

ENVIRONMENTAL ASSESSMENT
Mississippi Coastal Improvements Program (MsCIP) - Barrier Island Restoration Plan

West Ship Island North Shore Restoration

Mississippi Sound, Harrison County, Mississippi

A Federally Authorized Project



AUGUST 2010

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ENVIRONMENTAL ASSESSMENT

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1.0. INTRODUCTION

The U.S. Army Corps of Engineers (USACE), Mobile District, proposes to nourish the eroded northern shoreline of West Ship Island including the area fronting Fort Massachusetts, an historic fort. The USACE, Mobile District is preparing this Environmental Assessment (EA) to address potential impacts associated with the proposed project.

This EA is tiered from the Mississippi Coastal Improvements Program (MsCIP) Comprehensive Report and Integrated Programmatic EIS of June 2009. The MsCIP is an integrated system wide approach to increase the resiliency of the Mississippi coast against damages from future storms. The comprehensive plan includes a number of elements whose construction would be phased over the next 30 – 40 years including the comprehensive restoration of the Mississippi barrier islands, restoration of over 3,000 acres of wetland and coastal forest habitat, acquisition of approximately 2000 parcels, with relocation of residents, within the high hazard area and other hurricane and storm damage risk reduction measures. The comprehensive barrier island restoration plan, as recommended in the MsCIP Programmatic EIS, includes the placement of approximately 22 million cubic yards of sandy material within the NPS's Gulf Island National Seashore, Mississippi unit at Ship and Petit Bois islands. In addition, 1 – 2 million cubic yards would be used during the restoration of Cat Island. The restoration of the Mississippi Barrier islands and ecosystem restoration components of the MsCIP were authorized and funded in Public Law 111-32 in June 2009. The proposed action identified in this EA will assist in accomplishing this effort by restoring a segment of the northern shore of West Ship Island.

a. The Mississippi Sound

The Mississippi Sound is a shallow coastal lagoon along northern Gulf of Mexico from Mobile Bay, Alabama, in the east to Lake Borgne, Louisiana, in the west. It extends from the Mississippi /Alabama coastline to a string of sandy barrier islands, which separate it from the Gulf of Mexico. From east to west, the islands are Dauphin (Alabama), Petit Bois, Horn, Ship, and Cat. Ship Island was breached by prior hurricanes and now is actually two small islands, West Ship Island and East Ship Island, with a shallow sand bar between the two. The string of barrier islands are comprised of dynamic and diverse habitats and are part of a complex integrated system of beaches, dunes, marshes, bays, tidal flats, and inlets. The Gulf Intracoastal Waterway (GIWW) parallels the mainland coast offshore through the entire length of Mississippi Sound. Major navigation channels bisect the Sound at Pascagoula in Jackson County and Biloxi and Gulfport in Harrison County. The waterfront areas along the Gulf Coast, back bays and the

barrier islands in the Gulf are popular spots for swimming, windsurfing, parasailing, motor boating, water skiing, and sailing.

b. Project Location

The project area is located on the northern shore of West Ship Island (Figure 1). The barrier islands off Mississippi are part of the Gulf Islands National Seashore (GUIS) as shown in Figure 1, which stretches from portions of Cat Island in Mississippi to Santa Rosa Island in Florida (NPS, 2001). Ship Island is located between Horn Island to the east and Cat Island to the west and is bordered on the north by the Mississippi Sound and to the south by the Gulf of Mexico. A boat can be taken from Gulfport to Ship Island, which is noted for its beautiful beaches and historic Fort Massachusetts. The City of Gulfport is located on the mainland directly north of the island. The Gulfport ship channel transverses Ship Island pass at the western end of West Ship Island.

c. Gulf Islands National Seashore

Gulf Islands National Seashore, a unit of the National Park Service (NPS), includes outstanding natural, cultural, and recreational resources along the northern Gulf of Mexico coasts of Florida and Mississippi. These resources include several coastal defense forts spanning more than two centuries of military activity, archeological values, pristine examples of intact coastal barrier islands, salt marshes, bayous and submerged seagrass beds, complex terrestrial communities, emerald green water, and white sand beaches. The barrier islands within the Seashore are nationally significant for several reasons. Specifically, these islands:

- contain one of the most complete collections of publicly accessible seacoast defense structures in the United States, representing a continuum of development from early French and Spanish exploration and colonization through World War II;
- provide the public with recreational opportunities on natural and scenic island, beach, dune and water areas which possess the rare combination of remaining undeveloped and in a wilderness state, yet are located in close proximity to major population centers;
- provide habitat for several endangered species in diverse ecosystems, stop-over habitat for migratory birds, and critical nursery habitat for marine flora and fauna, and serve as an enclave for complex terrestrial and aquatic plant and animal communities that characterize the northern Gulf Coast, and fully illustrate the natural processes which shape these unique areas;
- contain land and marine archeological resources which represent a continuum of human occupation in a coastal environment and are important in enhancing the knowledge of the past including interactions between the earliest settlers and original inhabitants of this area of the Gulf Coast; and
- provide a benchmark to compare conditions in developed areas of the Gulf Coast to natural areas within the park.

The Mississippi barrier islands located within Gulf Islands National Seashore are Petit Bois, Horn, East and West Ship Islands, and portions of Cat Island; additionally, NPS administers 401-acre Davis Bayou area on the mainland near Ocean Springs, Mississippi. The Seashore's purpose, besides preserving, protecting, and interpreting its Gulf Coast barrier island and bayou

ecosystems and its system of historic coastal defense fortifications, is to provide for public use and enjoyment of these resources to the extent possible.

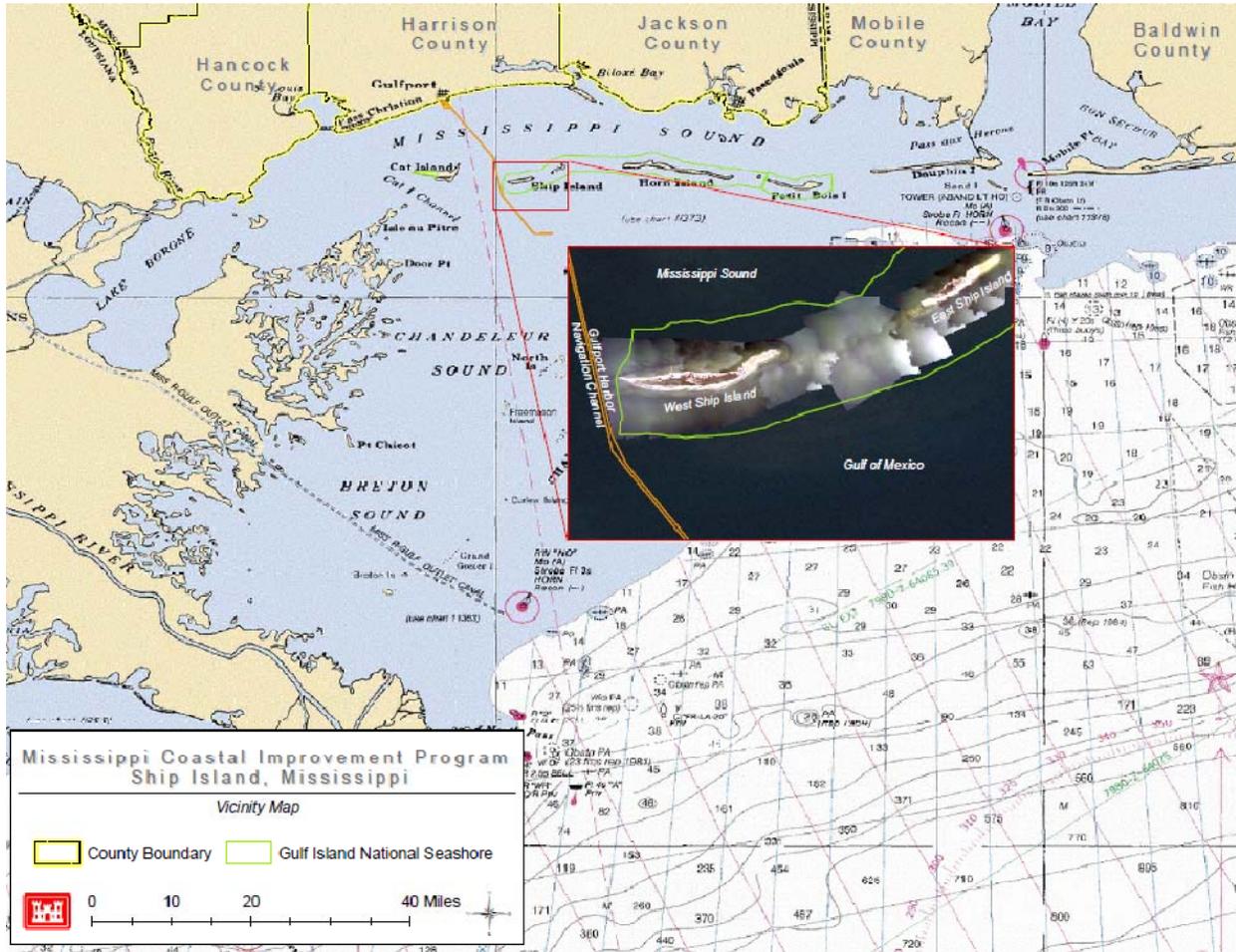


Figure 1 – Project Vicinity Map

The major structure on Ship Island is Fort Massachusetts, which is an historic fort that was constructed between 1858 and 1866, and is listed on The National Register of Historic Places (NRHP). The western migration of the island and erosion occurring from waves and storm events has left the fort vulnerable to high tides and other shoreline processes. The map in Figure 2 depicts the project area.

1.1 Problem Description. Ship Island has suffered from severe erosion throughout the years. Hurricane Camille in 1969 produced a 30-foot storm surge which breached the island creating two separate islands, East Ship Island and West Ship Island. Hurricane Katrina in 2005 severely damaged West Ship Island and resulted in the widening of the breach between the islands. Houser et al. (2007) looked at the morphological impact of Hurricane Katrina on the Mississippi islands including sediment volume change as associated with island elevations in a report to Gulf Islands National Seashore. Their report described the significant reduction in volume observed on Ship Island due to the lower elevation of the island where it was eroded during Hurricane

Camille and only partly recovered due to the higher storm surge and wave height on the island. Houser et al. (2007) has determined the potential for post-storm recovery of the shoreline is limited.

1.2 Purpose of and Need for the Proposed Project. The purpose of the proposed project is to supplement the eroded northern shoreline of West Ship Island with sand, which would continue the sustainability of this important barrier island system and ultimately protect Mississippi Sound and its very productive fisheries. An incidental benefit of the project would provide shoreline stabilization of the foundation of Fort Massachusetts located on the northern shore of West Ship Island. The current condition is undermining the historic structure and if not corrected immediately, will cause irreparable damage to the fort's foundation. During several site inspections during 2007-2008, with the most recent jointly with National Park Service (NPS), water lapping against the fort foundation on northwestern side was observed.

2.0. NATIONAL ENVIRONMENTAL POLICY ACT CONSIDERATION

This EA has been prepared to address the potential impacts associated with the West Ship Island north shore restoration project. The National Environmental Policy Act (NEPA) and Title 40 of the Code of Federal Regulations (CFR), CFR Parts 1500-1508 (40 CFR 1500-1508) require Federal agencies to consider the potential environmental consequences of proposed actions and alternatives. Executive Order (EO) 11514, Protection and Enhancement of Environmental Quality (amended by EO 11991), provides policy directing the Federal government to take leadership in protecting and enhancing the environment.

3.0 DESCRIPTION OF THE PROPOSED PROJECT

The MsCIP Barrier Island Restoration Plan as identified in the MsCIP Comprehensive Plan and Integrated Programmatic EIS includes restoration of Ship Island. The proposed action identified in this EA includes the placement of sand along the northern shore of West Ship Island. Placement of this sandy material will stabilize West Ship Island and allow continued biological diversity to persist in Mississippi Sound. This placement will extend along approximately 62% of the northern shore or about 10,350 feet (see Figure 2). About half of the placement will consist of a narrow band of sand along existing shoreline with the remaining placement filling in a concave area. Fill placement widths will range from approximately 150 feet to 550 feet. The narrow band of fill will also cover the beach area immediately north, east and west of Fort Massachusetts.

The sandy material used in the ecosystem restoration effort at West Ship Island would come from two identified borrow areas – the Bar channel portion of the federally authorized Gulfport Harbor widening project and the old Gulfport Harbor channel which was abandoned in the 1990s. Material contained in the abandoned channel segment has been used five times from 1974 to 2002 to provide a sand source for beach nourishment near Fort Massachusetts by the National Park Service and is comprised of sand that is fully compatible with the sand on Ship Island as described in Section 5.3 below. The abandoned channel acts as a very efficient sediment trap for sand migrating westward from the tip of the island.

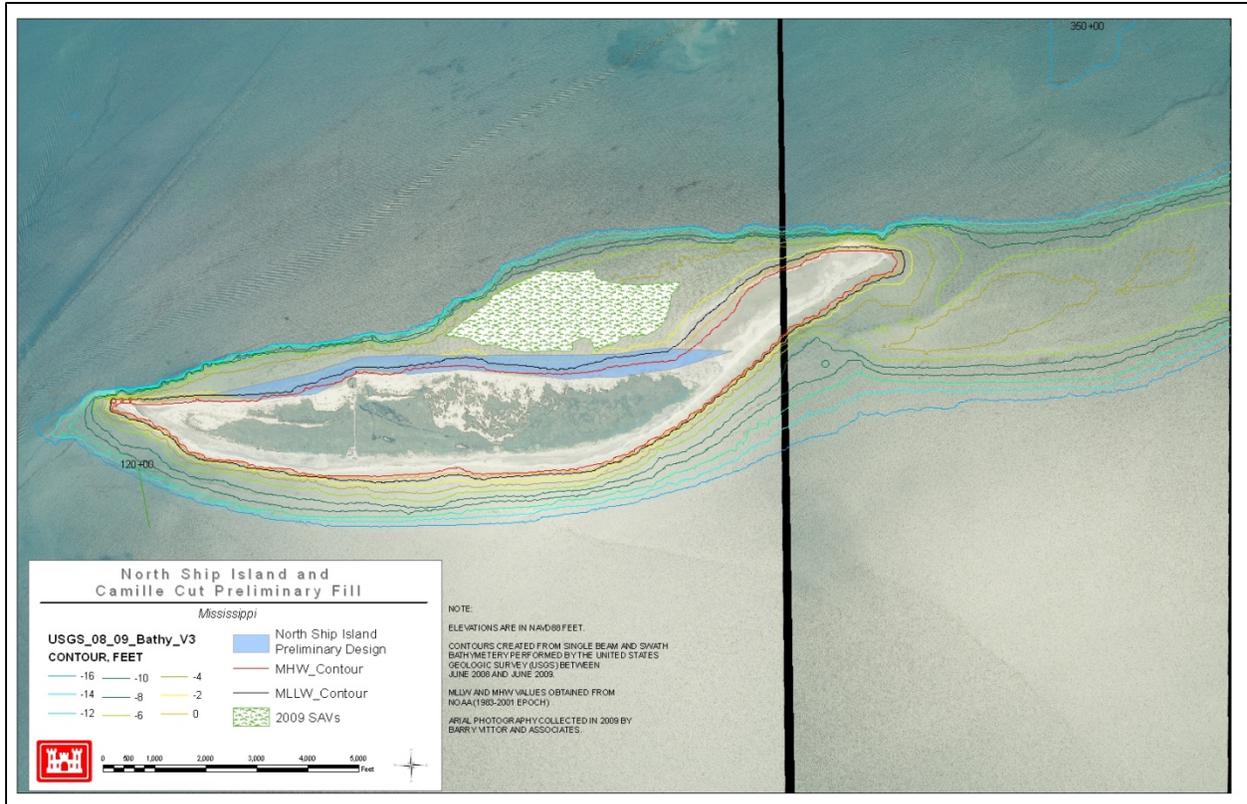


Figure 2: Restoration Area

The sandy material to be used from the channel widening project would be pumped directly on the beach. The estimate for the amount of sand available is approximately 128,000 cubic yards. The sand deposit is located between channel stations 525+00 and 628+00 (see Figure 3a). The sand deposit is broken into two sections that extends down to a depth of elevation -26.6 and -34.5 (NAVD88), short of the project depth of elevation -42.0 NAVD88 which includes two feet of allowable over depth and two feet of advanced maintenance. The remaining seven feet of sediment that will be removed down to elevation -42.0 NAVD88 will be added to the volume of sediment that is coming from the remaining portion of the project and will be disposed of in accordance with contract guidance. Figure 3b shows the typical cross section for the fill placement.

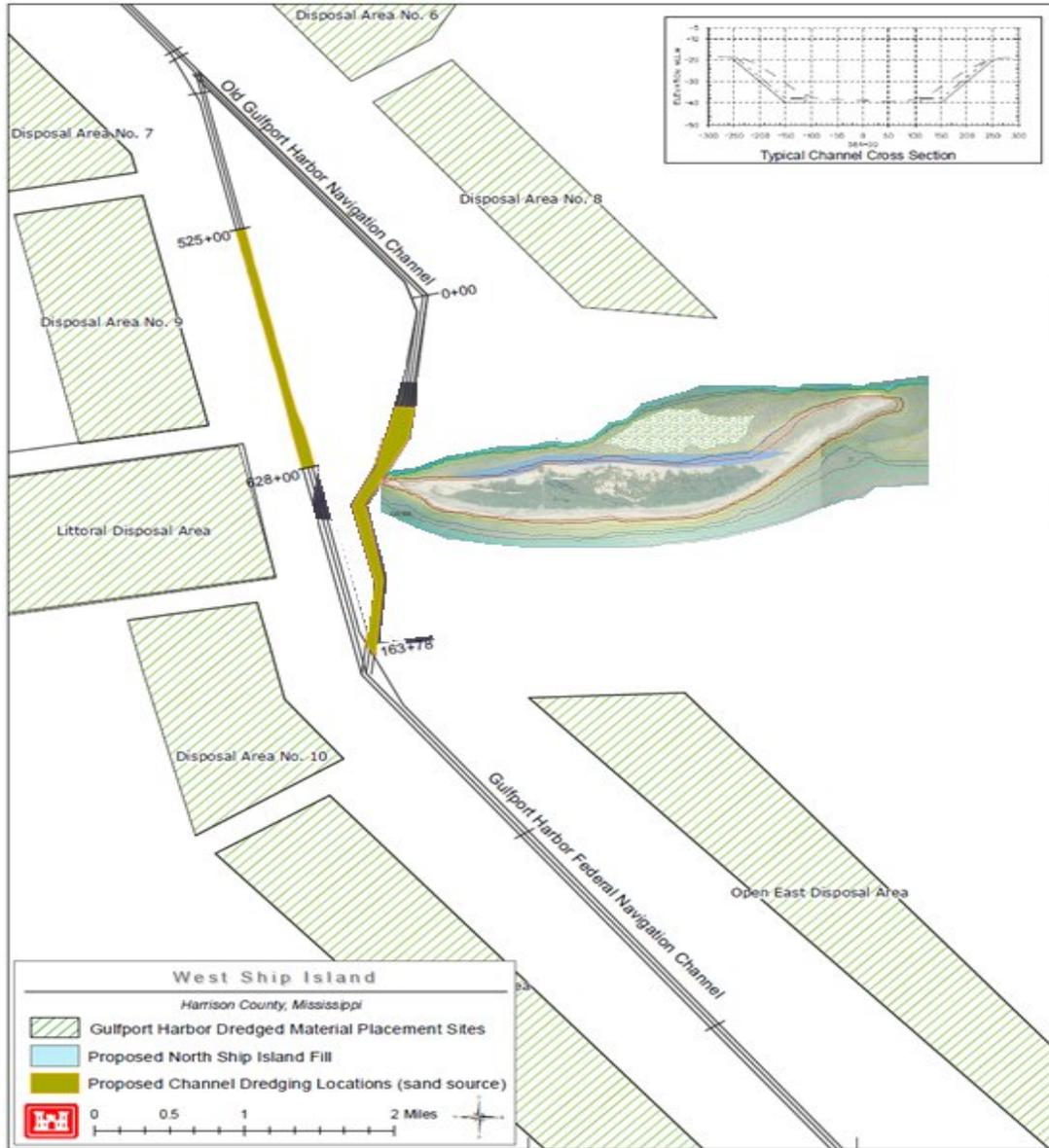


Figure 3a: Borrow Material Locations

The additional sand that would be used is located in the old Gulfport Navigation Channel alignment that is located east of the existing channel and near the western tip of West Ship Island. The abandoned channel alignment would be excavated down to the limits of the authorized template for that channel (i.e. 34 feet deep by 300 feet wide), pumped to the northern shore as required and mixed with the material from the channel widening using land based equipment. The available volume of sand from the abandoned channel is estimated to be 480,000 cubic yards.

The project area comprises approximately 77 acres. The two sources of sand combined will provide approximately 608,000 cubic yards of sand for use on West Ship Island and will be placed in the area shown in Figure 2 above.



Figure 3b: Restoration Area Cross Section

The material would be hydraulically dredged by using either a cutter-head pipeline or hopper dredge. A hopper dredge would be used for the overall channel widening project and may be used for the placement of sand on the north shore of West Ship Island. However, work in the old navigation channel may require use of a pipeline dredge due to the shallow water depth. The material will be pumped directly on the beach and reworked (shaped) by land based equipment. The sand would be placed along the shoreline and in shallow water bottoms to reach the limits of the historic beach template. A turbidity barrier would be utilized during construction activities and placed in between the project area and the adjacent submerged aquatic vegetation to reduce turbidity during the placement of sand

The sand material would be evenly spread by using dozers and trackhoes up to a finished elevation of +5 feet Mean Lower Low Water (MLLW) with a slope of 1V:10H generally following the shoreline around the historic fort and eastward. The heavy equipment would be offloaded near the beach into shallow water using a shallow draft barge and moved onto the beach. All equipment would be inspected to ensure that no leaking fluids may contaminate the work area. Supporting equipment such as fuel tanks would also be moved onto the beach and placed in a lined containment area to prevent any contamination during refueling operations or from any accidental spillage.

Construction slopes for beach projects are selected based on grain size among other variables. Traditionally, a 1:10 slope is frequently used and works well with moderate to coarse sand sizes in a low energy environment. A flatter slope will occur with moderate to fine size sand. The previous fill projects around Fort Massachusetts have used a 1V:10H construction slope. The north shore of West Ship Island has an existing mean grain size of approximately 0.4 mm therefore based on previous fill projects at the site and the coarser grain size a 1V:10H

construction slope was chosen. The project is scheduled to begin sometime in 2010, and the construction activities will occur 24 hours per day

In addition, rubble/rip rap in the placement area would be removed from the area with a barge-mounted crane using an 'orange-peel' grappling device and loaded onto a barge for transportation to an existing artificial reef site selected by the Mississippi Department of Resources. This site is currently permitted for use as a man-made fishing reef. .

4.0. ALTERNATIVES CONSIDERED

The MsCIP Comprehensive Report and Integrated Programmatic EIS recommended placement of approximately 22 million cubic yards of sandy material within the NPS's Gulf Island National Seashore, Mississippi unit and an additional 1 – 2 million cubic yards for the restoration of Cat Island. Approximately 13 million cubic yards of sand would be used to close the gap between East and West Ship Islands. The remaining nine million cubic yards of sand would be placed in the littoral zones at the eastern ends of Ship and Petit Bois Islands. The proposed action identified in this EA is an integral element of the overall barrier island restoration. Many alternatives were evaluated during the plan formulation process prior to selecting the above identified alternative. Evaluated alternatives included restoration of the entire barrier island system, constructing a dune feature at varying heights using existing and offshore sandy material, littoral zone placement with river or marine sands, constructing breakwater structures, and restoring native vegetation. Due to the time constraints associated with the preparation of the MsCIP Comprehensive Report and Integrated Programmatic EIS, a borrow site of known quality and quantity located approximately 45 miles from the barrier islands was evaluated and a determination made that additional investigations would be required to delineate closer suitable sand source and that a Supplemental EIS would be prepared to more fully evaluate the use of these specific borrow sites. Due to the opportunities (i.e. an ongoing improvement project at Gulfport Harbor), this EA is being prepared to address the environmental impacts associated with this particular element. This EA will consider the following two alternatives, No Action (the restoration of the north shore of West Ship Island would be accomplished as part of the total Ship Island restoration as originally evaluated) and the West Ship Island Shoreline Restoration Alternative, as described below.

4.1. No Action Alternative. The No Action alternative involves the continuation of the existing condition and delaying the proposed restoration effort at West Ship Island until the new borrow source is identified and evaluated under the MsCIP Comprehensive Plan through a Supplemental Environmental Impact Statement for the overall barrier island restoration within the next two years. The immediate area would remain particularly vulnerable to wave and storm activity until the project was constructed under the overall barrier island restoration effort. Additionally, future conditions associated with not restoring the island would result in the continued degradation of the valuable beach ecosystem and possible lack of suitable fish and wildlife habitats which would adversely impact numerous federally protected species. In addition, increased salinity due to continued degradation of the barrier islands will result in detrimental impacts to the vital economic fisheries industry that the estuarine environment sustains. Further, without corrective action, continued severe erosion along the West Ship Island northern shoreline could result in the loss of valuable public lands, wildlife and natural resources and

incidentally a National Register Historic Property. For these reasons, the no-action alternative is not selected as the preferred alternative.

4.2. Preferred Alternative. West Ship Island North Shoreline Restoration. This alternative would restore the northern shoreline of West Ship Island including the area in front of the historic Fort Massachusetts utilizing suitable sandy material from the widening of the bar channel segment of the Gulfport Harbor navigation channel and a segment of the abandoned Gulfport navigation channel. The proposed stabilization alternative is described under Section 3.0. The map in Figure 2 depicts the limits of the proposed project. The Shoreline Stabilization Alternative, as described in Section 3.0 is being carried further as the Proposed Action and associated impacts are fully evaluated in the following paragraphs.

5.0. AFFECTED ENVIRONMENT

The project area is located along the northern shore of Ship Island, approximately sixty miles from New Orleans, Louisiana, and forty miles from Mobile, Alabama, between Horn Island to the east and Cat Island to the west. Ship Island borders the Mississippi Sound, a shallow coastal lagoon; approximately 80 miles long by approximately nine miles wide and fronts the Gulf of Mexico as one of the chain of sandy barrier islands south of the Mississippi mainland. The natural island is home to an interesting variety of plants and wildlife, including many species of migratory birds. Warm tidal pools and wind shaped sand dunes crowned with sea oats help the island retain much of its natural beauty. This barrier island is currently in 2 parts; separated by a breach approximately 3 miles in length. The island is 8 miles in length and the terrain is low and sandy except at the east end. Because of the Ship Island Ferryboat that runs twice a day during the summer months, locals and tourists use West Ship Island for recreation. The restroom facilities, snack bar, ranger station, and Civil War fort (Fort Massachusetts) were severely damaged by the hurricanes of 2005 and are in the process of being reconstructed. East Ship Island, however, is not heavily used by tourists. The island is part of the GUIIS, owned and managed by the NPS. During the summer months, locals and tourists use West Ship Island for day-use recreation such as swimming, site-seeing, and fishing.

Typical recreational uses on West Ship Island, and adjacent park waters, fall into one of these two activity categories: 1) "General Recreation" which includes boating, sightseeing, picnicking, swimming, and visitation of historic Fort Massachusetts; and 2) "General Fishing" which includes fishing from the shoreline and boats. Visitors access the island using a commercial company called Ship Island Excursions, or via privately owned recreation boats. The NPS annual statistics were collected from 2000 through 2004. The average recreational use was 63,970 persons per year; however from 2005 (year of unusually frequent and destructive storms) through 2009, the average annual visitation was 35,159. Averaging both five-year blocks above, the ten-year annual attendance was 49,564. June, July, and August were the busiest months in 2000-2009, with July consistently being highest. The July average from 2000-2004 was 16,687; from 2005-2009 was 10,775; and the ten year average for July during this 10 year block (2000-2009) was 13,731.

5.1 Coastal Processes. The littoral drift in and around the barrier islands is typically from the east to west and the sediment is made up of primarily sands with a small amount of fines present.

The western transport of sand, thus the westward migration of the barrier islands, in particular Dauphin, Petit Bois, Horn and Ship Islands, is clearly evident in the historical record. Although the prevailing thought was that this westward transport continued to Cat Island on the west, the longshore currents that move the sand are not well defined west of Ship Island. Studies currently ongoing as part of the MsCIP program indicate that the westward littoral drift is likely truncated at Ship Island pass and a geomorphology study is being initiated to determine the evolution of Cat Island. The original authorized Gulfport ship channel extended straight across the bar at Ship Island Pass, roughly perpendicular to the length of Ship Island. As a result of the westward migration of the island, the western tip of the island encroached into the ship channel. A study conducted by Burns and Griffiee (2006) for the U.S. Army Engineer Research and Development Center (ERDC) indicated that the western end of Ship Island migrates to the west at an approximate rate of approximately 34 feet per year. The original ship channel was relocated approximately 1,900 feet west of Ship Island in the early 1990s which delayed shoaling problems associated with the island migration. The abandoned channel currently acts as a deposition basin along the east side of the channel.

5.2 Physiography. The Mississippi barrier island chain likely was initiated less than 4,500 years ago (Otvos and Giardino, 2004) as indicated by accretion ridges and recent optical luminescence dates for partly buried mainland Holocene beach ridges. The barrier island chain formed and grew at a time when there was a surplus of sand in the sediment transport system along the shore. Ship Island has lost approximately 64% of its land area since the mid-1800s and is particularly vulnerable to storm-driven land losses because topographic and bathymetric boundary conditions focus wave energy onto the island (Morton, 2007). The island has migrated westward as a result of predominant westward sediment transport by alongshore currents. Historically, Ship Island had a highly irregular shape with alternating narrow and wide segments due to inlet migration and island growth which consisted of low, narrow, mostly barren sand spit with isolated dunes. Sandy beach ridges were covered by pine trees and intervening swales that were filled with marsh vegetation or water. The historic central part of the island was a narrow sand spit connecting the triangular segment with a smaller oval-shaped segment that was offset to the south and formed the western part of the island. Prior to Hurricane Camille, a narrow low-tide bar separated the two main segments of Ship Island (see Appendix I, Figure 5).

Fort Massachusetts was constructed on the oval shaped segment and has continuously been threatened by storm damage and chronic beach erosion along the Mississippi Sound shoreline (Morton, 2007). Ship Island was breached during Hurricane Camille in August 1969. Ship Island along with the other adjacent barrier islands provide protection to the Mississippi Sound. The islands provide a boundary between the sea water salinity [~ 33 ppt] of the open Gulf of Mexico and the brackish water found in the Sound. Loss of the islands would allow the salinity to greatly increase changing the ecological habitats that now exist. This would impact, if not devastate shellfish and many other forms of estuarine life.

5.3 Sediments. West Ship Island is dominated by sand, sandy loam, and silts which are frequently flooded. Sandy beaches, dunes, emergent tidal and freshwater emergent wetlands are characteristic of the type soils found along and adjacent to the project site.

An analysis of both the native material samples and borrow material samples have been completed to compare the grain size distributions, compositions, and colors. The geotechnical investigations included two phases. The first phase included sampling the native material from West Ship Island (WSI). Four samples were taken around the island. The following is a description of the location and the color characteristics for each sample:

- West Ship Island - Adjacent to Boat dock on north shore (WSI-1)
- West Ship Island - End of boardwalk, south shore (WSI-2)
- West Ship Island - East end on north shore (WSI-3)
- West Ship Island - East end on south shore (WSI-4)

Area	Wet Color Code	Wet Color	Dry Color Code	Dry Color
WSI-2	5Y 7/1	LT. GRAY	5Y 7/1	LT. GRAY
WSI-3	2.5Y 7/1	LT. GRAY	2.5Y 7/1	LT. GRAY
WSI-4	GLE Y1 5/N	GRAY	GLE Y1 5/N	GRAY
Composite borrow area at present Gulfport Channel	2.5Y 6/1	GRAY	2.5Y 7.5/1	LT. GRAY
Borrow area at old channel (WSI-1)	GLE Y1 5/N	GRAY	GLE Y1 5/N	GRAY
Composite of both borrow sources	2.5Y 8/1	WHITE	2.5Y 7/1	LT. GRAY

Wet and Dry colors of both native and borrow material from Munsel Soil Color Charts, 2009.

Note – The sand sampled at WSI-1 is from past placement of abandoned channel material and is assumed to be representative of material currently in the abandoned channel.

The second phase of the geotechnical investigation included retrieving 4 samples from the Gulfport Channel, more specifically in the area of the channel widening. The samples were obtained by using a vibrocore. This material is considered to be the “New Borrow Material.” After completing the gradation for these samples a composite gradation was developed to determine the mean grain size (D50). The mean D50 for the new material is 0.19mm.

Borrow material from both the Gulfport Channel (new material) and abandoned channel (represented by WSI-1) would be blended and used for sand placement on the island. The mix consists of approximately 60% sand from the abandoned channel and 40% of sand from the channel widening. This is based on estimated quantities from each borrow source. The borrow material would be blended mechanically on the beach by the dredge contractor.

After all of the samples were obtained and gradations completed, the Unified Soils Classification System (USCS) describes all the material (both native and borrow sources) to be a medium to fine grain poorly graded sand (SP) with less than eight percent fines. Compatibility of the native and borrow material was done quantitatively in terms of size and composition of the borrow material sediments. This includes the native beach sediments in terms of an overfill factor which is defined as the volume of material required to produce a unit volume of stable beach with the same grain size distribution as the native beach material. The overfill ratios were computed using the method described in chapter 4 of EM 1110-2-1100 “Coastal Engineering Manual” (Part V) dated 1 Aug 2008, specifically equations V-4-3 and V-4-4 and Figure V-4-9. Below is a summary of the overfill factors, mean grain size and percent fines for all of the composite samples:

Area	overflow ratio	mean grain size, D50 (mm)	% Fines
Native material (WSI-2,3,4)		0.32	0.1
Proposed borrow area at present Gulfport Channel	4.8	0.19	5.3
Proposed borrow area at old channel (WSI-1)	1.01	0.48	0
Blended borrow from the 2 areas	1.32	0.33	2.1

Overflow ratio and Mean Grain size of both borrow and native samples.

Note – The sand sampled at WSI-1 is from past placement of abandoned channel material and is assumed to be representative of material currently in the abandoned channel.

A overflow ratio of 4.8 was computed for the proposed borrow area at the Gulfport channel, and it is larger than the range of 1.0 to 1.5 which is considered to be satisfactorily compatible. Therefore, material from the Gulfport channel is considered to be incompatible with the native material and unsatisfactory for borrow unless it is blended with the material from the old navigation channel. The overflow ratio is 1.01 at the abandoned channel and is 1.32 when blended with the material from the Gulfport Channel; therefore, borrow from the two areas are considered to be satisfactorily compatible with the native material as shown in Figure 3.c below. The overflow ratio of 1.32 suggests that about 1.32 units of blended borrow material will be required to create one unit of stable material similar to the native material.

Based on the extensive geotechnical investigations and the blending of these materials, the two borrow sources have been demonstrated to be compatible sources for the restoration project. The two borrow sources have color, size, and composition generally similar to that of the native material.

5.4 Biological Resources. The Mississippi Sound receives high saline waters from the Gulf of Mexico and freshwater from the streams/ivers, which drain some 20,000 mi² of land area (Corps 1984). Circulation is driven winds modified slightly by the tides. Gulf waters enter the Sound through the deep passes between the barrier islands with the help of tidal forces. This mixing of freshwater runoff and saline waters has created a dynamic estuarine ecosystem. Mississippi Sound receives its major freshwater flow from the Mobile Bay, and the Pascagoula and Pearl Rivers and is critical to the survival of numerous birds, mammals, fish, and other marine organisms of national importance. Many different habitat types are found in and around the estuarine ecosystem, including shallow open-waters, salt marshes, sandy beaches, mud and sand flats, oyster reefs, river deltas, tidal pools, and submerged aquatic vegetation (SAV)s. However, no oyster reefs are located within the project area. These diverse ecosystems serve a variety of critical functions necessary to sustain a vital thriving commercial fishing industry of national economic significance. Under current conditions, the islands provide a natural boundary between the salinity [~33 parts per thousand (ppt)] of the open Gulf of Mexico and the

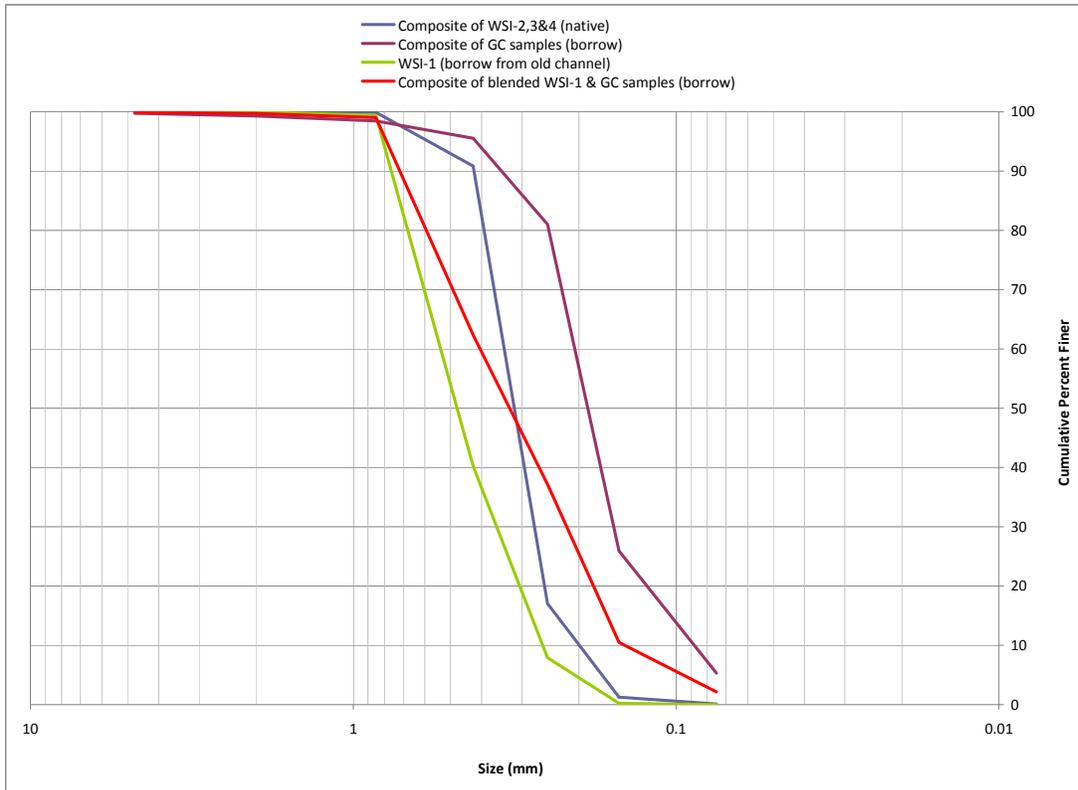


Figure 3.c Comparison of Composite Gradations

brackish water found in Mississippi Sound. Ship Island consists of several habitats including beaches, sand dunes, emergent wetlands, submerged aquatic vegetation (SAV), tidal flats, and open-water benthic habitats. These areas are home to an immensely diverse, resilient, and environmentally significant group of species. Ecological habitats within the project site include estuarine sub-tidal and inter-tidal water bottoms populated with diverse benthic communities. Benthic communities vary depending on the substrate bottom types present in the area. Inter-tidal and sub-tidal water bottoms are predominantly sand with patches of submerged aquatic vegetation north of the barrier islands.

5.4.1 Coastal Flora. Typically along the barrier islands, the land-water interface is characterized by beach conditions that support sea oats (*Uniola paniculata*), morning glory (*Ipomoea* spp.), and pennywort (*Hydrocotyle bonariensis*). This area is known as the beach-dune association.

In the sandy areas near the small central strip within the central portion of the island, the forest is open, consisting largely of slash pine (*Pinus elliotti*) with an understory of saw palmetto (*Serenoa repens*) and wax myrtle (*Myrica cerifera*). Freshwater marshes are along the ponds on the island. This region of the marsh marks the upper limit of black needlerush (*Juncus roemarianus*), the dominant form in the saline-brackish marsh.

Smooth cordgrass (*Spartina alterniflora*) is locally dominant in the tidally influenced marshes of the Mississippi Sound. The marshes are dominated by needle rush (*J. roemarianus*) in almost

pure stands with a slight mix of big cordgrass (*S. cynosuroides*) in relatively small areas. Smooth cordgrass and salt meadow cordgrass (*S. patens*) occur on the south and southwest portions of the island.

High turbidity and lack of suitable substrate have limited distribution of SAVs in Mississippi. Their occurrence is restricted to relatively quiet waters along mainland and barrier island northern shores. Typically, the grasses occur in isolated patches usually less than several hundred acres in size. In turbid waters of the sound and bays, beds are found only in shallow waters generally less than six feet deep, most in two feet or less.

There are submerged grass beds along the northern shores of all the barrier islands south of the mainland shoreline. A 2005 report of seagrass distribution in the barrier islands of Mississippi was prepared for the Mississippi Department of Marine Resources (MDMR). This report indicated that in 2003 of approximately 902.6 acres of seagrasses existed in the Mississippi Sound. Cat Island had the largest seagrass area, with 507.6 acres. Horn Island had 246.7 acres, Petit Bois Island had 131.3 acres and Ship Island had 16.9 acres (MDMR, 2005).

More recent evidence of existing SAVs on the northern boundary of West Ship Island is available in aerial photography (2009) (Vittor and Associates, Inc.), which indicates a patchy bed of what appears to be *Halodule wrightii* (shoalweed) within the shallow waters approximately 50 feet north of the proposed restoration area. The total bed area of shoalweed appears to cover approximately 94 acres (Figure 4).

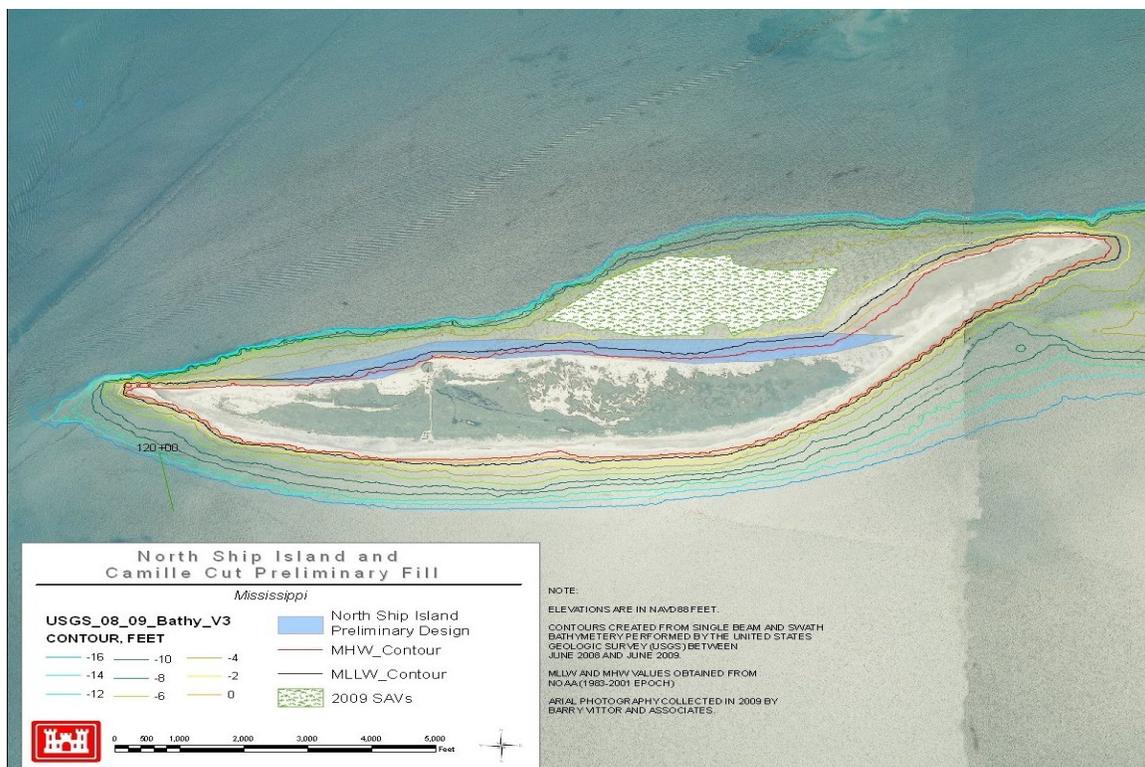


Figure 4: Location of Submerged Aquatic Vegetation at West Ship Island

Although an actual measurement of the current acreage of SAV is not available field work for acreage measurement and species verification has been initiated and will be complete prior to project implementation.

5.4.2 Coastal Fauna. Vittor and Associates (1982) investigated the macrofauna of Mississippi Sound and selected areas in the Gulf of Mexico. Over 532 taxa from offshore Mississippi and Alabama and 437 taxa from the Mississippi Sound were identified. Densities of individuals varied from 910 to 19,536 individual/square yards for the offshore and 1,200 and 38,863/square yards for the Sound area. Abundance of macrofauna is temporal with greatest densities occurring from fall to spring.

Many species of invertebrates and vertebrates make up the various fauna population along the Gulf Coast. Invertebrate populations in Mississippi Sound and the nearshore area of the Gulf of Mexico transfer energy through the coastal food web. Microscopic estuarine zooplanktons live throughout the water column with limited mobility. Zooplankton includes such organisms as copepods, protozoans, chaetognaths, pteropods, tunicates, ctenophores, and siphonophores. Larval stages of benthic forms and eggs and larval states of many fish species are often interspersed throughout zooplankton. Many important commercial species feed upon zooplankton.

Many commercially important species of crustaceans and mollusks are harvested in Mississippi Sound and the nearshore of the Gulf of Mexico. Brown shrimp (*Penaeus aztecus*) and oysters (*Crassostrea virginica*) are the main species harvested by commercial fishermen in the in the Mississippi Sound area. White shrimp (*P. setiferus*) and blue crabs (*Callinectes sapidus*) are also harvested within the study area. In addition to those commercial species, there is a very diverse community of crustaceans within Mississippi Sound and adjacent waters including a wide variety of forms and habitat preferences. Epibenthic crustaceans dominate the diet of flounder, catfish, croaker, porgy, and drum.

Christmas and Waller (1973) reported 138 fish species in 98 genera and 52 families taken from areas across Mississippi Sound. The major fisheries landed along the Mississippi Gulf coast are Anchovy (*Anchoa mitchilli*), menhaden (*Brevoortia patronus*), mullet (*Mugil cephalus*), croaker (*Micropogonias undulates*), seatrout (*Cynoscion nebulosus*), and redfish (*Sciaenops ocellatus*), Jackson County, primarily the ports of Pascagoula and Moss Point, receives greater than 85% of all Mississippi landings, including all industrial fish (menhaden), 95% of the mullet, trout, and red snapper, and 74% of the croaker landed (USACE 1992).

The barrier islands support an array of reptiles, amphibians, birds, and mammals. More than 260 species of birds have been identified within the boundaries of Gulf Islands National Seashore, since its establishment in January 1971. East and West Ship are home to the brown pelican (*Pelecanus occidentalis*), great blue heron (*Ardea herodias*) and osprey (*Pandion haliaetus*) to name a few. The raccoon (*Pryocyon lotor*) is present on East Ship Island and both East and West Ship Island are home to diamondback terrapin (*Malaclemys terrapin*) and cottonmouth snake (*Agkistrodon piscivorus*) (Hopkins, personal communication). The islands are a nesting ground for the loggerhead sea turtle (*Caretta caretta*). Blue crabs, fiddler crabs (*Uca* spp.), and hermit crabs (*Pagurus* spp.) are often seen on the beaches and in the marshes.

The annual waterfowl migrations, both spring and fall, are one of the most amazing spectacles in nature. Driven by changing weather conditions and the search for food, certain species of waterfowl will migrate thousands of miles stopping only briefly to rest and replenish their nutrient reserves. Others migrate more slowly and have longer stopovers en route. Yearly variation in weather, food supplies, and available habitat will greatly affect these migration patterns. Largely because of the success of early banding programs, it became possible in the early 1930's to map the main migration corridors or flyways, used by waterfowl on their annual fall migration. That information became the concept of the four flyway corridors – Atlantic, Mississippi, Central, and Pacific – upon which biologists now focus their management (Figure 5). The longest migration route of any in the Western Hemisphere lies in this flyway. Its northern terminus is on the Arctic coast of Alaska and its southern end in Patagonia. Well timbered and watered, the entire region affords ideal conditions for the support of hosts of migrating birds. The two rivers that mark it, the Mackenzie emptying on the Arctic coast and the Mississippi in the Gulf of Mexico, have a general north-and-south direction, another factor in determining the importance of this route which is used by large numbers of ducks, geese, shorebirds, blackbirds, sparrows, warbler and thrushes. The majority of North American land birds, seeking winter homes in the tropics that come south through the Mississippi Flyway take the short cut across the Gulf of Mexico in preference to the longer, though presumably safer, land or island journey by way of Texas or the Antilles (Association of Fish and Wildlife Agencies 2008).

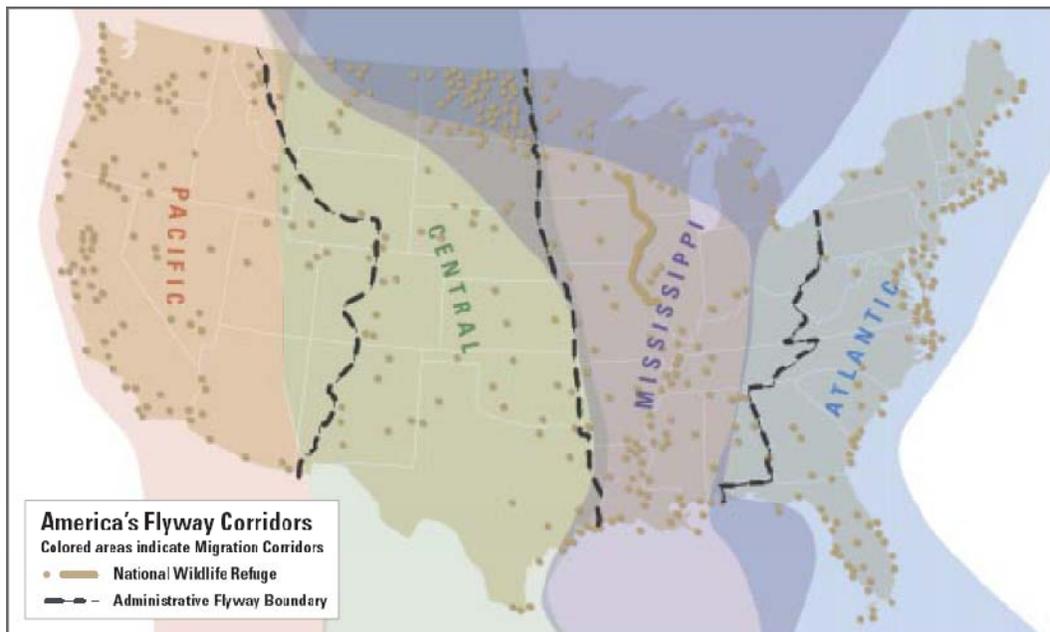


Figure 5. America's Flyway Corridors.

USFWS

Although waterfowl are what most people think of when they hear the word flyway or migration, many other birds migrate as well. Approximately two thirds of the breeding bird species of eastern United States forests migrate to tropical wintering areas in the Caribbean, Mexico, and Central and South America (Keast and Morton, 1980). The movement of birds across the Gulf of Mexico each spring and fall is a prominent feature of Nearctic-Neotropical bird migration

system. From early April through mid-May, the day-to-day consistency of migration across the Gulf of Mexico is rarely interrupted, and then only when strong cold fronts are positioned over the southern Gulf of Mexico (Gauthreaux, 1971). Even with favorable weather, migrants use coastal habitats in large numbers.

Over 300 species of birds have been reported as migratory or permanent residents within the area, several of which breed there as well. Shorebirds include: great blue heron, great egret, piping plover, sandpiper, gulls, brown and white pelicans, American oystercatcher, and terns. Birds of the area eat a great variety of foods, are also food to many predators, and exhibit a diversity of nesting behaviors. Although the barrier islands provide suitable nesting areas for a variety of colonial shorebirds during the spring and summer, especially the eastern and western ends of West Ship Island, it is unlikely that nesting shorebirds would utilize the specific project site due to the nature of the site, i.e. open water and open beach subject to inundation.

5.5 Essential Fish Habitat. Essential Fish Habitat (EFH) is defined in the Magnuson-Stevens Fishery Conservation and Management Act as "those waters and substrates necessary to fish for spawning, breeding, feeding or growth to maturity." The designation and conservation of EFH seeks to minimize adverse effects on habitat caused by fishing and non-fishing activities. The National Marine Fisheries Service (NMFS) has identified EFH for the Gulf of Mexico in its Fishery Management Plan Amendments. These habitats include estuarine areas, such as estuarine emergent wetlands, seagrass beds, algal flats, mud, sand, shell, and rock substrates, and the estuarine water column. Table 1 provides a list of the species that NMFS manages under the federally implemented Fishery Management Plans in the vicinity of the proposed action.

Table 1. EFH species in Project Area

Source: NOAA, 2008

Table 1		
Species with EFH in Project Study Area		Soft bottoms, sand, shell, estuaries, SAV, emergent marsh
Common Name	Scientific Name	EFH Concern
Fish		
Red snapper	<i>Lutjanus campechanus</i>	Neonate, Juvenile, Adult
Lane snapper	<i>Lutjanus synagris</i>	Neonate, Juvenile
Dog snapper	<i>Lutianus jocu</i>	Juvenile
Red drum	<i>Sciaenops ocellatus</i>	Neonate, Juvenile, Adult
High Migratory Species		
Scaploped Hammerhead Shark	<i>Sphyrna lewini</i>	Neonate
Spinner Shark	<i>Carcharhinus brevipinna</i>	Juvenile
Finetooth Shark	<i>Carcharhinus isodon</i>	Neonate, Juvenile, Adult
Atlantic Sharpnose Shark	<i>Rhizoprionodon terraenovae</i>	Neonate, Juvenile, Adult
Blacktip Shark	<i>Carcharhinus limbatus</i>	Neonate, Juvenile, Adult
Bull Shark	<i>Carcharhinus leucas</i>	Juvenile
Great Hammerhead Shark	<i>Sphyrna mokarran</i>	Neonate, Juvenile, Adult
Shellfish		
Brown Shrimp	<i>Penaeus aztecus</i>	Nursery Area, Adult Area
White Shrimp	<i>Penaeus setiferus</i>	Nursery Area, Adult Area
Pink Shrimp	<i>Penaeus duorarum</i>	Nursery Area, Adult Area
Gulf Stone crab	<i>Menippe mercenaria</i>	Nursery Area, Adult Area
Royal Red Shrimp	<i>Pleoticups robustus</i>	Nursery Area, Adult Area

Red Drum Fishery

Red drum occur throughout the Gulf of Mexico in a variety of habitats, ranging from depths of about 40 meter (m) [130 ft] offshore to very shallow estuarine waters. They commonly occur in most Gulf estuaries where they are found over a variety of substrates including seagrass, sand, mud, and oyster reefs. Spawning occurs in deeper water near the mouths of bays and inlets, and on the Gulf side of the barrier islands (Simmons and Breuer, 1962; Perret et al., 1980), from about September through November. Red drums are known to spawn in depths ranging from a minimum of 40 m to a maximum of 70 m [130 to 230 ft] (NMFS, 2004). The eggs hatch mainly in the Gulf, and larvae are transported into the estuary where the fish mature before moving back to the Gulf (Perret et al., 1980). Known nursery areas in the western Gulf of Mexico are Lake Pontchartrain and Mobile Bay (NCDD, 2008). Estuarine wetlands are especially important to larval, juvenile and subadult red drum. An abundance of juvenile red drum has been reported around the perimeter of marshes in estuaries (Perret et al., 1980). Young fish were found in quiet, shallow, protected waters with grassy or slightly muddy bottoms (Simmons and Breuer, 1962). Shallow bay bottoms or oyster reef substrates were especially preferred by subadult and adult red drum (Miles, 1950). Adult red drum use estuaries but tend to spend more time offshore as they age. Larval red drum feed almost exclusively on mysids, amphipods, and shrimp, whereas larger juveniles feed more on crabs and fish (Peters and McMichael, 1987). Overall, crustaceans (crabs and shrimp) and fishes are most important in the diet of red drum; primary food items are blue crabs, striped mullet, spot, pinfish and pigfish. In the Mississippi Sound juvenile red drum are relatively common year round and adults are relatively common from February to October.

Highly Migratory Species

The Mississippi Sound and adjacent waters have been identified as important nursery areas for nine sharks primarily: Atlantic sharpnose, blacktip, finetooth, and bull sharks. Less common species are the spinner, blacknose, sandbar, bonehead, and scalloped hammerhead. EFH has been identified in this area for the bonnethead, finetooth, Atlantic sharpnose, blacktip, and bull, great hammerhead, and scalloped hammerhead sharks.

Typically sharks migrate inshore in the early spring around March and April, remain inshore during the summer months and then migrate offshore during the late fall around October. Most shark species in the Mississippi waters give birth during late spring and early summer, with young sharks spending just a few months of their life in shallow coastal waters. Most shark species are abundant around barrier islands, with adult sharks commonly located south of the barrier islands. Younger sharks, which can handle lower salinities, have been found as far inshore as Round and Deer Island. The four most common inshore shark species feed primarily on fish including: menhaden, spot, croaker, speckled trout, and hardhead catfish.

Shrimp Fishery

Brown, white, and pink shrimp all spawn offshore in the Gulf of Mexico and produce demersal eggs, which hatch into pelagic larvae. The pelagic larvae of all three species consume planktonic algae and zooplankton (Darnell, 1958; Perez-Farfante, 1969). All three species migrate to estuaries as postlarvae. They all become benthic upon reaching their estuarine nursery grounds, growing and metamorphosing to juveniles quickly in the food-rich estuarine environment (St.

Amant et al., 1966). All three species are opportunistic feeders as juveniles and adults, consuming detrital organic matter, small invertebrates, small fishes, and plants (Darnell, 1958; Perez-Farfante, 1969). As they approach maturity, they migrate from estuaries to offshore habitats.

Stone Crab Fishery

Florida stone crab, *Menippe mercenaria*, and gulf stone crab, *M. adina* comprise the stone crab fishery in the Gulf of Mexico. The Gulf stone crab is typically smaller than *M. mercenaria* and replaces the Florida stone crab in the northern and western Gulf of Mexico (northwest Florida to Tamaulipas, Mexico). Adult stone crabs are benthic organisms and can be found from the shoreline out to depths of 61 m [200 ft]. They occupy a variety of habitats including burrows under rock ledges, coral heads, dead shell, or seagrass patches. Adults also inhabit oyster bars and rock jetties and are commonly found on artificial reefs where adequate refugia are present. Stone crabs spawn principally from April through September. Juveniles are also benthic dwellers but do not burrow; they use readily available refugia in close proximity to food items. Juveniles can be found on shell bottom, sponges, and *Sargassum* mats as well as in channels and deep grass flats. Adults and juveniles are relatively common in most of the Mississippi Sound year round.

Reef Fishery

Lane snapper: Lane snapper occur throughout the shelf area of the Gulf in depths ranging from 0 to 130 m [0-425 ft]. The species is demersal, occurring over all bottom types, but is most common in coral reef areas and sandy bottoms. Spawning occurs in offshore waters from March through September. Nursery areas include the mangrove and grassy estuarine areas in southern Texas and Florida and shallow areas with sandy and muddy bottoms off all Gulf States. Early and late juveniles appear to favor grass flats, reefs, and soft bottom areas to offshore depths of 20 m [66 ft] (NOAA, 1985). Adults occur offshore at depths of 4 to 132 m [13-433 ft] on sand bottom, natural channels, banks, and man-made reefs and structures. Sensitive life stages of this species primarily occur outside of the habitat supported within the channels and disposal areas.

Red Snapper: Red snapper occur throughout the Gulf of Mexico shelf. They are particularly abundant on the Campeche Banks and in the northern Gulf. The species is demersal and is found over sandy and rocky bottoms, around reefs, and underwater objects from shallow water to 200m [656 ft]. Adults favor deeper water in the northern Gulf. Spawning occurs in offshore waters from May to October at depths of 18 to 37 m (59 to 121 ft) over fine sand bottom away from reefs. Eggs are found offshore in summer and fall. Larvae, postlarvae and early juveniles are found July through November in shelf waters ranging in depth of 17 to 183 m [55-600 ft]. Early and late juveniles are often associated with structures, objects or small burrows, but also are abundant over barren sand and mud bottom. Late juveniles are taken year round at depths of 20 to 46 m [65 to 130 ft]. Sensitive life stages of this species primarily occur outside of the habitat supported within the channels and disposal areas. Furthermore, the juvenile/adult life stages of the red snapper are highly mobile and would likely avoid the area during dredging operations. It is therefore unlikely that this species would be directly impacted by the proposed action.

Non-EFH Designated Species and Life Stages in the project area

Additional species of commercial, recreational, or ecological importance occurring within the Mississippi Sound system include: blue crab, oyster, Gulf menhaden, spotted and sand seatrout, croaker, mullet and flounder.

5.6 Threatened and/or Endangered Species. The NMFS lists the following species as either threatened and/or endangered that may occur within the estuarine or Gulf of Mexico waters adjacent to Ship Island: fin whale (*Balaenoptera physalus*), humpback whale (*Megaptera novaeangliae*), sei whale (*Balaenoptera borealis*), blue whale (*Balaenoptera musculus*), northern white whale (*Eubalaena glacialis*), and sperm whale (*Physeter catodon*); turtles - green sea turtle (*Chelonia mydas*), hawksbill sea turtle (*Eretmochelys imbricata*), Kemp's ridley sea turtle (*Lepidochelys kempii*), leatherback sea turtle (*Dermochelys coriacea*), and loggerhead sea turtle (*Caretta caretta*); and Gulf sturgeon (*Acipenser oxyrinchus desotoi*).

The U.S. Fish and Wildlife Service has listed the following species as either threatened and/or endangered and may occur within the proposed project area: West Indian manatee (*Trichechus manatus*), Louisiana black bear (*Ursus americanus luteolus*), piping plover (*Charadrius melodus*), red-cockaded woodpecker (*Picoides borealis*), Mississippi gopher frog (*Rana capito sevosa*); black pine snake (*Pituophis melanoleucus*), Alabama red-bellied turtle (*Pseudemys alabamensis*), eastern indigo snake (*Drymarchon corais couperi*), gopher tortoise (*Gopherus polyphemus*), Gulf sturgeon (*Acipenser oxyrinchus desotoi*), Louisiana quillwort (*Isoetes louisianensis*), loggerhead sea turtle (*C. caretta*), Kemp's ridley sea turtle (*Lepidochelys kempii*), and the green sea turtle (*Chelonia mydas*).

Of these species listed, those most likely to be found within the project area include: the Gulf sturgeon, West Indian Manatee, Kemp's ridley, green and loggerhead sea turtles, and the piping plover. Bald eagles (*Haliaeetus leucocephalus*) may be found, but are not known to nest within the project area.

Manatees may be occasionally found in the shallow waters of the project area during the warmer months of the year. Given their slow-moving and low visibility nature, it is possible that manatees could wander into close proximity of the dredging and placement operations. To minimize contact and potential injury to manatees, the Manatee Construction Conservation Measures as specified by the U.S. Fish and Wildlife Service will be strictly observed.

The Kemp's ridley sea turtle is usually found in water with low salinity, high turbidity, high organic content, and where shrimp are abundant. This species of sea turtle is the most commonly found species along the Mississippi coast. The continual influx of freshwater and high organic content associated with the northern Gulf of Mexico provides ideal foraging habitat for this species. Loggerhead sea turtles inhabit continental shelves, bays, estuaries, and lagoons in temperate, subtropical, and tropical waters. In the Atlantic, loggerhead sea turtles' range extends from Newfoundland to as far south as Argentina. During summer, sea turtles nest in the lower latitudes. Primary Atlantic nesting sites are along the east coast of Florida, with additional sites in Georgia, the Carolinas, and along the Gulf coast. Green turtles are generally found in fairly shallow waters (except when migrating) inside reefs, bays, and inlets. The turtles are attracted to

lagoons and shoals with an abundance of marine grass and algae. Open beaches with a sloping platform and minimal disturbance are required for nesting. Within the U.S., green turtles nest in small numbers in the U.S. Virgin Islands, Puerto Rico, Georgia, South Carolina, and North Carolina, and in larger numbers in Florida. The project area would not be considered as possible nesting habitat for the loggerhead, green and Kemp's ridley sea turtles.

5.6.1 Gulf Sturgeon. The Gulf sturgeon, also known as the Gulf of Mexico sturgeon, is a subspecies of sturgeon. It is a large fish with an extended snout, vertical mouth, and with the upper lobe of the tail longer than the lower. Adults are 71 to 95 inches in length, with adult females larger than adult males. The skin is scaleless, brown dorsally and pale ventrally and imbedded with five rows of bony plates. In early spring, sub-adult and adult fish migrate into rivers from the Gulf of Mexico and continue until early May. In late September or October, sub-adult and adult sturgeons begin downstream migrations. Adult fish spend eight to nine months each year in rivers and three to four of the coolest months in estuarine or Gulf waters. Gulf sturgeons are bottom-feeders, which apparently only feed during their stay in marine waters; food items are rarely found in the stomachs of specimens sampled from rivers. The Pearl River and the surrounding Mississippi Sound have been designated as critical habitat for the Gulf sturgeon. The project site is located within the limits of critical habitat.

On March 19, 2003, critical habitat was collectively designated by the USFWS and NMFS for this species. Fourteen geographic areas among the Gulf of Mexico, rivers, and tributaries were designated as critical habitat for the Gulf sturgeon. These 14 geographic areas (units) encompass approximately 1,580 river miles (mi) and 2,333 square miles (mi²) of estuarine and marine habitat.

Critical habitat for the Gulf sturgeon within the project vicinity is identified as Unit 8 (Figure 6). The primary constituent elements essential for the conservation of the Gulf sturgeon are those habitat components that support foraging, riverine spawning sites, normal flow regime, water quality, sediment quality, and safe unobstructed migratory pathways.

Little data is available on Gulf sturgeon feeding habits. Their threatened status limits sampling efforts. Generally, adults and subadults could be described as opportunistic benthivores typically feeding on benthic marine invertebrates including amphipods, lancelets, polychaetes, gastropods, shrimp, isopods, mollusks and crustaceans. The benthic community noted by Vittor and Associates (1982) within the Mississippi Sound provides suitable forage habitat for adult and subadult fish. It is highly likely that the benthic assemblages within the project area would provide suitable forage for Gulf sturgeon.

As Gulf sturgeon feed principally on benthic invertebrates, potential impacts to the "winter-feeding" constituent element would be confined to possible impacts to the benthic community. Vittor and Associates (1982) classified the benthic community (Mississippi Sound) in a study of the Mississippi Sound and selected sites in the Gulf of Mexico. In the sound, a total of 437 taxa were collected at densities ranging from 1,097 to 35,537 individuals per square meter.



Figure 6: Piping Plover and Gulf Sturgeon Critical habitat boundaries

The “water quality” constituent element is of concern to Gulf sturgeon critical habitat. Temperature, salinity, pH, hardness, turbidity, oxygen concentrations, and other chemical characteristics must be protected in order to preserved normal behavior, growth, and viability of all Gulf sturgeon life stages. If water quality is severely degraded, adverse impacts to Gulf sturgeon and its critical habitat may result.

The “sediment quality” constituent element is listed to ensure sediment suitable (i.e. texture and other chemical characteristics) for normal behavior, growth, and viability of all life stages. In addition, sediment quality is of a concern to support a viable benthic community in order to allow the Gulf sturgeon continual foraging of the area.

The “migration habitat” constituent element is concerned with ensuring safe unobstructed passage for the species. It is intended primarily for the more confined areas near the river mouths or the rivers themselves. The species could potentially migrate through the project area.

5.6.2 Piping Plover. The piping plover is a small, pale-colored North American shorebird. The bird's light sand-colored plumage blends in with the sandy beaches and shorelines that are its primary habitat. It weighs 1-2 ounces (43-63 grams) and is 6-6 ½ inches (17-18 centimeters) long. During the breeding season the legs are bright orange and the short stout bill is orange with a black tip. There are two single dark bands, one around the neck and one across the forehead between the eyes. Plumage and leg color help distinguish this bird from other plovers. The female's neck band is often incomplete and is usually thinner than the male's neck band. In winter, the bill turns black, the legs remain orange but pale and the black plumage bands on the head and necks are lost. Chicks have speckled gray, buff, and brown down, black beaks, orange legs, and a white collar around the neck. Juveniles resemble wintering adults and obtain their adult plumage the spring after they fledge.

Historically, piping plovers bred across three geographic regions. These regions include: the United States and Canadian Northern Great Plains from Alberta to Manitoba and south to Nebraska; the Great Lakes beaches; and the Atlantic coastal beaches from Newfoundland to North Carolina. Currently, piping plovers live in an area similar to their historical range, although the numbers of those breeding in the Great Lakes region have decreased significantly since the 1930s. The Great Lakes breeding population is now found mainly in Michigan, with one pair nesting in Wisconsin. Generally, piping plovers favor open sand, gravel, or cobble beaches for breeding. Breeding sites are generally found on islands, lake shores, coastal shorelines, and river margins.

Piping plovers winter in coastal areas of the United States from North Carolina to Texas. Piping plovers begin arriving on the wintering grounds in July, with some late-nesting birds arriving in September. Behavioral observations of piping plovers on the wintering grounds suggest that they spend the majority of their time foraging (Nicholls and Baldassarre 1990; Drake 1999a, 1999b). Of the birds located on the United States wintering grounds past censuses found that 89 percent were found on the Gulf Coast and eight percent were found on the Atlantic Coast. All piping plovers are considered threatened species under the Endangered Species Act when on their wintering grounds.

Piping plovers feed along beaches and intertidal mud and sand flats. Primary prey for piping plovers includes worms, various crustaceans, insects, and occasionally bivalve mollusks. Many of the coastal beaches traditionally used by piping plovers for nesting, feeding, and roosting have been lost to commercial, residential, and recreational developments. Also, developments near beaches provide food that attracts increased numbers of predators such as raccoons, skunks, and foxes. Water level manipulation along the major rivers may also lead to loss of breeding habitat. In order to recover the piping plover and remove it from the endangered species list, threats to reproductive success at breeding grounds must be addressed. Availability of quality foraging and roosting habitat in the regions where this species winters is necessary in order to insure that an adequate number of adults survive to migrate back to breeding sites and successfully nest. Piping plovers often nest on beaches where people like to live and enjoy the shoreline. Their nests accidentally get stepped on or crushed by people and vehicles. The presence of people also may cause the birds to desert the nest, exposing eggs or chicks to the hot sun and predators. Interruption of feeding may stress juvenile birds during critical periods in their life cycle. Pets, especially dogs, may harass or kill the birds.

Surveys for piping plover on East and West Ship Island indicate a mid-winter period when most of the birds are winter residents and a spring – fall migration when many more birds move through the islands staying for only a short time. During the migration the islands serve as refueling spots on the long migratory journey. Surveys conducted during the mid-winter indicate plovers on both islands in varying numbers as shown on the below. Also included in the table are numbers noted during a 2006 spring migration (Nick Winstead, personal communication).

Year	Survey Indicator	West Ship	East Ship
1988	Nichols	4	1
1991	IPCC *	13	0
1996	IPCC	0	1
2001	IPCC	0	0
2006	IPCC	4	7
2006	Muddock **	25	14
2008	MS DWFP	18	15
2010	MS DWFP	10	2

Occurrence of piping plover on East and West Ship Island – mid-winter survey unless noted

*IPCC International Piping Plover Census

**Spring migration survey

Critical habitat for the piping plover is identified on the map as shown in Figure 6 within the vicinity of the project area. The primary constituent elements essential for the conservation of the wintering plovers are those habitat components that support foraging, roosting, sheltering and the physical features necessary to maintain the natural processes that support these habitat components. The primary constituent elements are found in geologically dynamic coastal areas that support or have the potential to support intertidal beaches and flats and associated dune systems. Important components of intertidal flats include sand and or mud flats with no or sparse emergent vegetation.

5.7 Cultural Resources. Potential impacts to cultural resources from the present project as well as a wide variety of other USACE dredging projects have been considered over the last four decades. Most recently impacts to cultural resources were assessed as part of the environmental review process for the Gulfport Navigation Harbor Supplemental Environmental Impact Statement (CH2MHill 2009). Analysis was via a literature review focused on marine archaeological resources (shipwrecks). Records consulted included those located at the USACE, Mobile District, National Park Service archives, the National Register of Historic Places (NRHP), the Mississippi Department of Archives and History, the Louisiana State historic site files, and the Automated Wreck and Obstruction Information System (AWOIS) database.

The information gathered from those sources was used to characterize and assess the potential effects of the Proposed Action, as well as others. The study identified and evaluated literature about historic wrecks and vessels, collected existing data, including archival records and maps, and used this information to assess potential impacts. Existing studies were reviewed to determine whether any recorded or listed historical and/or archaeological resources are located in

the project study area.

Shipwrecks in the Gulf of Mexico could include those from the earliest periods of exploration of the southern United States to those from modern times. Shipwrecks in the nearshore areas occurred near major ports (Pearson et al. 2003). Shipwrecks in the nearshore waters increased after 1950. This increase can be correlated with the increase in recreational boating, fishing, the offshore oil and gas industry, and commercial fishing.

A literature search revealed that although many shipwrecks are present in the northern Gulf of Mexico from Florida to Texas, no designated sites are within the project study area. There is one site, an Eighteenth-Century Ballast Pile, off the shore of the northern Chandeleur Islands (Garrison et al., 1989). The site was investigated in 1989 and determined not to be a shipwreck; it was a collection of ballast, pottery shards, six iron cannons, a lead patch, and lead bilge pump tube. The survey did not recover the remains of a hull; it was assumed that a ship was grounded and in an effort to free itself, discarded items that would lighten the ship's load. Although the site was surveyed, it was never officially designated as eligible for the NRHP.

Other marine archaeological sites in the general project area include a site in the Biloxi Back Bay and another in the Bay St. Louis area; these are the only officially recorded sites in the Mississippi Sound. The official recorded sites are not within the project Area of Potential Effect (APE) which includes both the borrow areas and deposition zones (see Section 3). In a recent study, sites of potential historic shipwrecks and known shipwrecks were compiled and plotted (Pearson and Forsyth, 2006). This research study revealed no sites within the current project APE. Maintenance dredging historically occurred in the former Navigation Channel alignment with no shipwrecks having been reported.

Ship Island was so named because of its large, naturally deep harbor on the north side of the island where large vessels could anchor (NPS, 2006). The island served as a primary port for explorers and colonists along the Gulf coast for decades. The island was named a military reservation in 1847 and construction of a fort, now known as Fort Massachusetts, began nine years later. Work on the fort was completed in 1866. The fort is the only surviving historic structure on the island. It was listed in the NRHP in 1971 and is open year-round to visitors.

A lighthouse was constructed on Ship Island in 1853 and was destroyed during the Civil War. That lighthouse was replaced in 1862. In 1947, the lighthouse was automated and in 1959, the structure was altered for a recreational use with the addition of new quarters for men and women, a kitchen, and bathrooms. Hurricane Camille hit the island in 1969, damaging the lighthouse and cutting the island in two. In 1999, the historic lighthouse was rebuilt on the historic foundation. Hurricane Katrina destroyed that structure in 2005 (Lighthousefriends.com, 2006). An archaeological component of the lighthouse, recorded via state trinomial 22HR640 is reported to date to the Paleoindian time period. The condition of that is at present unknown.

A single, multi-component archaeological site is also recorded on East Ship Island. Known as the French Warehouse site, 22HR638 includes both historic materials as well as prehistoric. Reports from post-Katrina have indicated that the site was damaged by the storm, but maintains some archaeological integrity. Site 22HR638 was accepted as eligible for the NRHP in 1991.

A marine archaeological study of the area was conducted for the initial deepening and widening EIS for the Gulfport Navigation Channel, as well as for disposal of material at Ship Island. The study entitled “Underwater Archaeological Investigations, Ship Island Pass, Gulfport Harbor, Mississippi” included detailed historical research, remote sensing survey and underwater investigations (Irion 1989). Several magnetic anomalies were investigated. No historic properties were identified as a result of the investigation (Irion, 1989). No impacts to cultural resources by the proposed project were found, and no further investigations were recommended.

5.8 Aesthetics. The project area is located along the shoreline fronting the historic fort within an area that primarily remains undeveloped and in a natural state; however, a ferry between the mainland and West Ship Island allows the island to be used by recreational day-users. A small concession area is located adjacent to the southern shoreline of the island and the fort is open daily for tours.

5.9 Noise. The predominant ambient sounds in the vicinity of the project are those expected with marine recreational areas, including those associated with light fishing vessels, ships entering a moderate sized port, and a small passenger ferry for day-users.

5.10 Air Quality. Ship Island is in attainment with the National Ambient Air Quality Standards (NAAQS) of the Clean Air Act. A State Implementation Plan (SIP) for the establishment, regulation, and enforcement of air pollution standards is not needed due to the state of Mississippi being in attainment.

6.0. ENVIRONMENTAL IMPACTS

The actions that would create the dominant environmental impact at the site are those associated with dredging of sandy material in the channels and placement of the sand onto the beach. The environmental impacts anticipated as a result of the proposed project include the temporary loss of benthic organisms, physical substrate disturbance, short- and long-term aesthetic impacts, temporary water quality impacts, temporary increased turbidity, temporary noise degradation and air quality degradation, and protection of Mississippi Sound’s estuary. Measures to provide visitor health and safety during the project would include posting signs and boundary markings during construction and post-construction recovery.

The impacts of the Deepwater Horizon oil spill on coastal Mississippi are uncertain at this time (August, 2010). This spill could potentially adversely impact USACE water resources projects and studies within the Mississippi coastal area. Potential impacts could include factors such as changes to existing or baseline conditions, as well as changes to future-without and future with project conditions. The USACE will continue to monitor and closely coordinate with other Federal and state resource agencies and local sponsors in determining how to best address any potential problems associated with the oil spill that may adversely impact USACE water resources development projects/studies. This could include revisions to proposed actions as well as the generation of supplemental environmental analysis and documentation for specific projects/studies as warranted by changing conditions

6.1 Coastal Processes.

The dynamic nature West Ship Island is reflected by the fact that the island has migrated west, with the western tip now almost a mile from the fort, whereas the fort was originally constructed at the western tip. Today, the fort is exposed to waves on approximately 1/3 of its northern side. The proposed nourishment project on West Ship Island requires dredging of approximately 350,000 cubic yards of sand from the abandoned Gulfport Harbor Ship channel and approximately 325,000 cubic yards from the Gulfport channel located at the western tip of Ship Island. The project would result in an restoration of the shoreline to a more sustainable condition similar to that which existed prior to Hurricane Camille. This project would likely not change the dominant currents and shoreline processes on the island, and no adverse impacts to the stability of the island are foreseen. In addition, the project would provide an increased sand supply for down-drift areas of the island, specifically in the Fort Massachusetts shoreline area. The barrier islands are vital to the health of the Mississippi Sound.

No-Action Alternative:

Under the No-Action Alternative, the island would continue to erode from wave action and storm activity, the salinity in the Mississippi Sound could increase, leading to saltwater intrusion, increased wave action at the mainland shore, and destruction of wetlands. Increased salinity within the Mississippi Sound would adversely impact shellfish and other forms of estuarine life vital to the fisheries industry.”

6.2 Physiography.

Dredging activities will remove a total of approximately 675,000 cubic yards of sand for placement along the shoreline in front of the fort. The overall characteristic of the island will not be changed as the project will replace eroded sandy material in an effort to restore the shoreline to a more sustainable condition. Much of this material was removed from the sediment budget of the barrier islands due to man’s past intervention.

No-Action Alternative:

Under the No-Action Alternative, the overall characteristic of the island would not be changed, however the island would continue to lose shoreline along the north face.

6.3 Sediments. Additional beach sand placed along the shoreline would provide additional stabilization to the eroding shoreline. The borrowed materials of the abandoned Gulfport Channel and the Present Gulfport Channel widening area will be mixed and placed on the beach for the stabilization of the shoreline. The physical properties of the blended borrow material being utilized during restoration of the shoreline are compatible with the native sediment on the shoreline of this area of Ship Island. As mentioned in section 5.3, this material will be mixed in a ratio of 60% of the proposed borrow from the abandoned channel material to 40% of the proposed borrow of the present Gulf Channel material in order to reach compatibility with the native material of West Ship Island north shore. The compatibility of the composite of the old and present material is determined by the overfill ratio. Taken from the table in Section 5.3 , the

overflow ratio of the borrow material from the abandoned channel is 1.01, and is 1.32 for when blended with the material from the present Gulfport Channel widening; therefore, borrow from the two areas are considered to be satisfactorily compatible with the native material, due to the fact the ratio falls within the 1.0 to 1.5 range which determines satisfactorily compatible material. The overflow ratio of 1.32 suggests that about 1.32 units of blended borrow material will be required to create one unit of stable material similar to the native material. Along with the color, size, and composition, the mixed borrow material from the two channels achieves a general similarity to that of the native material.

In addition, the material to be utilized during restoration of the beach meets the criteria set forth in the Clean Water Act, Section 404(b)(1). The Section 404(b)(1) Evaluation Report is included in APPENDIX A. The material is characterized as clean sand which is sufficiently removed from sources of pollution and is located in areas of high current velocities to provide reasonable assurance that the placement areas would not be contaminated by such pollution.

No-Action Alternative:

Under the No-Action Alternative, no changes to the character of the sediments would occur. However, without this action, sediment would continue to erode.

6.4 Biological Resources. The benthos within the borrow areas and adjacent to the existing sand beach will be lost during dredging and placement activities; however, it is believed that affected areas should repopulate once the project activities are complete and should rapidly recover. Turbidity levels would increase during the dredging and placement operations. Best management practices would be used to minimize turbidity impacts to adjacent biological resources during placement operations. Best management practices to be used include, using a turbidity barrier to reduce turbidity plumes, avoiding creating access channels to move equipment on site, restoring any vegetation disturbed, and ensuring borrow material is compatible with the native beach sand to avoid problems. It is anticipated that the levels of turbidity would subside shortly after dredging operations is complete. No long-term adverse impacts are anticipated. Due to the nature of the existing shallow water bottoms there should be no basic change in overall productivity. However, the proposed project would provide a beneficial impact by restoring lost habitat and the additional beach shoreline would provide additional habitat for benthos.

No-Action Alternative:

Under the No-Action Alternative, no impacts to benthos would occur. However, if the island continues to erode, the salinity in the Mississippi Sound would increase; thus, changing the ecological habitats that exist, which could lead to saltwater intrusion, increased wave action, and the destruction of wetlands. Increased salinity within Mississippi Sound would impact shellfish and many other forms of marine life. Increased salinity due to continued degradation of the barrier islands will result in detrimental impacts to the vital economic fisheries industry that the estuarine environment sustains.

6.4.1 Coastal Fauna. The proposed project would provide a beneficial impact by restoring lost habitat and the additional beach shoreline would provide additional habitat for coastal fauna. However, temporary impacts to aquatic species would occur during dredging and placement activities. The project would result in either hydraulic and/or hopper dredging of open water bottoms to a maximum depth of six feet. No significant impacts to the benthos, motile invertebrates, and fishes from the proposed action are anticipated. There would be temporary disruption of the aquatic community caused by the dredging and placement activities. Non-motile benthic fauna within the area would be destroyed by dredging and placement operations, but should repopulate within 12 months upon project completion (Culter and Mahadevan, 1982), (Saloman et al., 1982). Some of the motile benthic and pelagic fauna, such as crabs, shrimp, and fishes are able to avoid the disturbed area and should return shortly after the activity is completed. Larval and juvenile stages of these forms may not be able to avoid the activity due to limited mobility. Losses to the benthic and pelagic fauna should not be significant due to the small area (percentage wise) of ecosystem that would be affected at a given point in time.

Potential impacts include increased turbidity, increased noise levels, and disturbance of marine life. The most vulnerable organisms during this action would be benthic animals, such as polychaete worms, shrimp, and crabs. Placement of dredged material could temporarily disrupt the benthic communities occupying these areas. However, populations of benthic organisms should reestablish within 12 months after placement occurs (Culter and Mahadevan, 1982), (Saloman et al., 1982).

Adjacent benthic communities are anticipated to move into the dredged site and begin recolonization. Temporarily reduction of light penetration may tend to affect primary production by phytoplankton zooplankton populations. However, due to the nature of the materials to be utilized these impacts would be short term in nature. On the contrary, the proposed project would provide a beneficial impact by restoring lost habitat and the additional beach shoreline would provide additional habitat for coastal fauna.

Although the barrier islands provide nesting habitat for colonial shorebirds the timing of this action in late fall/winter should cause no impacts to these resources. Should the activity be conducted during the nesting season, appropriate shorebird nesting surveys would be conducted during the activity and appropriate steps, e.g. buffer areas around identified nesting sites etc., would be implemented to reduce the possibility of impacts.

No-Action Alternative:

Under the No-Action Alternative, impacts to coastal fauna would occur overtime as the island continues to erode. A reduction of available habitat for coastal fauna would be a direct impact of a continual eroding barrier island. In addition, the continual erosion the barrier island would allow the salinity to increase changing the ecological habitats that now exist. Increased salinity within Mississippi Sound would impact shellfish and many other forms of marine life. Increased salinity due to continued degradation of the barrier islands will result in detrimental impacts to the vital economic fisheries industry that the estuarine environment sustains.

6.4.2 Coastal Flora: No flora would be disturbed other than that floating within the project vicinity. Adverse impacts to SAVs near the project area would be avoided through the use of heavy duty turbidity barriers. No pipelines would cross the SAV area.

No-Action Alternative:

Under the No-Action Alternative, no immediate impacts to coastal flora would occur. However, if the island continues to erode, the salinity in the Mississippi Sound would increase; thus, greatly changing ecological habitats that exist, which could lead to saltwater intrusion, increased wave action, and the destruction of wetlands. Continued erosion of the barrier islands would negatively impact the submerged aquatic vegetation that is dependent upon the calm nature of the sound north of the islands

6.5 Essential Fish Habitat Assessment (EFH): The proposed activities would not adversely impact wetland vegetation, SAVs, or shell reefs. Protective measures such as avoidance and the use of silt fences as described in Section 6.4.2 would be used to minimize impacts to SAV areas near the project. The proposed project would dredge approximately 675,000 cubic yards of sandy material from the abandoned and existing Gulfport Harbor ship channels located at the western tip of the island consisting of estuarine substrate utilized by various life stages of various marine organisms. Most of the motile benthic and pelagic fauna, such as crab, shrimp, and fish, should be able to avoid the disturbed area and/or should recover within 6 to 12 months after the activity is completed. Shark species would likely avoid the area during dredging and disposal activities. It is unlikely that shark species would be directly impacted by the proposed action. The selected borrow area is characterized as sandy bottom and does not contain any hard-bottoms, coral reefs, oyster beds, or seagrasses. No long-term direct impacts to managed species are anticipated. Though temporary disruption of the aquatic community due to dredging and disposal activities is inevitable, non-motile benthic fauna within the area should repopulate within 6 to 12 months of activity completion (Culter and Mahadevan, 1982), (Saloman et al., 1982). The proposed project should not significantly affect coastal habitat identified as EFH or the species present in the project area. However, the proposed project would provide a beneficial impact by restoring lost habitat and the additional beach shoreline would provide additional nursery and feeding habitat for aquatic species.

No-Action Alternative:

Under the No-Action Alternative, the island would continue to erode, and the salinity in the Mississippi Sound would increase; thus, greatly changing ecological habitats that exist, which could lead to saltwater intrusion, increased wave action, and the destruction of wetlands. Increased salinity within the Mississippi Sound would impact shellfish and many other forms of marine life. Increased salinity due to continued degradation of the barrier islands will result in detrimental impacts to the vital economic fisheries industry that the estuarine environment sustains.

6.6 Threatened and Endangered Species. The proposed project will be coordinated with U.S. Department of the Interior, Fish and Wildlife Service and the U.S. Department of Commerce, National Marine Fisheries Service, to determine if any endangered or threatened plant or animal

species would be adversely affected by the proposed project. Based on preliminary review, it is believed that endangered or threatened plant or animal species may be affected by the proposed action but are not likely to be adversely effected.

Potential impacts to listed sea turtles and Gulf sturgeon resulting from the proposed dredging and disposal activities would be confined to direct impacts associated with the dredge equipment. No effects are anticipated with the use of a hydraulic cutter-head dredge, as they are not known to impact sea turtles and Gulf sturgeon as determined by the National Marine Fisheries Service in 2003 in the Regional Biological Opinion for Dredging of Gulf of Mexico Navigation Channels and Sand Mining Areas Using Hopper Dredges by COE Galveston, New Orleans, Mobile, and Jacksonville Districts (RBO) (Consultation Number F/SER/2000/01287) dated November 19, 2003. Conditions of the RBO will be adhered to when using a hopper dredge. Impacts associated with construction activities should be temporary and isolated to actual construction limits. Manatees, Gulf sturgeon and sea turtles could be in the project area; however there is not a potential for adverse impacts to occur. As a precaution, standard manatee conditions would be followed during construction activities. It is anticipated these species would avoid the construction areas due to noise and activity. A hydraulic cutter-head dredge would be utilized to avoid adverse impacts to listed species. Placement activities would be accomplished using appropriate BMPs to reduce turbidity and other potential adverse impacts to species and their critical habitat. Best management practices to be used include, using a turbidity containment fence to reduce turbidity plumes, avoiding creating access channels to move equipment on site, restoring any vegetation disturbed, and ensuring borrow material is compatible with the native beach sand to avoid problems. Further consultation would be required to determine adverse impacts to critical habitat for the Gulf sturgeon. It is anticipated that whale species would avoid the project area during construction activities due to noise and activity and no collisions should occur.

6.6.1 Gulf sturgeon. A Biological Assessment (BA) has been prepared and is included in the appendix of this EA. In summary of the BA, alteration of Gulf sturgeon critical habitat is unlikely. Unit 8 is listed due to its containing four of the primary constituent elements that identify critical habitat. These constituent elements consist of the following: abundant prey items, sediment quality, water quality, and “migration habitat.” The non-motile benthic community within the project area would be temporarily, adversely impacted as a result of the dredging and disposal operations. However, these impacts will not result in permanent habitat alteration due to the fact that the areas will re-colonize with similar benthic species within 6 to 12 months upon completion of the project remaining functionally identical to the existing habitat (Culter and Mahadevan, 1982), (Saloman et al., 1982). The project area constitutes a fraction of one percent of the total available forage habitat for the species in that area. It is expected that the sandy dredged material will be compatible to the adjacent sandy placement areas; otherwise the dredged material would not be used. Therefore, no long-term change in community structure is expected to occur. Additionally, within the placement area, water depths vary up to three feet and Gulf sturgeon are known to utilize sandy habitat between 5 to 20 feet. Since: 1) construction would occur in depths shallower than those typically utilized by Gulf sturgeon and 2) the Ship Island Pass would not be blocked during construction activities, the Corps believes the temporary reduction of benthic prey available within this area is not expected to reduce the critical habitat’s ability to support the gulf sturgeon’s conservation in the short or long term. In addition, the project

area affected represents only a very small amount of the overall habitat and the long-term benefits of replacing lost habitat far outweighs the temporary impacts.

Prey Abundance: Activities associated with placement cover epibenthic crustaceans and infaunal polychaetes within the project area that serves as potential prey items for the Gulf sturgeon. The impacts are considered short-term in nature and consist of a temporary loss of benthic invertebrate populations where the shoreline extends seaward. It is believed that this will not alter critical habitat. The beach placement area has suffered erosion due to highly dynamic wind and wave action within the area, especially during recent hurricane and storm events. Prior to the shoreline eroding, the area was above mean high water and was not contributing to the benthic productivity of the coastal system.

Past observances have recorded subpopulations found within the Pearl and Pascagoula Rivers utilize the project area located within and around Ship Island. NOAA, PRD, in previous biological opinions for projects within Mississippi Sound, concluded the actual number of the species utilizing the project area for foraging is likely few based on the small population sizes.

Some data are available to describe what the Gulf sturgeon may feed on in the nearshore zone of the Gulf of Mexico. Studies supporting the critical habitat rule indicate that the Gulf sturgeon's diet includes amphipods, lancelets, polychaetes, gastropods, shrimp, isopods, mollusks, and crustaceans.

The benthic species that exist in the intertidal region that would be impacted by the beach nourishment activities are rather hardy and typically exhibit only short term reductions in abundance followed by rapid immigration from adjacent areas (Culter and Mahadevan, 1982), (Saloman et al., 1982). In addition, past monitoring studies associated with placement activities have indicated that the benthic communities showed a high degree of variability through the site. The area exhibited a high degree of resilience and rapid recovery over the study period. Results from the samplings show that there is a general increase in the number of individuals per species as well as an increase in the percentage of prey species out of all species represented. This is particularly true for Branchiostoma (lancelet), which has been identified as primary Gulf sturgeon prey. Based on past benthic studies, it is concluded that the placement activities associated with the beach nourishment will not cause a significant impact on possible feeding of the Gulf Sturgeon and it is believed the project would not result in an adverse modification to the designated Gulf sturgeon critical habitat. The project area represents a small amount of the overall habitat and available feeding areas. Placement activities would cause only a short-term disturbance of the shallow areas that are less than 5 feet deep. Feeding activities would resume within the project area within 12 months as benthic organisms repopulate (Culter and Mahadevan, 1982) (Saloman et al., 1982). Motile species would return to the area shortly following construction activities.

Migratory passage: The primary migration pattern through the area would be parallel to the shoreline in Mississippi Sound, near the islands and within the island passes. The proposed action is occurring primarily in a very small area at the western edge of Ship Island and around the foundation of Fort Massachusetts and will not restrict fish migration. No significant short-term or long-term effects to migratory passage have been identified. The remaining area surrounding the Ship Island would be available for the sturgeon's migration.

Sediment quality: Sediment quality and texture of the dredged material from the old Gulfport

channel is comprised of sand that has naturally migrated westward and are the same as existing conditions at the placement area. It is expected this constituent element will not be significantly affected by the proposed activity as the mixture of sand from the abandoned channel and the bar channel portion of the Gulfport Channel Harbor widening project has been determined to be compatible with the existing beach sand.

Water quality: Impacts from sediment disturbance during construction are expected to be temporary and minimal, with suspended particles settling out within a short time frame, with no measurable effects on water quality. Minor, short changes dissolved oxygen and turbidity are expected during disposal and dredging activities. However, no changes in temperature, salinity, pH, hardness, and other chemical characteristics are anticipated. During dredging and disposal operations, turbidity levels would be monitored, to ensure compliance with the state water quality certification. The material to be used during the restoration is predominately sand sized particles with less than 6% fines and the use of the rigid turbidity screen between the submerged aquatic vegetation and the placement site will further reduce any impacts from turbidity resulting from the disposal. Temperature, salinity, and density profiles would be affected as a result of water column mixing during dredging activities. Profiles would return to previous conditions following completion of dredging. Any impacts to profiles would be temporary and minor. No significant long term changes in temperature, salinity, pH, hardness, oxygen content and other chemical characteristics are expected. The Corps does not expect measurable impacts to Gulf sturgeon critical habitat as a result of water quality impacts related to the proposed action.

No-Action Alternative:

Future conditions associated with the No-Action alternative would result in the continued reduction of a valuable ecosystem, including critical habitat for the gulf sturgeon various shorebirds including the least tern, and numerous fish and wildlife species. The immediate area would remain particularly vulnerable to wave and storm activity that continually threaten the mainland shoreline and prevent the re-establishment of the shoreline.

6.6.2 Piping Plover. The shoreline restoration at Ship Island is expected to enhance habitat and restore lost habitat in the long term, which would be a long-term beneficial impact to piping plovers. However, short-term impacts to foraging and roosting habitat could occur during and after placement activities, as the new shoreface equilibrates and benthos become reestablished. There would be no direct impact to the tidal overwash areas on the east or west ends of West Ship Island from this activity. Since piping plovers do not nest in this area, therefore construction activities will not impact breeding and nesting activities. Direct short-term foraging habitat losses would occur during the placement of sediment on the beach and associated construction operations. However, only a small portion of the available foraging habitat would be directly affected at and around the discharge site, adjacent habitat is still available and the overall direct loss of foraging habitat will be minimal and short-term. The placement of sediment on the beach may temporarily impact foraging, sheltering, and roosting habitat and; therefore, it has been determined that the placement of sediment would cause minor adverse impacts to piping plovers. However, the overall the long-term benefits of replacing lost habitat far outweigh the minor adverse impacts.

No-Action Alternative:

Under the No-Action Alternative, the island would continue to erode and critical habitat for gulf sturgeon and piping plovers and resting and nesting areas for other various threatened and endangered species would be reduced in the Mississippi Sound.

6.7 Cultural Resources. This section describes the potential impacts to historic and archaeological resources within the APE (Area of Potential Effect) of the proposed shoreline stabilization project associated with the No-Action Alternative and the Proposed Action. Federal regulations require consideration of how the Proposed Action might affect these resources. Section 106 of the National Historic Preservation Act of 1966, (NHPA), as amended, and implementing regulations at 36 CFR Part 800 require consultation with others to consider the potential effects on historic properties (properties eligible for or listed on the NRHP). The criteria used to evaluate potential impacts on submerged or marine archaeological resources would be related to any damage incurred by a historic shipwreck or submerged vessel as a result of the dredging operations.

The assessment of impacts is focused on submerged or marine archaeological resources such as wrecks and vessels due to the nature of the proposed action. The submerged resources, for purposes of evaluation for the NRHP, are considered structures since the underlying geology does not support the likelihood that buried and submerged terrestrial archaeological sites would exist. The NRHP is a listing of cultural resources that are significant either at the national, state, or local level.

To qualify for the NRHP, a vessel must have significance as one of five basic types of historic vessels: floating, dry-berthed, small craft, hulk, and shipwreck. The vessel must also retain integrity of location, design, setting, materials, workmanship, feeling, and association, and meet one or more of the NRHP criteria. Determining the significance of a vessel requires researching and analyzing the vessel's qualities, associations, and characteristics. This analysis determines if the vessel is historic and eligible for the NRHP. The proposed action would have an effect if it changed in any way the characteristics and integrity that qualify, in this case a historic vessel, for inclusion in the NRHP. Potential effects on historic vessels and wrecks include but are not limited to physical destruction of an historic resource or damage/alteration to portion of an historic resource.

Projects that affect historic or archaeological resources, including vessels and wrecks, are subject to the following primary Federal laws and regulations including: NHPA, National Environmental Policy Act of 1969 (NEPA), Antiquities Act of 1906, Archaeological and Historic Preservation Act of 1974, Archaeological Resources Protection Act of 1979, Abandoned Shipwreck Act of 1987 (ASA) 36 CFR 800 Protection of Historic Properties, and 43 CFR 7, Protection of Archaeological Resources. The purpose of the ASA is to "vest title to certain abandoned historic shipwrecks that are buried in State lands to the respective States and to clarify the management authority of the States for these abandoned historic shipwrecks." Section 106 of the NHPA creates a process for reviewing the effects of federally assisted projects on properties listed in or eligible for the NRHP.

The APE includes the two identified borrow areas – the federally authorized Gulfport Harbor widening project at the Bar channel and the old Gulfport Harbor channel which was abandoned

in the 1990s. The APE also includes West Ship Island placement area. The placement will extend along approximately 62% of the northern shore of the island or about 10,350 feet (see Figure 2). About half of the placement will consist of a narrow band of sand along existing shoreline with the remaining placement filling in a concave area. The narrow band of fill will also cover the beach area immediately north of Fort Massachusetts. The wider fill will take place east of the fort.

Although outside of the direct APE, Historic Fort Massachusetts is considered to be within the indirect APE of the proposed action. Therefore, analysis of the effect on the historic property is warranted. Currently, the long term condition of the fort is in danger of ever increasing damage from wave action and erosion. Examination of the fort immediately after hurricane Katrina in 2005 showed excessive storm surge damage to the fort. Damage included erosion of the earthen berm, large granite blocks dislodged from the base of the fort and in the moat, and the interior was filled with mud and debris several inches thick. Parts of the fort's rampart were also breached by the storm surge. Domed surfaces of the casements were also exposed when earth was removed by the water action. Portions of the Sally Port were also damaged, and at least one cannon carriage was flooded.

Individual artifacts associated with the fort including the Rodman cannon and artifacts on exhibit were also damaged. In addition, the reconstructed lighthouse was destroyed. All of this, as well as the noted beach erosion are evidence of the damage caused by tropical weather. In 1969, hurricane Camille cut the entire island in half and also did tremendous damage to the historic components on the island.

Based on the exhibited damage from tropical weather, and continued erosion of the island near the fort, it's evident that without protection, the survival of the fort long term is unlikely. Studies on long term management of historic properties and the impact of erosion and tropical weather show the effect can be catastrophic (Spennemann and Look 1998). The present project will add additional sediment and distance between the fort and the waters of the Gulf of Mexico. In addition, since the sediment addition will be in accordance with the original material and shoreline of the island, the project will have a positive visual effect in that it will more closely resemble the original view shed. Therefore, the effect of the project to the cultural resources on the island, in particular the Historic Fort Massachusetts is considered extremely beneficial.

In 1989 a survey was conducted to determine if any resources would be affected by deepening and widening of the navigation channel to its authorized dimensions. This is now known as the "abandoned channel" and includes much of the current project area. The survey determined that there were no cultural resources present including any considered potentially eligible for the NRHP (Irion 1989).

Based on the results of literature review, previous archaeological surveys, and the nature of the project, the USACE, as lead federal agency for Section 106 has determined that the proposed action would have no affect on historic properties, and thus no impacts to cultural resources.

Initial consultation with the Mississippi State Historic Preservation Officer (SHPO) and interested parties concerning proposed barrier island restoration, including Ship Island, began in

2006 through the distribution of the Interim Report for MsCIP (MDAH Project Log#05-186-06). Further consultation was conducted in 2009 with the distribution of the Draft Comprehensive Plan and Integrated Programmatic Environmental Impact Statement for MsCIP (MDAH Project Log #02-069-09). Tribes consulted included all 12 federally recognized tribes associated with Southern Mississippi (Table 6.7.1). Four tribes expressed interest in further participation on MsCIP. The interested tribes included the Choctaw Nation of Oklahoma, Mississippi Band of Choctaw Indians, Thlopthlocco Tribal Town, and the Alabama-Coushatta Tribe of Texas. Based on the results of the previous consultation, the SHPO and four interested tribes have been consulted concerning this action.

It is possible that unknown historical or archaeological resources could be discovered during dredging. In the event that any resources are discovered during dredging activities, dredging would be halted in the area immediately and the USACE archaeologist would be contacted. Should the resources be confirmed as a possible historic property, the USACE would contact the SHPO and other appropriate authorities within 48 hours. The site would be recorded and the level of significance, if any, would be determined. If the site is found to be significant, mitigation measures would be developed through negotiation of a Memorandum of Agreement (MOA) with the USACE, the SHPO, and the Advisory Council on Historic Preservation.

No-Action Alternative:

Under the No-Action Alternative, there will be continued erosion. Potential long term damage from the erosion, as well as vulnerability to storm surges will be greatly increased. Therefore, the identified cultural properties, including the Historic Fort Massachusetts, as well as the historic and prehistoric archaeological sites will likely suffer continued and potentially significant impacts. Under criteria of the National Historic Preservation Act, these impacts would be considered adverse effects on the historic properties.

6.7.1. Federally-Recognized American Indian Tribes Associated with Southern Mississippi

<u>Muscogee (Creek) Nation of Oklahoma</u>
<u>Choctaw Nation of Oklahoma</u>
<u>Tunica-Biloxi Tribe of Louisiana</u>
<u>Coushatta Tribe of Louisiana</u>
<u>Mississippi Band of Choctaw Indians</u>
<u>Miccosukee Tribe of Indians of Florida</u>
<u>Seminole Nation of Oklahoma</u>
<u>Seminole Tribe of Florida</u>
<u>Poarch Band of Creek Indians</u>
<u>The Chickasaw Nation</u>
<u>Thlopthlocco Tribal Town</u>
<u>Alabama-Coushatta Tribe of Texas</u>
<u>Alabama-Quassarte Tribal Town of the Creek Nation</u>

6.8 Aesthetics. The proposed project would result in slight changes to the appearance of the beach along the shoreline during nourishment operations. In the long-term, the proposed action would result in an improvement to aesthetic quality by providing additional beach area.

No-Action Alternative:

Under the No-Action Alternative, changes to aesthetics would continue to occur as a result of the existing and future erosion of the shoreline.

6.9 Noise. Noise levels in the vicinity would be temporarily increased by small land based construction equipment. These increases would be short-term and overall the noise level would return to normal immediately following construction. No long-term adverse impacts are anticipated.

No-Action Alternative:

Under the No-Action Alternative, noise levels would not change from the existing conditions.

6.10 Air Quality. The proposed beach nourishment project activities are expected to add equipment exhaust emissions to the project area during construction, but this would not result in any permanent changes to the air quality of the area. The project area is within a National Ambient Air Quality Standards attainment area and therefore a conformity analysis pursuant to Section 176(c) of the Clean Air Act is not required.

No-Action Alternative:

Under the No-Action Alternative, air quality would not be affected.

7.0 OTHER PERTINENT ENVIRONMENTAL PERMITS AND LAWS

7.1. COASTAL ZONE CONSISTENCY. The State of Mississippi, Department of Marine Resources (DMR) will review the proposed project relative to the Mississippi Coastal Management Program (MCMP). The USACE, Mobile District has determined that the proposed project is consistent with the MCMP to the maximum extent practicable. No project action will begin until DMR concurs with our determination of consistency and the requirements of Section 307 of the Coastal Zone Management Act are fulfilled.

7.2. WATER QUALITY CERTIFICATION. The State of Mississippi, Department of Environmental Quality, Office of Pollution Control (OPC), is expected to issue a water quality certification for the proposed project. No project action will begin until OPC issues water quality certification for the proposed project. Water quality certification issued by OPC will indicate that the proposed project was in compliance with the applicable provisions of the Clean Water Act of 1972 and the Mississippi Code.

7.3. PROTECTION OF CHILDREN. Executive Order (EO) 13045, Protection of Children from Environmental Health Risks and Safety Risks (April 21, 1997), recognizes a growing body of scientific knowledge that demonstrates that children may suffer disproportionately from environmental health risks and safety risks. These risks arise because children’s bodily systems are not fully developed; because children eat, drink, and breathe more in proportion to their body weight; because their behavior patterns may make them more susceptible to accidents. Based on these factors, the President directed each Federal agency to make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children. The President also directed each Federal agency to ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks. No changes in demographics, housing, or public services will occur as a result of the proposed project. The proposed beach nourishment project will accommodate use by all persons in the surrounding communities. The proposed project does not involve activities that will pose any disproportionate environmental health risk or safety risk to children.

7.4 ENVIRONMENTAL JUSTICE. EO 12898, Federal Actions to Address Environmental Justice in Minority and Low-Income Populations (February 11, 1994), requires that Federal agencies conduct their programs, policies, and activities that substantially affect human health or the environment in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons (including populations) from participation in, denying persons (including populations) the benefits of, or subjecting persons (including populations) to discrimination under such programs, policies, and activities because of their race, color, or national origin. On February 11, 1994, the President also issued a memorandum for heads of all departments and agencies, directing that EPA, whenever reviewing environmental effects of proposed projects pursuant to its authority under Section 309 of the Clean Air Act (CAA), ensure that the involved agency has fully analyzed environmental laws, regulations, and policies. The proposed project is not designed to create a benefit for any group or individuals. The proposed construction activities do not create disproportionately high or adverse human health or environmental impacts on any low-income populations of the surrounding area. Review and evaluation of the proposed project have not disclosed the existence of identifiable minority or low-income communities that will be adversely affected by the proposed project.

7.5 EXEMPTION FROM NATIONAL PARK SERVICE WETLAND STATEMENT OF FINDINGS. Executive Order 11990 – *Protection of Wetlands*, directs all federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative. In the absence of such alternatives, parks must modify actions to preserve and enhance wetland values and minimize degradation. Consistent with Executive Order 11990 and National Park Service (NPS) Director’s Order #77-1: *Wetland Protection*, NPS adopted a goal of “no net loss of wetlands.” Director’s Order #77-1 states that for new actions where impacts to wetlands cannot be avoided, proposals must include plans for compensatory mitigation that restores wetlands on NPS lands, at a minimum acreage ratio of 1:1.

For the purpose of implementing E.O. 11990 on NPS-managed lands, any area that is classified as a *wetland* according to the U.S. Fish and Wildlife Service's "Classification of Wetlands and

Deepwater Habitats of the United States" (Report FWS/OBS-79/31); Cowardin et al. 1979) is subject to NPS D.O. #77-1 and its implementation procedures. Under the Cowardin definition, a wetland must have one or more of the following three attributes:

1. at least periodically, the land supports predominantly hydrophytes (wetland vegetation);
2. the substrate is predominantly undrained hydric soil; or
3. the substrate is non-soil and is saturated with water or covered by shallow water at some time during the growing season of each year.

The Cowardin wetland definition encompasses more aquatic habitat types than the definition and delineation manual used by the Corps of Engineers for identifying wetlands under Section 404 of the Clean Water Act. The 1987 "Corps of Engineers Wetlands Delineation Manual" and its regional supplements require that *all three* of the parameters listed above (hydrophytic vegetation, hydric soil, wetland hydrology) be present in order for an area to be considered a wetland. The Cowardin wetland definition includes such wetlands, but also adds some areas that, though lacking vegetation and/or soils due to natural physical or chemical factors such as wave action or high salinity, are still saturated or shallow inundated environments that support aquatic life (e.g., intertidal portions of shorelines that are unvegetated due to wave action).

A map of existing wetlands, following the Cowardin wetland definition and classification system, and acreages of each type, is shown in Figure 4. This figure also shows the types and acreages of Cowardin wetlands that would exist after the project is implemented. Intertidal unvegetated beach wetlands will be replaced with an unvegetated intertidal beach community. As part of the restoration effort 24.34 acres of wetlands will be filled, resulting in a total 26.10 acres of restored wetlands, for a net gain of 1.7 acres. This meets and exceeds the NPS "no-net-loss of wetlands" policy as stated in the NPS Procedural Manual #77-1. Intertidal areas that are exposed by the extreme low spring tide are considered wetlands. In addition, there will be a net benefit to wetland habitat as a result of the proposed action. The benefit will be a net increase in high quality intertidal wetland habitat.

Since there is a net increase in high quality intertidal wetland habitat the project can be considered under the Restoration Exception in Section 4.2.1 (h) of NPS Procedural Manual #77-1. Sand grain size from the proposed donor dredge site is similar, or the same, as what is currently found in the beach intertidal zone. Temporary impacts to the existing wetlands will be unavoidable as this area will be replaced with sands to create a new beach intertidal area immediately to the north of the existing shoreline, but curvilinear enough to create a longer shoreline and therefore greater wetland acreage than what currently exists. It is anticipated that the natural ecological processes will, to the extent practicable, function at the site as they did prior to disturbance. This includes the re-establishment of the benthic community. Therefore, under the restoration excepted action a Wetland Statement of Findings does not need to be prepared.

The following BMP's will be observed:

1. Finished shoreline will have a similar slope as the existing shoreline.
2. Use of heavy equipment for smoothing of sand will leave no trace of disturbance when renourishment effort is complete.

8.0 CUMULATIVE EFFECTS SUMMARY

Cumulative impacts are those impacts on the environment that result from the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions. This section analyzes the proposed actions as well as any connected, cumulative, and similar existing and potential actions occurring in the area surrounding the site.

No projects are known to be interdependent upon this project. Portions of the West Ship Island northern shoreline near Fort Massachusetts have been renourished several times in the past due to extensive erosion. It is likely that renourishment events in the project area would continue to occur in the future to maintain the integrity of the barrier island shoreline and additional sand sources would be used. Renourishment is expected to occur as needed with increasing occurrence if the area is impacted by tropical storm events.

Recent channel modification projects in vicinity of the project area have included the Gulfport Channel Widening project, and the Pascagoula Shipping Channel Deepening project. These projects are independent in nature and are separated by more than 10 miles. Impacts from these projects which primarily occur during dredging and disposal operations have resulted in minor impacts to non-motile benthic organisms and non-significant impacts to environmental resources through the use of conservation and avoidance measures. The proposed project is not interdependent to these projects, and the cumulative impacts are minor in nature, temporarily adverse and non-significant.

The proposed project action would result in renourishment of the eroded shoreline. Without the renourishment, the barrier island would continue to erode and lose valuable fish and wildlife habitat. Overtime, if the island is lost, the salinity in the Mississippi Sound would increase; thus, greatly changing ecological habitats that exist, which could lead to saltwater intrusion, increased wave action, and the destruction of wetlands. Increased salinity within Mississippi Sound would impact shellfish and many other forms of marine life.

The minor and temporary adverse impacts that would result from the project action are outweighed by the long-term beneficial impacts of the sustainability and habitat restoration of the barrier island; therefore no significant adverse cumulative impacts are foreseen.

9.0. CONCLUSION. The proposed action would have no significant adverse environmental impacts on the existing environment. No mitigation actions are required for the proposed project. Best Management Practices would be employed during the proposed actions to minimize any identified adverse impacts from equipment operation, the quality of materials being placed, turbidity control, and placement locations. The implementation of the proposed action would not have a significant adverse impact on the quality of the environment and an environmental impact statement is not required.

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11.0 LIST OF AGENCIES AND OTHERS CONTACTED REGARDING THE ACTION.

U.S. Environmental Protection Agency, Region 4
U.S. Department of the Interior, Fish and Wildlife Service
U.S. Department of the Interior, National Park Service
U.S. Department of Commerce, National Marine Fisheries Service
Gulf of Mexico Fishery Management Council
Commander, Eighth Coast Guard District
Mississippi Department of Environmental Quality
Mississippi Department of Marine Resources
Mississippi State Historic Preservation Officer
Mississippi Secretary of State
Mississippi Department of Wildlife, Fisheries, and Parks, Museum of Natural Science

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APPENDIX A
SECTION 404(B)(1) EVALUATION REPORT

DRAFT

SECTION 404(B)(1) EVALUATION REPORT

U.S. ARMY CORPS OF ENGINEERS

MISSISSIPPI COASTAL IMPROVEMENTS PROGRAM

WEST SHIP ISLAND NORTH SHORE RESTORATION

MISSISSIPPI SOUND, HARRISON COUNTY, MISSISSIPPI

A FEDERALLY AUTHORIZED PROJECT

1. DESCRIPTION OF THE PROJECT.

The proposed action involves the placement of sand along the northern shore of West Ship Island. Placement of this sandy material is needed to stabilize Western Ship Island and allow continued biological diversity to persist in Mississippi Sound. Detailed drawings of proposed work are shown in the Environmental Assessment.

a. Location. West Ship Island northern shoreline in Mississippi Sound, Harrison County, Mississippi.

b. Description of the Proposed Action. The project involves restoration of the northern shoreline on West Ship Island. This placement will extend along approximately 62% of the northern shore or about 10,350 feet. About half of the placement will consist of a narrow band of sand along existing shoreline with the remaining placement filling in a concave area. The narrow band of fill will also cover the beach area immediately north, west and east of Fort Massachusetts, a historical site on West Ship Island.

The sandy material to be used in the ecosystem restoration effort at West Ship Island will come from two identified borrow areas – the federally authorized Gulfport Harbor widening project and the old Gulfport Harbor channel which was abandoned in the 1990s. The estimate for the amount of sand available is approximately 325,000 cubic yards. The sand deposit is located between channel stations 525+00 and 628+00. The sand deposit extends down to a depth of elevation -35.0 (NAVD88), short of the project depth of elevation -42.0 NAVD88 which includes allowable overdepth and advanced maintenance. The remaining seven feet of sediment that will be removed down to elevation -42.0 NAVD88 will be added to the volume of sediment that is coming from the remaining portion of the project and will be disposed of in accordance with contract guidance. Figure 2 represents a typical cross section for the project.

c. Alternatives to the Proposed Action.

The MsCIP Comprehensive Report **and Integrated Programmatic EIS** recommended placement of approximately 22 million cubic yards of sandy material within the NPS's Gulf

Island National Seashore, Mississippi unit and an additional 1 – 2 million cubic yards for the restoration of Cat Island. Approximately 13 million cubic yards of sand would be used to close the gap between East and West Ship Islands. The remaining nine million cubic yards of sand would be placed in the littoral zones at the eastern ends of Ship and Petit Bois Islands. The proposed action identified in this EA is an integral element of the overall barrier island restoration. Many alternatives were evaluated during the plan formulation process prior to selecting the above identified alternative. Evaluated alternatives included restoration of the entire barrier island system, constructing a dune feature at varying heights using existing and offshore sandy material, littoral zone placement with river or marine sands, constructing breakwater structures, and restoring native vegetation. Due to the time constraints associated with the preparation of the MsCIP Comprehensive Report [and Integrated Programmatic EIS](#), a borrow site of known quality and quantity located approximately 45 miles from the barrier islands was evaluated and a determination made that additional investigations would be required to delineate closer suitable sand source and that a Supplemental EIS would be prepared to more fully evaluate the use of these specific borrow sites. Due to the opportunities (i.e. an ongoing improvement project at Gulfport Harbor), this EA is being prepared to address the environmental impacts associated with this particular element. This EA will consider the following two alternatives, No Action (the restoration of the north shore of West Ship Island would be accomplished as part of the total Ship Island restoration as originally evaluated) and the West Ship Island Shoreline Restoration Alternative, as described below.

1) The No Action alternative involves the continuation of the existing condition and delaying the proposed restoration effort at West Ship Island until the new borrow source is identified and evaluated under the MsCIP Comprehensive Plan through a Supplemental Environmental Impact Statement for the overall barrier island restoration within the next two years. The immediate area would remain particularly vulnerable to wave and storm activity until the project was constructed under the overall barrier island restoration effort. Additionally, future conditions associated with not restoring the island would result in the continued degradation of the valuable beach ecosystem and possible lack of suitable fish and wildlife habitats which would adversely impact numerous federally protected species. In addition, increased salinity due to continued degradation of the barrier islands will result in detrimental impacts to the vital economic fisheries industry that the estuarine environment sustains. Further, without corrective action, continued severe erosion along the West Ship Island northern shoreline could result in the loss of valuable public lands, wildlife and natural resources and incidentally a National Register Historic Property. For these reasons, the no-action alternative is not selected as the preferred alternative.

2) The recommended course of action is to restore the northern shoreline of West Ship Island near the historic Fort Massachusetts.

d. Authority and Purpose. The purpose of the proposed project is to supplement the eroded littoral zone of West Ship Island with sand, which would continue the sustainability of this important barrier island system and ultimately protect Mississippi Sound and its very productive fisheries. An incidental benefit of the project would provide shoreline stabilization of the foundation of Fort Massachusetts located on northern end of West Ship Island. The current condition is undermining the historic structure and if not corrected immediately, will cause irreparable damage to the fort's foundation. Restoration of the barrier islands and ecosystem restoration to

restore historic levels of storm damage reduction to the Mississippi Gulf Coast was authorized by Public Law 111-32 dated 24 June 2009.

e. General Description of the Discharge Sites. Generally, the discharge site for the project consists of the northern shoreline along West Ship Island. The placement area will extend along approximately 62% of the northern shore or about 10,350 feet.

2. FACTUAL DETERMINATIONS.

a. Physical Substrate Determinations.

(1) Substrate elevation and slope. The substrate in the shoreline protection project areas ranges in elevation 5.0 to 5.5 NGVD 88 (*National Geodetic Vertical Datum*), extending some 230 feet seaward to Elevation 3.5 then extending some 35 feet to Elevation -2.5 feet.

(2) Fill type. The material proposed for placement as fill along the Ship Island northern shoreline consists of naturally occurring sands.

(3) Dredged/Fill Material Movement. Currents in the vicinity of the proposed placement area are tidal and wind driven currents and the shoreline of the Mississippi Sound is a very dynamic environment and the barrier island is subjected to wind and wave erosion on a daily basis. The erosive forces of nature generally move sand.

(4) Physical Effects on Benthos. Dredging activities will remove approximately 675,000 cubic yards of sandy sediments from within two borrow areas. These areas are located at the federally authorized Gulfport Harbor widening project at the Bar channel and the old Gulfport Harbor channel, which was abandoned in the 1990s. The benthos within the borrow areas and placement area would likely be destroyed. However, it is believed that affected areas should repopulate within one year and should rapidly recover. Seagrass beds are located outside of the fill placement area. Adverse impacts to seagrasses would be avoided and minimized thru the use of best management practices, such as a rigid silt curtain. No oyster beds are located within the project area. Turbidity levels would increase during the dredging operations; however, the levels of turbidity would subside shortly after dredging operations is complete. No long-term adverse impacts are anticipated.

(5) Other Effects. Not applicable.

(6) Actions Taken to Minimize Impacts. Rigid turbidity curtains would be installed to ensure that no sand is placed on adjacent submerged aquatic vegetation beds. The borrow area locations have been chosen to provide sand which is compatible to existing sand materials on the barrier island to the maximum extent possible. No additional actions are deemed necessary to minimize impacts.

b. Water Circulation/Fluctuation and Salinity Determination.

(1) Water.

- (a) Salinity. No significant effects.
- (b) Water Chemistry. No significant effects.
- (c) Clarity. Minor increases in turbidity may be experienced in the immediate vicinity of the project during placement activities. This increase would be temporary and would return to pre-project conditions shortly after completion.
- (d) Color. No significant effects.
- (e) Odor. No significant effects.
- (f) Taste. No significant effects.
- (g) Dissolved Gases. No significant effects.
- (h) Nutrients. No significant effects.
- (i) Eutrophication. No significant effects.

(2) Current Patterns and Circulation.

- (a) Current Patterns and Flow. The placement of material on the barrier island shoreline would not result in any change in current patterns or circulation.
- (b) Velocity. No significant effects.
- (c) Stratification. No significant effects.
- (d) Hydrologic Effects. See (a) above. No significant effects.

(3) Normal Water Level Fluctuations. No significant effects.

(4) Salinity Gradients. No significant effects.

(5) Actions That Will Be Taken To Minimize Impacts. None appropriate.

c. Suspended Particulate/Turbidity Determinations.

(1) Expected Changes in Suspended Particulate and Turbidity Levels in the Vicinity of the Placement Site. Short-term increases in suspended particulate levels may occur at the time of material placement on the shoreline due to some fine grained material within the nourishment material. However, due to the nature of the material to be placed, these

increases would be within the normal range of fluctuation of these parameters for this area of the Mississippi Sound and would not violate state water quality standards.

(2) Effects on the Chemical and Physical Properties of the Water Column.

(a) Light Penetration. Due to temporary increases in turbidity during construction, light penetration in the immediate project area may be reduced. As with turbidity, this would be a temporary effect which would subside after construction is completed.

(b) Dissolved Oxygen. No significant effects.

(c) Toxic Metals and Organics. No significant effects.

(d) Pathogens. No significant effects.

(e) Esthetics. No significant effects.

(f) Others as Appropriate. None appropriate.

(3) Effects on Biota.

(a) Primary Production, Photosynthesis. No significant effects.

(b) Suspension/Filter Feeders. No significant effects.

(c) Sight Feeders. No significant effects.

(4) Actions Taken to Minimize Impacts. Due to the nature of the material to be placed and the energy regime of the placement site the impacts would be minimal. No further actions are deemed appropriate.

d. Contaminant Determination. The material to be utilized consists of sand in the old abandoned Gulfport channel and existing Gulfport channel and it is not expected to contain contaminants. No significant effects.

e. Aquatic Ecosystem and Organism Determinations.

(1) Effects on Plankton. No significant effects.

(2) Effects on Benthos. Some benthic organisms would be destroyed during the dredging and placement activities. It is expected the area would re-colonize within months of completion of the project.

(3) Effects on Nekton. No significant effects.

(4) Effects on Aquatic Food Web. No significant effects.

(5) Effects on Special Aquatic Sites.

- (a) Sanctuaries and Refuges. Not applicable.
- (b) Wetlands. Not applicable.
- (c) Mud Flats. Not applicable.
- (d) Vegetated Shallows. No significant effects.
- (e) Coral Reefs. Not applicable.
- (f) Riffle and Pool Complexes. Not applicable

(6) Threatened and Endangered Species. No threatened or endangered species would be impacted by the proposed action. The proposed activity has been coordinated with the National Marine Fisheries Service and Fish and Wildlife Service.

(7) Other Wildlife. No significant effects.

(8) Actions to Minimize Impacts. Minimization of impacts on the aquatic ecosystem will be accomplished by the use of rigid turbidity curtains.

f. Proposed Disposal Site Determinations.

(1) Mixing Zone Determinations. It is anticipated that the State of Mississippi, Department of Environmental Quality, Office of Pollution Control, would require that the turbidity outside the limit of a 750-foot mixing zone shall not exceed the ambient turbidity by more than 50 Nephelometric Turbidity Units (NTU's). The proposed action is anticipated to be in compliance with this mixing zone requirement.

(2) Determination of Compliance With Applicable Water Quality Standards. The proposed action would be in compliance with all applicable water quality standards.

(3) Potential Effects on Human Use Characteristics. Restoration of the barrier island shoreline would ensure continued protection of the existing barrier island and MS Sound ecosystem, continued nesting by shorebirds including threatened and endangered species, continued existence of critical habitat for listed species, and continued use by visitors.

- (a) Municipal and Private Water Supply. Not applicable.
- (b) Recreational and Commercial Fisheries. No significant effects.
- (c) Water Related Recreation. The project would result in a marked improvement.

(d) Esthetics. The temporary esthetic degradation to the environment which would occur as a result of the proposed action is deemed acceptable in all areas. Temporary impacts would occur primarily as a result of the physical presence of heavy equipment during construction.

(e) Parks, National and Historic Monuments National Seashores Wilderness Areas, Research Sites, and Similar Preserves. The State of Mississippi State Historic Preservation Officer (SHPO) reviewed and concurred with the proposed action. The National Park Service, Gulf Island National Seashore has reviewed and concurred with the proposed action.

g. Determination of Cumulative Effects on the Aquatic Ecosystem. The proposed action is not expected to have significant cumulative adverse impacts. The action would have cumulative beneficial impacts due to the erosion attenuation and habitat restoration.

h. Determination of Secondary Effects on the Aquatic Ecosystem. No significant secondary effects on the aquatic ecosystem would occur.

3. FINDING OF COMPLIANCE.

a. No significant adaptations to the guidelines were made relative to this evaluation.

b. The only alternative identified is the “no action” alternative which was deemed unacceptable.

c. Pursuant to the Clean Water Act (CWA), Section 401, State Water Quality Certification has been requested from the State of Mississippi, Department of Environmental Quality, Office of Pollution Control. Coastal Consistency will be requested from the State of Mississippi, Department of Marine Resources. No action would take place until the above agencies concur.

d. The proposed action is not expected to harm endangered or threatened species or critical habitat of any endangered species within the project area. The proposed activity has been coordinated under Section 7 of the Endangered Species Act.

e. The proposed action would not result in any significant adverse effects on human health or welfare, including municipal or private water supplies, recreation and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. The life stages of aquatic life and other wildlife would not be adversely affected. Significant adverse effects on aquatic ecosystem diversity, productivity and stability, and recreational, esthetic, and economic values are not expected to occur.

f. No wetlands or submerged aquatic vegetation would be destroyed by the proposed action.

g. The proposed action is specified as complying with the requirements of these guidelines.

DATE _____
Steven J. Roemhildt

Colonel, Corps of Engineers
District Commander