are provided in **Appendix D** (Volume IIa) and additional detail on potential effects on marine mammals is found in **Appendix E** (Volume IIa).

TABLE 6-14
Potential Impacts on Wildlife and Protected Species

Activity	Details	Duration of Impact	Mitigation Measures	Anticipated Level of Impact
Construction				
Mainline Conversion	• The amount of seafloor disturbance is significantly reduced due to the Project’s	Short-term	All discharges will meet NPDES permit requirements. If necessary based on	Negligible to minor and localized

TABLE 6-14
Potential Impacts on Wildlife and Protected Species

Activity	Details	Duration of Impact	Mitigation Measures	Anticipated Level of Impact
	ability to convert the existing Mainline. • Hydrostatic test water discharge.		regulatory requirements, the GOM seawater will be discharged through a neutralization and filtration spread adjacent to the WC 509 Platform Complex platform and discharged overboard or retained in frac tanks and disposed of onshore	
Crude Oil Loading Pipeline Construction	• Seafloor disturbance during pipeline burial. • Turbidity and sedimentation during pipeline burial and lay barge anchoring. • Hydrostatic test water discharge.	Short-term	Compliance with USACE Permit, EPA Permit, and BOEM ROW grant conditions	Negligible to minor and localized
Platform Conversion	• Pollution due to potential spills of fuels or other hazardous materials. • Noise created during construction.	Short-term	Compliance with BOEM/BSEE Permit conditions; Adherence to SPCC Plan	Negligible to minor and localized
CALM Buoy / PLEM Installation	• Seafloor disturbance during PLEM and CALM installation. • Turbidity and sedimentation during PLEM and anchor installation. • Underwater noise from pile driving.	Short-term	Compliance with USACE and BSEE Permit conditions	Negligible to minor and localized
Construction Vessel Operations	• Localized changes in water temperature, salinity, and dissolved oxygen due to vessel discharges. • Potential spills of fuels or other hazardous materials. • Engine noise. • Potential vessel strikes.	Short-term	Compliance with federal regulations for vessel operations; Adherence to SPCC Plan	Negligible to minor and localized
Operations				

TABLE 6-14
Potential Impacts on Wildlife and Protected Species

Activity	Details	Duration of Impact	Mitigation Measures	Anticipated Level of Impact
Crude Oil Transfer	• Potential oil spill from the offloading buoy or pipeline.	Lifetime of Project	Compliance with USCG regulations and Energy Transfer's Sea Robin Oil Spill Response Plan (O-726), modified to include BMOP	Negligible and localized
Platform Operations	• Potential spills of fuels or other hazardous materials. • Localized changes in water temperature, salinity, and dissolved oxygen due to platform discharges. • Ichthyoplankton entrainment in seawater intakes. • Sediment scour around the platform.	Lifetime of Project	Compliance with BOEM ROW Grant, and MARAD License conditions, Adherence to Energy Transfer's Sea Robin Oil Spill Response Plan (O-726), modified to include BMOP	Negligible and localized
Crude Oil Carrier Operations	• Localized changes in water temperature due to cycling of cooling water. • Ichthyoplankton entrainment in cooling water. • Potential spills of fuels, hazardous materials. • Underwater noise associated with mooring.	Lifetime of Project	Compliance with federal regulations for vessel operations	Negligible to minor and localized
Support Vessel Operations	• Localized changes in water temperature due to cycling of cooling water. • Localized changes in water temperature, salinity, and dissolved oxygen due to ballast water exchange. • Potential spills of fuels or other hazardous materials. • Engine noise.	Lifetime of Project	Compliance with federal regulations for vessel operations	Negligible to minor and localized

TABLE 6-14
Potential Impacts on Wildlife and Protected Species

Activity	Details	Duration of Impact	Mitigation Measures	Anticipated Level of Impact
	• Potential for marine mammal and sea turtle strikes or disturbance.			
Upsets and Accidents				
Pipeline and Platform Operations	• Pollution due to potential oil spill.	Lifetime of Project	Continuous monitoring of pipeline operations, SCADA, early detection of abnormal operations, and remote shutdown; Adherence to Energy Transfer's Sea Robin Oil Spill Response Plan (O-726), modified to include BMOP, BOEM ROW Grant, and MARAD License conditions	Minor to major and localized, depending on the volume of oil released and the exposure of the release to sensitive marine resources
Vessel Operations	• Pollution due to potential oil spill.	Lifetime of Project	Compliance with Energy Transfer's Sea Robin Oil Spill Response Plan (O-726), modified to include BMOP, and USCG regulations	Minor to major and localized, depending on the volume of oil released and the exposure of the release to sensitive marine resources
Decommissioning				
Platform and CALM Buoy Removal	• Seafloor disturbance during removal. • Turbidity and sedimentation during removal. • Potential vessel related impacts, similar to facility construction. • Pollution due to potential spills of fuels or other hazardous materials. • Noise created during removal. • Habitat loss / conversion with platform removal.	Short-term	Compliance with USACE Permit, BOEM ROW grant conditions, and MARAD license	Negligible to minor and localized
Facility Abandonment in Place	• Seafloor disturbance during abandonment preparations.	Short-term	Compliance with USACE and BOEM/BSEE Permit	Negligible to minor and localized

TABLE 6-14
Potential Impacts on Wildlife and Protected Species

Activity	Details	Duration of Impact	Mitigation Measures	Anticipated Level of Impact
	• Turbidity and sedimentation during abandonment preparations. • Localized changes in water quality due to pipeline purging.		conditions; Adherence to SPCC Plan	
Support Vessel Operations	• Localized changes in water temperature due to cycling of cooling water. • Localized changes in water temperature, salinity, and dissolved oxygen due to vessel discharges. • Potential spills of fuels or other hazardous materials. • Engine noise. • Potential strike or disturbance of marine mammals and sea turtles.	Short-term	Compliance with USCG regulations for vessel operations	Negligible to minor and localized

6.3.1 Construction and Installation

Construction activities will include pile driving, jet sledding, hydrostatic testing, anchoring, and increased vessel traffic. Construction methods are described in Topic Report 1 (Volume IIa). Potential impacts on wildlife and protected species from these activities are discussed below.

The amount of construction disturbance required, and potential impacts to the marine environment, have been significantly reduced with the planned conversion of the existing Mainline, WC 509 Platform Complex, and WC 148 Platform. Potential impacts due to construction of the Project would range from negligible to moderate, depending on the nature of the activity and the biological resource at risk. None of the potential environmental consequences from Project construction are expected to have irreversible or significant impacts to any wildlife populations or habitat.

6.3.1.1 Noise

Project construction activities that will generate underwater sound include pile driving, pipelay, and vessel traffic. Pile driving will generate the most sound energy of any of these activities and has the greatest potential to affect biological resources. Although the design has not been completed for the CALM Buoys or PLEMs, the Applicant has assumed a conservative number of pilings necessary to secure each facility. A total of four 24-inch steel piles (2 for each PLEM) and sixteen 36-inch steel piles (8 per CALM Buoy) could be driven into the seafloor using an impact hammer under this conservative scenario. The 24-inch piles will be driven approximately 40 feet below the seabed taking a total of 1,000 strikes per pile over a 2-

hour period for each pile, and a total of two workdays for all four piles. The 36-inch piles will be driven approximately 150 feet into the seabed, requiring approximately 3,750 strikes over a 6-hour period for each pile, with all piles completed within 16 workdays. Levels of sound expected to be generated by pile-driving were selected from published values for similar pile sizes and are indicated in **Table 6-15**.

TABLE 6-15
Source Levels Used for Analysis of Project Pile Driving

Pile Type	Distance Source to Measurement[a] (feet)	Peak[a] (dB re 1 µPa)	RMS[a] (dB re 1 µPa)	SEL[a] (dB re 1 µPa)
24-inch steel pipe[b]	33	207	194	178
36-inch steel pipe[b]	33	210	193	183

Notes:
[a] Data from Rodkin and Pommerenck, 2014; Buehler et al., 2015.
[b] Data from measurement while driving a 30-inch steel pipe with a D52 diesel impact hammer in water depths of 33 feet in the Siuslaw River, Oregon (Buehler et al 2015).

Levels of continuous sound likely to be generated by vessel traffic and pipelay were similarly estimated from measurements reported in the literature and are provided in **Table 6-16**. Regarding pipelay (jetting and/or trenching), most of the underwater sound generated will be from the vessels that position the laybarge / jet barge anchors; however, winching of the anchor cables also produces considerable sound energy.

TABLE 6-16
Source Levels used for Analysis of Project Pipelay / Lowering and Vessel Traffic

Vessel Type	Activity	Project Vessels	Source Level (dB rms)	Proxy Source Level (vessel type and reference)
Small vessel	Transit	Crew boat, survey vessel, lift boat	160	Serac, 34-foot diesel jet engines, at 16-20 knots, Naval Surface Warfare Center 2003.
Large vessel	Transit	Platform supply vessel, heavy lift vessel	175.1	M/V Harvey Supporter, 300 ft PSV, transiting at 8.7 knots, Austin et al., 2016
Tug	Anchor handling	Anchor handling tug, cargo tug, diver support vessel	177.2	M/V Aiviq, 360 ft anchor handler, laying anchors, Austin et al., 2016
Tug	Pushing barge	Cargo tug	163.8	M/V Leo pushing gravel barge, Blackwell and Greene, 2003
Pipelay / jetting	Winching	Laybarge	166.6	Monohull laybarge winching, Hannay et al. 2004

Assessment of potential effects on biological resources of the GOM are provided below based on the above source levels and published threshold sound levels for each resource.

Marine Mammals

Marine mammals, especially cetaceans (whales and dolphins), are sensitive to sound. They generate and use sound for such things as communication (calls) and echolocation (navigation and hunting) (Southall et al., 2007). Anthropogenic underwater sound or noise can potentially interfere with these marine mammal activities. Masking of the marine mammal sounds could occur if the sound levels of the anthropogenic are sufficiently great enough and the frequencies are similar enough to those of the sounds emitted by the marine mammals themselves (Erbe, 2012). At certain frequencies and sound levels, underwater noise is also thought to at least have the capacity to result in harassment of marine mammals resulting in avoidance of areas by the marine mammals (Richardson et al., 1995) or a temporary threshold shift (TTS) in their hearing (Weilgart, 2007). If of sufficient amplitude and/or duration, sound could potentially injure a marine mammal, primarily by causing a permanent threshold shift (PTS) in its hearing (Southall et al., 2007). Potential indirect effects of underwater sound on marine mammals includes such things as a decrease in prey (e.g. fish) availability.

NMFS (2016; 2018) has provided guidance on the minimum sound energy levels (thresholds) that they believe could result in injury (Level A) or disturbance (Level B) harassment of exposed marine mammals (See **Table 6-17)**. There are separate thresholds for impulsive sounds (pile driving) that are transient and characterized by a rapid rise and decline in amplitude, and continuous sound (vessels, pipelay). Thresholds have not been established for the West Indian manatee, but they would not be expected to occur in the offshore environment where these activities would take place. As shown in **Table 6-17**, NMFS has grouped cetaceans into three groups (low-frequency, mid-frequency, and high-frequency cetaceans) based on their hearing sensitivities. The only two cetaceans commonly found in GOM shelf waters (common bottlenose and Atlantic spotted dolphins) are mid-frequency cetaceans. All baleen whales are low-frequency cetaceans, and all other GOM odontocetes are mid-frequency cetaceans with the exception of dwarf and pygmy sperm whales, which are high-frequency cetaceans.

TABLE 6-17
NMFS Received Sound Exposure Thresholds for Cetaceans

Marine Mammal Functional Hearing Group	Injury (Level A) Threshold[a]		Disturbance (Level B) Threshold[b]	
	Impulsive Sound	Non-Impulsive Sound	Impulsive Sound	Non-Impulsive Sound
Low-Frequency Cetaceans	219 dB L_{pk} 183 dB SEL	199 dB SEL	160 dB rms	120 dB rms
Mid-Frequency Cetaceans	230 dB L_{pk} 185 dB SEL	198 dB SEL	160 dB rms	120 dB rms
High-Frequency Cetaceans	202 dB L_{pk} 155 dB SEL	173 dB SEL	160 dB rms	120 dB rms

Notes:
[a] NMFS (2018b) Level A thresholds indicating the onset of PTS; Lpk = peak received level; SEL = 24-hour cumulative sound exposure level.
[b] NMFS (2018b) Level B thresholds indicating the onset of TTS; rms = root mean squares sound pressure level.

The extent of ensonification in the water column resulting from pile driving and potential effects on marine mammals were analyzed using NMFS (2018b) guidelines. Calculated radial distances to NMFS threshold isopleths are provided for impulsive sounds in **Table 6-18** and for continuous sounds in **Table 6-19**.

TABLE 6-18
Distances to NMFS Underwater Sound Threshold Isopleths for Pile Driving

Pile	Distance to Threshold[a] (feet)								
	Low Frequency Cetaceans			Mid-Frequency Cetaceans			High Frequency Cetaceans		
	Level A 219 pk	Level A 183 SEL	Level B 160 rms	Level A 230 pk	Level A 185 SEL	Level B 160 rms	Level A 202 pk	Level A 155 SEL	Level B 160 rms
24-inch	8	2,071	3,280	N/A	74	3,280	112	2,466	3,280
36-inch	8	3,148	3,280	N/A	112	3,280	112	3,750	3,280

Notes:
[a] Thresholds from NMFS (2018b) and **Table 6-17**, source levels in **Table 6-16**, distances calculated with NMFS (2018b) User Spread Tool, using a 15LogR propagation rate.

TABLE 6-19
Distances to NMFS Underwater Sound Thresholds - Vessels and Pipelay

Vessel Type	Distance to Threshold[a] (feet)							
	Low Frequency Cetaceans		Mid-Frequency Cetaceans		High-Frequency Cetaceans		Phocid Pinnipeds	
	Level A 199 SEL	Level B 120 rms	Level A 198 SEL	Level B 120 rms	Level A 198 SEL	Level B 120 rms	Level A 198 SEL	Level B 120 rms
Small vessel transit	0.0	1,523	0.0	1,523	0.0	1,523	0.0	1,523
Large vessel transit	0.1	15,464	0.0	15,464	0.0	15,464	0.0	15,464
Tug pushing	0.0	2,729	0.0	2,729	0.0	2,729	0.0	2,729
Anchor handling	0.0	21,346	0.0	21,346	0.0	21,346	0.0	21,346
Winching	0.0	4,194	0.0	4,194	0.0	4,194	0.0	4,194

Notes:
[a] Thresholds from NMFS (2018b) and **Table 6-17**, source levels in **Table 6-16**, distance calculated with NMFS (2018b) User Spread Tool, assumes a 15LogR propagation rate.

Neither pipeline installation nor vessel use (See **Table 6-19**) are expected to result in sound levels (NMFS Level A thresholds) thought to be sufficient for PTS injuries. Underwater sound associated with pile driving for installation of the PLEMs and CALM Buoys anchors may exceed these Level A thresholds for a distance of 74 to 112 feet from the pile for common bottlenose and Atlantic spotted dolphins (See **Table 6-18**). Such exposures are, however, unlikely to happen given the small area ensonified, the density of dolphins in the area (Fulling et al., 2003; Mullins et al., 1990), the brief duration of the planned pile driving activities (approximately 18 days), and probable avoidance by the animals (Kastelein et al., 2013; BMU, 2014). Mitigation measures would be implemented to reduce the potential for such occurrences, including:

- Use of protected species observers (PSOs) to monitor the ensonified area for marine mammals;
- Not commencing pile-driving until the Level A ensonified area has been observed to be clear of marine mammals for at least 30 minutes;
- Commencing pile-driving with a soft start with an initial set of three strikes from the hammer at about 40 percent energy is followed by a 30-second waiting period, and then two subsequent three-strike sets before continuing normal operations; and

- Shutting down pile-driving if a marine mammal is observed in or approaching the Level A ensonified area.

Ensonification above the NMFS Level B threshold could extend out 0.6 miles from driven piles and 0.8 to 4.0 miles from pipelay and jetting. As this ensonification would be limited to the continental shelf, the only marine mammals expected to occur in the areas where these activities would occur are the common bottlenose dolphin and the Atlantic spotted dolphin. Reported effects on marine mammals in response to such ensonification are largely behavioral, such as changes in orientation or activity, reactions (e.g., rapid dives), changes in breathing and call rates, and temporary avoidance (BMU, 2014), but also include physiological effects such as increased stress levels and potentially TTS. Pile driving has been shown to result in temporary avoidance by small odontocetes over relatively large areas. Given the location and duration of these construction activities, potential effects on marine mammals would be limited to common bottlenose and Atlantic spotted dolphins, and would be minor and short-term, lasting only as long as the construction activity is occurring.

It is difficult to discern whether observed marine mammal reactions to vessels are responses to underwater sound or visual clues, but very heavy vessel traffic in some areas has been linked to increases in stress levels in marine mammals and changes in activity such as foraging time. The common bottlenose dolphin and the Atlantic spotted dolphin, however, have been found to exhibit little negative reaction (e.g., avoidance) to vessel traffic in the open ocean, most often approaching the transiting vessel and engaging in bow riding behaviors (Würsig et al., 1998). Bottlenose dolphins are known to inhabit very heavily trafficked areas including Galveston Bay and the Galveston Ship Channel with relatively few effects (Acevedo, 1991; Piwetz, 2019), although some temporary behavioral effects such as changes in orientation and swimming speed have been observed (Piwetz, 2019).

While most of the sound generated by pile-driving (Stockham et al., undated; Bailey et al., 2010) and vessel use (OSPAR, 2009) is at frequencies below vocalizations, some masking of dolphin communications could occur (David, 2006). The level of vessel activity due to the Project would represent a very small increment in the on-going vessel traffic in the GOM (BOEM, 2017), however, replacing some of the lightering traffic is a benefit of the DWP offshore, reducing vessel traffic. Given the duration of these construction activities, the potential effects on marine mammals are considered minor and short-term, lasting only as long as the construction activity is occurring.

Sea Turtles

NOAA's Greater Atlantic Regional Fisheries Office (NOAA GARFO) has implemented interim acoustic thresholds (NOAA GARFO, 2019) and these along with their pile driving acoustics tool were used to evaluate potential effects of Project pile driving on sea turtles. Results of the analysis indicate that underwater sound generated by Project pile driving are not anticipated to reach physiological (PTS, TTS) thresholds, but ensonification of the water column to levels above the behavioral threshold value could extend out 328 feet from the pile driving (See **Table 6-20**).

TABLE 6-20
Distances to Sea Turtle Underwater Sound Thresholds for Pile Driving

Pile	Permanent Threshold Shift (PTS)[a] (feet)		Temporary Threshold Shift (TTS)[a] (feet)		Behavioral[a] (feet)
	204 dB re 1 µPa²-s SEL	232 dB re 1 µPA Peak	189 dB re 1 µPa²-s SEL	226 dB re 1 µPA Peak	175 dB re 1 µPA RMS
24-inch	N/A	N/A	N/A	N/A	328
36-inch	N/A	N/A	N/A	N/A	328

TABLE 6-20 **Distances to Sea Turtle Underwater Sound Thresholds for Pile Driving**
Notes: [a] Threshold levels from NOAA GARFO (2019); N/A is not applicable, does not reach the threshold. [b] The practical spreading loss formula was used with a transmission loss of 15logR.

All five sea turtle species could occur within the vicinity of the offshore Project area; however, they occur at very low densities in this part of the GOM (McDaniel et al., 2000), with the Kemp's ridley sea turtle and the loggerhead sea turtle being the most common sea turtles in the Project area. With the low density of sea turtles in this portion of the GOM, the restricted time period associated with pile driving, and the relatively small area of ensonification, exposures of sea turtles are unlikely to occur. Potential effects on sea turtles, if such exposures were to occur, would be minor and short-term brief behavioral reactions such as rapid dives or avoidance.

Fish and Invertebrates

The same methodology used for the noise assessment for sea turtles was used for fish. NOAA GARFO's (2019) underwater sound thresholds for physiological and behavioral effects on fish and the calculated distance to these sound isopleths from planned Project pile driving are provided in **Table 6-21**. Results of the analysis indicate that peak levels of sound are potentially injurious to fish within a distance of 61 feet of the pile. Cumulative sound exposure levels (SELs) above thresholds extend 2,070 feet from the pile; however, these distances assume exposure of a stationary fish to these sounds over a 24-hour period. Avoidance behaviors would likely prevent such exposures. Mitigation measures being imposed for marine mammals including soft starts where an initial set of three hammer strikes are conducted at about 40 percent energy followed by a 30-second waiting period and two subsequent sets of three strikes each with a waiting period, would provide fish the opportunity to avoid exposures to both peak pressures and cumulative sound exposures. While the analysis indicates fish injuries are possible, experiments with caged fish have generally found no injuries (Hart Crowser, Inc. et al., 2009; Caltrans, 2010a). Pile driving will be conducted over a limited time (18 days). Fish are highly mobile and with the mitigation measures implemented, potential effects on fish are likely to be limited to behavioral responses for the duration of pile driving and are expected to be minor and short-term.

TABLE 6-21
Distances to Fish Underwater Sound Thresholds for Pile Driving

Pile Size	**Distance to Threshold (feet)**			
	Injury 206 dB Peak	**187 dB SEL**	**183 dB SEL**	**Behavioral 150 dB RMS**
24-inch	61	707	1,306	15,228
36-inch	61	1,706	2,070	15,228

Notes:
[a] Threshold levels from NOAA GARFO (2019)
[b] The practical spreading loss formula was used with a transmission loss of 15logR.

6.3.1.2 Seafloor Disturbance

Most seafloor disturbance associated with the Project construction would result from the installation of the two new Crude Oil Loading Pipelines. Approximately 467 acres of seafloor would be disturbed in the GOM (See **Table 6-22**). These disturbance areas include the potential effects of pipelay (laybarge anchor scars and cable sweep) and deposition of displaced sediments (re-deposition of suspended sediments due to jetting).

TABLE 6-22
Seafloor Disturbance during Project Construction

Project Component	Location	Length (miles)	Disturbance (acres)	Sediments Displaced (cubic yards)	Habitat Type
Crude Oil Loading Pipelines (2)[a]	GOM	2.0	467.0	43,955	Soft bottom
Subsea Tie-in and MLV Replacement[a]	GOM	0.2	0.2	756	Soft bottom
Service vessel mooring	GOM	<0.1	3.0	N/A	Soft Bottom
All	--	2.3	467.2	44,711	Soft bottom

Notes:
[a] Disturbance area includes area of seafloor disturbed due to sediment displacement and re-deposition, anchors, and anchor chains/cables.
[b] Disturbance area is for hand jetting and includes only area of sediment displacement and re-deposition.

All of these areas of seafloor disturbance (See **Table 6-22**) are located within soft bottom habitats, the most widespread habitat type in both the mid-shelf portion of the northwestern GOM. No submerged aquatic vegetation (SAV), oyster reefs, hard bottoms, coral reefs, banks/shoals, or shelf edge habitats will be affected. The primary direct effects of seafloor disturbance on the habitat will be the potential creation of irregularities in the seafloor and potential loss of sessile benthic invertebrates. Potential irregularities in the seafloor are expected to be ameliorated over time by sediment movement due to currents and wave action. Because the seafloor sediments are unconsolidated, consisting of sand, silt, and clay particles, and located in relatively shallow waters, this potential smoothing process is expected to occur within months or a few years.

Most of the sessile macrobenthos in the disturbed areas could be killed, either crushed or buried and smothered in the jetting and trenching process. Mid-shelf benthic infaunal communities are dominated by polychaetes (annelid worms), crustaceans, and molluscs. Re-colonization of soft bottom areas after disturbance usually happens quickly, generally re-populating within months or one year (MMS, 2004; Lewis et al., 2003). However, disturbed sediments with a greater proportion of sand to mud may fill in with fine silty material, altering grain size and potentially resulting in a temporary change in the community composition that first recolonizes the area (BOEM, 2016). Because soft bottom habitats consist predominantly of clays and silts, are widespread, with the Project affecting a relatively small portion of available habitats, these potential direct effects are considered, long-term, lasting months after construction is complete, but minor.

The seafloor disturbance could also have direct effects on EFH (See **Table 6-23**) and indirect effects on fish. Potential disturbance effects on soft bottom EFH will be as described above with minor but long-term effects on seafloor sediment grain size, smoothness, and localized benthic invertebrate fauna densities. Potential effects on the fish themselves will include direct effects such as loss of demersal eggs (negligible and short-term) and indirect effects such as loss of spawning habitat and feeding areas (negligible and long-term). However, potential effects are not expected to have a measurable effect on any species population.

TABLE 6-23
EFH in Areas of Seafloor Disturbance

EFH[a]	Species[b]	Life Stage / Habitat Association[c,d] (in soft bottom habitat)
Shrimp	Brown shrimp	Eggs, larvae, adults
	White shrimp	Eggs, larvae, adults
Red drum	Red drum	Larvae, adults
Coastal pelagics	Spanish mackerel	WCA[d]
	King mackerel	WCA[d] (eggs, larvae, adults)
	Cobia	WCA[d] (eggs, larvae)
Reef fish	Red snapper	Juveniles (eggs, larvae WCA)
	Gray snapper	Adults (eggs, larvae WCA)
	Lane snapper	Juveniles, adults
	Vermilion snapper	WCA[d] (eggs, larvae)
	Yellowedge grouper	Adults (eggs, larvae, juveniles WCA)
	Greater amberjack	WCA[d] (eggs, larvae, juveniles, adults)
	Gray triggerfish	WCA[d] (eggs, larvae, juveniles)
Highly migratory species	Blacktip shark	Juveniles, adults
	Bull shark	Juveniles, adults
	Blacknose shark	Juveniles, adults
	Spinner shark	Juveniles, adults
	Sharpnose shark	Juveniles, adults
	Bonnethead shark	Neonates

The proposed seafloor disturbance is expected to have no effect on sea turtles or marine mammals. Although Kemp's ridley and loggerhead sea turtles feed on crabs, these prey items are most often epi-pelagic or epi-benthic and mobile and would be unlikely to be injured or forcefully removed by the slow-moving jet sled. Marine mammals found in the area feed primarily on epipelagic species.

6.3.1.3 Increased Turbidity

Pipeline lowering and hand jetting for the sealing of side taps along the existing Mainline in the GOM could displace substantial volumes seafloor sediments (See **Table 6-22**) and resuspend a portion of these volumes in the water column resulting in increased turbidity and total suspended solids (TSS) concentrations.

Pipeline lowering would be accomplished with a jet sled (Crude Oil Loading Pipelines) or jetted by hand (Subsea Tie-ins). TSS loads could increase to as much as 1,000 to 5,000 milligrams per liter (mg/L; Swanson et al., 2015) in immediate proximity to the jet sled but within 65 feet of the jetting the maximum TSS load is expected to be 235 mg/L. To put this in perspective, Schubel et al. (1978) documented increases in TSS of 100 to 550 mg/L at locations 6 feet above a shrimp trawl. Jetting of the Crude Oil Loading Pipelines is expected to be completed within 24 days with elevated TSS loads likely lasting less than 24 to 48 hours at any location (NOAA GARFO, 2020).

Turbidity associated with the suspended sediments could result in decreased feeding efficiencies for fish, sea turtles, birds, and cetaceans, or in avoidance of the plume area. However, the expected TSS concentrations are below levels known to have adverse effects on fish or cetaceans (typically 1,000 mg/L; NOAA GARFO, 2020). No information on the effects of TSS on sea turtles; however, they breathe air and would be expected to swim through any such plume encountered with no adverse effects (NOAA GARFO, 2020). Sea turtles have been entrained by dredges with resulting mortalities, but nearly all such instances have involved hopper dredges. Potential effects of increased turbidity and TSS concentrations on fish, turtles, birds, and marine mammals from Project construction will be intermittent, short-term and negligible as they would occur over a small area relative to the amount of available similar habitat, short duration, and low level of intensity.

6.3.1.4 Vessel Collision

Project construction will involve the use of numerous vessels and therefore has the potential to result in collisions with marine mammals and sea turtles. Transiting vessels occasionally collide with marine mammals, and such collisions with vessels often result in the injury and deaths of marine mammals (Laist et al., 2001; Jensen and Silber, 2004; Panigada et al,. 2006; Van Waerebeek et al., 2007; Berman-Kowalewski et al., 2010). Most vessel collisions with large whales have involved large vessels (>262.5 feet) and speeds over 13 knots. Cetaceans most frequently killed by vessel collisions are fin whales followed by humpbacks, right whales, gray whales, and others that do not generally occur in the GOM. Species found in the GOM such as sperm whales, killer whales, and Bryde's whale have been struck as well (Jensen and Silber, 2004; Van Waerebeek et al., 2007); however, use of GOM waters by these species is generally restricted to oceanic waters off the shelf, while most, if not all, Project construction vessels traffic would occur on the shelf between the DWP and shore rendering the potential for collisions with these species negligible. Historically, very few whales have been struck in the GOM (Jensen and Silber, 2004) despite high volume of vessel traffic associated with the offshore oil and gas industry (BOEM, 2017) and shipping as well as commercial and recreational fishing.

The only two cetacean species frequenting GOM shelf waters are the common bottlenose dolphin and the Atlantic dolphin. While the larger, slower, baleen whales are thought to be at much greater risk, smaller odontocetes, including these two species, are sometimes struck as well (Van Waerebeek et al., 2007). Vessel strikes of these smaller odontocetes have, however, tended to involve smaller faster vessels (outboards or smaller fishing vessels) often in constricted waterways or areas of high vessel traffic due to fishing or tourism. Most Project vessels will be relatively larger and will be working onsite or transiting at relatively slow speeds. The smaller, faster vessels such as crew boats traveling through waterways such as Sabine Pass present the greatest risk, but even under these conditions, the potential for vessel strikes is negligible. Mitigation measures to be implemented include compliance with the requirements of BOEM's Gulf of Mexico Vessel Strike Avoidance and Injured/Dead Aquatic Protected Species Reporting Protocols (Attachment A in **Appendix E**) and NOAA Fisheries Southeast Region Vessel Strike Avoidance Measures and Reporting for Mariners (Attachment B in **Appendix E**; NOAA Fisheries, 2008), which include:

- Maintaining a vigilant watch for marine mammals and slowing down or stopping to avoid striking protected species;
- Maintaining a distance of 100 yards or greater from any sighted whale, and 50 yards from small cetaceans;
- When cetaceans are sighted while a vessel is underway, remaining parallel to the course of any sighted cetacean, and avoiding excessive speed or abrupt changes in direction until the cetacean has left the area;
- Reducing vessel speed to 10 knots or less when mother and calf pairs, pods, 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 of the vessel; therefore, precautionary measures should always be exercised; and
- Reducing speed and shifting the engine to neutral when animals are sighted in the vessel's path or close proximity, and not engaging the engines until the animals are clear of the area.

The West Indian manatee is very susceptible to vessel strikes, which represent the single greatest mortality factor to the population. Occurrences of manatees in the northwestern GOM are apparently increasing

(Reid, 2020; Pabody et al., 2009), but are still very infrequent with very few sightings west of the Mississippi River (Carmichael, 2020; Carmichael et al., 2020). Most Project vessels traffic in the marine environment will be in Federal waters of the OCS with three exceptions (BOEM, 2017) where manatees have not been known occur at all. The greatest potential for strikes will be associated with vessel traffic in coastal waters (e.g., Sabine Pass); a manatee was struck and killed by a work boat in a Louisiana canal in 1995 (BOEM, 2012; Fertl et al., 2005). Despite this instance, the potential for such strikes by Project vessels is negligible given the rare occurrence of the marine mammals in the area and the short-term period of construction. During operations, fewer crew or supply vessels will be transiting coastal waters to the WC 509 Platform Complex.

Sea turtles are vulnerable to vessel strikes (Reneker et al., 2017; Barco et al., 2016; Singel et al., 2007), with evidence of such collisions observed in 20 to 30 percent of stranded sea turtles (NMFS, 2020b). Vessel collisions with sea turtles are probably more common in coastal areas with higher turtle densities as well as heavy boat traffic involving smaller and faster vessels; however, Hazel et al. (2007) concluded that sea turtles appear to be unable to avoid vessels traveling in excess of 2.2 knots. BOEM requires mandatory reporting of vessel strikes by its lessees and stated in 2017 that no such strikes have been reported for the GOM OCS (BOEM, 2017). The greatest potential for vessel strikes of sea turtles would be associated with transit of smaller vessels such as crew boats in coastal waters where turtle density is higher (e.g., Sabine Pass); however, the potential for such strikes is negligible and short-term lasting only as long as construction vessel traffic is on-going. Mitigation measures to be implemented for the Project include compliance with BOEM's Gulf of Mexico Vessel Strike Avoidance and Injured/Dead Aquatic Protected Species Reporting Protocols, which include the requirement that vessels maintain a distance of 50 yards or more when possible whenever sea turtles are sighted.

6.3.1.5 Loss of Habitat/Displacement

Loss of marine habitat will be minimal. Approximately 467 acres of seafloor will be disturbed during the installation and lowering of the Crude Oil Loading Pipelines but will revert to a natural condition within a few months (Section 6.3.1.2) and represents only a negligible temporary loss to benthic fish and invertebrates. Approximately 2.1 acres of seafloor habitat would be lost by the installment of the PLEMs and their pilings, the CALM Buoys and their moorings, and the moorings for the service vessels (**Table 6-24**). The conversion of the existing WC 509 Platform Complex, WC 148 Platform, and Mainline will not result in new permanent impacts.

TABLE 6-24
Project Components Placed on the Seafloor

Project Component	Location	Acres			Habitat Type
		Moorings	Cable Sweep	Total	
CALM Buoys[a]	GOM WC 509, EC 263	2.1	0.0	2.1	Soft bottom
PLEMs	GOM WC 509, EC 263	<0.1	0.0	<0.1	Soft bottom
Service Vessel Mooring[b]	GOM WC 509	<0.1	3.0	3.0	Soft bottom
All	--	2.1	3.0	5.1	Soft bottom

Notes:
[a] Includes suction pile and approximately 500 linear feet of anchor chain representing worst case seafloor impacts.
[b] Includes the mooring structure, mooring chains, and some sweep of the mooring chains that would occur during operations.

All of the seafloor in these areas consists of soft bottom habitats, which are ubiquitous in the northwestern GOM. Infaunal and epifaunal benthic communities in these areas could be lost and likely replaced with fouling communities that are often dominated by barnacles but include anemones, amphipods, polychaetes, crabs, copepods, hydroids and sponges (George and Thomas, 1979; Love, 2019). These seafloor areas are within EFH for shrimp, reef fish, coastal migratory pelagics, blacktip shark, bull shark, blacknose shark, spinner shark, and bonnethead shark. Species, life stages, and habitat associations of fish within these EFH groupings are indicated in **Table 6-23**. With the exception of shrimp and some reef fish, these species use the water column more than the seafloor. Some fish may use the structure as habitat and/or feed on fouling organisms. The placement of these Project components on the seafloor could have negligible but long-term effects on invertebrates, fish, and EFH. This loss of 2.1 acres of soft bottom seafloor habitats will have no effect on sea turtles, birds, or marine mammals, but the installation of the PLEMs and CALM Buoys would add new substrate for fouling organism colonization. The existing platforms would also be cleared of current invertebrate colonization allowing new growth to occur over the life of the Project.

6.3.1.6 Withdrawal and Discharge of Water

Hydrostatic testing of the pipelines will involve withdrawal of GOM seawater, use of it in the test, and subsequent discharge to the GOM. Approximately 26,005,000 gallons of seawater will be used to test the existing offshore Mainline, and 525,000 gallons will be used to test the Crude Oil Loading Pipelines, a total of 26,530,000 gallons. Seawater will remain in the pipeline for considerable time following conversion of the Mainline and installation of the Crude Oil Loading Pipelines so chemicals such as biocides and oxygen scavengers may be added to these test waters to avoid corrosion of the pipe. All discharges will meet the regulatory requirements and standards of a National Pollutant Discharge Elimination System (NPDES) permit. If necessary based on regulatory requirements, the GOM seawater will be discharged through a neutralization and filtration spread adjacent to the WC 509 Platform Complex and discharged overboard or retained in frac tanks and disposed of onshore. The discharge of hydrostatic test waters to the open ocean could have very localized effects on water quality. The water column in the immediate vicinity of the outfall could experience slight changes in dissolved oxygen levels, pH, solids, but these changes will be quickly ameliorated due to dilution and ambient currents. Compared to the large volume of seawater in the GOM as a whole (634 quadrillion gallons), the discharge will be minimal in volume and have no effect on fish, birds, sea turtles, or marine mammals.

During withdrawal, GOM seawater will be pumped into the pipe and filtered with a mesh screen to prevent solids and foreign materials from entering the pipeline. Some fish and invertebrate eggs and larvae could be entrained in the test waters in this process with probable 100 percent mortality due to the mechanical pumping process, retention time in the pipe, and in some cases the addition of chemicals. Larvae, juveniles, and early adult fish may also become impinged on the intake screen and suffer injury or mortality. The level of impact would be dependent on the season in which the water is withdrawn and what species are present at the time.

Analysis of 230 plankton samples from Southeast Area Monitoring and Assessment Program (SEAMAP) stations within 30 miles of the WC 509 Platform yielded an average overall density of 9,741 fish larvae and 3,719 eggs in 1.0 million gallons of seawater. The withdrawal and use of 26,530,000 gallons of seawater could result in the loss of approximately 258,429 fish larvae and 98,629 eggs (all taxa combined and using a multiplier of three to account for bongo net extrusion). Despite these numbers, the potential effect on populations of both ichthyoplankton, adult fish, and invertebrates will be negligible because the reproductive strategy of most marine fish and invertebrates entails broadcasting enormous amounts of eggs (thousands or millions per fish, dependent on species) with limited survival needed to perpetuate the stock. Ichthyoplankton densities in the withdrawn seawater would also be found in the waters across much of the GOM, thus impacts on ichthyoplankton from such withdrawals can be looked at in the context of the proportion of the entire waterbody represented by the test waters. Hydrostatic test water withdrawals will have no direct effect on birds, sea turtles, or marine mammals. Because the potential effects on ichthyoplankton are negligible, the withdrawals will also have no indirect effects on turtles, birds, or marine mammals.

6.3.2 Operations

Operations are described in Topic Report 1 (Volume IIa). Aspects of Project operations that could potentially affect wildlife and protected species include habitat loss and conversion, platform lighting as well as noise, disturbance, and potential collisions associated with vessel and helicopter traffic. Potential impacts due to operation of the Project, as described below, are expected to range from negligible to moderate, depending on the nature of the activity and the biological resource at risk; however, most would be long-term lasting at least intermittently through the life of the Project, but minor in context and intensity.

The existing WC 509 Platform Complex will be converted to support oil export and natural gas transportation. The Project will not require the placement of new platforms in the area. To minimize and avoid potential impacts, the Project will follow the BMPs in its Port Operations Manual (see Appendix G, Volume III [*Confidential*]). Given the extent of locally available soft-bottom and pelagic habitat, and that there are no live-bottom areas, reefs, or other special marine resources located near the proposed DWP (other than the platforms themselves), operation of the proposed Project will not have a significant or irreversible impact to any wildlife populations or habitat.

6.3.2.1 Habitat Loss and Conversion

There would be very limited additional habitat conversion associated with Project operations. As discussed above in Section 6.3.1.5, approximately 2.1 acres of soft bottom benthic habitat would be lost during construction due to installation of the PLEMs, CALM Buoys, and service vessel moorings (See **Table 6-24**). A portion of these areas would be converted from soft bottom habitat to steel and concrete structures and these conversions would remain through operations. An additional 3.0 acres at the service vessel moorings will potentially be affected by anchor cable sweep.

As required by the Bureau of Safety and Environmental Enforcement (BSEE), the existing platforms will be cleaned of existing marine growth on the pilings to ensure structural integrity and strength of the platform. The loss of the existing invertebrate communities that colonized these platforms will regenerate over the life of this Project, resulting in a short-term loss of habitat and food source for the fish communities living in and around these platforms.

The minimal conversion of habitat will have no effect on sea turtles, birds, marine mammals, or protected species. The structures will be located within an area of the GOM designated as EFH for shrimp, reef fish, coastal migratory pelagics, blacktip shark, bull shark, blacknose shark, spinner shark, and bonnethead shark. Species, life stages, and habitat associations of fish within these EFH groupings are indicated in **Table 6-23**. With the exception of shrimp and some reef fish, these species use the water column more than the seafloor. These and other fish may use the structure as structural habitat and / or feed on fouling organisms. EFH for each of these species encompasses most of the continental shelf in the northern GOM so that the impacted area represents a negligible effect but a long-term one continuing for the life of the Project.

6.3.2.2 Water Intake and Discharge

Volumes of GOM seawater will be withdrawn, used, and discharged back to the GOM throughout Project operations (**Table 6-25**). The VLCCs or other crude oil carriers will not be part of the Project but are included as they would be serviced by the DWP and would discharge in the area.

TABLE 6-25
GOM Seawater Intakes during Operations

Facility	Component	Intakes		Discharges / Uses	Treatment
		Rate (gph)	Annual (gallons)		
Platform	Firewater system	240,000	35,520,000	System testing	Biocide
	Jockey pump	1,200	20,971,440	Potable, utility, gray/black water	MSD
	Deck drainage	N/A	N/A	Deck drainage	Oil water separator
VLCCs	Ballast water	N/A	N/A	Ballast discharged	
	Cooling water	530,000	4,642,800,000	Engine cooling	
All	--	--	4,699,301,440	--	--

The proposed uptake of GOM seawater will have no direct effect on sea turtles, birds, marine mammals, or protected species. The intakes will be located within GOM waters designated as EFH for shrimp, reef fish, coastal migratory pelagics, blacktip shark, bull shark, blacknose shark, spinner shark, and bonnethead shark. Any effects will be direct effects on the fish themselves. Planktonic, water-column-associated (WCA) forms of these managed species (See **Table 6-23**) and others may be entrained in the intake waters, with probable 100 percent mortality due to the water use. Larvae, juveniles, and early adult fish may also become impinged on the intake screen and suffer injury or mortality.

An analysis of the levels of entrainment likely to be associated with the use of GOM seawater by a VLCC was conducted using available data on ichthyoplankton densities from SEAMAP stations within 30 miles of the DWP (see **Appendix D** of Volume IIa). Estimates of impingement and entrainment of fish eggs and larvae by a VLCC are shown in **Table 6-26**. The estimates are based on the assumption that at a surface water temperature of 72 degrees Fahrenheit, a VLCCs or other crude carrier moored at the DWP is estimated to require up to 530,000 gallons per hour of cooling water (USCG, 2020). It is important to note that VLCCs are already operating in the GOM for oil export with the use of lightering to ferry oil from onshore terminals to the moored VLCC.

TABLE 6-26
Estimates of Entrainment from a VLCC's Cooling Water while at the DWP

Plankton	Number Entrained per Hour[a]		
	Lower 95% Confidence Interval	Hourly Mean	Upper 95% Confidence Interval
Fish eggs[b]	7,118	5,914	4,710
Fish larvae[c]	17,124	15,489	13,854

Notes:
[a] Estimates of the number entrained based on SEAMAP station samples from 1982-2016 within 30 miles of the DWP.
[b] Based on a mean density of fish eggs of 0.0037198 eggs/gallon using bongo net data. The number was adjusted by a factor of 3 to account for net extrusion.
[c] Based on a mean density of all fish larvae of 0.009741 individuals/gallon using bongo net data. The number was adjusted by a factor of 3 to account for net extrusion.

These estimates of egg and larval entrainment include many species. Fish eggs are not identifiable to species but to look at impacts on a species level, we estimated potential entrainment of larvae for three species. These species, the bay anchovy, the Gulf menhaden, and the red snapper, were selected based on their ecological importance in the food chain (bay anchovy and Gulf menhaden) and on managed species that are important commercial or recreational stocks (gulf menhaden, red snapper). Estimates of larval entrainment for these three species are provided in **Table 6-27**. These are likely overestimates as fish larvae were not always identified to the species level in the SEAMAP data; larvae from larger taxonomic groups identified in the data that may include the species of interested were included in the analysis (see associated taxa in **Table 6-27**). The average also assumes a constant level of larval densities through the year when in reality the larval densities are highest in spring and summer. These are estimates of hourly entrainment rates. The DWP will service up to 365 VLCCs or other crude oil carriers annually, with each being at the DWP up to 24 hours. Potential effects on fish populations will be negligible but long term.

TABLE 6-27
Entrainment of Larvae of Key Fish Species by a VLCC at the DWP

Species	Associated Taxa [a]	Estimated Number of Larvae Entrained Per Hour		
		LCL	Mean	UCL
Bay anchovy	*Anchoa* spp., *A. mitchilli*, Engraulidae	746	1,125	1,503
Gulf menhaden	*Brevoortia patronus*, Clupeidae	78	38	0
Red snapper	*Lutjanus* spp, *L. campechanus*, Lutjanidae	305	228	150
Red drum	*Sciaenops oceellata*, Sciaenidae	15	39	62

Notes:
[a] Larvae identified to these taxa were included as larvae for the species of interest as the larger (genus, family) may include that species.

A VLCC will be loaded and leave the DWP within a 24-hour period, resulting in negligible numbers of both ichthyoplankton and adult fish and invertebrates losses. Marine fish such as these broadcast enormous amounts of eggs multiple times through the spawning season.

6.3.2.3 Noise

Most of the underwater sound generated during operations will be associated with the transit of the VLCCs (or other crude oil carriers), which involves assist tugs and a service vessel in addition to the VLCC. Lower levels of underwater sound will be produced by the use of a crew boat or supply vessel to make supply runs between the DWP and shore bases. The expected levels and extent of water column ensonification from these types of vessels and associated impacts on fish and marine mammals are evaluated in the EFH Assessment (**Appendix D** of Volume IIa) and MMPA Assessment (**Appendix E** of Volume IIa). Sound source levels were selected from published measurements available in the literature for similar vessels, and the extent of ensonification was predicted following methodologies provided by NMFS (NMFS, 2018b; NOAA GARFO, 2019). The analysis indicated that ensonification is not expected to reach levels considered to be potentially injurious to marine mammals (NMFS Level A thresholds), but that ensonification above NMFS Level B thresholds (potentially resulting in marine mammal harassment) may extend out 4.0 miles from the CALM Buoys. This may result in some avoidance by marine mammals; however, cetaceans are known to habituate to stressors such as underwater sound or vessel traffic. Common bottlenose dolphins inhabit waterways leading to some of the busiest industrial and oil and gas ports in the Gulf of Mexico (Maze and Würsig, 1999; Pennacchi, 2013). Cetaceans are also known to habituate to stressors such as underwater sound or vessel traffic (Pennacchi, 2013). Potential impacts of noise on marine mammals due to DWP operations will be long-term but minor.

6.3.2.4 Vessel Collision

As described above in Section 6.3.1.4, marine mammals and sea turtles are vulnerable to collisions with vessels (strikes). Potential for strikes by operations vessels would be similar to those described for construction vessels in Section 6.3.1.4. Additional detail on the potential for vessel strikes of marine mammals is provided in **Appendix E** (Volume IIa). Most vessel trips during operations will be supply runs with a crew boat or supply vessel between the DWP that are expected to be needed approximately twice per month. VLCCs or other crude oil carriers will call on the DWP approximately once per day.

Crew boats making supply runs between the DWP and a shore base could encounter common bottlenose dolphins or Atlantic dolphins, the only two cetacean species frequenting GOM shelf waters. Vessel strikes of cetaceans typically involve the larger slower moving species, but these two species, are sometimes struck as well (van Waerebeek et al., 2007) although typically by smaller faster vessels (outboards or smaller fishing vessels) often in constricted waterways or areas of high vessel traffic due to fishing or tourism. The common response of these cetaceans to larger vessels is to approach and initiate bow riding behaviors (Würsig et al., 1998). Crew boats can travel at speeds of up to 35 knots, but generally transit at much slower speeds of 20 to 23 knots. Approaches to constricted coastal waters present the greatest risk, but even under these conditions, the potential for vessel strikes is long-term but negligible.

The West Indian manatee is very susceptible to vessel strikes, which represent the single greatest mortality factor to the population. Occurrences of manatees in the northwestern GOM are apparently increasing (Reid, 2020; Pabody et al., 2009) but are still very infrequent with very few sightings west of the Mississippi River (Carmichael, 2020; Carmichael et al., 2020). Most Project vessels traffic in the marine environment would be in Federal waters of the OCS where, with three exceptions (BOEM, 2017), manatees have not been known occur at all. The greatest potential for strikes will be associated with vessel traffic in coastal waters such as Sabine Pass. The potential for such strikes by Project vessels during operations is long-term but negligible given the rare occurrence of the marine mammals in the area.

Sea turtles are vulnerable to vessel strikes (Reneker et al., 2017; Barco et al., 2016; Singel et al., 2007), with evidence of such collisions observed in 20 to 30 percent of stranded sea turtles (NMFS, 2020b). Vessel collisions with sea turtles are probably more common in coastal areas with higher turtle densities as well as heavy boat traffic involving smaller and faster vessels. BOEM (2017) requires mandatory reporting of vessel strikes with sea turtles by its lessees and stated in 2017 that no such strikes have been reported for the GOM OCS. The greatest potential for vessel strikes of sea turtles will be associated with transit of crew boats in coastal waters and passes where turtle density is higher; however, the potential for such strikes is long-term but negligible.

Mitigation measures to be implemented include compliance with the requirements of BOEM's Gulf of Mexico Vessel Strike Avoidance and Injured/Dead Aquatic Protected Species Reporting Protocols (Attachment A in **Appendix E**) and NOAA Fisheries Southeast Region Vessel Strike Avoidance Measures and Reporting for Mariners (Attachment B in **Appendix E**; NOAA Fisheries, 2008), which include the requirement that vessels maintain a distance of 50 yards or more when possible whenever sea turtles are sighted.

6.3.2.5 Lighting

Lighting at the DWP could have direct adverse effects on birds (Montevecchi, 2006; Russel, 2005). Lights on offshore platforms have been shown to attract birds, disorient them, and sometimes result in continued circling with resulting effects such as collisions or energetic deficiencies (Ronconi et al., 2015; Orr et al., 2013; Wiese et al., 2001). Artificial lighting used on platforms may disorient birds because they use natural light sources and patterns for navigation or other critical biological behaviors. Poor weather conditions such as rain, fog, and low cloud cover can further disorient birds and increase their attraction to artificial lights, leading to collisions. Such effects generally increase during bird migrations and bad weather (Orr et al., 2013; Ronconi et al. 2015). The Applicant will adhere to lighting regulations set forth in 33 CFR Part 149. Further, the Applicant is converting the existing WC 509 Platform Complex and WC 148 Platform. These are already lighted structures. Potential impacts on marine and coastal birds during operations are expected to be long-term but negligible.

Shoreline artificial lighting is known to cause disorientation in nesting and hatchling sea turtles (Raymond, 1984; Garber, 1985; Witherington and Martin, 1996), which can result in mortalities of hatchlings (Witherington and Bjorndal, 1991). However, artificial lighting on oil and gas platforms and other offshore structures has not been identified as an impacting factor (Orr et al., 2013; NMFS, 2020b) and lighting on the DWP platform is expected to have no effect on sea turtles given its distance from shore and its presence for the past 40 years.

6.3.2.6 Debris and Entanglement

Although much more common with regards to fishing gear and other debris, entanglement of marine mammals in mooring lines has been known to happen and is a potential concern. NOAA Fisheries, Alaska Regional Office (2017) reported an instance where a humpback whale became entangled in an anchor line of a cruise ship. Mooring lines at the DWP during operations include those associated with the service vessel and CALM Buoys. Benjamins et al. (2014) reviewed the risk of entanglement in mooring lines and cables at offshore renewable energy projects such as wind turbines and concluded risks were highest with large baleen whales and lowest with small whales and dolphins and noted there are no records of marine megafauna entanglements in moorings or any other infrastructure associated with the offshore oil and gas industry. The potential risk of such entanglements during Project operations is long-term but negligible.

Debris that makes its way to waters of the GOM could affect fish, sea turtles, birds, and marine mammals, through ingestion or entanglement (NMFS, 2020b). Seabirds ingest plastic objects and other marine debris more frequently than do any other taxa (Ryan, 1990). Interaction with plastic materials may lead to permanent injuries and death. Intentional discharge of marine debris is prohibited by law (30 CFR § 250.40; MARPOL, Annex V, P.L. 100-220 [101 St. 1458]), yet accidental losses of debris into the marine environment can occur. The Applicant will adhere to the requirements of BSEE NTL 2015-G03 Marine Trash and Debris and Awareness and Elimination and other good house-keeping BMPs. NTL-2015-G03 requirements include debris awareness training for workers, posting of placards, and recording and reporting any items lost overboard. Debris potentially reaching the ocean from Project operation is therefore expected to be minimal to nonexistent and effects on fish, sea turtles, birds, and marine mammals would be negligible but long-term.

6.3.3 Upsets and Accidents

The marine environment could be impacted if an inadvertent release of oil, diesel, lubricants, or other chemicals were to occur. The fate and transport of a spill is dependent on the size of the spill and the type of material spilled in addition to other factors. Potential spills during all phases of the Project are likely to be small or minor.

The types and quantities of chemicals and lubricants that are expected to be stored on the WC 509 Platform Complex are discussed in Topic Report 1 (Volume IIa). Hazardous materials will be stored and managed in accordance with all applicable regulations. The proposed DWP will not include refueling capabilities for personnel and supply vessels. Limited amounts of fuel will be stored at the DWP for emergency needs to support vessels, helicopters, generators, cranes, and for use during startup. In the event of an inadvertent release, Energy Transfer’s Sea Robin Oil Spill Response Plan (O-726), modified to include BMOP , would be followed. Based on this requirement, and the fact that large quantities of petroleum hydrocarbons or other hazardous waste will not be stored on the DWP, the risk potential for impacts on wildlife and wildlife habitat from a spill from the DWP is considered negligible.

Appendix F (Volume IIa) contains a Project-specific Oil Spill Trajectory and Fate Modeling Report. In addition, **Appendix F** (Volume IIa) also contains a Tactical Response Assessment, which provides a discussion of potential response tactics that would facilitate a rapid and effective incident response to an inadvertent release.

6.3.4 Decommissioning

Decommissioning will involve removal of the DWP Platform jacket as well as the piles to approximately 15 feet below the seabed and abrasive cutters, explosives, or water cutters may be used during the decommissioning. After removal, the jacket will likely be used as an artificial reef as part of the Rigs to Reef program, which would provide a long-term benefit to fish and other marine life. The offshore pipelines will be abandoned in place, and all other offshore components (i.e., PLEMs, CALM Buoys, moorings) will be removed and transported to shore for reuse or disposal. Potential impacts to wildlife and wildlife habitat from decommissioning will be similar to those described for construction. Removal of above-seafloor structures could result in increased noise, vessel collision, increased turbidity, and habitat conversion. Potential impacts associated with decommissioning would range from negligible to moderate. Potential impacts on wildlife and protected species from decommissioning are discussed below.

6.3.4.1 Noise

Underwater noise will be generated by vessels and equipment during the decommissioning process. Vessel use and the equipment used to remove the platform are expected to be the greatest sources of such sound. The potential effects of underwater sound associated with vessels and equipment on marine mammals, sea turtles, and fish, are described in Section 6.3.1.1 and will be similar during decommissioning. Potential noise impacts due to decommissioning of the DWP are expected to be negligible. If explosives are used, an assessment of associated impacts on wildlife and protected species will be addressed at that time as part of the decommissioning plan.

6.3.4.2 Vessel Collision

Decommissioning will require the use of number of work vessels increasing vessel traffic in the area. The vessels are expected to be similar in type to those described for Project construction. Vessel transit can result in collisions with marine mammals and sea turtles, and the potential for vessel collision impacts with these types of vessels is discussed in Section 6.3.1.4. The potential for strikes during decommissioning will be similar to those described for construction.

6.3.4.3 Increased Turbidity

Although subsea components are expected to be abandoned in place, removal or surface components such as the PLEMs, CALM Buoy moorings and the platform will result in sediments being disturbed and suspended in the water column. Any resulting increases in TSS and turbidity will be localized and occur for a very short duration. The potential suspension and redeposition of these sediments could have minor and short-term effects on benthic communities and ichthyoplankton, but will not be expected to affect fish, birds, and marine mammals. Potential impacts related to increased turbidity during construction are described in Section 6.3.1.3 but are expected to occur at a much smaller scale during decommissioning.

6.3.4.4 Habitat Conversion

The WC 509 Platform Complex's structures will have developed a fouling community as well as an assemblage of fish over the life of the Project. Areas around oil and gas platforms have also been shown, in at least some areas, have higher densities of birds and sea turtles than areas away from the platforms. Structure removal will result in the removal of the hard substrate and encrusting community, likely resulting in an overall reduction in species diversity (MMS, 2005; Schroeder and Love, 2004). Epifaunal organisms attached to the platform will die when the platform is removed, and the seafloor habitat will return to its original condition as soft-bottom substrate. The Applicant's plan is to dispose of the top of the platform onshore, but, if permitted, will install the bulk of the platform substructure at a GOM Rigs to Reef location. If that occurs the loss of this structural habitat and its biotic assemblages will be short-term, soon redeveloping in the new location.

6.3.5 Listed Species Determinations

Based on agency correspondence, information available in the literature, and the analysis presented above in Sections 6.3.1 and 6.3.2, an assessment as to whether the proposed Project may impact federally listed species was made using the following USFWS and NMFS effect determinations (USFWS and NMFS, 1998):

- ***No effect*** – This determination is appropriate when the proposed project will not directly or indirectly affect (neither negatively nor beneficially) individuals of listed, proposed, or candidate species or designated/proposed critical habitat of such species.
- ***May affect, not likely to adversely affect*** – This determination is appropriate when the proposed project is likely to cause insignificant, discountable, or wholly beneficial effects to individuals and designated critical habitat. Certain avoidance and minimization measures may need to be implemented to reach this level of effect.
- ***May affect, likely to adversely affect*** – Adverse effects to listed species may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions, and the effect is not discountable, insignificant, or beneficial.

Table 6-28 summarizes the effect determinations for federally protected species with the potential to occur within the onshore Project area. As discussed below, the Project ***may affect, but is not likely to adversely*** affect nine federally listed threatened or endangered species based on the insignificance of any potential effect. A no effects determination was found for all other considered species.

The offshore threatened and endangered species sections of this Topic Report as well as the offshore threatened and endangered species sections in Volume IIb, Topic Report 5 serve as the Biological Assessment (BA) for the Project.

TABLE 6-28
Effects Determination for Threatened and Endangered Species

Common Name	Federal Status [a]	State Status [b]	Potential to Occur in Project Area [c]	Effects Determination
West Indian manatee	T	E	Unlikely	*May affect, not likely to adversely affect*
Fin whale	E	E	Very unlikely	*No effect*
GOM Bryde's whale	E	--	Very unlikely	*No effect*
North Atlantic right whale	E	E	Very unlikely	*No effect*
Blue whale	E	--	Very unlikely	*No effect*

TABLE 6-28
Effects Determination for Threatened and Endangered Species

Common Name	Federal Status [a]	State Status [b]	Potential to Occur in Project Area [c]	Effects Determination
Sei whale	E	E	Very unlikely	*No effect*
Sperm whale	E	E	Unlikely	*May affect, not likely to adversely affect*
Piping plover	T	T	May	*May affect, not likely to adversely affect*
Rufa red knot	T	N/A	May	*May affect, not likely to adversely affect*
Green sea turtle North Atlantic DPS[a]	T	T	May	*May affect, not likely to adversely affect*
Hawksbill sea turtle	E	E	Unlikely	*May affect, not likely to adversely affect*
Kemp's ridley sea turtle	E	E	Known	*May affect, not likely to adversely affect*
Loggerhead sea turtle	T	T	Known	*May affect, not likely to adversely affect*
Leatherback sea turtle	E	E	Known	*May affect, not likely to adversely affect*
Giant manta ray	T	--	Very unlikely	*No effect*
Oceanic whitetip shark	T	--	Very unlikely	*No effect*
Smalltooth sawfish	E	E	Very unlikely	*No effect*
Gulf sturgeon	T	T	Very unlikely	*No effect*
Dwarf seahorse	C	--	Very unlikely	*No effect*

Notes:
[a] T = Threatened; E = Endangered; C = Candidate
[b] Louisiana status
[c] From **Tables 6-2, 6-3, 6-5, 6-9**

6.4 CUMULATIVE IMPACTS

A complete discussion of cumulative impacts is included in **Appendix C,** Framework for Cumulative Impacts Analysis (Volume IIa).

6.5 MITIGATION MEASURES

Based on the information provided in this analysis, biological resources, such as marine mammals, sea turtles, and fish, could be impacted by Project activities. As necessary, the Applicant will implement impact minimization and mitigation measures throughout the duration of the Project to reduce any potential impacts on wildlife and protected species. Additional mitigation measures may be required through agency consultation and permitting of the proposed Project.

For pile-driving associated with Project construction, the Applicant will:

- Use PSOs to monitor the ensonified area for marine mammals;
- Not commence pile-driving until the Level A ensonified area has been observed to be clear of marine mammals for at least 30 minutes;
- Commence pile-driving with a soft start with an initial set of three strikes from the hammer at about 40 percent energy, followed by a 30-second waiting period, and then two subsequent three-strike sets before continuing normal operations; and
- Shutting down pile-driving if a marine mammal is observed in or approaching the Level A ensonified area.

To minimize the potential for vessel collisions with marine mammals, Project vessels would follow the vessel strike avoidance measures outlined in BOEM's Gulf of Mexico Vessel Strike Avoidance and

Injured/Dead Aquatic Protected Species Reporting Protocols (Attachment A in **Appendix E**) and NOAA Fisheries Southeast Region Vessel Strike Avoidance Measures and Reporting for Mariners (Attachment B in **Appendix E**; NOAA Fisheries, 2008), which include:

- Maintaining a vigilant watch for marine mammals and slowing down or stopping their vessel to avoid striking protected species;
- When whales are sighted, maintaining a distance of 100 yards or greater from the whale;
- When small cetaceans are sighted, attempting to maintain a distance of 50 yards or greater whenever possible;
- When cetaceans are sighted while a vessel is underway, attempting to remain parallel to the animal's course and avoiding excessive speed or abrupt changes in direction until the cetacean has left the area;
- Reducing vessel speed to 10 knots or less when mother/calf pairs, pods, or large assemblages of cetaceans are observed near an underway vessel when safety permits; and
- When vessel personnel sight animals in the vessel's path or in close proximity to a moving vessel, reducing speed and shifting the engine to neutral. Do not engage the engines until the animals are clear of the area.

The Applicant proposes the following mitigation lighting measures concerning marine wildlife:

- Under the DWPA, the Project would be required to meet all lighting stipulations as noted in 33 CFR Part 149. To this end, the Applicant would limit, to the greatest extent possible, the amount of total lighting used on the DWP to that required for safety and navigational concerns only.

To reduce potential effects of marine debris, the Applicant will adhere to the requirements of BSEE NTL 2015-G03 Marine Trash and Debris and Awareness and Elimination and other good house-keeping beast management practices.

- NTL-2015-G03 requirements include debris awareness training for workers, posting of placards, and recording and reporting any items lost overboard; and
- All in-water construction activities will 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 Project. In addition, as per USCG and EPA regulations, Energy Transfer's Sea Robin Oil Spill Response Plan (O-726), modified to include BMOP, would be implemented during all phases of the Project.

With adherence to the proposed mitigation measures, the Project's potential effects on offshore wildlife and protected species are not expected to:

- Violate a legal standard for protection of a species;
- Degrade the commercial, recreational, ecological, or scientific viability or significance of a biological resource;
- Measurably change the population size (density) or change the distribution of an important species in the region;
- Introduce new, invasive, or disruptive species in the proposed Project area; and/or

- Reduce quality and/or quantity of EFH as defined by the MSFCMA, causing adverse effects, such as direct or indirect physical, chemical, or biological alteration of the waters or substrate, and loss of or injury to planktonic organisms and their habitat, and other ecosystem components.

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