ENVIRONMENTAL ASSESSMENT FOR THE ISSUANCE OF A NON-COMPETITIVE NEGOTIATED AGREEMENT FOR USE OF OUTER CONTINENTAL SHELF SANDS FOR THE CAMERON PARISH SHORELINE RESTORATION PROJECT (CS-33)

Prepared for:

United States Department of Interior Bureau of Ocean Energy Management

Funded by:

Louisiana Office of Coastal Protection and Restoration

Prepared By:

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EXECUTIVE SUMMARY

This Environmental Assessment (EA) analyzes the potential environmental impacts associated with the Bureau of Ocean Energy Management (BOEM) issuing a non-competitive negotiated agreement (NNA) to the State of Louisiana, Office of Coastal Protection and Restoration (OCPR), for the use of Gulf of Mexico, Outer Continental Shelf (OCS) sand resources to construct the Cameron Parish Shoreline Restoration Project (CS-33 SF). This project involves the dredging of sand from Sabine Bank sand body in West Cameron Area OCS blocks 114 and 117 and transporting the dredged sand to the shores of Cameron Parish to be used for beach nourishment.

The Cameron Parish Shoreline Restoration Site (CPSRS), located in the chenier plain of southwestern Louisiana, extends from the western Calcasieu Pass jetty west 8.7 miles to the easternmost breakwater at the Holly Beach-Constance Beach breakwater field. Sabine Bank is approximately 18.5 miles offshore from the CPSRS.

Alternatives considered for this project include no action, five sediment delivery system (SDS) alternatives, and five beach nourishment alternatives. No action would not meet the project purpose, which is to protect public and private infrastructure (storm damage reduction), including Louisiana Highway 82 (LA 82), coastal wetlands north of LA 82, and the remaining chenier beach ridge from further erosion and shoreline retreat. No action would not meet the project need: restore the chenier that has been subjected to chronic erosion and lack of replenishment from littoral transport.

The five SDS alternatives were evaluated based on costs, construction time, permitting time and permitability, need for additional data, impacts to the natural environment, industry, navigation, and users, and risks to project completion. To remain flexible for contractors, two of the five SDS alternatives were recommended to move forward into design for plans and specifications. One of the recommended alternatives, Calcasieu Pass Pump-out, involves pump-out of the hopper dredge via a pipeline routed to the CPSRS. The other alternative, Calcasieu Pass Re-handling, involves depositing the material at a re-handling site, where it would be re-dredged and piped to the CPSRS.

Five build alternatives for the beach nourishment project were considered, all of which incorporate three million cubic yards of sand in the beach restoration. The beach nourishment alternatives were analyzed relative to meeting the project goal: to extend the longevity of the chenier beach in a manner that will delay shoreline retreat and prevent the breaching of the chenier beach for the next 20 years. One alternative was selected to move through final design, Alternative 5. This alternative involves creating a wide beach area (380 feet) where LA 82 is closest to the shoreline and 230 feet over the rest of the CPSRS. Alternative 5 enhances the part of the shoreline and highway that are in immediate threat of breaching while providing nourishment to the entire shoreline, which makes it the most reasonable and feasible alternative for beach nourishment. Five million cubic yards of OCS sand will be requested to account for unforeseen construction-related design modifications.

Potential impacts associated with the overall project involve:

- removal and potential long recovery time of benthos at the sand source
- burial and potential long recovery time of benthos at the CPSRS
- burial and potential long recovery time of benthos at the re-handling site (if selected)
- burial of native beach vegetation at the CPSRS
- temporary, reduced access to nearshore fishery resources for local commercial and recreational fishermen as a result of the sediment transport pipeline and associated infrastructure
- burial or smothering of benthos around temporary rigs and pipeline supports used for sediment transport (short-term and quick recovery due to minimal footprint)
- temporary increases in turbidity at the sand source, the CPSRS, and the re-handling area, if selected (minimal due to ability of fish and mobile benthic organisms to relocate)
- temporary alteration of fishing/eating and swimming habits of cetaceans, sea turtles, and other marine species as a result of the physical presence of the dredge, noise from the dredge, and turbidity resulting from operation
- measurable sedimentation of the Calcasieu Ship Channel if the Calcasieu Pass Re-handling SDS alternative is selected (unlikely, but possible)

To reduce possible impacts, the pump-out site, re-handling site, and pipeline routes were developed with the participation of port users and local fishermen. Benthos at the CPSRS would be expected to rebound quickly due to the dynamic nature of the intertidal environment. Benthos at Sabine Bank may require a year or more to recover from the impact of sand removal (Brooks et al. 2004a). Beach vegetation will be buried during dune creation; however, plantings are planned to stabilize the new dune system and natural recruitment is expected to occur over time to further revegetate the beach. All other impacts are considered temporary in nature and are not expected to linger after cessation of work. Since the hopper dredge would operate until full and transport the material to another location, the dredge site would have recovery time between loads to allow for the settling of solids suspended during dredging.

Supplemental documents produced in support of this EA include:

- Archaeological and Structures Surveys (*Borrow Source Investigation, 2009)*
- Hydrodynamic and Sediment Transport Analysis (*30% Design Report, 2011)*
- Coastal Zone Management Act Consistency (Joint Permit Application submitted May 2011)
- Biological Assessment for the Piping Plover (Biological Opinion issued by USFWS on February 23, 2012)
- Biological Opinion on Sea Turtles and the Gulf Sturgeon (NMFS, June 1, 2012)

In addition to these support documents, three permits/authorizations are required: Coastal Use Permit, United States Army Corps of Engineers Section 10/404 Permit, and 401 Water Quality Certification. With the submittal of the *30% Design Report* for the project in April 2011, a joint permit application was filed with the Louisiana Department of Natural Resources to officially begin the permit process for the three aforementioned permits. The New Orleans District of the U.S. Army Corps of Engineers issued permit number MVN-2011-01601-WII on April 2, 2012 in support of this project. This permit contains the other two required permits.

LIST OF ACRONYMS

BA	**Biological Assessment**
BO	**Biological Opinion**
BOEM	**Bureau of Ocean Energy Management**
CHE	**Coast and Harbor Engineering, Inc.**
CMP	**Coastal Management Program**
CPE	**Coastal Planning and Engineering**
CPP	**Calcasieu Pass Pump-out**
CPR	**Calcasieu Pass Re-handle**
CRS	**Cultural Resource Survey**
CRSRS	**Cameron Parish Shoreline Restoration Site**
CS-33 SF	**Cameron Parish Shoreline Restoration Project**
CUP	**Coastal Use Permit**
CZMA	**Coastal Zone Management Act**
DP	**Direct Pump-out**
EA	**Environmental Assessment**
EO	**Executive Order**
EFH	**Essential Fish Habitat**
FEMA	**Federal Emergency Management Agency**
FWP	**Fish and Wildlife Propagation**
GOM	**Gulf of Mexico**
HAPC	**Habitat Areas of Particular Concern**
IMMS	**Institute for Marine Mammal Studies**
IRC	**Integrated Report Category**
LA 82	**Louisiana Highway 82**
LDEQ	**Louisiana Department of Environmental Quality**
LDNR	**Louisiana Department of Natural Resources**
LDWF	**Louisiana Department of Wildlife and Fisheries**
MMS	**Minerals Management Service**
MLLW	**Mean Lowest Low Water**
MORPHO	**Sediment transport and morphology model**
NAAQS	**National Ambient Air Quality Standards**
NCDC	**National Climatic Data Center**
NCDDC	**National Coastal Data Development Center**
NEPA	**National Environmental Policy Act**
NHPA	**National Historic Preservation Act**
NMFS	**National Marine Fisheries Service**
NNA	**Non-competitive negotiated Agreement**
NOAA	**National Oceanic and Atmospheric Administration**
NWR	**National Wildlife Refuges**
OCPR	**Office of Coastal Protection and Restoration**
OCS	**Outer Continental Shelf**
ODMDS	**Ocean Dredge Material Disposal Site**
OP	**Offshore Pump-out**
OR	**Offshore Re-handle**
OYS	**Oyster Propagation**
PCR	**Primary Contact Recreation**

RPM	**Reasonable and Prudent Measures**
SCR	**Secondary Contact Recreation**
SDS	**Sediment Delivery System**
SHPO	**State Historic Preservation Office(r)**
SSA	**Sole Source Aquifer**
TMDL	**Total Maximum Daily Load**
USACE	**United States Army Corps of Engineers**
USEPA	**United States Environmental Protection Agency**
USFWS	**United States Fish and Wildlife Service**
WIC	**Waterbody Impairment Combination**
WQC	**Water Quality Certification**

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1.0 INTRODUCTION

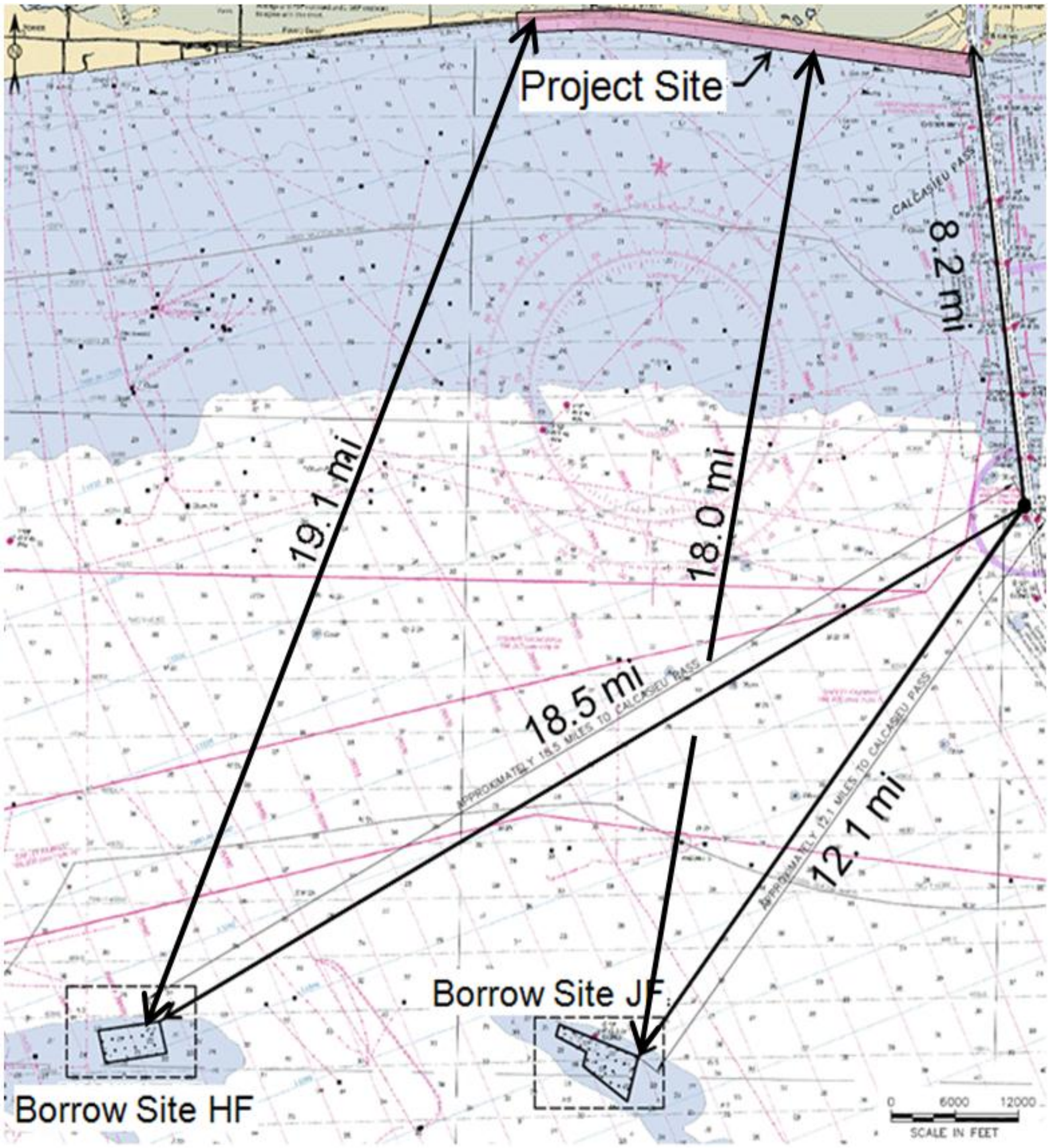
The proposed project involves dredging sand from the Outer Continental Shelf (OCS) for use in the Cameron Parish Shoreline Restoration Project (CS-33 SF), in Cameron Parish, Louisiana. The project will be constructed using state surplus funds provided by the State of Louisiana, Office of Coastal Protection and Restoration (OCPR). The purpose of this Environmental Assessment (EA) is to analyze the potential environmental impacts, in accordance with the National Environmental Policy Act of 1969 (NEPA), associated with the Bureau of Ocean Energy Management (BOEM) issuing a non-competitive negotiated agreement (NNA) to the OCPR, for the use of Gulf of Mexico (GOM), OCS sand resources. The EA summarizes the extensive alternatives analysis conducted for the sand source, the sediment delivery system, and the beach nourishment project conducted over the last several years. The analyses are contained in three separate documents, all of which are included in the Appendices (A, B, and C, respectively): *Cameron Parish Shoreline Restoration Project (CS-33 SF)*, *Borrow Source Investigation (2009); Cameron Parish Shoreline Restoration Project (CS-33 SF)*, *30% Design Report (2011); and Cameron Parish Shoreline Restoration Project (CS-33 SF)*, *20% Design Report (2010).*

The project has been coordinated through the joint permit process between the Louisiana Department of Natural Resources (LDNR), the United States Army Corps of Engineers (USACE), and the Louisiana Department of Environmental Quality (LDEQ), as an LDNR Coastal Use Permit (CUP), USACE Section 10/404 permit, and 401 Water Quality Certification (WQC) are required for the construction of the project. Through the joint permit process, public comments have been received through the public notice period and coordination between the state and federal agencies continued through the issuance of the permit on April 2, 2012.

1.1 Project Location and Setting

The overall project area encompasses two sites: an offshore sand source, and an onshore beach nourishment location. The sand source is within West Cameron Area OCS Lease Blocks 114 and 117 on the Sabine Bank sand body in the GOM (**Figure 1**). There are two borrow areas, the HF site and the JF site. The beach nourishment site, hereinafter referred to as the Cameron Parish Shoreline Restoration Site (CPSRS), is along the southwest shoreline of Cameron Parish, Louisiana. More specifically, the CPSRS is between the western Calcasieu Pass jetty and the easternmost breakwater of the Holly Beach-Constance Beach breakwater field, a distance of approximately 8.7 miles (**Figure 2**). The CPSRS includes Calcasieu Pass and the community of Holly Beach.

FIGURE 1
SABINE BANK SAND SOURCE SITES



Source: CHE 30% Design Report, Figure 12

FIGURE 2
CAMERON PARISH SHORELINE RESTORATION SITE

Source: CHE 30% Design Report, Figure 1

The area between the CPSRS and Sabine Bank has been affected by dredge material deposition (associated with the maintenance dredging of Calcasieu Pass), the mobile GOM hypoxic zone, and the BP Mississippi Canyon 252 release (Deepwater Horizon Spill). Dredge material deposition has been occurring on the east and west side of the Calcasieu Ship Channel since the 1940s. Material dredged annually from the bar channel continues to be deposited adjacent to and south of the jetties along the west side of the channel. The GOM hypoxic zone varies in size and location on an annual basis and has been documented in the vicinity of Sabine Bank. In April 2010, catastrophic failure of a blowout preventer at the Deepwater Horizon offshore drilling platform resulted in the release of oil into the GOM from April through August. Research and monitoring since the event revealed evidence that submerged mat of weathered tar remain off the coasts of Florida and Alabama at varying depths (www.bp.com). No evidence of submerged tar mats was identified off the Louisiana coast.

Various coastal restoration/protection projects have occurred within the bounds of or adjacent to the CPSRS. These projects include the breakwater field that exists between Holly Beach and Constance Beach, a beach nourishment project completed in 2003 between Constance and Peveto Beaches, and the construction of a concrete revetment in the 1970s to protect Louisiana Highway 82 (LA 82).

1.2 Purpose and Need

Plagued by chronic erosion and resulting shoreline retreat, areas to the west of the CPSRS have received some benefit from the construction of a concrete revetment designed to protect LA 82, a breakwater field (approximately 85 structures), and a beach nourishment project between the years of 1971 and 2003. Despite these projects, the CPSRS continues to experience high rates of erosion that threaten public and private infrastructure, as well as sensitive coastal marshes. Approximately 40,000 acres of brackish coastal marshland exists immediately north of LA 82 in the project area. This marsh system would be irrevocably impacted by exposure to wave action and high salinity waters in the event the beach and LA 82 were breached.

The project purpose is to protect public and private infrastructure including the remaining chenier beach ridge, LA 82, and the community of Holly Beach from further erosion, wave energy, and shoreline retreat through storm damage reduction. The project need is driven by chronic erosion and lack of replenishment from littoral transport. Without the project, erosional processes will eventually breach the chenier beach, exposing the fragile coastal marsh landward of the chenier to increased salinity and wave action, as well as threaten the integrity of Holly Beach and damage adjacent infrastructure.

The stated project goal is to extend the longevity of the chenier beach in a manner that will delay shoreline retreat and prevent breaching of the beach for the next 20 years. Preventing breaching is paramount to the protection of the brackish marsh north of LA 82.

1.3 Authority

This EA is being prepared in association with a beach nourishment project designed to protect the public and private resources of the CPSRS for approximately 20 years. Benefits anticipated from the project include protection of approximately 40,000 acres of coastal marsh north of LA 82, maintaining the integrity of Holly Beach and LA 82. These benefits translate into economic benefits for Cameron Parish. Construction of the project requires the issuance of a USACE Section 10/404 permit, a CUP, a Section 401 WQC, and an NNA between the BOEM and the OCPR. It has been prepared in accordance with NEPA, the Outer Continental Shelf Lands Act, and the laws, regulations, Executive Orders, and guidance as provided in **Table 6.1** of this document. Funding in support of this project was received through an act of the Louisiana legislature in 2008.

2.0 ALTERNATIVES

The alternatives analysis conducted for this project included consideration of the no build alternative, locating borrow sites, five build alternatives for the sediment delivery system, and five build alternatives for the beach nourishment configuration. A brief summary of the alternatives is presented below.

Detailed analysis of potential alternatives for the borrow sites is contained in **Appendix A**, the *Cameron Parish Shoreline Restoration Project (CS-33 SF)*, *Borrow Source Investigation* (2009) prepared by Coast and Harbor Engineering, Inc. (CHE). The build alternatives for the sediment delivery systems and beach nourishment along with decision matrices are presented in **Appendix B**, the *Cameron Parish Shoreline Restoration Project (CS-33 SF)*, *30% Design Report* (2011) (*30% Design Report*).

2.1 Borrow Source Identification

The borrow source identification process was a two-step process involving a preliminary investigation and a final investigation. The purpose of the investigation was to locate a sand source for the CS-33 SF project. Potential environmental impacts would be considered at such time as a site or sites that contained suitable material was located. If a suitable sand source could not be located, no impacts would be expected.

The preliminary investigation consisted of a literature review aimed at identifying sites with a high probability of containing usable sediment with a low risk of unusable sediments. The final investigation was designed to narrow the search and focus on delineating the site or sites identified in the preliminary investigation for use as the borrow site.

The literature investigation considered nearshore and offshore regions. The nearshore investigation focused on identifying sediment in buried fluvial channels that may contain material suitable for beach nourishment. The 2003 Peveto-Constance Beach nourishment project utilized material from the buried Peveto Fluvial Channel. The offshore investigation focused on delineating beach nourishment quality sediment from various Sabine Bank features. This focus was based on work that identified sand accumulations at or near the seafloor deposited during the most recent transgression (Paine et al. 1988). Morton and Gibeaut (1993) estimated that at least 195 million cubic yards of sand is available from the eastern portion of Sabine Bank.

Three potential nearshore sites associated with fluvial channel locations were identified in the preliminary investigation:

- LGS 1985 investigation sites west of Calcasieu Pass
- Peveto Fluvial Channel
- Offshore Cameron Fluvial Channels

One offshore site, Sabine Bank, was identified in the preliminary investigation. Work by Morton and Gibeaut (1993) and Coastal Planning and Engineering (CPE) (2001, 2002) was sufficient to indicate that Sabine Bank could be a successful borrow site, but additional geophysical surveying and sampling would be required to confirm this indication.

2.2 Sediment Delivery System (SDS) Alternatives

SDS - Alternative 1 – Calcasieu Pass Rehandle (CPR)

Under the CPR Alternative, material will be dredged from Sabine Bank using a trailing suction hopper dredge. The dredged material will then be transported to the approved re-handling site in Calcasieu Pass, outside the Calcasieu Ship Channel, where it will be bottom dumped. A cutterhead dredge will re-dredge the material from the re-handling site and pump it to the beach nourishment sites using a pipeline and booster pumps as needed.

SDS - Alternative 2 – Calcasieu Pass Pumpout (CPP)

Under the CPP Alternative, material will be dredged from Sabine Bank using a trailing suction hopper dredge. The dredged material will then be transported to a designated pump-out station in Calcasieu Pass. Here the hopper dredge will connect to a pipeline and pump the material directly from the dredge's hopper to the beach nourishment sites using booster pumps as necessary. The pump-out station may require placement of temporary mooring piles and/or a jack-up barge or similar equipment, to be removed after construction.

SDS - Alternative 3 – Offshore Rehandle (OR)

Under the OR Alternative, material will be dredged from Sabine Bank using a trailing suction hopper dredge. The dredged material will then be transported to a designated re-handling site in open water offshore of the CPSRS where it will be bottom dumped. A cutterhead dredge will re-dredge the material from the re-handling site and pump it to the beach nourishment sites using a pipeline and booster pumps as needed. The proposed re-handling area is six to seven miles offshore of the CPSRS.

SDS - Alternative 4 – Offshore Pumpout (OP)

Under the OP Alternative, material will also be dredged from Sabine Bank using a trailing suction hopper dredge; then dredged material will be transported to a designated pump-out station in open water offshore of the CPSRS. Here, the hopper dredge will connect to a pipeline and pump the material directly to the beach nourishment sites using booster pumps as necessary. The pump-out station may require placement of temporary mooring piles and/or a jack-up barge or similar equipment, to be removed after completion of construction, and is proposed to be six to seven miles offshore.

SDS - Alternative 5 – Direct Pumpout (DP)

Under the DP Alternative, material will be dredged from Sabine Bank using a cutterhead dredge and pumped via pipeline from the dredge sites to the beach nourishment sites using booster pumps as necessary. Booster pumps will be on jack-up barges or similar temporary structures along the pipeline as needed.

SDS No Build Alternative

The SDS No Build Alternative assumes there will be no sand mined at Sabine Bank that will require transport to the CPSRS.

2.3 CPSRS Beach Nourishment Alternatives

Five build alternatives and the no build alternative for the beach nourishment project were considered. All of the build alternatives incorporate three million cubic yards of sand as fill material. The five build alternatives are shown on **Figure 3.**

CPSRS Alternative 1

This alternative involves uniform placement of sand (beach and dune) across the entire length of the project. The end result is 320 feet of beach nourishment along the 8.7-mile CPSRS.

CPSRS Alternative 2

Alternative 2 incorporates a tiered concept with wider berms at the western Calcasieu Pass jetty narrowing westward. Adjacent to Calcasieu Pass, the berm width would be the widest at 430 feet. The second tier is closest to LA 82 and would be 330 feet wide. The third tier would be 230 feet wide from Holly Beach to the end of the CPSRS. The tiers correspond to the anticipated rates of shoreline retreat, with the widest berm in the area of highest land loss.

CPSRS Alternative 3

Protection of LA 82 is the focus of Alternative 3. Sections of LA 82 are threatened with undermining and breaching. This alternative has a uniform width of 540 feet over 20,000 linear feet along the sections where the shoreline is in close proximity to the road. No additional material is placed in the CPSRS with the understanding that predominant drift is to the west and beach nourishment material will travel and deposit westward of the placement location.

CPSRS Alternative 4

Alternative 4 is a hybrid of Alternatives 2 and 3, placing 390 feet of sand along the road where the shoreline is closest and placing 140 feet of sand in front of Holly Beach and Calcasieu Pass.

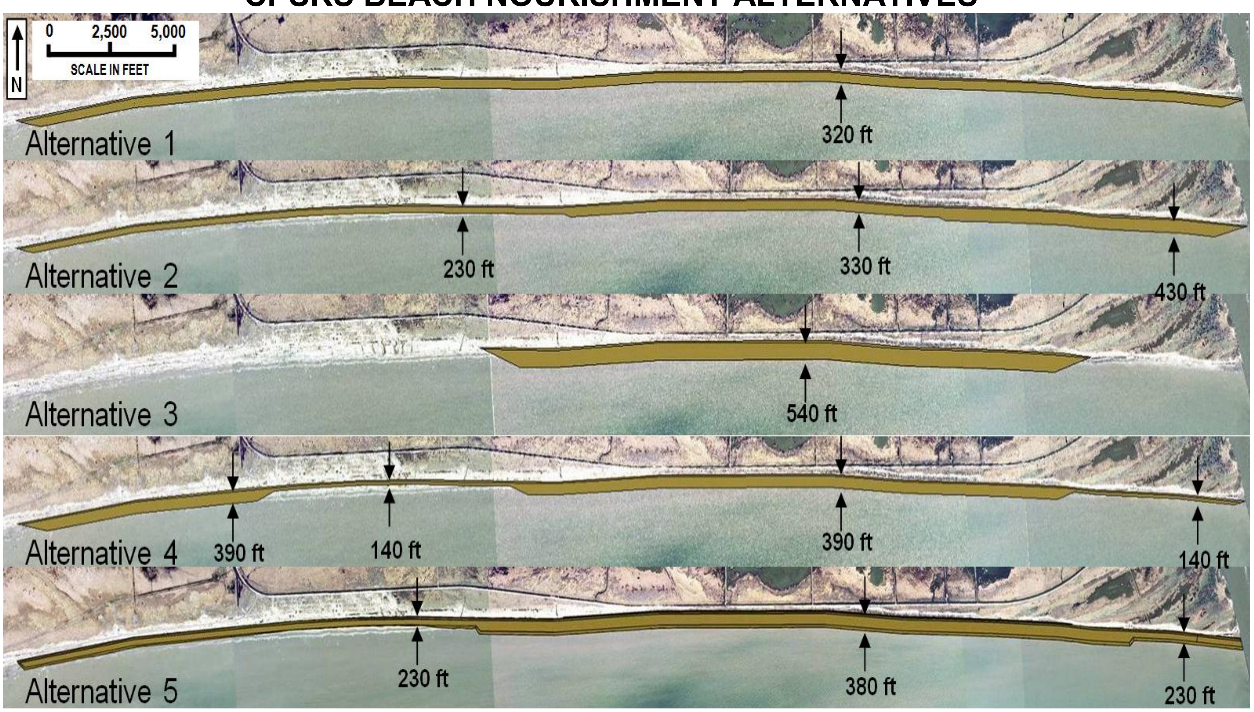
CPSRS Alternative 5

This alternative involves creating a wide beach area (380 feet) where LA 82 is closest to the shoreline and 230 feet over the rest of the CPSRS. Alternative 5 enhances the part of the shoreline and highway that are in immediate threat of breaching, while providing nourishment to the entire shoreline.

CPSRS No Build Alternative

This alternative involves not constructing the recommended beach nourishment project at the CPSRS.

FIGURE 3
CPSRS BEACH NOURISHMENT ALTERNATIVES



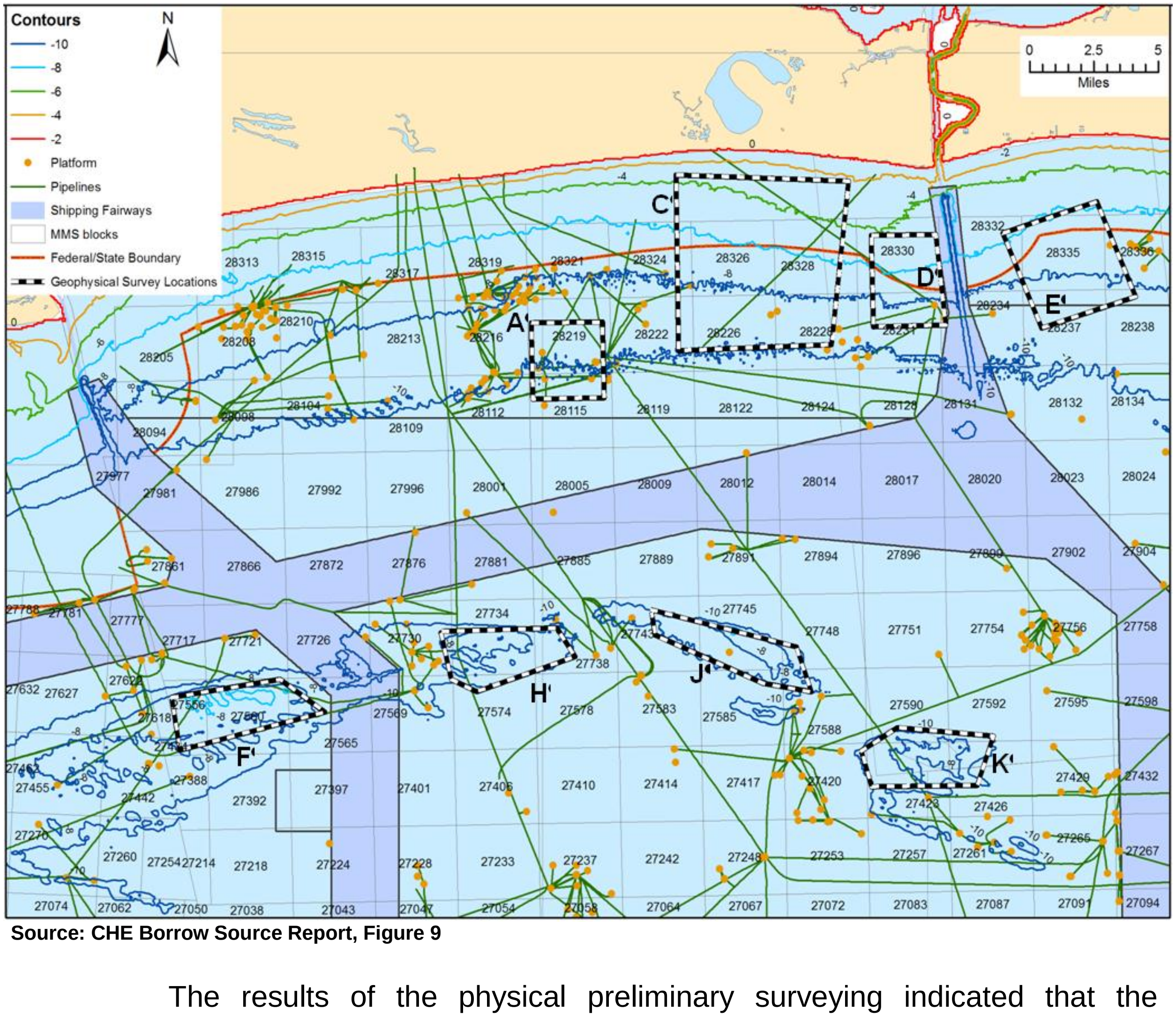
Source: CHE 30% Design Report, Figure 33

2.4 Alternatives Analysis

2.4.1 Borrow Source Alternatives

Preliminary investigation surveying involved eight GOM blocks, including four nearshore and four offshore blocks. The nearshore blocks focused on the buried fluvial channels and the offshore blocks were in the vicinity of Sabine Bank. **Figure 4** demonstrates the survey areas. Approximately 180 line miles of geophysical surveying was included in the preliminary investigation, which included subbottom profiling, side-scan sonar, magnetometer, and bathymetric data collection, in addition to 50 vibracores to calibrate and verify the sites identified through the geophysical survey.

FIGURE 4
BORROW SOURCE INVESTIGATION SURVEY SITES

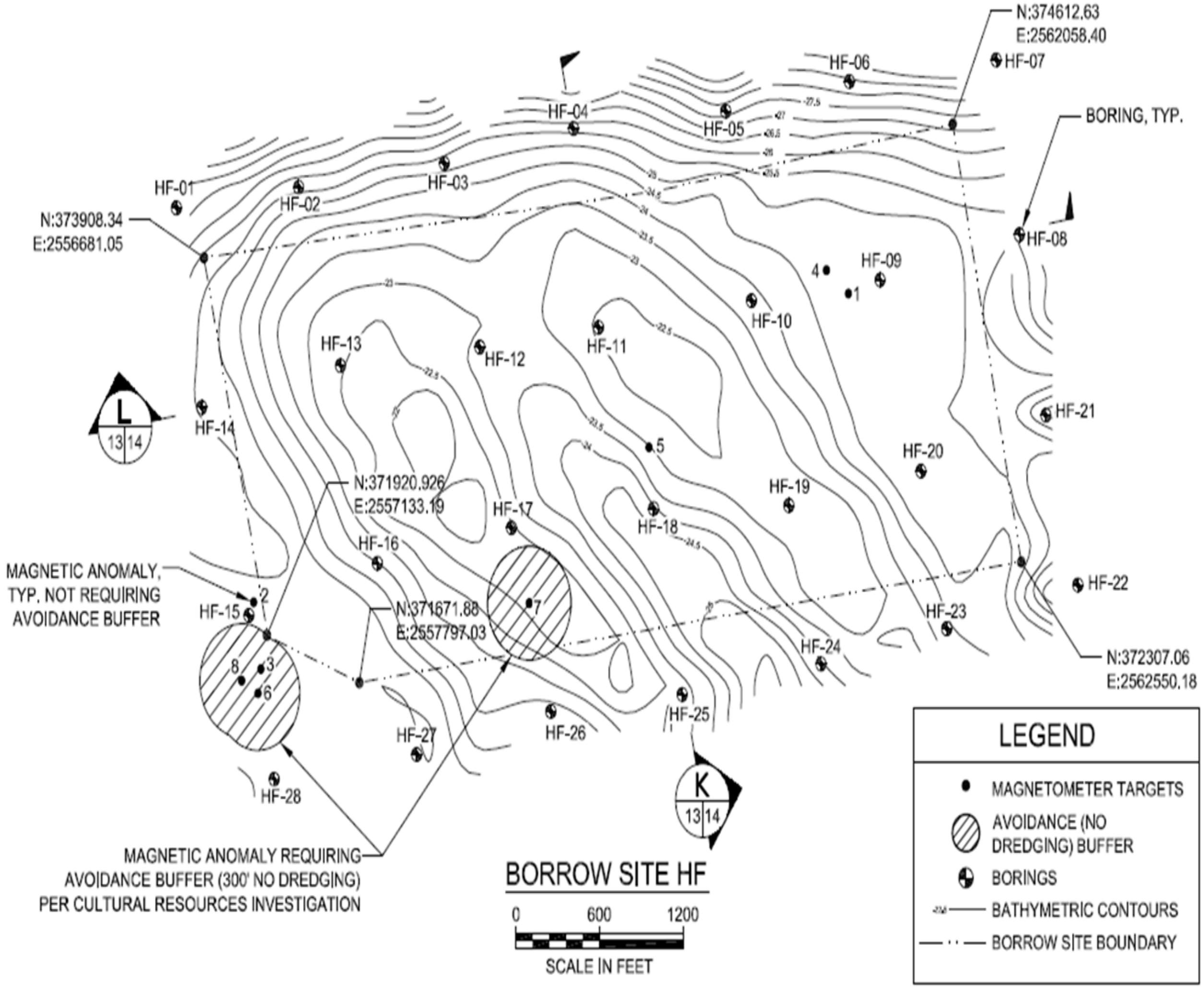


Source: CHE Borrow Source Report, Figure 9

The results of the physical preliminary surveying indicated that the likelihood of the nearshore sources containing appropriate beach nourishment material was minimal. Significant survey effort would be necessary to fully determine if suitable material was present in necessary quantities. In contrast, the offshore survey indicated that a large quantity of high quality sand, situated within approximately 14 million cubic yards of suitable and less desirable sand, was present in areas H and J (**Figure 1**). In addition to the extensive survey effort required to accurately assess the use of the nearshore sites, environmental and economic impacts would be expected to be more significant at the nearshore sites. The fluvial channel sites are located in commercial fishing zones and shallow water that would remain turbid for longer periods than deeper offshore sites. Additional analysis relative to long-term shoreline change impacts as a result of sand mining close to shore would also be required. These findings resulted in focusing the final physical investigation on the two offshore areas of Sabine Bank.

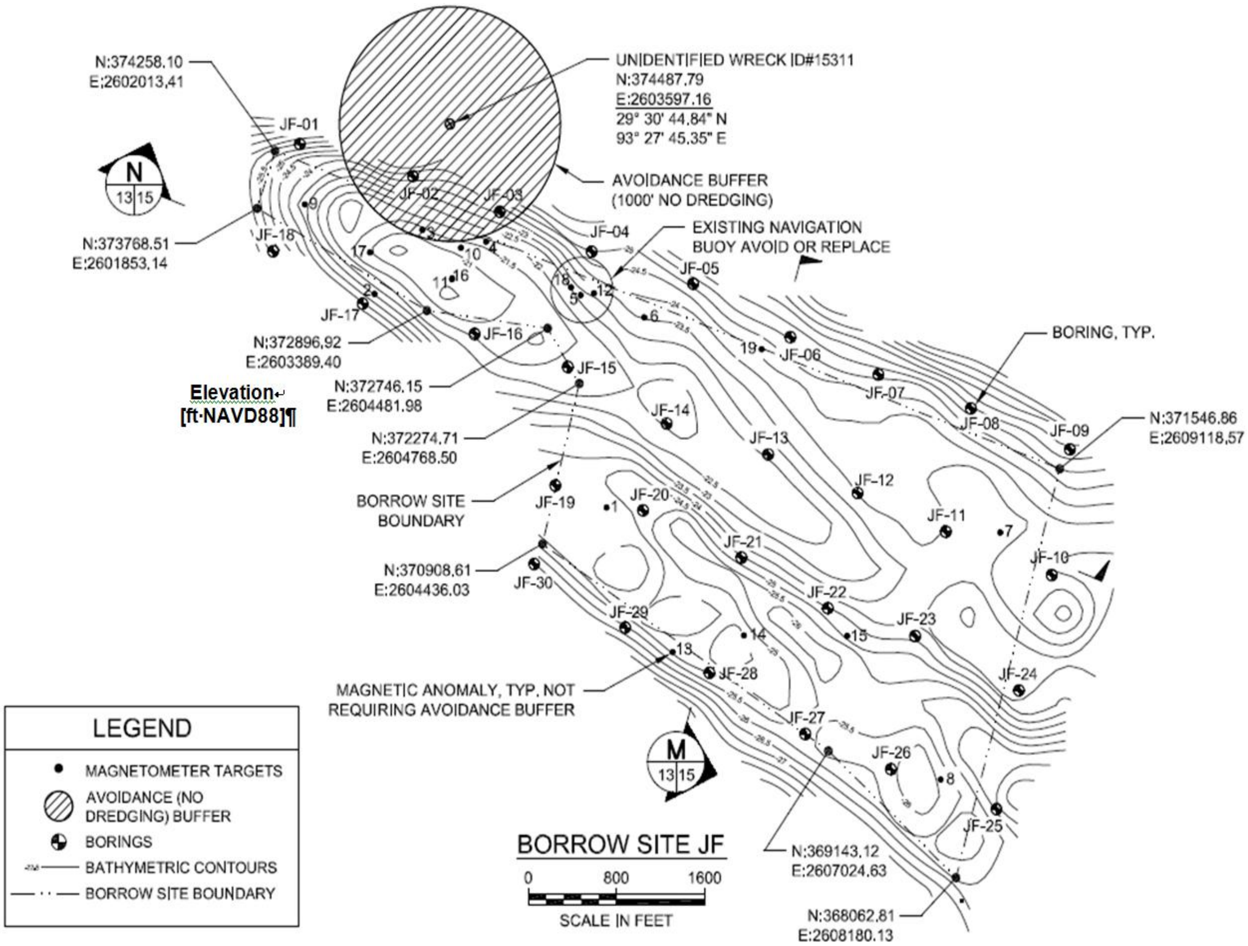
The final investigation assumed a need for five million cubic yards of material. Field work associated with the final investigation included approximately 50 line miles of geophysical exploration to delineate the potential sources and identify cultural resources and 20 vibracores at 1000-foot spacing. The results of the survey resulted in the determination that two sites within areas H and J would be suitable to provide the material for the CPSRS. The two areas were delineated in order to ensure that sufficient volumes of sand would be available in the event that potential sensitive cultural resources and/or environmentally sensitive features were located within the borrow sites that may reduce the usable area. Two anthropogenic features were located near JF, an unidentified shipwreck and a navigation buoy. A 1000-foot buffer was applied to the shipwreck. Three potentially sensitive cultural resource areas were identified in HF, all of which will have a 300-foot buffer applied during dredging activities. **Figure 5** and **Figure 6** demonstrate the bathymetry of the selected sites HF and JF, respectively.

FIGURE 5
BATHYMETRY OF BORROW SOURCE SITE HF



Source: CHE Borrow Source Report, Figure 14

FIGURE 6
BATHYMETRY OF BORROW SOURCE SITE JF



Source: CHE Borrow Source Report, Figure 15

2.4.2 SDS Alternatives

The five SDS build alternatives were evaluated based on:

- potential environmental impacts
- cost estimate
- construction time
- need for new data collection
- potential impacts to industry, navigation, and other users
- risks to project completion

Since the SDS No Build alternative would not meet the purpose and need of the project or require dredging, it was not evaluated on the above factors. A dredge material volume of three million cubic yards was assumed for all five build alternatives. Permitting time-frames as they related to threatened and endangered species and essential fish habitat are equal across each alternative. All alternatives will require some level of additional data collection. Regardless of whether the pipelines are floating or anchored to the bottom, differing degrees of impacts to navigation and fishing are likely. Permitting time for the three alternatives involving offshore to onshore material transport in open water is expected to be longer due to the transfer of the materials via pipeline from federal to state waters. Cost, construction time, and risks to project completion are variable between the five alternatives. The data shown in **Table 2.1** is from Table 15 of the *30% Design Report* and summarizes the evaluation factor analysis. Based on the analysis of the evaluation factors, the *30% Design Report* recommended carrying SDS Alternative CPR and SDS Alternative CPP through to final design for project construction bidding. The report recommends carrying forward SDS Alternative OP as an alternate in the event that unforeseen circumstances make the Calcasieu Pass alternatives less desirable and the risks associated with six miles of pipeline perpendicular to the shoreline are acceptable. SDS Alternatives OR and DP were recommended to be excluded from further study due to high cost, risk, and excessive construction time. In the time that elapsed between the *30% Design Report* and the preparation of this EA, SDS Alternative OP was removed from further study and design due to the potential risks associated with six miles of pipeline perpendicular to the shoreline in open water.

TABLE 2.1
SUMMARY OF SDS ALTERNATIVES

Alternative	% change from least cost alternative	Duration [days]	Maximum Production Rate [cy/day]	Effective Downtime [%]
SDS 1 CPR	least cost	207	17,769	22
SDS 2 CPP - 1L	125%	306	12,115	20
SDS 2 CPP - 1M	155%	531	6,984	20
SDS 2 CPP - 2L	116%	153	24,532	20
SDS 2 CPP - 2M	144%	264	13,969	20
SDS 3 OR	193%	537	13,774	60
SDS 4 OP - 1L	140%	291	13,890	27
SDS 4 OP - 2L	131%	147	27,780	27
SDS 5 DP	235%	549	13,473	60

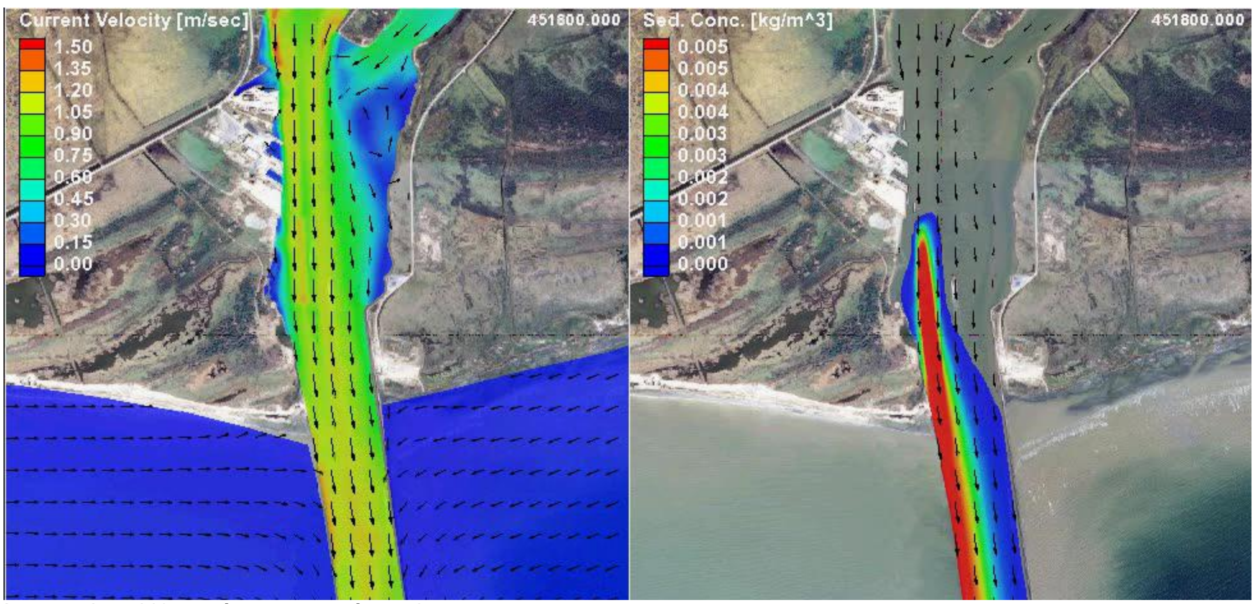
Source: CHE 30% Design Report, Table 15
SDS – Sediment Delivery System **CPR – Calcasieu Pass Rehandle** **CPP – Calcasieu Pass Pumpout**
OR – Offshore Rehandle **OP – Offshore Pumpout** **DP – Direct Pumpout**
L – Large hopper dredge **M – Medium hopper dredge**

The potential impacts to industry (fishing, oil and gas) and navigation were considered as stated. SDS Alternative CPP will have no direct impacts to the navigation channel and it is anticipated to have minimal to no impact to local fishermen during shrimping seasons.

The re-handling site associated with SDS Alternative CPR was selected in consultation with federal navigation, fishing, and shipping interests

(**Appendix D**). Tidal currents naturally scour this channel reach and no maintenance dredging is required (USACE, pers. comm.). While studies have indicated that the volume of sediment that may be dispersed from the re-handling site to the channel "is negligible and will not measurably affect the navigable depth," frequent surveys during construction will monitor water depth and will identify any sedimentation. The potential for erosion of the re-handling site mound and subsequent sedimentation of the adjacent ship channel was investigated using CHE's proprietary sediment transport and morphology model MORPHO (Kivva et al. 2004). **Figure 7** and **Figure 8** demonstrate the results of the MORPHO model relative to the affect the re-handling site may have on current velocities in the ship channel and sedimentation. **Figure 9** demonstrates a cross-section through the proposed re-handling site in the Calcasieu River. If the project is found to cause sedimentation of the ship channel, contractors will remove the material as quickly as possible.

FIGURE 7
RE-HANDLING SITE (A) CURRENT VELOCITIES FOR EXISTING CONDITIONS AND (B) SEDIMENT CONCENTRATION ERODED FROM THE RE-HANDLING SITE AS SIMULATED WITH THE MORPHO MODEL

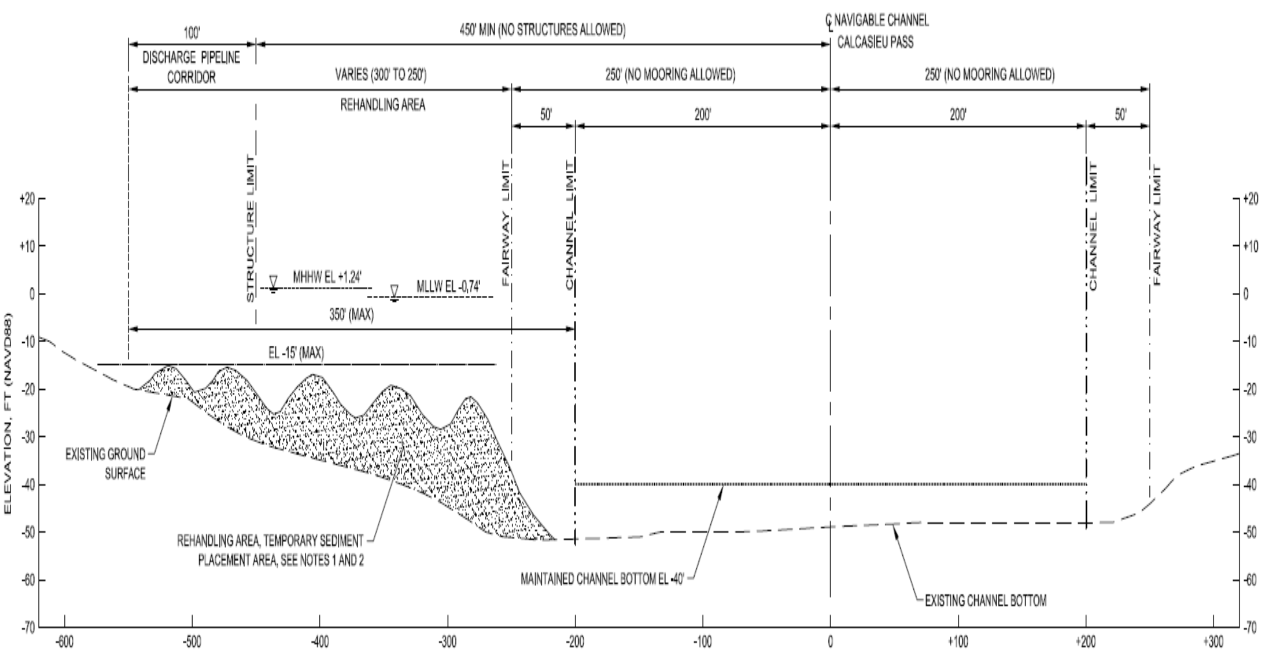


Source: CHE 30% Design Report, Figure 37

FIGURE 8
BED CHANGE RESULTING FROM FIVE MONTHS OF SEDIMENT TRANSPORT FROM THE RE-HANDLING SITE

Source: CHE 30% Design Report, Figure 37

FIGURE 9
CROSS-SECTION OF THE RE-HANDLING SITE IN THE CALCASIEU RIVER



Source: CHE 30% Design Report,

2.4.3 CPSRS Alternatives

The five CPSRS build alternatives were analyzed relative to potential environmental impacts and their ability to meet the project goal: to extend the longevity of the chenier beach in a manner that will delay shoreline retreat and prevent the breaching of the chenier beach for the next 20 years. The positive and incremental benefits to the environment resulting from the construction of the CPSRS were determined to be significant when compared to the short-term construction impacts; therefore, biological environmental factors were not included in the final build alternatives analysis. To accomplish the build alternatives analysis, shoreline positions for the 20-year project life were predicted and the 2009 shoreline was compared to the predicted 2029 shoreline. The dynamic sediment budget method (CHE, 2010) was used to make these shoreline predictions. A complete description of this method is included in the *Cameron Parish Shoreline Restoration Project (CS-33 SF)*, *20% Design Report (2010) (20% Design Report)* located in **Appendix C**; the analysis conducted for the CPSRS alternatives is fully detailed in the *30% Design Report*. This method predicts shoreline location using historical data and computed empirical factors and parameters, including:

- longshore transport rates
- morphological processes (known sediment wave and cross-shore geotechnical composition)
- statistical estimates of storm events
- beach nourishment diffusion
- profile composition (the relationship between shoreline change and volume change)

As shown on **Tables 2.2** and **2.3** below, Alternatives 2 and 5 demonstrated the best performance. **Table 2.2** presents gains and losses of beach area based on the 2009 shoreline position. **Table 2.3** provides a relative performance comparison of the build alternatives in four areas considered necessary to meet the project goal: erosion reduction along the entire shoreline, short-term protection, long-term protection, and cost. The best performing alternatives were assigned a numerical value of 5 and the worst were assigned a numerical value of 1. Alternative 2 resulted in the most erosion reduction over the entire area, with the highest net area seaward of the 2009 shoreline. This alternative was determined to have the best long-term performance, as the bulk of the sediment would be deposited on the eastern portion of the CPSRS and sediment transportation will occur from east to west. Alternative 5 demonstrated similar performance to Alternative 2 with two differences: Alternative 5 offers immediate protection after construction to one of the most critical areas of the shoreline along LA 82. However, as a result of the wider beach at this location and due to the more uniform distribution of sediments, it is somewhat less effective than Alternative 2 in relation to long-term erosion reduction.

TABLE 2.2
ESTIMATED LOSSES AND GAINS OF BEACH AREA AFTER CONSTRUCTION OF BEACH NOURISHMENT AND AFTER 20 YEARS

Alternative	Post-Construction Beach Gain [acres]	20-year Beach Gain [acres]	20-yr Beach Losses [acres]
1	268	79	52
2	266	67	35
3	258	104	69
4	273	90	59
5	267	82	48

Source: CHE 30% Design Report. Table 16
Based on 2009 Shoreline position.

TABLE 2.3
COMPARISON OF BEACH NOURISHMENT ALTERNATIVES

Alternative	Erosion reduction along entire project site	Short-term protection	Long-term protection	Relative cost	Total score
1	4	3	3	3	13
2	4	3	4	4	15
3	2	3	2	3	10
4	3	5	3	2	13
5	4	4	3	4	15

Source: CHE 30% Design Report, Table 17
Rankings for erosion reduction, protection, and cost are based on 5 as the best, 1 as the worst

The CPSRS No Build Alternative was not analyzed in the same manner as the build alternatives, as none of the evaluation factors would occur. If no action is taken at the CPSRS, erosion will eventually damage adjacent infrastructure, including Holly Beach, as well as expose the fragile coastal marsh landward of the chenier beach to increased salinity and wave action. The speed and severity with which damage occurs depends on the number and intensity of tropical systems and winter storms that impact Cameron Parish in the near future. There are locations along LA 82 where there is less than 15 feet of beach between the highway and the GOM. These areas are currently threatened by the most minimal of tropical systems. Once sustained exposure to wave action occurs, the road bed could be undermined, causing the collapse of LA 82, the designated hurricane evacuation route for residents in coastal Cameron Parish. Loss of the roadway would allow high salinity waters instant access to marshes north of LA 82, where permanent damage to the ecosystem would occur. Additionally, any infrastructure north of LA 82 would be subject to wave action and subsequently be damaged or destroyed.

The complete alternatives development and analysis of the CPSRS alternatives was presented to the Project Team, Cameron Parish Police Jury, and other local stakeholders. Alternative 5 was selected by the Project Team and the Cameron Parish Police Jury to move forward to final design.

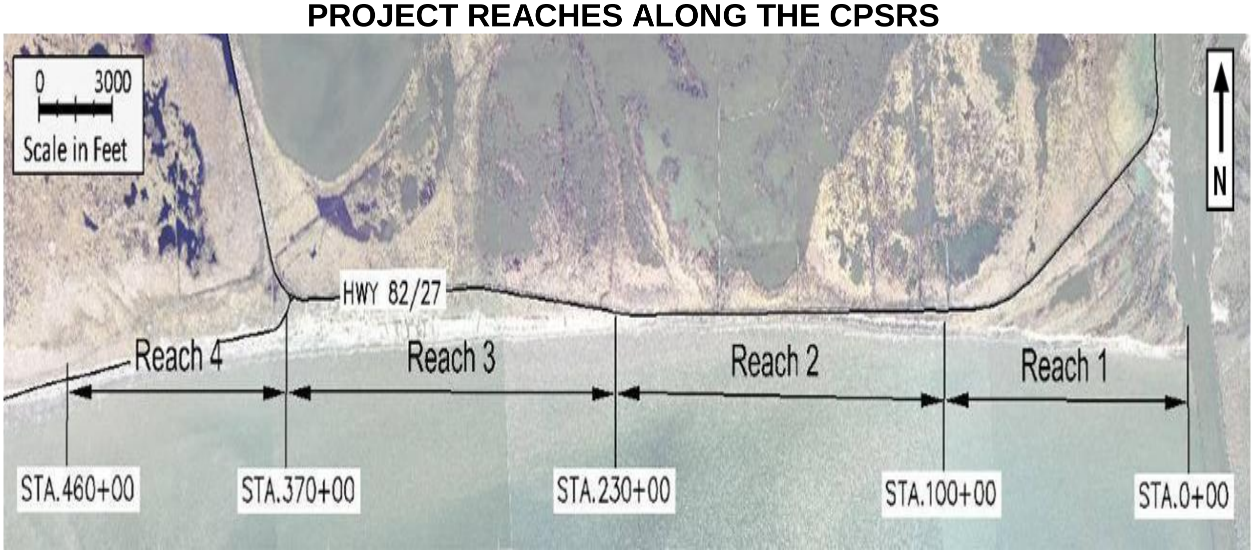
In summary, Sabine Bank was selected as the most practical and least environmentally damaging borrow site, SDS Alternatives CPR and CPP were selected on the basis of less environmental impact, practicality, and cost, and CPSRS Alternative 5 was selected as the beach nourishment alternative based on performance and cost, as environmental factors were equal across the alternatives. These selected alternatives will continue through the design process and potentially to construction bid documents.

3.0 AFFECTED ENVIRONMENT

3.1 Physical Resources

Due to the variability of physical conditions, morphology, hydrodynamics, and sediment transport along the 8.7-mile CPSRS, the shoreline was divided into four reaches for analysis and design (**Figure 10**). Features of the physical environment of the CPSRS will be divided into reaches only when necessary to describe current conditions. A separate discussion of Calcasieu Pass is not provided, as the sediment delivery alternative components are included in the CPSRS discussion. The two Sabine Bank sand sources (the HF site and the JF site) are similar enough with respect to geology and topography to not be discussed separately.

FIGURE 10
PROJECT REACHES ALONG THE CPSRS



Source: CHE 30% Design Report, Figure 2

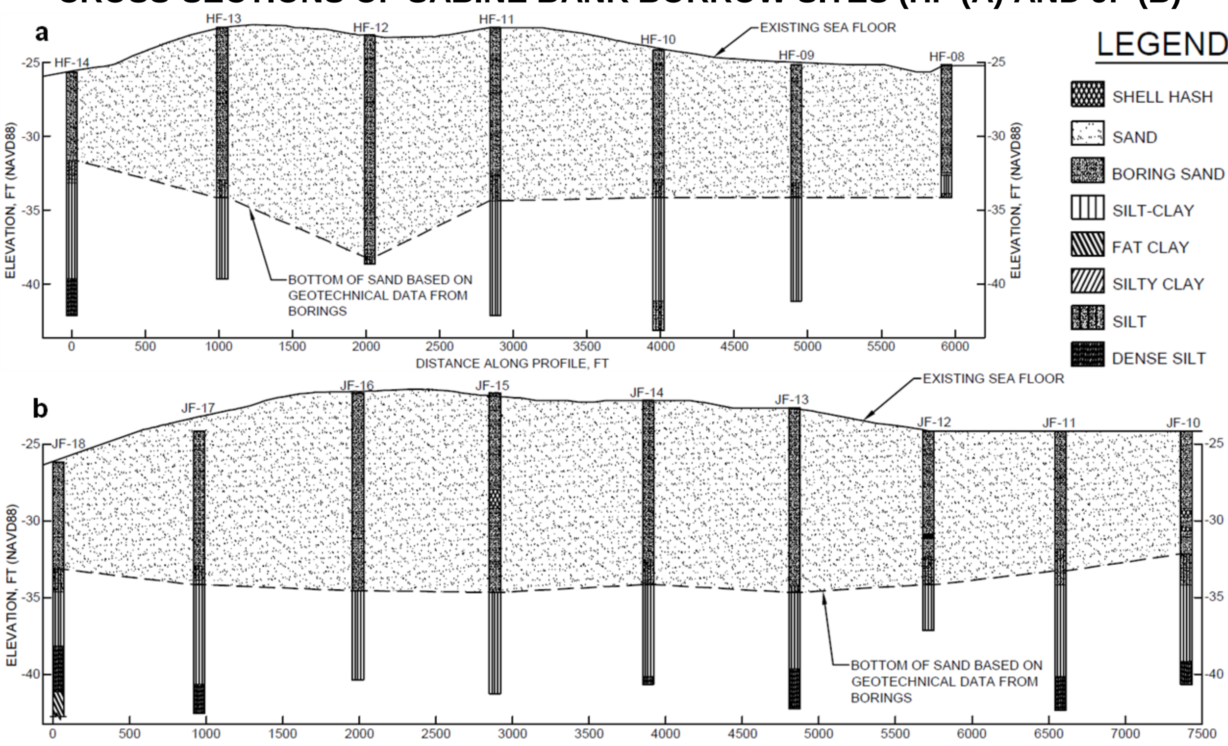
3.1.1 Geology/Topography

3.1.1.1 Sabine Bank

Sabine Bank is located on the Texas shelf, which is believed to owe much of its bathymetry and morphology to alternating periods of sea level rise and fall during the Pleistocene (Morton and Gibeaut, 1993). As a barrier remnant, Sabine Bank likely formed during minor reverses in sea level (Morton and Gibeaut 1993). Since the bank lies along the southern margin of the entrenched valleys of the Sabine and Calcasieu Rivers and above valley fill deposits, it postdates the valley fill. In terms of depth, Sabine Bank is defined by the 32-foot isobaths, with the shallowest areas to the east around 22 feet below mean lowest low water (MLLW) to greater than 33 feet below MLLW to the west (Morton and Gibeaut 1993).

Figure 11 represents cross-sections of the borrow sites, both of which were obtained from the *30% Design Report*. As shown on the figure, the sites are somewhat flat to gently sloping on the surface, which is composed of high quality fine- to medium-grain sand with a very low composition of silt and clay. The sand layer is approximately ten feet thick across the borrow areas and contains less than 20 percent shell hash (finely ground shell material) based on sediment cores. No significant man-made features were observed within either borrow site (CHE 2010).

FIGURE 11
CROSS-SECTIONS OF SABINE BANK BORROW SITES (HF (A) AND JF (B)



3.1.1.2 CPSRS

The CPSRS is on Louisiana's chenier plain. The chenier plain of coastal southwestern Louisiana developed its ridge and swale characteristics in a marginal deltaic environment during a series of shoreline transgressions and regressions over the past 3,000 to 4,000 years (Gould and McFarlan 1959; Penland and Suter 1989). The plain stretches approximately 125 miles from west of Sabine Pass, Texas, to Southwest Point, Louisiana, and ranges between 12 to 20 miles in width (Penland and Suter 1989). Chenier plain evolution is closely related to variations in the influx of sediment supplied by the longshore currents as the Mississippi River shifted laterally through delta switching events (Gould and McFarlan 1959). The swale features are considered the result of rapid deposition of large quantities of reworked riverine sediments supplied by the Mississippi River during a more western position of the active delta. This rapid deposition resulted in the development of expansive mudflats. During a more eastern position of the active delta, the amount of sediment supplied to the area was drastically reduced, allowing wave action to rework the shoreline, winnowing coarse-grained material and producing narrow shell- and sand-rich shoreline ridges perched on top of the original mudflat. These shoreline retreat-advance cycles resulted in a net progradation of the seashore and development of the Louisiana Chenier Plain: a series of alternating shore-parallel ridges composed primarily of sand and shell perched on top of, and separated from each other by, regressive mudflats and marsh deposits. Now confined to the eastern end of the delta plain, much of the Mississippi River's sediment load is being deposited into the deep waters off the continental shelf. This results in a reduction in the amount of sediment transported by the littoral transport system (Gould and Morgan 1962). Although the Atchafalaya River delivers some sediment to this coastal region, the net reduction in material transported westward by the littoral system results in a transgressive system where the shoreline is being eroded. Data from 1880 to 2005 indicate that the project area has lost up to 40 feet of shoreline (McCorquodale et al. 2007). As a result, the chenier ridge at the CPSRS is almost completely removed and the beach face is now primarily composed of fine silt and clay.

<u>Reach 1</u>

Reach 1 includes an area that was designated for dredged material placement from the maintenance dredging of the Calcasieu Ship Channel and Calcasieu Pass. Calcasieu Bar Channel Ocean Dredge Material Disposal Sites (ODMDS) 1 and 2 are located adjacent to the Calcasieu Jetties and Calcasieu Pass and are utilized on an annual basis for the disposal of dredged material removed from the mouth of the Calcasieu River. Approximately 1.1 million cubic yards of material was placed in Calcasieu Bar ODMDS 2 in 2009. Recent dredging (2009) of the Calcasieu Ship Channel upriver from the shoreline removed approximately eight million cubic yards of material that was deposited in beneficial dredge disposal sites in the marshes north of LA 82 (USACE 2010). As a result of the history of dredge material disposal, part of this reach is marshy with a thin veneer of sand over a silt/clay core (*30% Design Report*). The majority of the reach is clay with little or no sand. There are small dune ridges, composed of overwash material and shell hash, present at various locations along the reach.

Reach 2

The majority of Reach 2 is clay with little or no sand. There are small dune ridges, comprised of overwash material and shell fragments, present at various locations along the reach. At Reach 2, LA 82 lies immediately landward of the clay erosional scarp and is, in some areas, separated from GOM waters by no more than 15 feet of vegetated mudflat.

Reach 3

Reach 3 is composed of a wide (400 to 500 feet) sandy beach with average dune heights of approximately +6 feet NAVD88 (*30% Design Report*). The sand is a mix of fine- to medium-grain sand with shell hash.

Reach 4

Reach 4 is a low, flat, narrow, sandy beach with no dunes and is composed primarily of fine sand. LA 82 lies immediately north of the beach in this reach and is less than 200 feet, on average, from the Gulf shoreline.

3.1.2 Water Resources

3.1.2.1 Sabine Bank

The borrow sites are on the seabed of the GOM, approximately 18.5 miles offshore from the CPSRS. There is not a significant volume of data on water quality at this distance from shore. Data associated with anthropogenic contamination was not located. A possible source of hydrocarbon contaminates could be the natural oil seeps on the slope in deeper oceanic waters. This seepage was documented by Gallaway et al. (1988). Current data on the state of water quality in the northern GOM is limited to the nearshore region and is associated with research into the hypoxic zone. Nutrient input from the Mississippi and Atchafalaya Rivers is monitored annually; however, data associated with nutrient loading in the vicinity of Sabine Bank was not located. The National Oceanic and Atmospheric Administration's (NOAA) National Coastal Data Development Center (NCDDC) maintains a hypoxia watch interactive map with data collected since 2002 on the movements of the hypoxic zone through the northern GOM. At any given time in any year, it is possible that oxygen levels on the seabed in or in close proximity to the Sabine Bank could be low. Based on data collected from 2002 through June 2011, oxygen levels detected near Sabine Bank have ranged from 3.0 to 8.0 parts per million (NCDDC 2011)

Thousands of water samples from the GOM, as well as nearshore and estuarine waters on the Louisiana coast, have been, and continue to be, collected as a result of the BP Mississippi Canyon 252 release. The release began in April 2010 and was effectively shut down on July 15, 2010. A review of sampling results available to date from BP has not yielded offshore ambient water quality data, only data specific to the constituents of the dispersant and hydrocarbons.

The average salinity in the central GOM is 35.6 parts per million (Minerals Management Service [MMS] 2000). Salinity levels are expected to be lower closer to shore because of the influence of freshwater input (McCorquodale et al. 2007). The thermocline of the GOM occurs further offshore than Sabine Bank, as the depth at Sabine Bank is not sufficient to demonstrate the decrease in temperature consistent with increasing water depth.

3.1.2.2 CPSRS

The CPSRS extends from Calcasieu Pass on the east, westward approximately 8.7 miles to the Holly Beach-Constance Beach breakwater field. Significant waterbodies in the area, in addition to Calcasieu Pass, include Mud Lake to the north and GOM waters.

Natural and Scenic Rivers

The Louisiana Natural and Scenic River Act of 1970 established the Louisiana Natural and Scenic River System, a state river protection initiative to limit impacts to those rivers, streams, and bayous afforded protection through the act. There are no Louisiana-designated natural or scenic rivers or segments or federally-designated Wild and Scenic Rivers at the CPSRS (Louisiana Department of Wildlife and Fisheries [LDWF], no date).

Sole Source Aquifers

A Sole Source Aquifer (SSA) is an aquifer designated by United States Environmental Protection Agency (USEPA) as the "sole or principal source" of drinking water for a given service area. A SSA is one that is used to supply 50 percent or more of the drinking water for a particular area (USEPA 2011). The Chicot SSA underlies the CPSRS. The Chicot Aquifer is of Pleistocene Age and is composed of fine sand and gravel interspersed with thin intermittent clay layers to very thick confining clay layers. The Upper and Lower Chicot units grade into a zone of undifferentiated sand. The Chicot Aquifer is the regional freshwater supply aquifer and is the most extensively pumped aquifer in the state.

Surface Water Quality

The CPSRS lies within two Water Quality Management Basins as defined by the LDEQ: Calcasieu and Sabine. The LDEQ publishes water quality data for state surface waters every two years. The most recent water quality inventory document, *2010 Louisiana Water Quality Inventory Integrated Report - Fulfilling the Requirements of the Federal Clean Water Act Sections 305(b) and 303(d),* was utilized to provide the data referenced in this section.

Surface waterbodies crossed by, or adjacent to, this segment that have data provided in the inventory include:

1. Calcasieu River from Moss Lake to the GOM – Subsegment LA0304012
2. Calcasieu Lake - Subsegment LA030402
3. Calcasieu River Basin coastal bays and GOM waters to three miles – Subsegment LA031201
4. Holly Beach – Subsubsegment LA031201-001
5. Sabine Lake – Subsegment LA110303
6. Sabine Pass – Subsegment LA110304
7. Sabine River Basin coastal bays and GOM waters to three miles – Subsegment LA110701
8. Constance Beach – Subsubsegment LA110701-001

Waterbody segments listed in 1, 2, 5, and 6 are fully meeting all four of their designated uses: primary contact recreation (PCR), secondary contact recreation (SCR), fish and wildlife propagation (FWP), and oyster propagation (OYS). Waterbody segments listed as 3, 4, 7, and 8 are fully meeting three of their four designated uses: PCR, SCR, and OYS. Their respective subsegments are not meeting the designated use of FWP due to the presence of mercury in fish tissues presumably from atmospheric deposition. The subsubsegments along the beachfront also have enterococcus contamination detected from an unknown source(s). Waterways under numbers 3 and 7 are classified as Integrated Report Category (IRC) 4a. This means that a total maximum daily load (TMDL) exists for the waterbody impairment combination (WIC) and the waterways are not on the Section 303(d) of the Federal Clean Water Act (CWA) list. Waterways under numbers 4 and 8 are classified as IRC 5. IRC 5 waterways represent Louisiana's 303(d) list of impaired waterbodies, as a WIC exists and a TMDL is required.

3.1.3 Physical Oceanographic Processes

3.1.3.1 Sabine Bank

Sabine Bank is a sand source on the seabed of the GOM. The GOM is a dynamic marine environment dominated by two major circulation/current patterns: the Loop Current and a warm anticyclonic eddy (MMS 2000). The Loop Current is formed by the interconnection of the Yucatan and Florida Currents and is the primary circulation pattern in the eastern GOM. The warmer water anticyclonic eddy is associated with cold-water cyclones and is the primary circulatory feature of the central and western GOM. In addition to these currents, the GOM is influenced by a large volume of freshwater inflow from the Mississippi and Atchafalaya Rivers. Nearly two-thirds of the U.S. and half the area of Mexico drain into the GOM. Approximately 30 percent of the Mississippi River enters the northern GOM through the Atchafalaya River system, with the rest exiting the system at the bird foot delta in Plaquemines Parish, Louisiana. The Mississippi and other rivers, with their associated pollutants, nutrients, and sediment loads, have a great impact on all aspects of continental shelf oceanography in the northern GOM (MMS 2000).

Both potential Sabine Bank borrow locations are 18 to 19 miles offshore of the CPSRS. The borrow locations, therefore, are in the GOM inner shelf, which is between the shoreline and the mid-continental shelf. Louisiana's inner shelf is considered a low energy environment, where local storms, including tropical systems, facilitate increased hydrodynamic energy (Stone 2001). Several field studies conducted on the mid- and outer-shelf have indicated that mean near-bottom flows and bed stresses are not strong enough to re-suspend sediment during typical conditions (Adams et al. 1987; Halper and McGrail 1988; Stone 2001; Stone et al. 2011). However, the stress exerted by storms on the water column and seabed can scour the seafloor and result in significant sediment transport; hurricanes can convey up to 40 percent of the wind stress via water currents on the GOM seabed (Wijesekara et al. 2010). This storm-related stress drives currents and sediments generally along the shelf rather than cross-shelf (Wijesekara et al. 2010).

Tides in this area are typically diurnal with an average range of 1.5 feet. The average deep water wave height and period for Louisiana’s inner shelf is 3.3 feet at 5 to 6 seconds, with wave-approach typically from the southeast (Stone 2001). Due to the relative shallow depth of the shelf, wave dissipation and refraction occurs, resulting in lower wave heights closer to shore. However, during winter storm events, wave characteristics are markedly different, often as a result of high, long-period waves offshore prior to the passage of the front, followed by variable wave heights, periods, and direction during and after the frontal passage (Stone 2001; Stone et al. 2011).

3.1.3.2 CPSRS

The shoreline is affected by wind, waves, tides, bathymetry, predominate currents, and sea level rise. The CPSRS experiences a tidal range of approximately two feet during spring tides (McCorquodale et al. 2007). Winds and waves are generally mild along the Cameron Parish coast, with winter months typically providing the strongest winds and higher waves. Along the GOM, winds are typically from the southeast and average 15 miles per hour, or 13 knots (Stone 2001). Waves are typically from the south and southeast. At the CPSRS, average significant wave height is 3.2 feet, with a peak wave period of 4.5 seconds (Stone 2001).

Summer/fall tropical systems result in higher-than-average wave heights and winds and have immediate shoreline impacts. Storm surges create overwash and erode beaches. Sand that is overwashed is considered lost from the littoral system. Eroded material removed seaward is assumed returned to the system and may be redeposited when normal ocean conditions resume (Stone 2001). On average, Cameron Parish is affected by a tropical storm or hurricane every three years and is directly hit by a hurricane every nine years (Hurricane City.com 2011).

Waves and currents are affected by the bathymetry seaward of the coastline: the shelf and shoreface. The Cameron Parish shoreface is relatively low-gradient, with water depths of around 12 feet approximately 1.5 miles offshore. At the borrow sites, approximately 18 miles offshore, the depth ranges from 20 to 35 feet.

Relative sea level rise combines the effects of localized influences on the land (subsidence or accretion) with global sea level rise (NOAA 2008). In Louisiana, the primary cause of relative sea level rise is predominantly subsidence-driven; primarily due to the consolidation of Holocene sediments (Penland and Ramsey 1990). Based on tide gauge data from Penland and Ramsey (1990) and NOAA (2008), a relative sea level rise rate of 5.6 millimeters, or 0.22 inch, per year was accepted for the CPSRS. This rate was utilized to predict future shoreline positions for each of the five alternatives considered for beach nourishment.

3.1.4 Climate

3.1.4.1 Sabine Bank

According to the National Climatic Data Center (NCDC) operated by NOAA, the climate offshore is influenced by both its subtropical latitude and the GOM. Average temperatures in the GOM range from a low of 64˚F in February to 84˚F in August.

During the summer months, winds are typically from the south. The warm moist air associated with the southerly wind often results in afternoon showers offshore and on land. Occasionally, westerly or northerly winds will interrupt the southerly flow, bringing in drier, hotter air, but this effect is diminished as the air flows over the GOM. In the cooler months, the GOM continues to bring more tropical conditions with the southerly winds, and continental winds bringing cold dry air diminish over the warmer GOM waters.

Rainfall is generally highest in the winter and spring. Summer brings typical mid-day showers and the potential for tropical systems, which have the capacity to generate large-volume rainfall pre- and post-storm passage. Fall is usually the driest season of the year.

3.1.4.2 CPSRS

According to the NCDC, Louisiana's climate is predominately influenced by its subtropical latitude and the GOM. In southern Louisiana, the average annual temperature is 69˚F, with an average low of 53˚F. South Louisiana experiences an average of 75 days per year where temperatures are at, or exceed, 90˚F.

During the summer months, winds are typically from the south. The warm moist air associated with the southerly wind flow often results in afternoon showers. Occasionally, westerly or northerly winds will interrupt the southerly flow, bringing in drier, hotter air for short periods. In the cooler months, there are periods of tropical air mixed with cold air associated with continental fronts.

Rainfall is generally highest in the winter and spring. Summer brings typical mid-day showers and the potential for tropical systems, which have the capacity to generate large-volume rainfall pre- and post-storm passage. Fall is usually the driest season of the year.

From December to May, rivers and coastal lakes are typically cooler than the air. This condition results in the potential for heavy to persistent coastal and nearshore fog.

3.1.5 Air Quality

3.1.5.1 Sabine Bank

The air over the GOM at the borrow sites is not classified as attainment or nonattainment, but it is presumed to be better than the National Ambient Air Quality Standards (NAAQS) for all criteria pollutants (MMS, 2000). Oil and gas exploration and production and support activities are the sources of air emissions that have the potential to impact air quality at the borrow sites and along the OCS. Potential emissions include sulphur dioxide associated with flaring, hydrogen sulfide, and hazardous air pollutants, including benzene.

3.1.5.2 CPSRS

Due to the close proximity to the GOM and juxtaposition with other open water bodies like the Calcasieu and Sabine Lakes, air masses here are generally unstable (EA 2002). As of 2011, all parishes in the state of Louisiana were listed as in attainment for the one-hour ozone standard and the 1997 8-hour ozone standard. A general conformity determination is not necessary. Air quality at the CPSRS is affected by vehicular emissions from LA 82, outboard engines, and diesel-vessel engines. Emissions associated with oil and gas production activities near the site may also contribute to local air quality.

3.2 Bio-Physical Resources

3.2.1 Open Water Habitat

3.2.1.1 Sabine Bank

Sabine Bank is approximately 18.5 miles off the Cameron Parish shoreline where the CPSRS lies. The open water habitat is described in detail in the following sections relative to bio-physical resources. Please refer to Sections 3.2.2.1, 3.2.3.1, 3.2.5.1, 3.2.6.1, 3.2.7.1, 3.3.1, and 3.3.2 for a full description of open water habitat.

3.2.1.2 CPSRS

The CPSRS is a chenier beach that supports some vegetation, but is primarily beach, intertidal, and shallow tidal habitat. No deep-water GOM habitat is present

3.2.2 Benthic Habitat

3.2.2.1 Sabine Bank

Both potential borrow sources consist of soft-bottom sediment, specifically high quality, fine- to medium-sized quartz sand with a very low percentage of silt and clay. Studies suggest that, with some overlap, sandy sediments are generally inhabited by filter feeders and areas of soft silt or mud are more utilized by deposit feeders (Rhoads and Young 1970; Levinton 1972; Day et al. 1989; Peterson 1991; Brown et al. 2000). Major groups represented in bottom sediments throughout the entire GOM include bacteria and other microbenthos, meiofauna [0.063-0.3 millimeters], macrofauna (larger than 0.3 millimeters), and megafauna (larger organisms, such as demersal fish) (Gage and Tyler 1991).

According to a literature review conducted by Brooks et al. (2004a), polychaetes were listed as the dominant taxon in 85 percent of the studies conducted in the GOM that specifically stated a macrofaunal taxon was dominant. While most papers only examined macrofauna, a few studies also included meiofauna and listed foraminiferans as dominant in the GOM west of the Mississippi River.

Brooks et al. (2004a) also examined information on numerical dominance by individual species. Four polychaete taxa were identified as predominant in five or more surveys (>20 percent of the survey studies) from the GOM, including *Paraprionospio pinnata*, *Mediomastus*, *Prionospio*, and *Cossura*. *Paraprionospio pinnata* was the most commonly cited dominant species (35 percent) in the GOM, which included survey data from both east and west of the Mississippi River. *Cossura*, *Mediomastus*, *Nereis*, and *Prionospio* were all dominant polychaete genera commonly found from studies on both sides of the northern GOM. *Sigambra tentaculata* and *Magelona phyllisae* were both common polychaete species in surveys west of the Mississippi River. *Ampelisca* was the predominant amphipod genera found in the GOM (>10 percent) and was found both east and west of the Mississippi River. The bivalve, *Mulinia lateralis*, was the most commonly reported mollusk in the GOM.

Many demersal fish species have sediment-based habitat preferences. According to a database review conducted by Brooks et al. (2004b), which included Sabine Bank in the study area, diverse communities of benthic fish utilize natural sandbanks in the northwestern GOM. However, there appears to be no unique community dependent upon sandbanks, but rather a suite of species which does not differ from communities beyond sandbanks. A July 2003 cruise study was conducted at Sabine Bank by Brooks et al. (2004c) and utilized trawl tows and bottom angling to target demersal species. The study yielded 15 demersal species: Atlantic croaker (*Micropogonias undulatus*), hardhead catfish (*Arius felis*), pinfish (*Lagodon rhomboides*), spot (*Leiostomus xanthurus*), silver seatrout (*Cynoscion nothus*), juvenile trout (*Cynoscion* sp.), least puffer (*Sphoeroides parvus*), banded drum (*Larimus fasciatus*), lane snapper (*Lutjanus synagris*), star drum (*Stellifer lanceolatus*), Sargassum pipefish (*Syngnathus pelagicus*), bluntnose stingray (*Dasyatis sayi*), pigfish (*Orthopristis chrysoptera*), black drum (*Pogonias cromis*), and blackwing searobin (*Prionotus rubio*). Other benthic fish that are common to the northwestern GOM and may be present at Sabine Bank include gafftopsail catfish (*Bagre marinus*), dwarf sand perch (*Diplectrum bivittatum*), sand perch (*Diplectrum formosum*), red snapper (*Lutjanus campechanus*), and red drum (*Sciaenops ocellatus*) (Brooks et al. 2004b).

3.2.2.2 CPSRS

Beach fauna are typically mobile and adapt to the changeable conditions caused by tides and exposure to air. The abundance of beach benthos, therefore, tends to be relatively low. Species that are present are usually cryptic species, such as crabs, that emerge from the sand only at night or when the tide is in. The biological diversity of the benthic community with all existing phyla represented is mainly composed of fauna that inhabit interstitial spaces. Species richness and abundance are determined by the speed of tidal retreat, which is rapid in the GOM. The asteroid and echinoid communities are relatively poor in littoral species when compared to the Pacific Ocean or other tropical seas. *Astropecten* and *Linckia* are characteristic asteroid genera, and *Diadema*, *Arbacia*, *Eucidaris,* and *Encope* are characteristic echinoid genera (Briones 2004).

3.2.3 Aquatic Communities

3.2.3.1 Sabine Bank

Fish

The GOM is the most productive fishery in the U.S. While this has much to do with the nursery-ground estuaries that the five Gulf coast states provide, more finfish, shrimp, and shellfish are harvested from the GOM annually than the combined fisheries of the south and mid-Atlantic, Chesapeake, and New England (USEPA 2010).

Due to the location of Sabine Bank, which is approximately 18.5 miles off the coast of Cameron Parish, commercially and recreationally important species are likely to be encountered there. These include primarily pelagic species, such as red drum, black drum, amberjack (*Seriola* spp.), spotted sea trout (*Cynoscion nebulosus*), triggerfish (*Balistes* spp.), and red snapper, most of which are more thoroughly discussed in Section 3.3. Coastal migratory pelagic species, including dorado (*Coryphaena hippurus*), cobia (*Raychycentron canadum*), cero (*Scomberomorus regalis*), king mackerel (*Scomberomorus cavalla*), spanish mackerel (*Scomberomorus maculatus*), little tunny (*Euthynnus alletteratus*), and bluefish (*Pomatomus saltatrix*) are also expected to be present (GOM Fishery Management Council 2010). In addition, large pelagic species that may pass through Sabine Bank but prefer deeper GOM waters include wahoo (*Acanthocybium solandri*), blackfin tuna (*Thunnus atlanticus*), bluefin tuna (*Thunnus thynnus*), yellowfin tuna (*Thunnus albacares*), tarpon (*Megalops atlanticus*), marlin (*Makaira nigricans*), sailfish (*Istiophorus albicans*), and swordfish (*Xiphias gladius*) (GOM Fishery Management Council 2010).

In addition to demersal fish, the Sabine Bank cruise study conducted by Brooks et al. (2004c), discussed in Section 3.2.2.1, also yielded 18 non-demersal species, including bay anchovy (*Anchoa mitchilli*), Atlantic bumper (*Chloroscombrus chrysurus*), striped anchovy (*Anchoa hepsetus*), Atlantic thread herring (*Opisthonema oglinum*), flat anchovy (*Anchoviella perfasciata*), Atlantic sharpnose shark (*Rhizoprionodon terraenovae*), cobia (*Rachycentron canadum*), and great barracuda (*Sphyraena barracuda*).

Based on data collected by the Shark Foundation (2005), 49 species of sharks inhabit the GOM during various seasons. These include the commonly observed bull (*Carcharhinus leucas*), sandbar (*Carcharhinus plumbeus*), blacktip (*Carcharhinus* *limbatus*), lemon (*Negaprion brevirostris*), thresher (*Alopias* spp.), and hammerhead (*Sphyrna mokarran*) sharks.

In addition to fish, cephalopods, such as octopus and squid, and cnidarians, such as jellyfish, are likely to be present at Sabine Bank.

Marine Mammals

In the GOM, twenty-one species of cetaceans regularly occur in the GOM (Jefferson et al. 1992; Davis et al. 2000) and are identified in the National Marine Fisheries Service (NMFS) GOM Stock Assessment Reports (Waring et al. 2010). The West Indian manatee (*Trichechus manatus*) is the only species of siren in the region (Davis et al. 2000) and is also identified in the NMFS GOM Stock Assessment Reports (Waring et al. 2009). More specifically, Davis et al. (2000) reported that 18 species of dolphins and whales are commonly observed in the northern GOM. These include, in order of abundance, pantropical spotted dolphins (*Stenella attenuata*), spinner dolphins (*Stenella longirostris*), Clymene dolphins (*Stenella clymene*), bottlenose dolphins (*Tursiops truncatus*), striped dolphins (*Stenella coeruleoalba*), melon-headed whales (*Peponocephala electra*), Atlantic spotted dolphins (*Stenella frontalis*), Risso's dolphins (*Grampus griseus*), short-finned pilot whales (*Globicephala macrorhynchus*), rough-toothed dolphins (*Steno bredanensis*), false killer whales (*Pseudorca crassidens*), dwarf/pygmy sperm whales (*Kogia siga/breviceps*), sperm whales (*Physeter macrocephalus*), pygmy killer whales (*Peponocephala electra*), killer whales (*Orcinus orca*), Cuvier beaked whales (*Ziphius cavirostris*), Fraser dolphins (*Lagenodelphis hosei*), and Bryde's whales (*Balaenoptera brydei*). It is noted that pantropical spotted dolphins and striped dolphins, while abundant in the northern GOM, are not common to the northwestern GOM region (Davis et al. 2000; Waring et al. 2010). Short-finned pilot whales and melon-headed whales are more abundant in the north central and northwestern GOM, hence, they are more likely to be encountered at Sabine Bank.

Sea Turtles

Since all five species of sea turtles that inhabit the northern GOM are threatened or endangered, they are discussed in Section 3.3. However, based on previous research conducted by Davis et al. (2000), two of the five species of sea turtles of the northern gulf, loggerhead sea turtles (*Caretta caretta*) and leatherback sea turtles (*Dermochelys coriacea*), are more likely to be encountered in open offshore waters. The leatherback is the most pelagic of the sea turtles and prefers to nest on sandy beaches with proximity to deep water and generally rough seas (USFWS 2011). Kemp's ridley sea turtles (*Lepidochelys kempii*) are considered one of the most commonly encountered by humans and could be expected at Sabine Bank during spring/summer migrations as could green sea turtles. Based on this data, the most likely sea turtles to be encountered at Sabine Bank are the loggerhead, and Kemp's ridley sea turtles. There is also the potential for green sea turtles to be present around Sabine Bank during migration.

From 2010 into 2011, an unusually high number of sea turtle strandings have been documented along the coasts of Alabama, Louisiana, and Mississippi (NMFS 2011; Institute for Marine Mammal Studies [IMMS], 2010; IMMS 2011). Research conducted by the IMMS during the 2010 strandings did not result in a detecting a conclusive cause for the strandings and/or deaths, originally thought to be oil-spill-related. Based on NMFS research into the 2011 strandings, results appear to be similar to the 2010 research. Some animals were observed with obvious injuries others had ingested sediment and fish (NMFS 2011). The vast majority of the strandings and deaths were Kemp's ridleys (IMMS, 2011).

3.2.3.2 CPSRS

Fish

Fish species that are potentially present at the CPSRS are discussed in Section 3.3.2.

Shrimp

Major shrimp species in the GOM include white shrimp (*Litopenaeus setiferus*), pink shrimp (*Farfantepenaeus duorarum*), and brown shrimp (*Farfantepenaeus aztecus*). A detailed discussion of these three shrimp species is in Section 3.3.2.

Marine Mammals

West Indian manatees live in shallow waters in marine zones, estuaries, lagoons, rivers and channels. A small percentage of manatees migrate across the northern GOM during the summer months and back to warmer tropical waters in Florida during the fall. Considered a summer resident that is likely to enter rivers and bayous during its stay, manatees are not expected to be present near the CPSRS year round. Manatees from the Northwest Unit are more likely to be seen in the northern GOM and can be found as far west as Texas; however, most sightings are in the eastern Gulf of Mexico (Waring et al. 2009).

The majority of cetacean species occupy oceanic waters more than 650 feet deep. Only three species normally inhabit shallow coastal waters: the bottlenose dolphin, the Atlantic spotted dolphin, and the rough-toothed dolphin (Ortega-Ortiz et al. 2004). Of these, the bottlenose dolphin would be more frequently encountered near the CPSRS as they represent the only cetacean that inhabits coastal lagoons, river deltas, littoral zones, and neritic and oceanic zones of the GOM. Inshore stocks of bottlenose dolphin are further delineated into 32 separate provisionally delineated northern Gulf of Mexico bay, sound, and estuarine stocks (Waring et al. 2010).

Sea Turtles

Since all five species of sea turtles that inhabit the northern GOM are threatened or endangered, they are discussed in Section 3.3.1. Any of the five species could be present in the nearshore waters off the CPSRS. Additionally, an increase in sea turtle strandings has been documented for 2011 and research is ongoing to assess the causes (see Section 3.2.3.1).

3.2.4 Beach/Intertidal Habitat

3.2.4.1 Sabine Bank

The borrow sites are 18.5 miles offshore of Cameron Parish. No beach or intertidal habitat is present at Sabine Bank.

3.2.4.2 CPSRS

The shoreline is primarily composed of silt/clay with no sand or only a thin veneer of sand. A small dune ridge is present in some locations formed from overwash material composed primarily of shell hash with a small amount of fine sand. The land landward of the dune ridge is primarily composed of marsh. An approximate three mile span in front of the Holly Beach village consists of a relatively wide sandy beach with average dune heights of approximately six feet.

3.2.5 Wildlife Communities

3.2.5.1 Sabine Bank

With Sabine Bank located offshore, wildlife present at the area would be members of the aquatic assemblage and avian community discussed in Sections 3.2.3.1 and 3.2.6.1.

3.2.5.2 CPSRS

Examples of wildlife using the beach and dune habitats include shorebirds, crabs, and various predators, such as raccoons and snakes. The beaches and dunes along the CPSRS are important wintering areas and nesting sites for shorebirds, including terns, skimmers, and plovers, which are discussed in Section 3.2.6.2.

Common wildlife inhabitants within the vicinity of the CPSRS include alligators (*Alligator mississippiensis*), alligator snapping turtles (*Macroclemys temminckii*), raccoons (*Procyon lotor*), rabbits (*Sylvilagus floridanus*), minks (*Mustela vison*), otters (*Lontra canadensis*), foxes (*Vulpes vulpes*), opossum (*Didelphis virginiana*), white-tailed deer (*Odocoileus virginianus*), squirrels (*Sciurus* spp.), muskrats (*Ondatra zibethicus*), nutria (*Myocastor coypus*), and coyotes (*Canis latrans*). The majority of these species may utilize the CPSRS for foraging and hunting, but generally do not reside there.

3.2.6 Avian Communities

3.2.6.1 Sabine Bank

Avian communities vary in the GOM depending on the time of year. Terns, petrels, gulls, jaegers, and shearwaters appear to be the most common avian species observed in the northern GOM in the spring. Summer species include black terns (*Chlidonias niger*), band-rumped storm petrels (*Oceanodroma castro*), magnificent frigatebirds (*Fregata magnificens*), Audubon’s shearwaters (*Puffinus lherminieri*), and sooty terns (*Onychoprion fuscatus*). Laughing gulls (*Larus atricilla*), royal terns (*Thalasseus maximus*), and pomarine jaegers (*Stercorarius pomarinus*) appear to be common from late summer through the winter, with laughing gulls and royal terns described as the most common year round residents (Davis et al. 2000; Duncan and Havard 1980; Ribic et al. 1997).

3.2.6.2 CPSRS

According to the Audubon Society, Louisiana is the center of the trans-GOM migration path, with a greater number of migratory song birds flying over the Cameron Parish coast than anywhere else in the country. In studies of offshore platform use by trans-GOM migrating species, radar images indicated that the spring flight path of migrants is directed toward the coasts of Louisiana and Texas (Russel 2005). The region also supports important wintering populations of Mississippi Flyway waterfowl and potentially those from the neighboring Central Flyway (Texas is in the Central

Flyway) and provides important nesting and brood-rearing habitat for resident waterfowl such as mottled ducks (*Anas fulvigula*). Wading birds, shorebirds, and other marsh and waterbirds live and winter in Cameron Parish in substantial numbers.

Waterfowl are abundant within the vicinity of the CPSRS, especially during the winter period. Waterfowl species include: snow geese (*Chen caerulescens*), Canada geese (*Branta canadensis*), mallard (*Anas platyrhynchos*), northern pintail (*Anas acuta*), gadwalls (*Anas strepera*), blue-winged teal (*Anas discors*), mottled duck, American green-winged teal (*Anas crecca*), American widgeon (*Anas americana*), lesser scaup (*Aythya affinis*), greater scaup (*Aythya marila*), red-breasted merganser (*Mergus merganser*), ring-necked duck (*Aythya collaris*), redhead (*Aythya americana*), canvasback (*Aythya valisineria*), and bufflehead (*Bucephala albeola*). Mottled ducks are the only ducks known to nest within the vicinity of Holly Beach (Alsop 2001).

Various species of wading birds, terns, gulls, rails, and shorebirds are common to the CPSRS area. These include: great egret (*Casmerodius albus*), great blue heron (*Egretta caerulea*), anhingas (*Anhinga anhinga*), little blue heron (*Florida caerulea*), cormorant (*Phalacrocorax olivaceus*), cattle egret (*Bubulcus ibis*), snowy egret (*Egretta thula*), black-crowned night heron (*Nycticorax nycticorax*), white ibis (*Eudocimus albus*), roseate spoonbill (*Ajaia ajaja*), laughing gull, clapper rail (*Rallus longirostris*), American oystercatcher (*Haematopus palliatus*), semi-palmated plover (*Charadrius semipalmatus*), royal tern, sandwich tern (*Sterna sandvicensis*), sooty tern, and red knot (*Calidris canutus*). Many of these species also nest locally (Martin and Lester 1990). Piping plovers (*Charadrius melodus)* are discussed in Section 3.3.1, as they are considered threatened in both their breeding and wintering ranges, of which Cameron Parish is considered as Critical Habitat.

3.2.7 Vegetation

3.2.7.1 Sabine Bank

The Sabine Bank sand source is comprised of high quality medium grain sand with very little clay material and less than 20 percent shell hash. No notation of submerged aquatic vegetation or sessile vegetation was noted in the research report characterizing the sand source or in other literature reviewed relative to the material composition of Sabine Bank. No mention was made as to whether vegetation was observed in the area during sediment sampling events. It is presumed sargassum mats/clumps, phytoplankton, and non-sessile microscopic plant life exist at Sabine Bank.

3.2.7.2 CPSRS

Dominant species in saline marsh typically include smooth cordgrass (*Spartina alterniflora*), saltgrass (*Distichlis spicata*), and black mangrove (*Avicennia germinans*). Brackish marsh is often dominated primarily by saltmeadow cordgrass (*Spartina patens*), but also includes big cordgrass (*Spartina cynosuroides*), gulf cordgrass (*Spartina spartinae*), and sturdy bulrush (*Schoenoplectus robustus*). Both intermediate and brackish marshes can be dominated by saltmeadow cordgrass, but these typically include a small number of other species, such as smooth cordgrass, saltgrass, needlegrass rush (*Juncus roemerianus*), or sturdy bulrush (Sasser et al. 2008).

The vegetation community at the CPSRS includes a band of vegetation that borders the beach to the north and is part of a larger community of primarily brackish marsh species. The distribution is mostly dense, with some areas that are bare to patchily distributed. Dominant species include saltgrass, saltmeadow cordgrass, pickelweed (*Salicornia* spp.), and bushy seaside tansy (*Borrichia frutescens*). The vegetated area appears to be well above the mean high tide line and likely rarely becomes inundated except during extreme high tide and storm surges. Based on this data, it is unlikely that the vegetation community would be considered EFH.

3.3 Critical Biological Resources

3.3.1 Threatened and Endangered Species

3.3.1.1 Sabine Bank

Cetaceans are marine mammals afforded protection under the Marine Mammal Protection Act of 1972, and are expected to be present at Sabine Bank. As discussed in Section 3.2.3.1, 18 species are common to the northern GOM. Within the northwestern GOM, the bottlenose dolphin and Atlantic spotted dolphin would be more abundant than the other northern GOM dolphin species (Davis et al. 2000). Whales, including dwarf/pygmy sperm whales, sperm whales, melon-headed whales, and short-finned pilot whales are also expected to be present around Sabine Bank (Davis et al. 2000).

Offshore marine life studies have indicated that two sea turtle species are more commonly observed in oceanic waters, loggerhead sea turtles and leatherback sea turtles, with leatherback sea turtles typically in deeper waters (Davis et al. 2000). Observations of Kemp's ridley sea turtles have also been documented (Davis et al. 2000).

3.3.1.2 CPSRS

Piping Plover

Piping plovers are federally listed as threatened. These are small shorebirds, approximately seven inches long, with a wingspan of approximately 15 inches. The birds are sand-colored on the back with white undersides, and are distinguished from similar species by its bright orange legs. During the breeding season, plovers have a single black band across the breast and forehead, which are absent during the winter (U.S. Fish and Wildlife Service [USFWS] 2000).

Several distinct populations of piping plovers occur in the U.S. The most endangered is the Great Lakes breeding population. The Northern Great Plains and Atlantic Coast populations are classified as threatened. All piping plovers winter along the southeast and GOM coasts and are classified as threatened in their wintering habitat. Major threats to the piping plover include the loss and degradation of wintering habitat due to development, subsidence, sea-level rise, disturbance by humans and pets, and predation. The Northern Great Plains population occurs at the CPSRS. They arrive from their northern breeding grounds as early as late July and may be present for eight to ten months of the year (USFWS 2000). Individuals of the Great Lakes population have also been documented in the area, but in low numbers (USFWS, pers. comm.). The Prairie Canada population has been document in Louisiana east of the CPSRS and in Texas, but not in the immediate area. It is, therefore, possible that individuals of these populations occur at the CPSRS but have not been observed due to a lack of survey effort in the area (Stucker and Cuthbert 2005; Stucker et al. 2010).

In July 2001, the USFWS designated specific areas in the U.S. as critical habitat for wintering piping plovers. The primary constituent elements of piping plover critical habitat are found in geologically dynamic coastal areas that contain intertidal beaches and flats (between annual low tide and annual high tide) and associated dune systems and flats above annual high tide. Important primary constituent elements of intertidal flats include sand and/or mud flats with no or very sparsely emergent vegetation. Adjacent unvegetated or sparsely vegetated sand, mud, or algal flats above high tide are also important, especially for roosting plovers (USFWS 2001).

The USFWS designated a total of 1,798 miles (165,211 acres) of shoreline along the GOM and Atlantic coasts as critical wintering habitat. Critical habitat in Louisiana encompasses 24,950 acres along 342.5 miles of shoreline, which is most of the coast of Louisiana. Critical habitat Unit LA-1 extends from the Texas/Louisiana border to Cheniere au Tigre and includes a portion of the CPSRS. Specifically, the CPSRS encompasses that portion of critical habitat between the east end of Holly Beach and the west jetty of the Calcasieu Ship Channel. Designated critical habitat consists of the land from the seaward boundary of mean low, low water to where densely vegetated habitat (not used by the piping plover) begins and where the primary constituent elements no longer occur (USFWS 2001).

West Indian Manatee

West Indian manatees are federally listed as endangered. The species is further protected as a depleted stock under the Marine Mammal Protection Act of 1972.

In Louisiana, manatees occasionally enter Lakes Pontchartrain and Maurepas. Sightings appear to be increasing, and they have been regularly reported in the Amite, Blind, Tchefuncte, and Tickfaw Rivers, and in canals within adjacent coastal marshes. They have also been occasionally observed elsewhere along the Louisiana Gulf Coast (USFWS 2010).

Kemp’s Ridley Sea Turtle

Kemp's ridley sea turtles are federally listed as endangered across their entire range. Critical habitat has been proposed, but has not been finalized to date. Kemp's ridley sea turtles are the rarest, most endangered, and enigmatic of all sea turtles world-wide (Perrine 2003; Spotila 2004). The majority of nesting beaches are located off the Gulf coast of Mexico; however, South Padre Island, Texas, supports a small resident breeding population (USFWS 2011). It is believed that hatchlings become entrained in eddies in the GOM and are dispersed throughout the GOM and Atlantic Ocean until they reach a size of approximately 8 inches (20 centimeters). At this age, Kemp’s ridley sea turtles enter into shallow coastal waters. According to the USFWS, nearshore and inshore waters of the northern GOM, particularly off the coast of Louisiana, are important habitat for the Kemp’s ridley.

Hawksbill Sea Turtle

Hawksbill sea turtles (*Eretmochelys imbricata*) are federally listed as endangered throughout their range. Hawksbills are one of the most infrequently encountered turtles in offshore Louisiana, as they are considered a more tropical species (USFWS 2011) nesting in the Caribbean, Seychelles, Mexico, Indonesia, and Australia.

However, a hawksbill was reported near Calcasieu Lake in 1986. Hawksbills generally inhabit tropical coastal reefs, bays, rocky areas, passes, estuaries, and lagoons, where they are found at depths of less than seventy feet.

Leatherback Sea Turtle

Leatherback sea turtles are federally listed as endangered throughout their range. Leatherbacks are found in the tropical waters of the Atlantic, Pacific, and Indian Oceans (Ernst and Barbour 1972), the GOM, and the Caribbean (Carr 1952). Nesting occurs from February through July at sites from Georgia to the U.S. Virgin Islands. Nesting leatherbacks occur along beaches in Florida, Nicaragua, and islands in the West Indies. In 2008, a single nest was recorded in Texas (Nation Park Service 2009). No nesting leatherbacks have been reported in Louisiana (Gunter 1981; Dundee and Rossman 1989), although leatherbacks are believed to occur offshore of Louisiana in deep waters and some have been collected from or sighted in Cameron Parish, Atchafalaya Bay, Timbalier Bay, and Chandeleur Sound (Dundee and Rossman 1989).

Green Sea Turtle

Breeding populations of green sea turtles (*Chelonia mydas*) in Florida and the Pacific Coast of Mexico are federally listed as endangered, and all others are listed as threatened. Although green sea turtles are found worldwide, their distribution can be correlated to grass bed distribution, location of nesting beaches, and associated ocean currents (Perrine 2003; Spotila 2004). Within Louisiana waters, these turtles probably occur all along the coast and may nest on the Chandeleur Islands (Dundee and Rossman 1989). Historically, green sea turtles were fished off the Louisiana coast, especially the Chandeleur Islands (Rebel 1974).

Loggerhead Sea Turtle

Loggerhead sea turtles are federally listed as threatened. Critical habitat has been proposed, but has not been finalized. The largest of the hard-shell sea turtles, loggerheads are distributed worldwide in temperate and tropical bays and open oceans. Loggerheads are assumed to range all along the Louisiana coast, though nesting grounds and subpopulations are defined in five distinct areas: 1) the Atlantic coast from North Carolina to northeast Florida, 2) south Florida (east and west coast), 3) Dry Tortugas (Florida Keys), 4) the panhandle of northwest Florida, and 5) Yucatan, Mexico (USFWS 2011). Nesting on the GOM coast occurs between the months of

April and August, with 90 percent of the nesting effort occurring on the south-central west coast of Florida (Hildebrand 1981).

Most loggerhead hatchlings originating from US beaches are believed to lead a pelagic existence for an extended period of time, perhaps as long as 10 to 12 years (USFWS 2011). Juvenile loggerheads eventually enter more shallow coastal areas and become benthic feeders in lagoons, estuaries, bays, river mouths, and shallow coastal waters. These juveniles occupy coastal feeding grounds for a decade or more before maturing and making their first reproductive migration (USFWS 2011). Although loggerheads have been documented as nesting on the Chandeleur Islands in 1962 and Grand Isle in the 1930s, it is doubtful that this species currently successfully nests on the Louisiana coast (Hildebrand 1981; Dundee and Rossman 1989).

Gulf Sturgeon

Gulf sturgeon (*Acipenser oxyrinchus desotoi*) are federally listed as threatened. NMFS and USFWS share jurisdiction of this species. The sturgeon are anadromous fish that inhabit coastal rivers from Louisiana to Florida during the warmer months, and the GOM and its estuaries and bays in the cooler months. Gulf sturgeon typically initiate movement up to rivers between February and April and migrate back out to the GOM between September and November. Gulf sturgeon critical habitat extends west from the Florida panhandle as far as Lake Pontchartrain in southeast Louisiana; it does not cross the Mississippi River into the project area.

3.3.2 Essential Fish Habitat

Under the Magnuson-Stevens Fisheries Conservation and Management Act of 1996 (Public Law 104-297), the GOM Fishery Management Council identified Essential Fish Habitat (EFH) for those species managed under its fishery management plans. EFH is defined by the act as being "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity."

The GOM Fishery Management Council lists the following federally managed species and species groups as being potentially found in coastal Louisiana and within the project area: white shrimp, brown shrimp, pink shrimp, migratory pelagics such as spanish mackerel and cobia, reef fish such as red snapper and gag grouper (*Mycteroperca microlepis*), and red drum. All of these species are managed under individual Fishery Management Plans approved by the GOM Fishery Management Council (2004). Habitat Areas of Particular Concern (HAPCs) are also regulated and include those areas that support corals. In the northern GOM, the Flower Garden Banks (east and west) are a HAPC. They are distinct geologic formations approximately 12 miles apart and over 110 miles from the coasts of Texas and Louisiana. Based on their distance from the project area, no discussion of this HAPC is warranted; the remaining text in this section addresses identified EFH within Sabine Bank and the CPSRS.

Brown Shrimp

Brown shrimp eggs are demersal and occur offshore. Postlarvae and juveniles are common to highly abundant in all US estuaries from Apalachicola Bay in the Florida panhandle to the Mexican border. In estuaries, brown shrimp postlarvae and juveniles are associated with shallow vegetated habitats, but they also are found over silty sand and non-vegetated mud bottoms. Sub-adults migrate from estuaries at night on ebb tide during new and full moon. Shrimp abundance offshore correlates positively with turbidity and negatively with hypoxia. Adult brown shrimp occur in neritic Gulf waters (i.e., marine waters extending from mean low tide to the edge of the continental shelf) and are associated with silt, muddy sand, and sandy substrates.

White Shrimp

White shrimp are offshore and estuarine dwellers and are pelagic or demersal, depending on life stage. The eggs are demersal and larval stages are planktonic; both occur in nearshore marine waters. Postlarval white shrimp become benthic upon reaching the nursery areas of estuaries, where they seek shallow water with mud-sand bottoms high in organic detritus or abundant marsh, and develop into juveniles. Juveniles are frequently found in tidal rivers and tributaries throughout their range. As juvenile white shrimp approach adulthood, they move from the estuaries to coastal areas where they mature and spawn. Migration from estuaries occurs in late August and September and appears to be related to size and environmental conditions (e.g., sharp temperature drops in fall and winter).

Pink Shrimp

Pink shrimp occupy a variety of habitats, depending on their life stage. Eggs and early planktonic larval stages occur in marine waters. Eggs are demersal, whereas larvae are planktonic until the postlarval stage when they become demersal. Recruitment into estuaries occurs in spring and fall at night, primarily on flood tides, through passes or open shoreline. Juveniles are commonly found in estuarine areas with seagrass where they burrow into the substrate by day and emerge at night. Postlarvae, juvenile, and subadult may prefer coarse sand/shell/mud mixtures.

Royal Red Shrimp

Royal red shrimp (*Pleoticus robustus*) are in the management unit of the shrimp fishery management plan; however, little is known of their habitat requirements and larvae. As royal reds are scarce in less than 820 feet and not abundant at depths greater than 1,640 feet, they would not be expected present at the borrow sites or the CPSRS.

Red Drum

In the GOM, red drum occur in a variety of habitats, ranging from depths of about 130 feet offshore to very shallow estuarine waters. They commonly occur in virtually all GOM estuaries where they are found over a variety of substrates, including sand, mud, and oyster reefs. Red drum can tolerate salinities ranging from freshwater to highly saline; optimum salinities for the various life stages have not been determined.

Spawning occurs in deeper water near the mouths of bays and inlets, and on the GOM side of the barrier islands (Simmons and Brewer 1962; Perret et al. 1971). The eggs hatch mainly in the GOM, and larvae move into the estuary where they mature before moving back to the GOM (Perret et al. 1971). Adult red drum use estuaries, but tend to spend more time offshore as they age. Schools of large red drum are common in deep GOM waters. All marine habitats of the GOM where red drum are known to occur is considered essential habitat for red drum.

Reef Fish

The GOM Fishery Management Council lists 11 selected species of federally managed reef fish as common (and thus EFH) in the GOM: red grouper (*Epinephelus morio*) gag grouper, scamp grouper (*Mycteroperca phenax),* red snapper, gray snapper (*Lutjanus griseus*), yellowtail snapper (*Ocyurus chrysurus*), lane snapper (*Lutjanus synagris*), greater amberjack (*Seriola dumerili*), lesser amberjack (*Seriola fasciata*) tilefish (*Lopholatilus chamaeleonticeps*), and gray triggerfish (*Balistes capriscus*).

These species are considered to be ecologically representative of the other species in the project area. Collectively, the EFH of the selected species ranges from the estuaries to depths of more than 1,640 feet offshore. Juveniles of four of the 11 species (i.e., gag grouper, gray, yellowtail, and lane snappers) occupy estuaries to some extent.

In general, reef fish are widely distributed in the GOM, occupying both pelagic and benthic habitats during their life cycle. Juvenile red snapper are common on mud bottoms in the northern GOM, particularly along the Texas through Alabama coasts. Some juvenile snapper, such as gray and red snappers, and grouper have been documented in inshore seagrass beds, mangrove estuaries, lagoons, and larger bay systems (GOM Fishery Management Council 1981).

Coastal Migratory Pelagic Species

The GOM Fishery Management Council manages six species of coastal migratory pelagics. These are king mackerel, Spanish mackerel, cobia, dorado, bluefish, and little tunny. Of these, king mackerel, spanish mackerel, cobia, and dorado would be most likely to occur in the project area. These four species are commonly distributed from the estuaries (i.e., cobia and spanish mackerel) throughout the marine waters of the entire GOM (i.e., dorado). The occurrence of these species is governed by temperature and salinity (GOM and South Atlantic Fishery Management Councils 1985). All four are seldom found in water temperatures less than 68˚F.

The king mackerel is found throughout the GOM from shore to 650 foot depths. As a marine pelagic, they seldom move into brackish water, although juveniles occasionally use estuaries. Spanish mackerel are pelagic, occurring over depths of 250 feet throughout the coastal zone of the GOM. Adults usually are found in neritic waters and along coastal areas. They will inhabit estuarine areas, especially the higher salinity areas, during seasonal migrations, but are considered rare and infrequent in many GOM estuaries. Cobia are large, pelagic, and epibenthic, and are often found near wrecks, reefs, pilings, buoys, and floating objects. They occasionally enter estuaries. Greatest abundance is in the coastal areas from shore to 130 feet in the northern GOM. Dorado are primarily oceanic, although they occasionally enter coastal waters that have oceanic-strength salinity. Bluefish are pelagic and found in many GOM estuaries and on the continental shelf to depths of 650 feet. In the GOM, bluefish are most common along the coasts of Louisiana, Mississippi, Alabama and Florida, although they are more abundant along the Atlantic seaboard. Little tunny are distributed throughout the GOM, usually occupying at depths less than 650 feet, but occasionally up to 3,000 feet. They are pelagic and most common in coastal areas with swift currents and near shoals.

3.4 Cultural Resources

3.4.1 Sabine Bank

A Cultural Resource Survey (CRS) was performed for the potential borrow sites in 2008 by Earth Search, Inc. (2009). The draft results are included in the Borrow Source Report (**Appendix A)** as Appendix C to the Borrow Source Report, and the results of the investigation are summarized in this section.

Archival research indicated that no historic or modern vessels have wrecked within either potential borrow area. Because the reported locations of most historic shipwrecks are imprecise and vague, and often shipwrecks went unreported, it cannot be concluded from existing records that there are no historic shipwrecks within the offshore borrow areas. This is illustrated by the location of a previously unidentified shipwreck adjacent to Borrow Source JF during the CRS. Upon coordination with BOEM, a 1000-foot radial buffer will be applied around this shipwreck where no work or anchoring will be done. Due to the extent of the survey, no additional shipwrecks are anticipated to be encountered in the project area.

The current project areas (HF and JF) are situated east of the relic buried Sabine River Valley, which was an exposed river system when Paleo-Indian cultures occupied the region (Earth Search, Inc. 2009). The river system was active for 12,000 years, which results in a high probability of offshore prehistoric site occurrence and preservation within the vicinity of the relic Sabine River and associated distributaries (Pearson et al. 1989). The surficial sand deposits that are the target of proposed dredging operations in this borrow area consist of reworked Holocene sands (Rodriguez et al. 1999) with little potential for preserved archaeological deposits. Based on research conducted in association with the 2008 CRS, no previously investigated archeological sites lie in or near the areas.

A total of 101.4 linear survey miles (45.9 linear miles in Area HF and 55.5 linear miles in Area JF) were surveyed, utilizing a combination of magnetometer, sonar imaging, and fathometer devices. Eight magnetic anomalies were recorded in Area HF. Three of these represent potential archeological resources and are recommended for avoidance. Avoidance criteria for these anomalies are suggested as a 300-foot buffer. No further archaeological research is recommended for the remaining magnetic anomalies in Area HF.

Fourteen anomalies were recorded in Area JF. Of these, four anomalies met the 50-gamma/80-ft criteria for submerged cultural resources; one of these is interpreted as modern debris. The three remaining anomalies are identified as debris associated with navigation buoy moorings. Two sonar contacts were recorded, with one identified as the mooring for the navigation buoy and the other as debris associated with navigation buoy maintenance. No further archaeological research is recommended for any of the magnetic and acoustic anomalies in Area JF.

3.4.2 CPSRS

In July 2009, archeological and historical consultation was initiated with the Louisiana State Historic Preservation Officer (SHPO) for cultural resource compliance at the CPSRS. The history of Cameron Parish includes occupation by the Atakapus Indians around Calcasieu River (sixteenth to eighteenth century), use of the river by Indians and the Spanish (1700s) for trade, large scale settlement by Europeans around 1812, the 1864 Battle of Calcasieu Pass, the construction of the Calcasieu Pass Lighthouse in 1876, and construction and operation of the first research station in Louisiana, the Gulf Biologic Station in 1903 (ESI 2008, www.swlahistory.org). In 1926, the Lake Charles Pilot organization was founded to guide vessels up the Calcasieu River to Lake Charles in Calcasieu Parish (www.lakecharlespilots.com). Most of these events and activities occurred in and around the mouth of the Calcasieu River, which is adjacent to the easternmost end of the CPSRS. Both the lighthouse and research station were abandoned in the early 1930s and dismantled between 1938 and 1940. The Gulf Biologic Station was located on the east side of the river outside of the project area. The site of the former lighthouse is in the middle of the Calcasieu Ship Channel. Although the presence of historic resources in close proximity to the project area requires consideration, coastal erosion, previous and current infrastructure projects, and the use of the beach by vehicles, both public and recreational, diminishes the potential of locating undisturbed sites. Subsequently, SHPO determined that the proposed project would have no adverse effect on historic resources at the deposition site. The SHPO determination is included as **Appendix E**. In September 2011, consultation was again initiated with the SHPO relative to the potential for the proposed re-handling site to support archaeological resources. The SHPO concluded that there were no recorded archaeological resources within the revised area of potential affect and provided an opinion of “no objection”. Email correspondence from the SHPO specific to the re-handling site is provided in **Appendix E**.

3.5 Socioeconomics

3.5.1 Sabine Bank

Louisiana’s offshore environment supports oil and gas exploration and production and commercial and recreational fisheries. These activities, to some degree, in turn support the population of Cameron and surrounding coastal parishes. Because the borrow sites are outside the three-mile state limit, the federal government has jurisdiction over the oil and gas operations in this area. Research into offshore drilling and employment has indicated that up to and potentially over 60 percent of offshore workers live in states adjacent to Louisiana and the countries of Mexico and Venezuela (Pike 2005). These out of state workers spend their salaries typically in their home states or countries, keeping a larger percentage of these revenues out of Cameron Parish and Louisiana.

3.5.2 CPSRS

With a land and water area of 1,932 square miles, Cameron Parish is the largest parish/county in the U.S., yet the least populated parish in

Louisiana. Despite the devastating impacts of Hurricanes Rita in 2005 and Ike in 2008, Cameron Parish's economic base remains tied to its resources. In 2010, the estimated value of the Parish's fish and wildlife harvest was $19,763,145 (LSU AgCenter 2011). All hunting-related expenditures in Louisiana totaled $526 million in 2006. Trip-related expenses, such as food, lodging, and transportation, totaled $205 million; 39 percent of total expenditures (U.S. Department of the Interior et al. 2008).

Ecotourism opportunities are plentiful with three national wildlife refuges (NWR) and one state wildlife refuge located wholly or partly within the parish, covering approximately 251,000 acres. The 180 mile Creole Nature Trail winds past the Sabine and Lacassine NWRs. The Sabine NWR alone records approximately 300,000 visitors annually (USFWS 2009). Louisiana coastal marshes host up to ten million of the nation's wintering waterfowl each year. Hunting leases in Cameron Parish specific to waterfowl totaled over six million in 2010 (LSU AgCenter 2010). Holly Beach and the beach in the project area supports camping and fishing, with some segments open to vehicle traffic.

There are two port complexes, East Cameron and West Cameron, with the Port of West Cameron located off the Calcasieu Ship Channel, which is the eastern end of the CPSRS. LA 27/82 is a critical arterial roadway for truck-related port traffic. The Port of West Cameron supports oil and gas and fishing interests. Terminals at the port include Martin Midstream, Cameron Fisheries and Seafood Processing, Cameron LNG, and Sabine LNG. Cameron's ports are estimated to supply 60 percent of the income stream for Cameron Parish (Cameron Parish Police Jury, no date). Prior to Hurricane Rita, Cameron Parish supported the fifth largest fishing port in the US landing 300 million pounds of seafood annually. The industry also supported more than 100 fishing guides and 66 charter boats. Hurricane Rita destroyed approximately 60 percent of the commercial fishing fleet (Louisiana Recovery Authority 2006), some of which has not been replaced. Sabine Pass LNG and Cameron LNG are two liquefied natural gas facilities that came online in 2008 and 2009, respectively. The Sabine Pass LNG facility is the largest (by regasification capacity) receiving terminal in the world (Cheniere Energy, Inc. 2011). Both facilities have contributed to the recovery of Cameron Parish from the losses of Hurricanes Rita and Ike.

Demographically, the parish supports an estimated population of 6,584 (U.S. Census Bureau 2009). As a result of Hurricanes Rita and Ike, the parish lost approximately 34 percent of its 2000 population. The median income of households in Cameron Parish between 2005 and 2009 was $57,786 and the median home value was $59,600. The majority of homes located in Block Group 1 of Census Tract 9702 (the CPSRS project area) were and continue to be single family housing (http://lra.louisiana.gov). In 2000, Block Group 1 supported approximately 334 residences. While 2010 census data remains unavailable for this block group, over 90% of the structures present in Cameron, Holly Beach, and Peveto Beach were destroyed by Hurricane Rita in 2005. Based on observations during a 2011 site visit by Providence, less than 30 permanent single family homes were observed in Holly Beach. As of the 2008 census update, approximately 68 percent of parish residents held high school diplomas, with eight percent holding bachelors or higher education degrees. The CPSRS lies within Census Tract 9702 in Block Group 1. Within the seven census blocks that comprise the CPSRS, minorities comprise less than one percent of the 2009 population of 112 persons. Parish-wide, two percent of the population is a race other than white (U.S. Census Bureau 2009). Less than seven percent of families and eight percent of all residents in Cameron Parish live below the poverty level. Within Block Group 1 of Census Tract 9702, which includes the CPSRS area, data for 2009 indicate that approximately 10 percent of residents within the project area were living below poverty in 2008.

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 Impact-Producing Factors

Impact–producing factors are defined as dredge operation, effluent discharge at sea, material transport, and depth of cut/contour changes. These factors are discussed below for Sabine Bank, the CPSRS, and the No Action Alternative.

4.1.1 Sabine Bank

4.1.1.1 Dredge Operation

Regardless of which of the two dredge material handling alternatives is selected during the contracting process, they both involve using a trailing suction hopper dredge at Sabine Bank. A typical trailing suction hopper dredge is a vessel equipped with a hopper and dredge apparatus so that it may load and unload itself (Central Dredging Association 2009). Material is drawn into suction pipes equipped with dragheads that are dragged over the seabed during the dredging process. The hopper receives the slurry of sand/silt and an overflow system discharges excess water.

Typical Trailing Suction Hopper Dredge Vessel

Source: www.marinelog.com

For this project, the trailing suction hopper dredge is assumed to work continuously (24 hours per day, seven days per week) excluding periods of maintenance and adverse weather conditions. Downtime is anticipated as 20 percent based on operating locations and capacities, with five percent due to weather conditions where it cannot dredge and 15 percent due to maintenance, mechanical breakdowns, and provisioning.

Estimated construction time varies from 153 days to 306 days relative to which alternative is selected and the size and number of hopper dredges utilized. Each of the alternatives transports material to a different location prior to placement at the CPSRS. Transportation is discussed in Section 4.1.1.3. The distance from Sabine Bank to the Calcasieu Pass sites is approximately 25 miles. The number of trips will depend on the selected alternative and the size of the hopper dredges.

4.1.1.2 Effluent Discharge at Sea

Effluent discharges at the sand source are not anticipated. Materials re-suspended as a result of dredging operations will be limited to the area of active dredging at and above the dredge's dragheads and will fall out upon completion of dredging operations.

4.1.1.3 Material Transport

Two alternatives for the sediment delivery system have been recommended to be designed and presented in construction bid documents. One involves transport of material to a pump-out station and one involves re-dredging from re-handling location.

SDS Alternative CPP

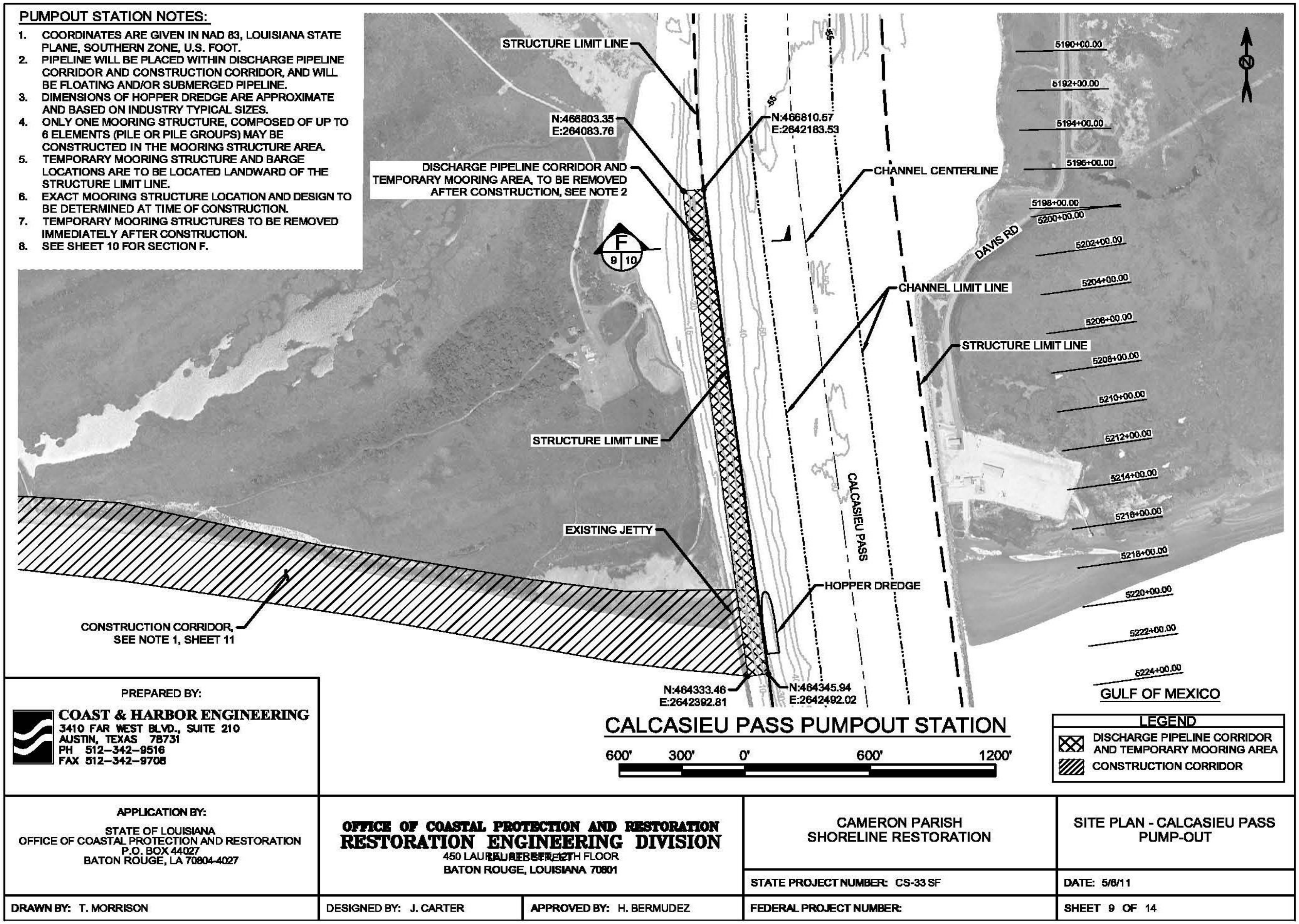
The CPP Alternative involves transporting the dredged material to a designated pump-out station in Calcasieu Pass. Here the hopper dredge will connect to a pipeline and pump the material directly from the hopper barge to the beach nourishment sites using booster pumps as necessary. The pump-out station may require placement of temporary mooring piles and/or a jack-up barge or similar equipment, to be removed after completion of construction (**Figure 12)**.

Based on data provided in the *30% Design Report*, stakeholders and interests, including the USACE, the Port of Lake Charles, the Lake Charles Pilot's Association, West Cameron Port Commission, Cameron Parish, and local property owners are not impacted by this alternative. The pump-out alternative will have no direct impacts to the navigation channel and it is anticipated to have minimal to no impact to local fishermen during shrimping seasons, as the pump-out site was selected in coordination with these individuals. Every attempt to minimize the amount of infrastructure for temporary mooring will be made to reduce the overall footprint of the pump-out area and reduce impacts to adjacent landowners and users. The pump-out alternative minimizes dredging activities as compared to the CPR Alternative, reducing potential impacts to sea turtles, manatees, and other wildlife. The pipeline from the pump-out area to the beach has been routed outside of wetlands and other environmentally sensitive areas and in a manner to not impact adjacent property owners. Material losses from the pipeline are not anticipated to cause environmental or navigation concerns. There may be temporary increases in turbidity during the installation and removal of ancillary equipment such as jack-up rigs and pilings, as well as impacts to the benthic community. These impacts are considered negligible due to the quick recover time of the benthic community and the short duration of the installation and removal activities.

SDS Alternative CPR

Under this alternative, dredged material will be transported to an approved re-handling site in Calcasieu Pass outside the Calcasieu Ship Channel where it will be bottom dumped. The location and final dimensions of the re-handling area were coordinated with the USACE, the Port of Lake Charles, the Lake Charles Pilot's Association, West Cameron Port Commission, Cameron Parish, local property owners, and local fishing interests. A cutterhead dredge will re-dredge the material from the re-handling site and pump it to the beach nourishment site using a pipeline and booster pumps as needed (**Figure 13**).

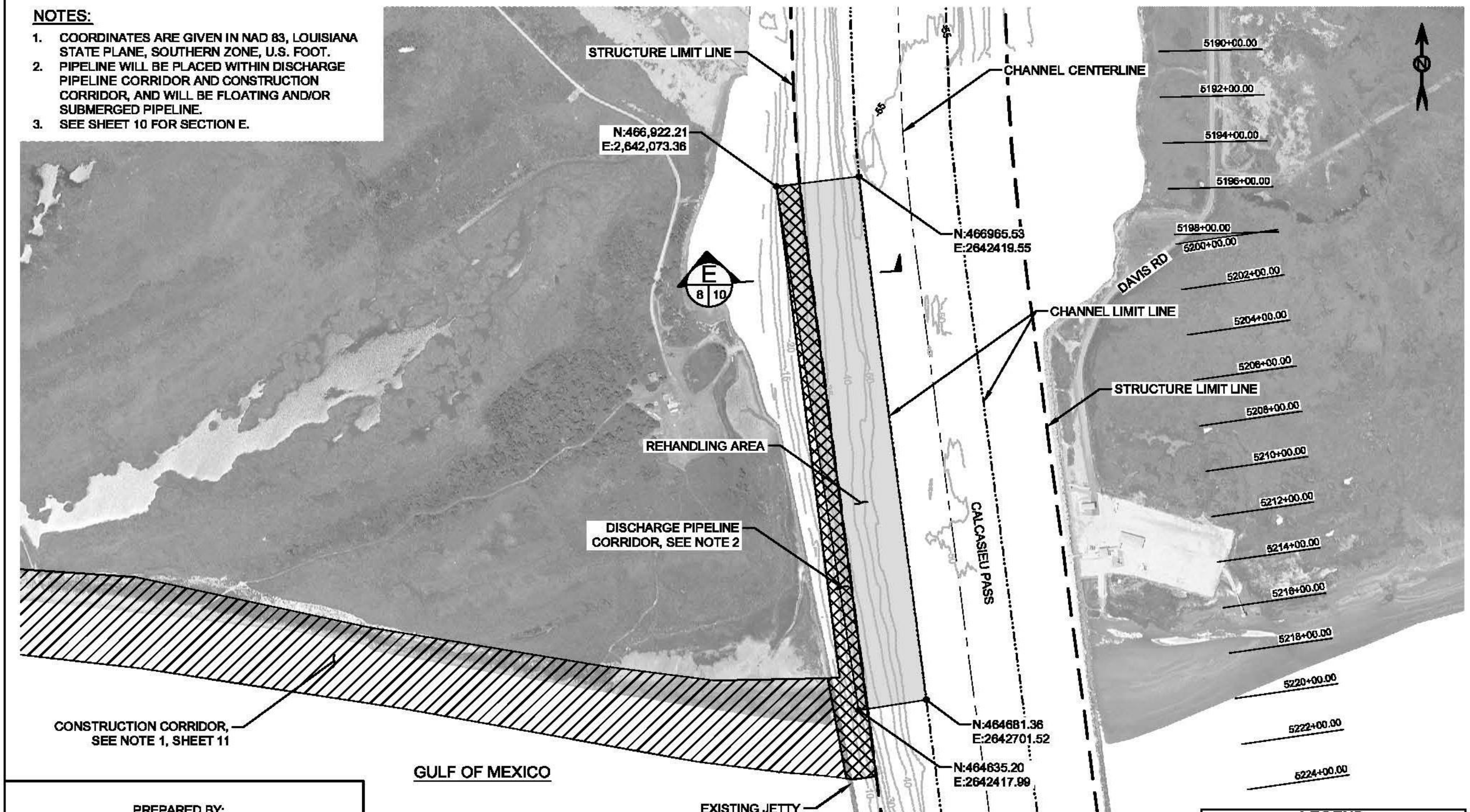
FIGURE 12 - LOCATION OF SDS ALTERNATIVE CPP (CALCASIEU PASS PUMPOUT)



Based on data provided in the *30% Design Report*, stakeholders, including the USACE, the Port of Lake Charles, the Lake Charles Pilot's Association, West Cameron Port Commission, Cameron Parish, fishermen, and local property owners are potentially impacted by this alternative. As with the CPP site, the CPR site was selected in coordination with this group to avoid and/or minimize potential impacts to the ship channel (**Appendix D**). Additionally, analysis associated with the *30% Design Report* demonstrated that the volume of sediment that may be dispersed from the re-handling site to the channel “will not measurably affect the navigable depth.” Temporary increases in turbidity may occur, but with the implementation of best management practices at the re-handling site and use of silt curtains, these increases would be expected to be minimal. Regardless, the possible influence of outside factors in combination with the project activities could result in sedimentation, which would impact stakeholders. Frequent surveys during construction will monitor water depth and will identify any sedimentation. If the project is found to cause sedimentation of the ship channel, contractors will remove the material as quickly as possible. Further, the potentially affected stakeholders will be consulted throughout the project to ensure fishing and shipping impacts are minimal during project status briefings. Similar to the CPP site, the pipeline to the CPSRS has been routed to minimize impact to adjacent landowners.

Material transport in this manner results in dredging adjacent to the Calcasieu Ship Channel, which may affect the benthic and aquatic community. While material will be deposited and re-dredged within a defined area, the potential exists for sea turtles, marine mammals, and other aquatic wildlife to be present within the re-handling site during operations. Visual observations for marine mammals, including Atlantic bottlenose dolphins and West Indian manatees, as well as sea turtles will be conducted prior to and during operations. If any of these species are observed, work will cease until the animals leave the area. Posters designed to assist workers in recognizing these species will be present on work vessels. Mobile benthic organisms would be expected to leave the work area during deposition and re-dredging activities and return when water conditions returned to normal. Sessile benthic organisms present at the re-handling site at the time of material deposition would be expected to be buried and later removed during re-dredging operations.

FIGURE 13 - LOCATION OF SDS ALTERNATIVE CPR (CALCASIEU PASS RE-HANDLING)



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MAXIMUM REHANDLING AREA

AREA (ACRES)
16.7

APPLICATION BY:
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BATON ROUGE, LOUISIANA 70801

CAMERON PARISH SHORELINE RESTORATION

SITE PLAN - CALCASIEU PASS REHANDLING

STATE PROJECT NUMBER: CS-33 SF

DATE: 5/6/11

DRAWN BY: T. MORRISON

DESIGNED BY: J. CARTER

APPROVED BY: H. BERMUDEZ

FEDERAL PROJECT NUMBER:

SHEET 8 OF 14

4.1.1.4 Depth of Cut/Contour Changes

The dredging pattern and depth of cut at each of the Sabine Bank borrow sites will be determined by the selected contractor based on geotechnical data, required sand quality at the CPSRS, and the equipment to be used. Between the two sites, over nine million cubic yards of sand material is available. Approximately five million cubic yards of material has been deemed necessary to construct CPSRS Alternative 5, the Preferred Alternative. Therefore, just over one-half of the available material will be dredged and used to nourish the CPSRS. Dredged slopes will not exceed 7.5H:1V along the dredge boundaries to ensure the integrity of the surrounding seabed, as suggested by Narin et al. (2005).

To assess the potential for the dredging of the borrow area to adversely affect the shoreline of Cameron Parish, wave transformation and longshore transport modeling were conducted for the four reaches of the project. Modeling was based on the removal of nine million cubic yards from the borrow sites (four million cubic yards more than what is proposed to be removed). According to the *30% Design Report*, “Changes to wave characteristics were minor, and resulting changes to longshore transport rates were negligible. No impacts from dredging the borrow sources are expected”. Additionally, a study conducted on the bottom boundary layer dynamics of Sabine Bank (data collected from 2004 through 2008) demonstrated no significant modification in wave pattern as a result of partial removal of the shoal crests at Sabine Bank (Stone et al. 2011). This study states, “Variation in wave heights along the coast, due to partial removal of the shoal crests was remarkably insignificant, of the order of less than 2%.” No modification in wave pattern as a result of the dredging supports the project modeling data that no shoreline impacts associated with dredging the Sabine Bank are anticipated.

4.1.2 CPSRS

4.1.2.1 Effluent Discharge

The only discharge expected to occur at the CPSRS will be the slurry of sand/sediment discharging from the pipeline. Mobile organisms (terrestrial and aquatic) would be expected to leave the area during discharge and return when the turbidity returns to ambient levels in the water column and when operations cease on the beach. The discharge of sand/sediment will bury sessile organisms present on the beach and potentially in the intertidal and shallow tidal zone. However, newly placed material will be quickly recolonized by benthos (Greene 2002).

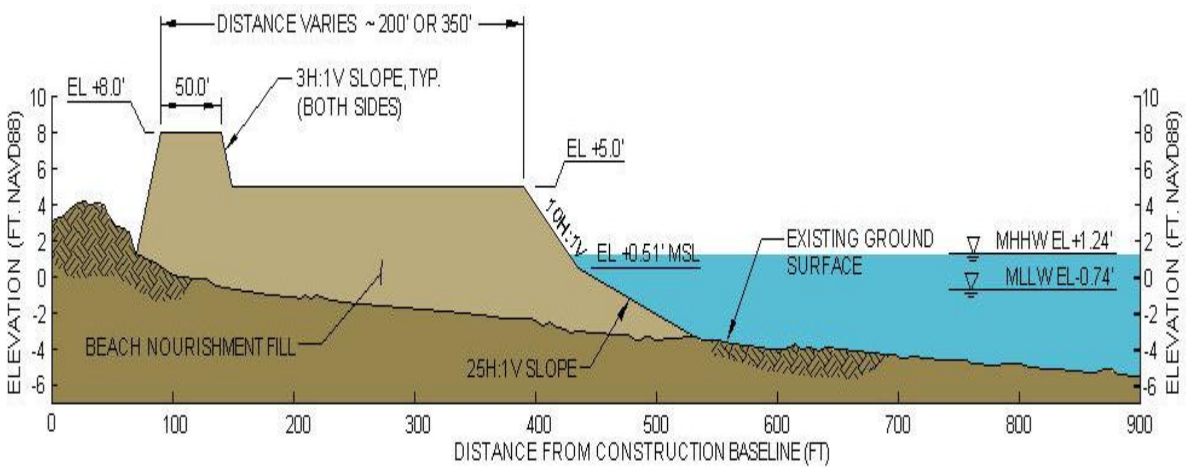
4.1.2.2 Material Transport

Methods of material transport as they relate to moving sand from either the pump-out site or the re-handling area to the CPSRS were presented in 4.1.1.3. Based on the information presented, there are potential impacts to navigation, fishing, and shipping interests, as well as benthic and aquatic species, depending on which of the two sediment delivery system alternatives is ultimately selected. Monitoring will be conducted throughout the project to assess sedimentation and loss of material from pipelines as well as impacts to fishermen and shipping interests.

4.1.2.3 Contour Changes from Sand Placement

Material will be received on the beachfront via pipeline from one of two sites off the Calcasieu Ship Channel. The new beach width ranges from 200 to 350 feet for the five million cubic yards of sand to be placed. The dune was designed to prevent overwash from moderate storm surges associated with two to five year storms. Specifically, the dune contains six cubic yards per foot of fill material, which meets the Federal Emergency Management Agency (FEMA) criterion for dune erosion during a five year storm (FEMA 1988). Based on the *30% Design Report*, the elevation of the dune crest is +8 feet NAVD88; this height will not prevent overwash from severe storm surge events. **Figure 14** demonstrates a typical cross-section for the beach nourishment.

FIGURE 14
TYPICAL CROSS-SECTION OF BEACH NOURISHMENT ALTERNATIVES



Source: CHE 30% Design Report, Figure 34

Upon completion of the sand placement and achievement of the desired beach contours, the Project Team recommended the placement of sand fencing and vegetation plantings. Assuming these recommendations are accepted, the preliminary sand fence design is a two-row wooden slat fence paralleling the shoreline. Vegetation plantings of Fourchon bitter panicum (*Panicum amarum*) on either side of the fencing to stabilize and enhance the dune system are also recommended. A total of three rows of plants on five-foot centers are recommended.

4.1.3 No Action Alternative

If no action is taken, there will be no dredging operations associated with the CPSRS project, no effluent discharges at sea from dredging at Sabine Bank for the CPSRS, no transportation of dredged material, and no changes to the existing contour of the seabed at Sabine Bank or the shoreface at the CPSRS. If none of these actions occur, there will be no impacts to water quality from the proposed project, no impacts to the benthic and aquatic community associated with dredging for the CPSRS, no impacts to shipping, fishing, and other industrial users associated with dredging and dredged material transport, and no physical changes to the topography/bathymetry of the two sites.

Taking no action does not restore the beach system or create a dune system designed to protect the infrastructure and natural resources of Holly Beach and Cameron Parish for the next 20 years.

4.2 Physical Resources

Potential impacts to physical resources are presented on **Table 4.2**. The table presents Sabine Bank, the CPSRS, and No Action impacts for each of the physical resources discussed in Chapter 3.

TABLE 4.2
POTENTIAL DREDGING AND BEACH NOURISHMENT IMPACTS TO PHYSICAL RESOURCES

Resource	Impact		
	Sabine	**CPSRS**	**No Action**
Geology/ Topography	Five million cubic yards of material will be dredged from the seabed, altering the topography of the seabed at the borrow sites. Studies indicate this material removal will not adversely impact the physical integrity of the borrow site or increase erosion on the Cameron Parish shoreline.	Five million cubic yards of material will be placed on the beach to replenish eroded material altering the existing shoreface profile. Beach nourishment will restore the beach and provide defense against storm surge and erosion for approximately 20 years.	No impacts to geology or topography will occur.
Water Resources	Temporary increases in turbidity would be expected as a result of the dredging operation. These increases will be of short duration and should not adversely impact water quality.	Temporary increases in turbidity in the surf zone would be expected. These increases will be of short duration and should not adversely impact area water quality beyond the placement timeframe. There are no anticipated impacts to scenic streams or sole source aquifers.	No impacts to water quality will occur as a result of the project.
Physical Oceanographic Processes	Studies indicate the material removal will not adversely impact currents, wave heights, tides, or water chemistry.	While beach nourishment will alter the shoreface in a manner to reduce the impacts of physical oceanographic processes on the beach, the construction will not impact the actual processes.	No impacts to physical oceanographic processes will occur as a result of the project.
Climate	No impacts to climate are anticipated.	No impacts to climate are anticipated.	No impacts to climate are anticipated.
Air Quality	Operation of the dredges and booster pumps will result in emissions from diesel engines during construction. These increases in emissions are not expected to diminish overall air quality.	Operation of the booster pumps will result in emissions from diesel engines during construction. These increases in emissions are not expected to diminish overall air quality.	No impacts to air quality will occur.

4.3 Bio-Physical Resources

The following table presents an impact summary of potential impacts to bio-physical resources.

TABLE 4.3
POTENTIAL DREDGING AND BEACH NOURISHMENT IMPACTS TO BIO-PHYSICAL RESOURCES

Resource	Impact		
	Sabine	**CPSRS**	**No Action**
Open Water	Open water impacts will be limited to the construction period. These impacts will include localized temporary degradation of water quality due to increased suspended solids.	Presently, the CPSRS does not support open water habitat.	No impacts to open water environments will occur.
Benthic Habitat	Benthic organisms will be directly removed during the dredging process. Overall, research suggests that recovery of benthos occurs relatively soon after impact. Documented recovery times of benthos range from between 45 and 156 days to two years (Brooks et al. 2004a).	Benthic organisms present at the CPSRS could be buried during nourishment activities; however, newly placed material will be quickly recolonized by benthos (Greene 2002). Benthic organisms in the rehandling area could be buried by deposited sediment and possibly removed during dredging – if that alternative is used. Mobile benthic organisms will probably leave the areas of high turbidity and return after the material has settled. Benthic organisms could be crushed or smothered with the installation and removal of pilings or a jack up barge.	No impacts to benthic habitat at Sabine Bank are anticipated. No action will continue to allow the shore to erode at its present rapid rate, ultimately removing the existing benthic habitat associated with the CPSRS.
Aquatic Communities	Impacts to aquatic communities are limited to the operational period of the dredging activity. The presence of the hopper dredge(s) and associated piping represent a physical hazard to aquatic life that may collide with the operating dredge. Disturbance of bottom-dwelling species and the prey base for coastal pelagics and mammals may result, as well as noise disturbance. Benthic communities are expected to re-colonize the area, restoring the prey base.	The discharge of the sand slurry may result in temporary increases in turbidity that may displace some aquatic life during the discharge period. Additionally, the pipeline, whether floating or anchored, could result in collisions with aquatic mammals. There may also be a decrease of EFH where elevations create dune from what may have been low lying somewhat submerged or ponding habitat.	No impacts to aquatic communities will occur.

Resource	Impact		
	Sabine	**CPSRS**	**No Action**
Beach/intertidal Habitat	There is no beach or intertidal habitat at the borrow source.	Initial impacts, benthic mortality, and disturbance to certain birds will be outweighed by the increased extent and improvement of the overall quality of beach and intertidal habitat	Beach and intertidal habitats will continue to erode at current rates, resulting in loss of habitat for benthic organisms and beach wildlife, and loss of recreational beach area for local users and tourists.
Wildlife and Avian Species	Wildlife and avian impacts would be the same as those for the aquatic community. Noise from the dredge may result in some avian species avoiding the area until work is completed.	Wildlife and avian impacts would be similar to those for the aquatic community. As observed during similar beach nourishment projects, an increase in avian presence could be expected during the discharge of the sand slurry.	Habitat utilized by area wildlife and avian species would continue to be lost to erosion, potentially removing certain species from the area (particularly those species that use beach/dune habitat).
Vegetation	No impacts to offshore non-sessile vegetation are anticipated. Although not noted in the borrow source report, any sessile submerged vegetation that may be present within the borrow site would be directly removed or impacted during dredging operations as a result of sedimentation.	Restoring the ridge will protect existing adjacent wetlands from wave energy and prevent salt water intrusion. Dunes created during the nourishment project will be planted with Fourchon bitter panicum (*Panicum amarum*) to encourage new vegetation communities preferable to wildlife and beach protection. Vegetation buried during the construction of the dune system will be replaced by plantings and natural recruitment.	Beach vegetation will be lost as the shoreline continues to erode.

4.4 Critical Biological Resources

4.4.1 Sabine Bank

Cetaceans

Cetaceans may be impacted by the presence of the hopper dredge(s) as a result of noise, their physical presence, and the effects of increased turbidity on prey availability (Davis et al. 2000). Noise associated with the vessel(s) will likely move the animals away from the dredge during operation. When not operating, the vessels may pose a collision threat to marine mammals. An increase in suspended sediments may alter the volume and types of prey available in the immediate vicinity of the dredge. All of these potential impacts are considered negligible due to the short time frame that they may be present and the ability of marine mammals to move to more favorable feeding areas during dredge operation. Additionally, using mobile hopper dredges disperses the effects over a larger area rather than concentrating suspension of sediments in a small area where the likelihood of fouling the water column would be greater.

Sea Turtles

The potential effects to sea turtles are similar to those for marine mammals, including disrupted feeding ability, loss of prey, and noise disruption. In addition, possible collisions with equipment could result in sea turtles being drawn into the dredge (Davis et al. 2000). Since 1992, sea turtle protection measures, including a turtle deflector for dredge dragheads have been required. Sea turtle takes as a result of the use of dredges per dredging project in the GOM from 1995 to 2008 were 1.14 per year (USACE 2011). NOAA's NFMS prepared a Biological Opinion (BO) relative to potential impacts to GOM sea turtles as a result of dredging operations associated with this project. The opinion was released June 1, 2012.

The NMFS BO found that the hopper dredging activities at Sabine Banks are likely to adversely affect Kemp's ridley, loggerhead, and green sea turtles, but not jeopardize their existence. NMFS has defined the incidental takings associated with this project to be:

- 5 sea turtle mortalities (2 Kemp's ridleys, 2 loggerheads, and 1 green) resulting from hopper dredging

- Non-injurious take of up to 30 sea turtles by relocation trawling, consisting of 14 Kemp's ridleys, 14 loggerhead, and 2 green sea turtles, during the 150-350 days of the project in federal and state waters; of these 30 maximum takes by relocation trawling, NMFS anticipates that 1 mortality may occur, of either a Kemp's ridley, loggerhead or green sea turtle

- NMFS anticipates that hopper dredging will result in 5 unobserved lethal takes of 2 Kemp's ridleys, 2 loggerhead, and 1 green turtle

As a result of this finding, the NMFS BO requires the following reasonable and prudent measures (RPM) must be implemented by BOEM:

1. BOEM shall have measures in place to monitor and report all interactions with any protected species (ESA or MMPA) resulting from the proposed action. Reports shall be sent to the Assistant Regional Administrator (Mr. David Bernhart) for NMFS' Protected Resources Division, Southeast Regional Office, 263 13th Avenue South, St. Petersburg, Florida 33701-5505.

2. BOEM will require NMFS-approved observers to monitor dredged material inflow and overflow screening baskets on the hopper dredge.

3. BOEM will implement relocation trawling in association with all hopper dredging. Trawling will begin 24 hours in advance of the start of dredging and will continue simultaneous with and to the completion of hopper dredging.

4. BOEM will require the hopper dredge's sea turtle deflector draghead(s) to be inspected by COE prior to start-up of hopper dredging operations. A solid-faced deflector shall be used, unless otherwise authorized by NMFS. In addition, BOEM shall ensure that all contracted personnel involved in operating hopper dredges receive thorough training on measures of dredge operation that will minimize sea turtle takes as outlined in the Gulf of Mexico Regional Biological Opinion.

Numerous terms and conditions are required to implement the RPMs outlined above and must be followed to maintain compliance with Section 9 of the Endangered Species Act. The terms and conditions relate to reporting and notification requirements, observer requirements, handling of captured sea turtles, and obtaining sampling data from captured animals. The lease prepared by BOEM will include these terms and conditions as presented in Section 9.4 of the NMFS BO included as **Appendix F**. In addition to the terms and conditions, recommended conservation methods will be implemented as practicable.

The following actions are also required by the NMFS BO:

- During hopper dredging operations, protected species observers will live aboard the dredge(s), monitoring every dredge haul 24 hours a day, for evidence of dredge related impacts to protected species, particularly sea turtles.

- Rigid turtle deflectors will be installed on the dragheads before work begins and all points of inflow will be screened.
- Cages will be attached to the ends of discharge pipes, be constructed of steel bar-stock, and welded in a grid pattern with openings approximately 4 inches x 4 inches. Observers will clean and inspect these screens, 24-hours a day, to document any evidence of sea turtle interactions by looking for sea turtle body parts.
- Observers will maintain a bridge watch for protected species and keep a logbook noting the date, time, location, species, number of animals, distance and bearing from dredge, direction of travel, and other information, for all sightings.
- During all phases of dredging operations, the dredge and crew will be required to adhere to NMFS' *Sea Turtle and Smalltooth Sawfish Construction Conditions.*

4.4.2 CPSRS

4.4.2.1 Threatened and Endangered Species

Piping Plover

Unavoidable short-term impacts to suitable habitat would result from human disturbance and the placement of sediments onto existing beach and dune habitats during construction and re-nourishment. Under optimal conditions, impacts to the piping plover could be avoided by conducting the proposed activities outside the wintering season. However, construction could last for 12 months or more and restricting work to the non-wintering season is not practicable for project completion.

Any birds utilizing the CPSRS during construction would likely be temporarily displaced to nearby suitable habitat along the Gulf shoreline to the east and west during construction; however, plovers would not be permanently excluded from the CPSRS. The temporary displacement of plovers will have no effect on their wintering survival, foraging ability, and energetic costs due to the close proximity of alternate habitat. Based on data associated with completed barrier shoreline restoration projects, it is anticipated that the completion of the project will benefit plovers and their critical habitat by adding and restoring more quality shoreline habitat.

Temporary impacts to piping plovers and designated critical habitat at the CPSRS would consist of human disturbance during construction and direct placement of fill. Further, as discussed in Section 4.3.1.2, benthic prey may take up to several months to recover following project completion (Brooks et al. 2004a), and could result in less suitable foraging during that time. It should be noted that newly placed material is quickly recolonized by benthos (Greene 2002). Therefore, the proposed project will likely temporarily impact the piping plover and its critical habitat during construction as a result of increased human disturbance and placement of sediment. Following construction and once the benthic fauna has recovered, it is anticipated that the piping plover will resume full utilization of the area and have a larger habitat to utilize than prior to construction.

The USFWS issued a BO on the BA prepared for the piping plover on February 23, 2012. The USFWS BO found that the beach replenishment activities at the CPSRS are not likely to jeopardize the existence of the piping plover. The USFWS has defined the incidental take associated with this project to be:

- Harm and harassment as a result of the proposed action on all piping plovers (directly or indirectly) using the affected 8.7 miles of Gulf shoreline (6 miles of which is designated critical habitat)

As a result of this finding, the USFWS BO requires the following reasonable and prudent measures (RPM) to be implemented:

1. The permit applicant should carefully mark and stake the boundaries of the project footprint along the Gulf shoreline and ensure that those markers are maintained for the duration of project construction activities. Should the project extend outside of those boundary markers, then the level (i.e., all piping plovers using the 8.7 miles of Gulf shoreline) of incidental take for this project would be exceeded and the Corps, along with its permit applicant, should reinitiate section 7 consultation with the Service as soon as possible.

2. A baseline piping plover survey should be conducted within the migrating and wintering season immediately prior to initial construction in order to determine the piping plover's preferred habitat use within the action area. Such information could then be used as an aid to determine whether specific project actions require slight modifications in order to minimize the effects of the take for future migrating and wintering seasons. For example, initial bird surveys may aid in locating and marking appropriate ingress and egress routes for ORVs and other work-related equipment, as well as equipment staging areas, in order to reduce disturbance to foraging and roosting birds to the maximum extent practicable.

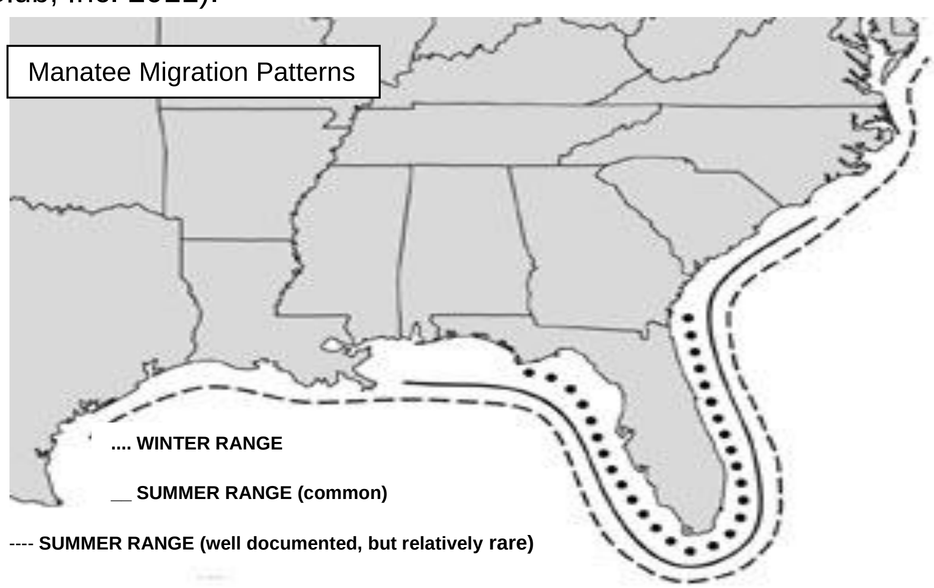
3. Piping plover monitoring surveys should be conducted during the migrating and wintering seasons throughout initial project construction in order to determine whether ingress and egress routes are working or whether they need to be adjusted.

4. A comprehensive report describing the actions taken to implement the RPMs and terms and conditions associated with this incidental take statement shall be submitted to the Service by June 30 of the year following completion of all required surveys.

Numerous terms and conditions are required to implement the RPMs outlined above and must be followed to maintain compliance with Section 9 of the Endangered Species Act. The terms and conditions relate to monitoring requirements, habitat marking requirements, and reporting requirements. The permit issued by the USACE includes these terms and conditions. In addition following the terms and conditions, recommended conservation methods will be implemented as practicable and USFWS and LDWF guidelines for avoiding impacts to nesting shore birds will be followed.

West Indian Manatee

Manatee occurrences have been regularly reported in the canals and coastline of Louisiana. Collision with boats and barges is one of the primary causes of manatee mortality. During the proposed work, the potential to encounter and impact manatees will likely be low because of the short duration of their summer migratory habits and rare occurrence in southwest Louisiana (Save the Manatee Club, Inc. 2011).



Source: Save the Manatee Club, Inc. 2011

However, best management practices (as defined in the USFWS BO) will be followed by work personnel in order to avoid or minimize impacts to manatees during construction.

Sea Turtles

Of the five species of sea turtles that occupy the northern GOM, none have been documented in recent history to nest on beaches in Cameron Parish (USFWS 2011). Further, Kemp's ridleys and loggerheads are the only sea turtles that prefer nearshore and inshore waters of the Louisiana coast (USFWS 2011), however, the BO issued by the NMFS addresses impacts to the Kemp's ridley, green, and loggerhead sea turtles. The potential for impacts to sea turtles at the pump-out site or re-handling site is similar to that of Sabine Bank. Presence of equipment may affect feeding or create a collision hazard; these potential impacts are temporary in nature. Utilization of submerged pipelines to transport the dredged material and minimization of associated infrastructure will reduce the collision hazard. The turbidity resulting from operations will likely encourage sea turtles to relocate to more favorable adjacent habitat until turbidity drops to ambient levels. The proposed project is not likely to adversely affect sea turtles at the CPSRS, this is confirmed in the NMFS BO. To further ensure impacts to sea turtles will be avoided, NMFS requested their *Sea Turtle and Smalltooth Sawfish Construction Guidelines* be added to the USACE permit issued for this project.

Gulf Sturgeon

Gulf sturgeon critical habitat does not extend westward from the Mississippi River and will not be impacted by the proposed project (NMFS 2007). Further, the project area is at the extreme western edge of gulf sturgeon home range. Additionally, the Gulf Sturgeon is provided management and protection under the USACE GRBO, which will be implemented for this project. Therefore, sturgeons are not likely to be adversely impacted by the proposed project. This opinion is supported by the NMFS BO.

4.4.2.2 Essential Fish Habitat

Short-term adverse impacts to fishery resources may occur during construction. Entrapment and smothering of slow moving fish and benthic prey in intertidal areas may occur during deposition. Increased turbidity will also likely occur at Sabine Bank and intertidal areas at the CPSRS. This may cause gill clogging, increased mucus production, smothering, or displacement of fish and prey. Increased noise levels from the construction and dredging phases may also cause displacement of mobile fish and prey. These impacts, however, are minor and would be limited to the immediate vicinity of Sabine Bank and the CPSRS and only for the duration of construction.

All estuarine systems of the GOM are considered EFH for all fish managed by the GOM Fishery Management Council (GOM Fishery Management Council 1998). The proposed project will help protect over 8,900 acres of important coastal wetland habitat, most of which is considered EFH. Positive impacts to EFH would include reestablishment of subaqueous beach habitat and protection of marsh. These wetlands serve as habitat for prey species of some of the managed fish, as well as provide nurseries for the larvae and juvenile stages of many managed species. There may, however, be a decrease of EFH where elevations create dunes from what may have been low-lying, somewhat submerged or ponding habitat.

An EFH consultation will be initiated with NMFS. Appropriate mitigation measures, as recommended during the consultation, will be implemented for this project.

4.4.3 No Action Alternative

If no action is taken, no impacts to critical biological resources at Sabine Bank would be anticipated. However, at the CPSRS, habitat necessary for the nesting and overwintering of piping plovers will continue to erode away and eventually be lost, resulting in the relocation of the species to more favorable habitats located along the Texas and Louisiana coasts.

With no action associated with this project and no action taken to prevent damage to LA 82, the next significant tropical event could result in the overtopping or breaching of the highway in some areas. The introduction of saline GOM waters into the sensitive marsh system protected in part by LA 82 will damage, potentially permanently, the nursery function these wetlands provide and their status as EFH for multiple species of shrimp and redfish.

4.5 Cultural Resources

4.5.1 Sabine Bank

As previously stated, two borrow sites may be utilized at Sabine Bank to supply the sand necessary to complete the beach nourishment project: HF and JF.

Archival research indicated that no historic or modern vessels have wrecked within either potential borrow area. However, a previously unidentified shipwreck adjacent to Borrow Source JF was discovered during the CRS. Upon coordination with BOEM, a 1000-foot radial buffer will be applied around this shipwreck where no work or anchoring will be done. Burial of the site is not considered likely, as the distance from the work area and planned slopes of the excavation should be adequate to prevent mechanical impact and sloughing. It should be noted that, due to the extent of the survey, no additional shipwrecks are anticipated to be encountered within the boundaries of the delineated borrow areas. The possibility exists for shipwrecks or other cultural resources to be present outside the borrow areas, some of which have been identified in the 2008 CRS; however, no dredging or bottom disturbing activities are proposed in those locations.

The borrow sources HF and JF are situated in an area considered to have a high probability of offshore prehistoric site occurrence and preservation (Pearson et al. 1989). The surficial sand deposits that are the target of proposed dredging operations in this borrow area consist of reworked Holocene sands (Rodriguez et al. 1999) with little potential for preserved archaeological deposits. Based on research conducted in association with the 2008 CRS, no previously investigated archeological sites lie in or near the areas.

Three magnetic anomalies detected during the 2008 CRS of Area HF were determined to represent potential archeological resources. A 300-foot buffer will be established around these locations to avoid impact to any potential resources present. The locations of all the buffer areas will be provided to the dredge contractor along with the requirements that there shall be no dredging, anchoring, or other bottom disturbing activities within the buffer zones.

Full details of the CRS are contained in Appendix C of the 2009 Borrow Source Investigation in **Appendix A** of this document.

4.5.2 CPSRS

Correspondence from the SHPO in 2009 indicated that there would be no adverse effect to cultural resources at the CPSRS. This correspondence is included as **Appendix E.**

While Cameron Parish, similar to the rest of south Louisiana, maintains a rich Native American history and more recent history including revolutionary and civil war battles, the shoreline of the project area has experienced ground disturbing impacts over the years. The construction of the Calcasieu Ship Channel, the establishment of ODMDS off the channel, and the installation of the jetties have affected the near shore and SDS sites. The shoreline has experienced high rates of erosion and the impacts of numerous stabilization projects as well as vehicular and pedestrian traffic. The determination of “no adverse affect” from the SHPO indicates that the state agency in charge of ensuring that the project complies with the National Historic Preservation Act (NHPA) has determined that there is not enough evidence to support any other conclusion. This determination does not indicate that the SHPO has determined that there is no potential for resources to be present and they reserve the right to reverse their decision if new information is discovered. However, since project activities at the CPSRS site involve the placement of material over the existing beach and the creation of dunes from the newly placed material, any unknown cultural resources that may be present at the CPSRS location will be further buried as a result of the project.

Relative to which SDS alternative is selected for material transport, the potential exists that a shipwreck or other known/unknown cultural resource may be adversely affected. Prior to the selection of the re-handling site in Calcasieu Pass, a bathymetric survey was conducted to detect any obstructions. Upon completion of the *30% Design Report*, a new bathymetric survey and magnetometer survey were performed at the site, and no obstructions or anomalies were identified. In terms of pipeline placement, bottom surveys will be necessary prior to the placement of the transport pipeline and any ancillary structures. These surveys should be sufficient to determine if there are any previously unidentified shipwrecks or structures on the seabed in the areas of proposed work activity. Additionally, the SHPO indicated that they have no objection to the use of the proposed re-handling in email correspondence dated September 28, 2011. This correspondence is in **Appendix E**.

In the event that no potential resources are detected through pre-construction surveys but are actually encountered during operations, work will be halted until the resource at risk can be accurately identified. It is possible that discovery of such a resource could occur during ground disturbing activities that may damage the resource.

4.5.3 No Action Alternative

The No Action Alternative will have no impact on known cultural resources at Sabine Bank or the CPSRS. While no sites are presently known, any presently undiscovered resources that may be present in the CPSRS could be lost to the GOM without the project, as beach erosion will not be prevented and loss of land will continue.

4.6 Socioeconomics

4.6.1 Sabine Bank

Implementation of this project will not interfere with Louisiana's offshore oil and gas exploration and production activities. As the trailing suction hopper dredge is a moving dredge, additional anchorages and infrastructure associated with a stationary dredge are not anticipated. Access to fishery resources around Sabine Bank will be less restricted due to the lack of this additional equipment. However, during construction, the presence of the dredge, noise associated with operation, and increased turbidity during sand mining will make the area less desirable for fish and fishermen. Fish can be expected to be impacted by seabed disturbance and temporary increases in turbidity (Tomlinson et al. 2007). The benefits of using the trailing suction hopper dredge include the lack of additional seabed impacting structures such as anchors and moorings and that the dredge will leave the borrow area when full, allowing time for suspended sediments to settle out in between dredge operations. Impacts to fisherman include loss of gear, increased boat traffic, restricted access to traditional navigation routes, and limited access to traditional fishing grounds (Tomlinson et al. 2007). Pipeline routes have been selected in coordination with local fisherman to minimize impacts to access routes, and during operation, the dredge will be moving, lessening the potential for loss of fishing gear.

No measurable impacts are anticipated because of the availability of the adjacent habitat for fish, shellfish, and crustaceans, and for commercial and recreational fishing.

4.6.2 CPSRS

SDS Alternative CPP will have no direct impacts to the navigation channel and it is anticipated to have minimal to no impact to local fishermen during shrimping seasons. Every attempt to minimize the amount of infrastructure for temporary mooring will be made to reduce the overall footprint of the pump-out area and reduce impacts to adjacent landowners and users.

The re-handling site associated with SDS Alternative CPR was selected in consultation with federal navigation, fishing, and shipping interests (see **Appendix D**). However, re-handling could result in sedimentation within the Calcasieu Ship Channel, affecting fishing and shipping interests. While studies have indicated that the volume of sediment that may be dispersed from the re-handling site to the channel “is negligible and will not measurably affect the navigable depth,” frequent surveys during construction will monitor water depth and will identify any sedimentation. If the project is found to cause sedimentation of the ship channel, contractors will remove the material as quickly as possible.

Placement of the sand at the CPSRS should result in a net positive economic impact by restoring and sustaining the new beachhead for 20 years. The restored beachhead and associated dune system will protect public and private infrastructure from wave energies and subsequent undermining and damage that may render structures such as LA 82 inoperable. Preventing overwash during typical non-tropical storm events will protect the fragile coastal marsh system north of LA 82 from high salinity water and wave action. The value of Louisiana’s coastal wetlands for storm protection has been estimate to be $1,530.82 per acre in 2007 dollars (Batker et al. 2010). Cameron Parish relies heavily on its natural resources for income. Damage to these resources threatens the quality of life enjoyed by residents of the parish and those visitors to the parish's many natural recreational areas.

Executive Order (EO) 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, specifies actions to be taken on a range of issues that are intended to promote nondiscrimination in federal actions to provide minority and low-income communities equal access to public information regarding a federal action, and to provide an opportunity for public participation in the evaluation of a federal action in matters relating to human health and the environment. Based on U.S. census data obtained for the census blocks comprising the CPSRS area, there are no minority or low income populations near the CPSRS (U.S. Census Bureau 2009). Therefore, the environmental impacts will not fall disproportionately on minority and/or low-income members of the community and/or tribal resources. No one particular group of individuals is expected to receive greater benefit or be adversely affected by the project. As the ports and Cameron Parish's natural resources drive the parish's economy, this project benefits all residents of the parish and supports the preservation of local infrastructure, which also contributes to commerce.

Coastal populations in Louisiana (and Cameron Parish) demonstrate an economic dependence on commercial fishing (including oystering) and on other traditional subsistence fishing, hunting, and trapping to augment their diets and household incomes. The implementation of the project will serve as a barrier to protect the economically valuable coastal marsh north of LA 82 as well as the beach for recreational fishing (wade fishing, crabbing, etc.)

4.6.3 No Action Alternative

Minimal impact to the economy associated with Sabine Bank would be expected without the project. Any impacts would be associated with changes in fishing and EFH resulting from impacts to presently protected brackish coastal marshes.

Without the project, erosional processes at the CPSRS will eventually damage adjacent infrastructure and threaten the integrity of Holly Beach, as well as expose the fragile coastal marsh landward of the chenier beach to increased salinity and wave action. Continued loss of the shoreline will eventually result in residential relocations, as houses will be abandoned to the GOM. Impacts to LA 82 will result in temporary and potentially permanent impacts to commerce, as well as exposing the brackish marsh to wave energy and saline GOM waters. Cameron Parish relies heavily on its natural resources for income, which will be damaged and/or lost without the project. Damage and loss of the beach and marsh threatens the quality of life enjoyed by residents of the parish and those visitors to the parish's many natural recreational areas.

4.7 Cumulative Impacts

Dredging of sediment resources can have indirect effects on the benthic community. Changes in sediment parameters (i.e., grain size, organic content) may create long-term changes in sediment suitability leading to a change in species composition (Hacking 2003). Sediment re-suspension is another indirect effect that can impact not only the immediate benthic community, but also the surrounding community structure because of differential susceptibility of fauna to either burial of adults/recruits (Miller et al. 2002), and/or prevention of effective suspension feeding (Rhoads and Young 1970). A change in the resident benthic community may then have indirect impacts to higher trophic levels which are dependent upon benthos composition for its resource value (Kenny and Rees 1996). Small changes in habitat quality or resource value that affect either the growth and/or survival of juvenile fishes may have eventual large impacts on fish population size (Diaz et al. 2003).

No measurable cumulative impacts are anticipated on the fish community as a result of the dredging activity. While changes in the benthic community are possible, the aquatic community (including coastal pelagic species and sea turtles) has ample access to undisturbed areas immediately adjacent to the borrow area and dredge re-handling site. Temporary increases in turbidity will tend to prevent sea turtles and other mobile aquatic life from entering the area during dredging operations. However, impacts associated with turbidity will be temporary and result in no cumulative impacts on water quality or use by the aquatic community.

The bathymetry of the two borrow sites at Sabine Bank will be altered. Studies conducted to ensure that adverse impacts to the shoreline would not result from the alteration of the bottom elevation of the borrow sites indicate that no measurable effects on wave heights or frequency are expected as a result of the cut (Stone et al. 2011). No measurable impacts to longshore sediment transport are anticipated.

There will be a significant net benefit to the CPSRS. All adverse impacts associated with the construction of the beach nourishment project are considered short-term and primarily restricted to the construction phase of the operation. No negative cumulative impacts are expected as a result of the sand placement. Once the sand has been discharged and spread into the configuration associated with Alternative 5, dune fencing will be installed and with plantings to assist in anchoring the dunes and providing habitat for shorebirds and other wildlife, including the piping plover. These actions will result in a wider and more stabilized beachhead that is intended to provide protection for area infrastructure and marshlands for approximately 20 years.

5.0 CONSULTATION AND COORDINATION

The Cameron Parish Shoreline Restoration Project was funded through an Act of the Louisiana legislature and is included in Louisiana's Coastal restoration program. During the development of alternatives, the Project Team, the Cameron Parish Police Jury, and other local interests were consulted to review and comment on sediment delivery and beach nourishment alternatives. On March 8, 2010, an interagency pre-application meeting was held in Baton Rouge to discuss the permitting of the project with state and federal regulators. Agencies represented included the LDNR Office of Coastal Management, the USACE, and the LDWF. **Appendix D** contains details on meetings and outreach activities. Agencies invited that did not attend or provide comments included the Cameron Parish Police Jury, LDEQ and NMFS. The USFWS was also not in attendance but indicated that a site visit to the beach nourishment site would be necessary to assess piping plover habitat. A field visit to assess piping plover habitat was made in May 2011 by the USFWS and Providence. A second meeting was held in November 2010 to further discuss the specifics of the project and obtain comments with representatives from LDNR, USFWS, USACE, NMFS, and BOEM in attendance. Upon completion of the *30% Design Report*, the joint permit application was filed with LDNR to officially initiate the permit process. Members of the public, regulatory agencies, and governmental entities will be provided additional opportunity to review the project and comment on its impacts through the joint permit process.

The Coastal Zone Management Act (CZMA) places requirements on any applicant for a proposed activity on the OCS that describes in detail a federal license or permit affecting any coastal use or resource, in or outside of a state's coastal zone. All federal license and permit activities occurring in the coastal zone are deemed to affect coastal uses or resources if the state coastal management program (CMP) has *listed* the particular federal license, permit, or authorization in its federally approved CMP. *For* a *listed* activity occurring in the coastal zone, the applicant must submit a Consistency Certification to the authorizing federal agency and the affected state CMP at the same time. In addition to the Certification, the applicant must provide the state with the *necessary data and information* (identified by the state CMP) required by NOAA's regulations at 15 CFR 930.58. Once the Consistency information is submitted and determined by the state to be adequate, the state CMP then has three months to concur or request an extension for an additional three months to provide its consistency decision. At the end of the six-month period, if a state has not responded, then the federal agency may presume consistency. The BOEM may not approve a sand or gravel NNA until such time that a state has concurred, BOEM has presumed concurrence, or upon an override of a state's objection by the Department of Commerce.

6.0 PERMITS AND COMPLIANCE

The following is a list of permits that are required to implement the proposed beach replenishment project:

- LDNR Office of Coastal Management issued Coastal Use Permit
- USACE issued Section 10/404 Permit
- LDEQ issued 401 Water Quality Certification

All three permits have been requested as part of the Joint Permit Application filed in order to obtain the Coastal Use Permit, which will provide Coastal Zone Management Act consistency. The New Orleans District of the USACE issued permit number MVN 2011-01601-WII on April 2, 2011, in support of this project.

In addition to the above referenced permits, this EA along with other supplemental support documents are required to be submitted to obtain a lease to mine sand from Sabine Bank to build the Cameron Parish Shoreline Restoration Project. One of the supplemental documents, a BA, addresses impacts to specific threatened and endangered species. The piping plover is the only species covered under the BA. Marine threatened and endangered species have been addressed under the BO issued by the NMFS. Acceptance of the final BA and issuance of the BO for the piping plover by the USFWS constitutes compliance with Section 7 of the Endangered Species Act with respect to the piping plover. Acceptance and implementation of the recommendations of the NMFS BO will also constitute compliance with Section 7 of the ESA with respect to sea turtles and the gulf sturgeon.

Compliance with legislation, regulations, EOs, and regulatory guidance is demonstrated in **Table 6.1**.

TABLE 6.1
COMPLIANCE CHECKLIST

Legislation/Executive Order	Compliance Yes	Compliance No
Marine Mammal Protection Act	x	
Archaeological and Historic Preservation Act of 1974	x	
Clean Water Act of 1977, as amended – including Sections 401 and 404	x	
Coastal Zone Management Act of 1972, as amended – CZMA consistency determination	x	
Endangered Species Act of 1973, as amended	x	
Estuary Protection Act	x	
Fish and Wildlife Coordination Act of 1958, as amended	x	
Magnuson-Stevens Fishery Conservation and Management Act of 1976, as amended	x	
National Environmental Policy Act of 1969, as amended	x	
National Historic Preservation Act of 1966, as amended	x	
Rivers and Harbors Act of 1899, Section 10	x	
Coastal Barrier Resources Act	x	
Resource Conservation and Recovery Act	x	
Comprehensive Environmental Response, Compensation, and Liability Act	x	
The Protection of Children (EO #13045)	x	
Federal Actions to Address Environmental Justice In Minority Populations and Low-Income Populations (EO #12898)	x	
Floodplain Management (EO #11988)	x	

Legislation/Executive Order	Compliance Yes	No
Protection of Wetlands (EO #11990)	x	
Federal Compliance with Pollution Control Standards (EO # 12088)	x	
Invasive Species (EO # 13112)	x	
Marine Protected Areas (EO #13158)	x	
Responsibilities of Federal Agencies to Protect Migratory Birds (EO # 13186)	x	
Protection and Enhancement of Environmental Quality (EO #11514/11991)	x	
Protection and Enhancement of the Cultural Environment (EO #11593)	x	
Environmental Effects Abroad of Major Federal Actions (EO #12114)	x	
Offshore Oil Spill Pollution (EO #12123)	x	
Procurement Requirements and Policies for Federal Agencies for Ozone Depleting Substances (EO #12843)	x	
Compliance with Right-to-Know Laws and Pollution Prevention (EO #12856)	x	
Implementation of the North American Free Trade Agreement (EO #12889)	x	
Energy Efficiency and Water Conservation at Federal Facilities (EO#12902)	x	
Federal Acquisition and Community Right-to-Know (EO #12969)	x	
Coral Reef Protection (EO #13089)	x	
Greening the Federal Government through Waste Prevention, Recycling, and Federal Acquisition (EO#13148)	x	
Consultation and Coordination with Indian Tribal Governments (EO #13175)	x	
Executive Order Facilitation of Cooperative Conservation (EO #13352)	x	
Applicable State Statutes	x	

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APPENDIX A

CAMERON PARISH SHORELINE RESTORATION PROJECT (CS-33 SF), BORROW SOURCE INVESTIGATION (2009)

APPENDIX B

CAMERON PARISH SHORELINE RESTORATION PROJECT (CS-33 SF), 30% DESIGN REPORT (2011)

APPENDIX C

CAMERON PARISH SHORELINE RESTORATION PROJECT (CS-33 SF), 20% DESIGN REPORT (2010)

APPENDIX D

PUBLIC OUTREACH DOCUMENTATION

APPENDIX E

SHPO CORRESPONDENCE

APPENDIX F

NOAA NMFS BIOLOGICAL OPINION

FINDING OF NO SIGNIFICANT IMPACT

Use of Outer Continental Shelf Sand from Sabine Bank Borrow Sites HF (a) and JF (b) for the Cameron Parish Shoreline Restoration Project (CS-33 SF), Cameron Parish, Louisiana

Introduction

Pursuant to the National Environmental Policy Act (NEPA) and Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR 1500-1508), the Louisiana Coastal Protection and Restoration Authority (CPRA), in coordination with the Bureau of Ocean Energy Management (BOEM), prepared an environmental assessment (EA) (Attachment 1) to determine whether authorizing the use of Outer Continental Shelf (OCS) sand from Sabine Bank Borrow Sites HF (a) and JF (b) would have a significant effect on the human environment and whether an environmental impact statement (EIS) should be prepared. Pursuant to the U.S. Department of the Interior (DOI) regulations implementing NEPA (43 CFR 46), BOEM has independently reviewed the EA and has determined that the potential impacts of the proposed action have been adequately addressed.

Proposed Action

BOEM's proposed action is the issuance of a negotiated noncompetitive agreement (NNA) to authorize the use of sand from Sabine Bank Borrow Sites HF (a) and JF (b), located in West Cameron Area Blocks 114 and 117. Area HF, the western of the two borrow sites, is 20.3 miles (32.7 kilometers) from the mouth of Calcasieu Pass, while Area JF, located to the east of Area HF, is 26.7 miles (43.0 kilometers) from the mouth of the Pass. The U.S. Army Corps of Engineers (COE) connected action is the issuance of a Section 10/404 regulatory permit for construction of the project. The project includes the reestablishment of the eroded headland/beach through the creation of a continuous beach and dune system for approximately 8.7 miles (14.0 kilometers) of shoreline, or approximately 840 acres (340 hectares) of restored beach habitat. These features shall be constructed using sand material from designated borrow sources (Borrow Sites HF and JF). Approximately 5,000,000 cubic yards of sand will be delivered to the project site through a multi-step process. A hydraulic hopper dredge will remove the sand from the borrow sites and transport it to a rehandling site in Calcasieu Pass or use a rehandling site adjacent to the beach on the western side of the Pass, outside of the navigation channel. The contractor can utilize both sites as holding areas to then deliver the sand to the beach nourishment placement site. For Alternative 1 (the Calcasieu Pass Rehandling method), the hopper dredge will bottom dump the sand into a rehandling site. The sand will then be removed via a hydraulic dredge and pumped through a temporary pipeline for beach placement in the designated fill areas. For Alternative 2 (the Calcasieu Pass Pump-out method), the hopper dredge will arrive at the pump-out station (see COE permit drawings, Attachment 2) and directly connect to a pipeline and pump the sand from its hopper through the temporary pipeline for beach placement in the designated fill areas. The COE evaluated and approved both alternatives. Dunes will be constructed with 50-foot (15-meter) crowns that will later be planted with bitter panicum vegetation. Temporary access roads will be matted and utilized to access the fill areas. Also, temporary mooring piles will be installed in the channel to aid in mooring.

The purpose of BOEM's proposed action is to respond to a request for use of OCS sand under the authority granted to DOI by the Outer Continental Shelf Lands Act (OCSLA). The legal authority for the issuance of negotiated noncompetitive leases for OCS sand and gravel is provided by the OCSLA (43 U.S.C. 1337(k)(2)).

Alternatives to the Proposed Action

The COE evaluated the terrestrial, State waters portion of the project. This included various fill area alternatives and associated sand rehandling alternatives (see EA Attachment 1). Under Section 404(b)(1) guidelines, COE may only permit discharges of dredged or fill material into waters of the United States that represent the least damaging practicable alternative.

The two OCS borrow locations that BOEM evaluated were identified and selected as a result of numerous geologic and geophysical investigations conducted between 1985 and 2011. There are no alternative borrow locations; thus, the only alternative to BOEM's proposed action is no action. In past environmental analyses for this restoration project, a number of alternatives related to sand sources have been considered. The alternatives have narrowed over time due to lack of sufficient volume and/or the presence of preexisting pipelines, oil and gas wells, and associated industry structures. However, the potential impacts resulting from BOEM's no action actually depend on the course of action subsequently pursued by the CPRA, which could include the unlikely identification of a different offshore (state waters) or upland sand source. In the case of the no action alternative, habitat deterioration and coastal erosion continue, and the likelihood and frequency of property and storm damage increases. The attached EA and COE 10/404 permit also analyzed a no action alternative that notes the same impact.

Environmental Effects

The Cameron Parish Shoreline Restoration Project is an environmental restoration project.

The waters of the Gulf of Mexico (GOM) are eroding the coastline at approximately 50 feet (15 meters) per year at some locations. If the remainder of the sandy chenier barrier separating the GOM from the landward wetlands is breached, more than 40,000 acres (16,187 hectares) of emergent wetlands could be in danger of being destroyed by saltwater intrusion and prolonged inundation.

The proposed project includes the reestablishment of the eroded headland/beach through the creation of a continuous beach and dune system for approximately 8.7 miles (14.0 kilometers) of shoreline, or approximately 840 acres (340 hectares) of restored beach habitat. When complete, the project is expected to restore the integrity of the Cameron Parish coastal shoreline, thus helping to sustain important and unique coastal habitats and to protect threatened and endangered species. The restored shoreline would reduce wave energy and saltwater intrusion from the GOM into back-barrier environments, including chenier ridges that provide shelter and feeding areas for migratory birds. Restoration of the Cameron Parish shoreline would also provide a sediment source to sustain beaches west of the Site over the long term. Incidental benefits from this project would be the protection of LA Highway 27/82, the only hurricane evacuation route in the area.

Based on the analysis presented in the attached EA (Attachment 1) and COE Decision Document/EA (Attachment 3), no significant impacts were identified. Mitigation measures (noted in the National Marine Fisheries Service's Biological Opinion [NMFS BO] and the Fish and Wildlife Service's Biological Opinion [FWS BO]) and dredge position monitoring and associated reporting requirements will enable the avoidance, minimization, and/or elimination of environmental impacts associated with the proposed action. Mitigation measures, monitoring requirements, and reporting requirements in the form of terms and conditions are added to the negotiated agreement and are considered enforceable as part of the agreement (see Appendix A). These requirements, combined with those included in the COE, Louisiana Department of Natural Resources (LADNR), and Louisiana Department of Environmental Quality (LADEQ) authorizations will minimize and eliminate any foreseeable adverse impacts. Following LADEQ issuance of a water quality certification (Attachment 6) on September 7, 2011; LADNR issuance of a Coastal Use Permit (CUP) on August 31, 2011 (Attachment 4); and a separate Consistency Determination on August 25, 2011 (Attachment 5), COE issued a Section 10/404 permit on April 17, 2012 (Attachment 5). Prior to permit authorization, COE completed its own independent Decision Document/EA (Attachment 3), in which it evaluated the entire project with a primary focus on the fill area and coastal/State waters portion of the project. Both the COE's EA and the LADNR's CUP concluded that the proposed project did not result in any significant long-term environmental impacts.

Significance Review

Pursuant to 40 CFR 1508.27, BOEM evaluated the significance of potential environmental effects considering both CEQ context (such as society as a whole, human, and national; the affected region; the affected interests; and the locality) and intensity factors. The potential significance of environmental effects have been analyzed in both spatial and temporal contexts. Potential effects are generally considered reversible because they will be minor to moderate, localized, and short-lived. No long-term significant or cumulatively adverse effects were identified. The primary factors noted below were considered in the CPRA's EA and COE's EA and are specifically noted below:

1. Impacts that may be both beneficial and adverse

Potential adverse effects to the physical environment, biological resources, cultural resources, and socioeconomic resources have been considered. Adverse effects to benthic habitat and communities in the borrow area are expected to be localized, short term, and reversible. Adverse effects on fish habitat and fishes are expected within the dredged area due to the alteration of benthic habitat and changes in shoal topography and in the fill placement area due to burial of existing benthic habitat. No impacts to hard-bottom communities will occur. Temporary displacement of birds near the shoal site or beach shoreline/beach could occur. Birds may be attracted to feeding near the hopper as it is being filled at the borrow area or near discharge pipelines on the beach. Impacts would be short term, localized, and temporary and should have no lasting effects on bird populations in the area. Temporary reduction of water quality is expected due to turbidity during dredging and placement operations. Small, localized, temporary increases in concentrations of air pollutant emissions are expected, but the short-term impact by emissions from the dredge or the tugs would not affect the overall air quality of the area. A temporary increase in noise level and a temporary reduction in the aesthetic value offshore during construction in the vicinity of the dredging would occur. For safety reasons, navigational and recreational resources located in the vicinity of the dredging operation would temporarily be unavailable for public use. No archaeological resources will be affected. A dredge with GPS-positioning equipment will be used to ensure the dredge is operating in the authorized location. An unexpected finds clause will be implemented in case an archaeological resource is discovered during operations. Mitigation measures (noted in the NMFS BO and FWS BO), dredge position monitoring, and associated reporting requirements will enable resource avoidance and minimize and/or eliminate environmental impacts associated with the proposed action. Mitigation measures, monitoring requirements, and reporting requirements in the form of terms and conditions will be added to the negotiated agreement and are considered enforceable as part of that agreement.

Overall, COE's public interest review concluded that the proposed project was in the public interest and that it would provide multiple public and private benefits, which included economic improvements, wetlands protections, fish and wildlife benefits, and a reduction in shoreline erosion.

2. Degree to which the proposed action affects public health or safety

The proposed activities are not expected to significantly affect public health. Construction noise will temporarily increase ambient noise levels, and equipment emissions would decrease air quality in the immediate vicinity of placement activities. The public is typically prevented from entering the segment of beach under construction; therefore, recreational activities will not be occurring in close proximity to operations. During dredging operations, watercraft access will be restricted in the dredging area in the interests of public safety. These restrictions would be of short duration and are expected to be minor to boat operators. During dredging and placement, the use of the area immediately surrounding the borrow area and in the vicinity of shore restoration would be temporarily restricted due to public safety. The COE Section 10/404 permit also requires the CPRA contractors to coordinate and develop a safety plan with the U.S. Coast Guard.

3. Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas

No prime or unique farmland, designated wild and scenic reaches, wetlands, parks, or cultural resources would be impacted by implementation of this project. The CPRA's dredge contractor and the pipeline corridors will be monitored to ensure that dredge and construction activity stays within the approved and permitted project footprint.

4. Degree to which the effects on the quality of the human environment are likely to be highly controversial

No effects are expected that are scientifically controversial. Effects from beach nourishment projects, including dredging on the OCS, are well studied. The effects analyses in the EA have relied on the best available scientific information, including information collected from past COE contracted dredging and permitted dredging activities in and adjacent to the project area. Negative effects of dredging and beach nourishment activities on shoreline change, benthic communities, nesting and swimming sea turtles, and shorebirds are expected to be minimal, localized, and short term.

5. *Degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks*

Coastal restoration beach nourishment is a common solution to coastal erosion problems along the Louisiana coast. Federally authorized and permitted beach nourishment and emergency shoreline stabilization actions in this vicinity have been ongoing since Hurricane Katrina. No significant adverse effects have been documented during or as a result of past operations. The project design is typical of beach nourishment activities. Mitigation and monitoring efforts are similar to that undertaken for past projects and have been demonstrated to be effective. The effects of the proposed action are not expected to be highly uncertain, and the proposed activities do not involve any unique or unknown risks.

6. *Degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration*

No precedent for future action or decision in principle for future consideration is being made in BOEM's decision to authorize use of Sabine Bank sand. BOEM considers each use of a borrow area on the OCS as a new Federal action. BOEM's authorization of the use of the borrow area does not dictate the outcome of future leasing decisions. Future actions will also be subject to the requirements of NEPA and other applicable environmental laws.

7. *Whether the action is related to other actions with individually insignificant but cumulatively significant impacts*

Significance may exist if it is reasonable to anticipate cumulatively significant impacts that result from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions. The EA identifies those actions and the potential impacts related to underlying activities. The EA and previous NEPA/regulatory documents conclude that the activities related to the proposed action are not reasonably anticipated to incrementally add to the effects of other activities to the extent of producing significant effects. Because the seafloor is expected to equilibrate and because moving sand will slowly accumulate in the Sabine Banks borrow location, the proposed project provides an incremental but localized effect on the reduction of offshore sand resources. Although there will be a short-term and localized impact in benthic habitat and populations, both are expected to recover within a few years. No significant cumulative impacts to benthic habitat are expected from the use of the borrow site.

8. *Degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources*

The proposed action will not affect any significant scientific, cultural, or historic resources. Both terrestrial and open-water cultural resource surveys determined the absence of significant scientific, cultural, or historic resources within the area of potential effect. Section 106 coordination with the Louisiana State Historic Preservation Officer (SHPO) and the Chitimacha Tribe of Louisiana has been completed by COE and CPRA, and no additional cultural resource investigation are warranted. All of these activities have been completed in accordance with the National Historic Preservation Act (NHPA), as amended; the Archeological and Historic Preservation Act (AHPA), as amended; and Executive Order 11593.

9. *Degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973*

The proposed project has the potential to affect the endangered West Indian manatee (*Trichechus manatus*), the threatened piping plover (*Charadrius melodus*) and its designated critical habitat, the threatened Gulf sturgeon (*Acipenser oxyrhychus desotoi*), and three federally listed sea turtles (i.e., Kemp's ridley, , loggerhead, , and green sea turtles). The FWS issued a BO (04EL1000-2012-F-0262) dated February 23, 2012 (Attachment 7), to COE for this project covering the piping plover and its designated critical habitat and the West Indian manatee. The COE permit was issued on April 17, 2012, and was appropriately conditioned to mitigate potential adverse effects to both species as well as designated critical habitat (Attachment 2). BOEM completed Section 7 consultation with NMFS for the OCS component of the project, specifically for impacts to federally listed sea turtles. BOEM received a BO from NMFS on June 1, 2012 (Attachment 9). The NMFS stated the following: "It is NMFS' biological opinion that the action, as proposed, is likely to adversely affect Kemp's ridley, loggerhead, and green sea turtles, but is not likely to jeopardize their continued existence". Mitigations and recommendations noted in the NMFS BO will likely reduce potential adverse effects and, as such, will be incorporated as stipulations in the BOEM NNA.

10. *Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment*

The COE Section 10/404 permit and the LADNR CUP require that CPRA comply with all applicable Federal, State, and local laws and requirements. The COE has concurrence and no objection statements for this project from NMFS, FWS and the U.S. Environmental Protection Agency (USEPA). In addition to the CUP, a Consistency Determination from LADNR has been issued for the proposed project. Through the COE Section 10/404 permit, monitoring and mitigation efforts with regard to migratory birds has been coordinated with FWS and the Louisiana Department of Wildlife and Fisheries, and an FWS-approved migratory bird abatement plan will be implemented. The CPRA will implement their migratory bird abatement plan to avoid and monitor for potential effects on migratory birds. The proposed action is in compliance with the Marine Mammal Protection Act. Marine mammals are not likely to be adversely affected by the project, and incorporation of safeguards to protect threatened and endangered species during project construction are conditions within the COE Section 10/404 permit. A water quality certification has been issued by LADEQ; as such, water quality will be monitored by CPRA to ensure State water quality standards are not violated.

Consultations and Public Involvement

The COE, serving as the lead Federal agency, posted a public notice with a 20-day comment period on July 25, 2011. The LADNR published a public notice in local newspapers and the *Baton Rouge Advocate* on June 28, 2011. BOEM was listed with the point-of-contact information for both public notices. The COE, serving as the lead Federal agency, and the BOEM, in a consulting role, have coordinated with FWS, NMFS, USEPA, Natural Resource Conservation Service, Louisiana SHPO, and the Chitimacha Tribe of Louisiana in support of this leasing decision. The above-noted pertinent correspondence with Federal and State agencies are attached to this EA and are provided in the Appendix of the EA. No public comments were received as a result of the COE or LDNR public notices. After signature of this Finding of No Significant Impact (FONSI), a Notice of Availability of the FONSI and EA will be prepared and published by BOEM in the *Federal Register* or by other appropriate means. The EA and FONSI will be posted to BOEM's website at http://www.boemre.gov/sandandgravel/MarineMineralProjects.htm.

Conclusion

BOEM has considered the consequences of issuing an NNA to authorize use of OCS sand from Ship Shoal. BOEM jointly prepared and independently reviewed the attached EA (Attachment 1) and finds that it complies with the relevant provisions of the CEQ regulations implementing NEPA, DOI regulations implementing NEPA, and other Marine Mineral Program requirements. Based on the NEPA and consultation process coordinated cooperatively by COE, CPRA, and BOEM, appropriate terms and conditions enforceable by BOEM will be incorporated into the NNA to avoid, minimize, and/or mitigate any foreseeable adverse impacts. The COE Section 10/404 permit requirements include U.S. Coast Guard requirements; this serves as additional safeguards to reduce risk and to minimize and mitigate foreseeable and impacts. Based on the evaluation of the potential impacts and mitigating measures discussed in the EA, BOEM finds that entering into an NNA, with the implementation of the mitigating measures, does not constitute a major Federal action significantly affecting the quality of the human environment, in the sense of NEPA Section 102(2)(C), and will not require preparation of an EIS.

Barry Obiol for

Joseph A. Christopher, Regional Supervisor
Office of Environment
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region

7/2/12
Date

Attachments

1. Environmental Assessment for the Issuance of Non-Competitive Negotiated Agreement or Use of Outer Continental Shelf Sands for the Cameron Parish Shoreline Restoration Project (CS-33)

2. U.S. Army Corps of Engineers' Section 10/404 Permit (MVN-2011-01601 WII)

3. U.S. Army Corps of Engineers' Decision Document/Environment Assessment

4. Louisiana Department of Natural Resources, Coastal Use Permit (P20110728)

5. Louisiana Department of Natural Resources, Consistency Determination (C20110310)

6. Louisiana Department of Environmental Quality Section 401 Water Quality Certification

7. U.S. Fish and Wildlife Service's Biological Opinion (04EL1000-2012-F-0262)

8. National Marine Fisheries Service's Biological Opinion

FONSI Appendix A

Mitigation, Monitoring, and Reporting Requirements