FINDING OF NO SIGNIFICANT IMPACT

MISSISSIPPI COASTAL IMPROVEMENTS PROGRAM (MSCIP)

WEST SHIP ISLAND NORTH SHORE RESTORATION

MISSISSIPPI SOUND, HARRISON COUNTY, MISSISSIPPI

A. Description of the Proposed Action.

The West Ship Island North Shore Restoration Project was authorized by Public Law 110-28, *Supplemental Appropriations Bill - Public Law 110-28, U.S. Troop Readiness, Veterans' Care, Katrina Recovery, and Iraq Accountability Appropriations Act, 2007,* as part of the Mississippi Coastal Improvements Program (MsCIP) for Hancock, Harrison, and Jackson Counties, Mississippi. 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 historic Fort Massachusetts. The MsCIP Barrier Island Restoration Plan as identified in the MsCIP Comprehensive Plan and Integrated Programmatic Environmental Impact Statement (EIS) includes restoration of Ship Island. The proposed action 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. In addition, rubble/rip rap in the placement area would be removed from the area and used for an existing artificial reef site. The fill material will 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. The project area comprises approximately 77 acres. The two sources of sand combined will provide approximately 400,000 cubic yards. In addition, approximately 1,100 cubic yards of concrete rubble will be removed from the sandy shoreline and placed offshore to create an artificial reef.

The purpose of the proposed project is to supplement the eroded northern shoreline of West Ship Island with sand, which will 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 will 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.

B. Description of Alternatives.

The MsCIP Comprehensive Report and Integrated Programmatic EIS recommends 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. The proposed action is an integral element of the overall barrier island restoration. Many alternatives were evaluated during the plan formulation process described in the above cited report prior to selecting the above identified alternative. A Supplemental EIS will evaluate these

barrier island restoration alternatives. Due to the opportunities (i.e. an ongoing improvement project at Gulfport Harbor), an Environmental Assessment (EA) has been prepared to address the environmental impacts associated with this particular element. The EA considered 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 above and in greater detail in the attached EA.

C. Potential Environmental Impacts.

Impacts associated with this project at Ship Island were discussed in the MsCIP EA, Section 404 (b)(1) Evaluation, and the Finding of No Significant Impact (FONSI), dated September 2010. Findings of this EA, Section 404 (b)(1) Evaluation, and FONSI determined no significant impacts will occur as a result of this West Ship Island Northern Shoreline Restoration MsCIP Project. The West Ship Island Restoration project would have no significant adverse environmental impacts on the existing environment. No mitigation actions are required for the proposed project. Best Management Practices will 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 will not have a significant adverse impact on the quality of the environment and an environmental impact statement is not required.

D. Coordination.

The USACE coordinated this project with state, Federal, and local agencies and the public through circulation of the Public Notice No. FP10-S101-08 and EA dated August 10, 2010. In addition, the MsCIP interagency group held monthly meetings throughout the planning process. There were no objections to the project. No adverse impacts to any endangered or threatened species would occur from the project (USFWS, August 31, 2010). In addition, the project would not cause any adverse effects to essential fish habitat and critical habitats for piping plovers and gulf sturgeons (National Marine Fisheries Service (NMFS)-Habitat Conservation Division, November 9, 2010; NMFS-Protected Resources Division, September 28, 2010). No Cultural resources are likely to be impacted from the project (Mississippi Department Archives and History State Historic Preservation Officer; September 15, 2010). No adverse impacts to water quality under Section 401 would occur from the project, and a water quality certification was received from the Mississippi Department of Environmental Quality on September 13, 2010. The project is in compliance with the Mississippi Department Natural Resources (MDNR) Mississippi Coastal Program, and a coastal zone consistency letter was received from MDNR on August 27, 2010. Additional details of coordination are provided in the attached EA.

Finding of No Significant Impact (FONSI).

A careful review of the EA shows that the West Ship Island North Shore Restoration Project will not have a significant adverse impact on the natural and human environment. The requirements of the National Environmental Policy Act and the Council on Environmental Quality regulation have been satisfied and the preparation of an Environmental Impact Statement is not necessary.

DATE 10-25-10

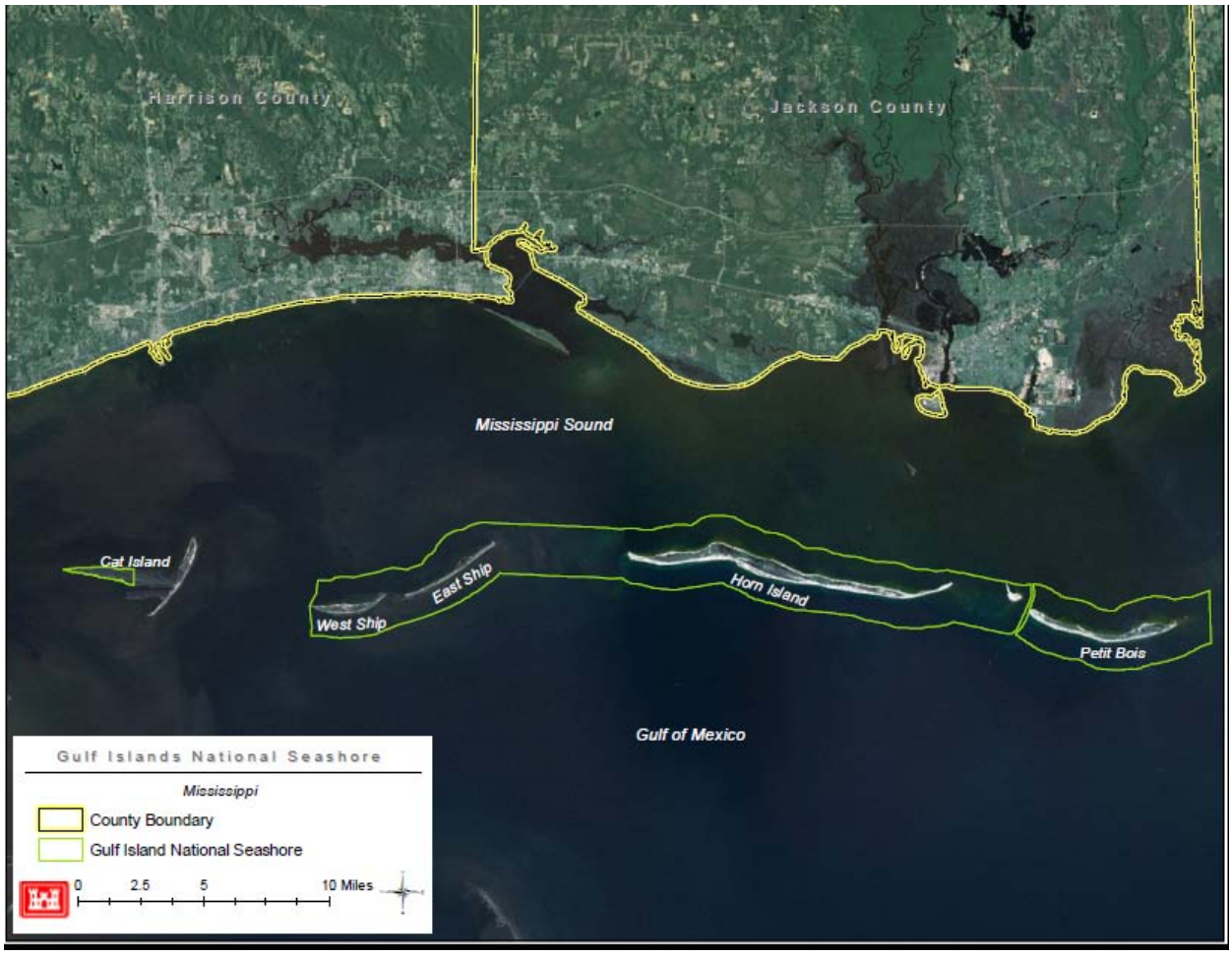
Steven J. Roemhildt
Colonel, Corps of Engineers
District Commander

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



OCTOBER 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.

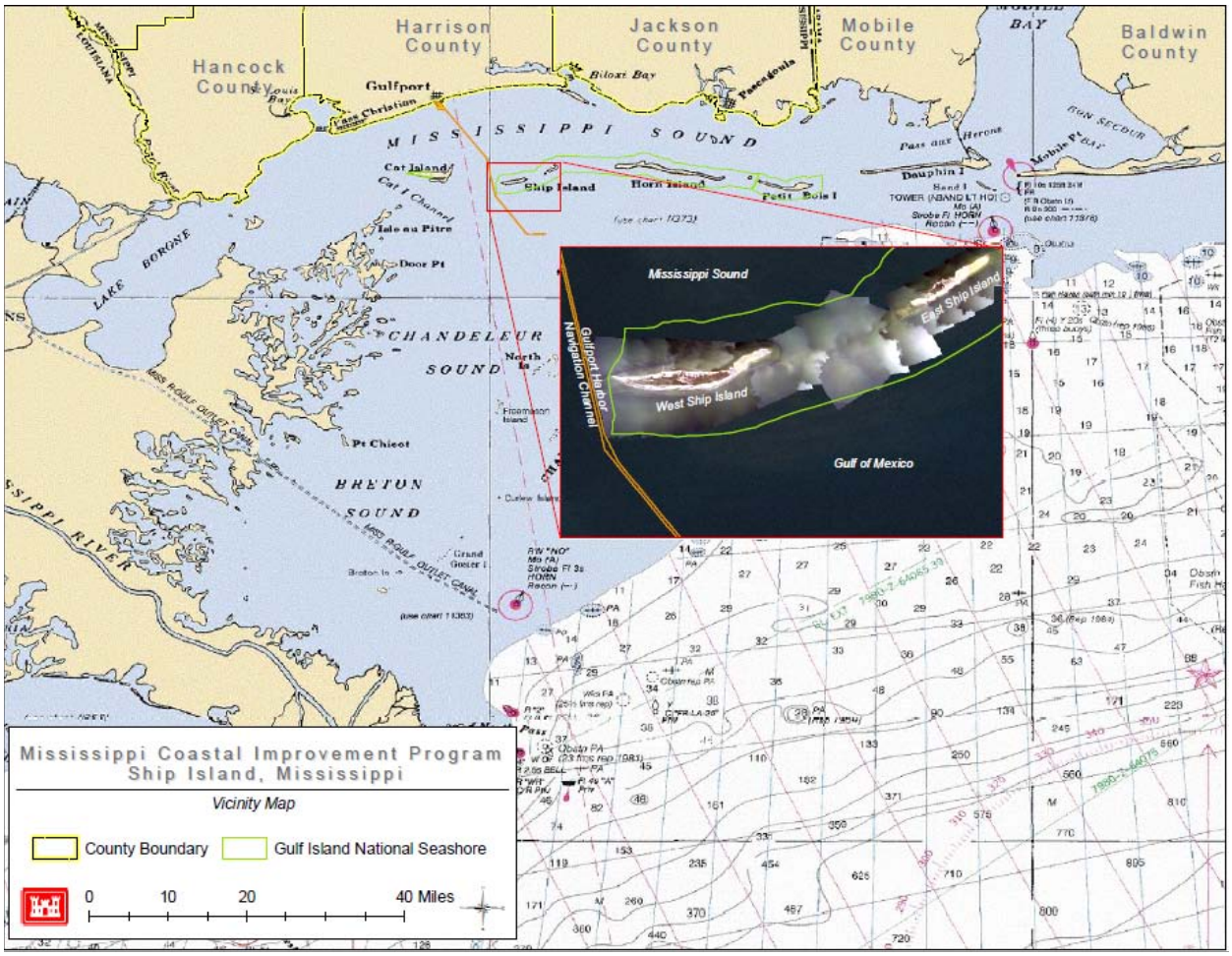

Figure 1 – Project Vicinity Map

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.

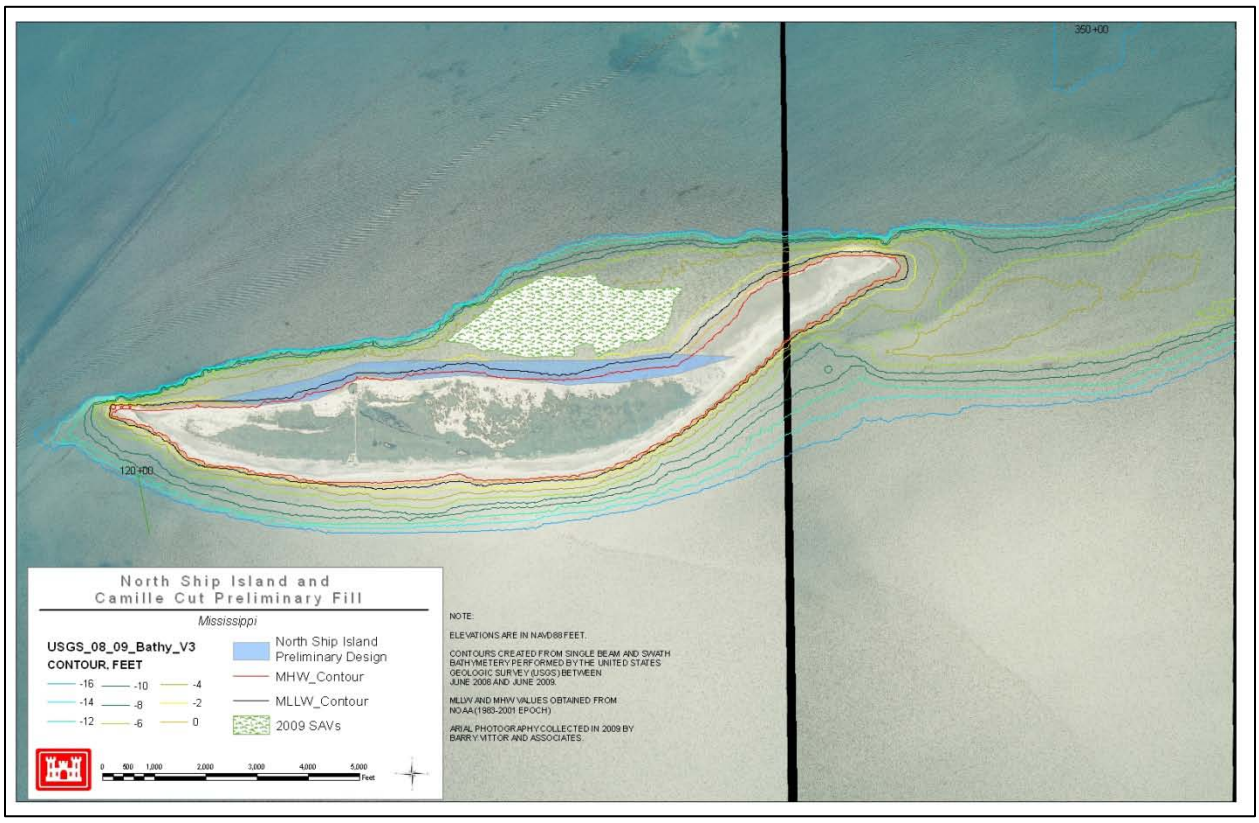

Figure 2: Restoration Area

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.

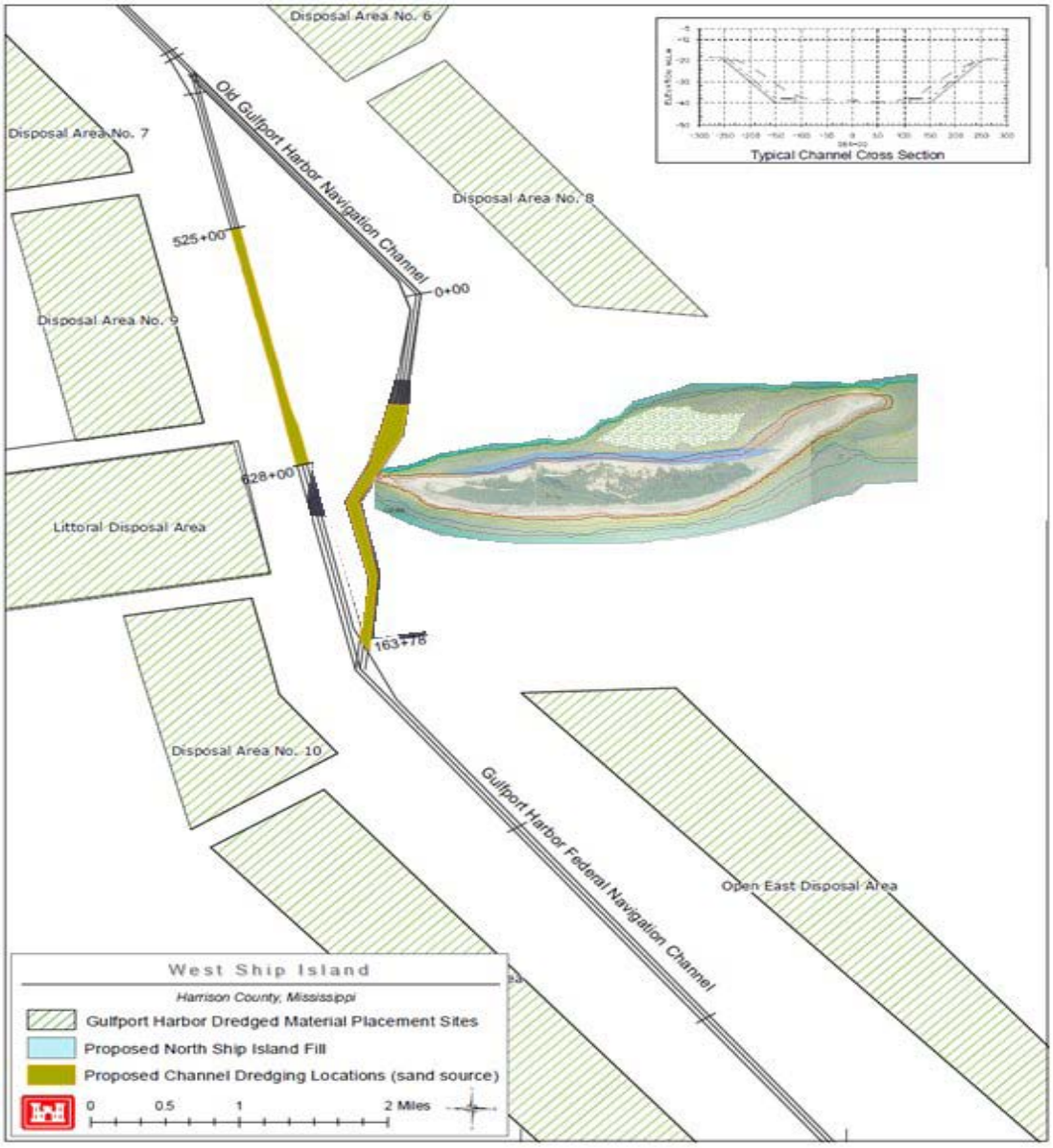

Figure 3a: Borrow Material Locations

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 272,000 cubic yards.

The project area comprises approximately 77 acres. The two sources of sand combined will provide approximately 400,000 cubic yards of sand for use on West Ship Island and will be placed in the area shown in Figure 2 above.

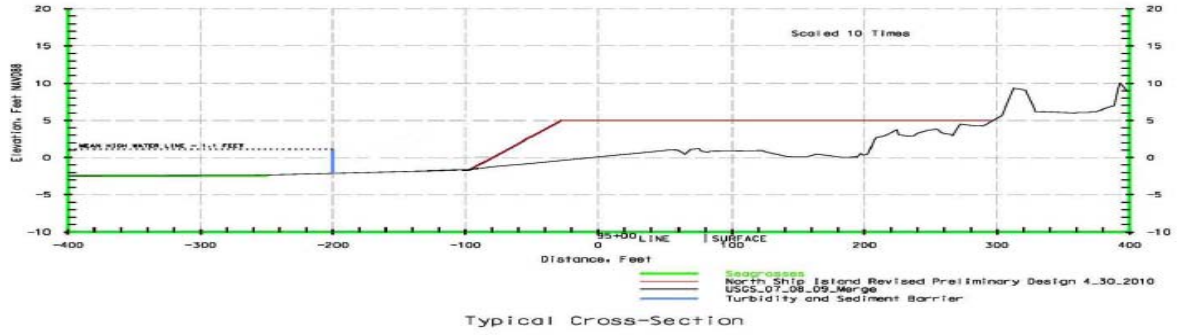

Figure 3b- Restoration Area

The material from the existing Gulfport Navigation Channel would be hydraulically dredged by using a hopper dredge. However, work in the old navigation channel would 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 doziers 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 know 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 GUIS, 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 Griffee (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 split 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.

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. Table 1 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	GLEY1 5/N	GRAY	GLEY1 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)	GLEY1 5/N	GRAY	GLEY1 5/N	GRAY
Composite of both borrow sources	2.5Y 8/1	WHITE	2.5Y 7/1	LT. GRAY

Table 1. 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 vibracore. 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 in Table 2 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. Table 2 is a summary of the overfill factors, mean grain size and percent fines for all of the composite samples:

Area	overfill 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

Table 2. Overfill 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 overfill 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 overfill 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. The overfill 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/rivers, which drain some 20,000 mi^2 of land area (Corps 1984). Circulation is driven by 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

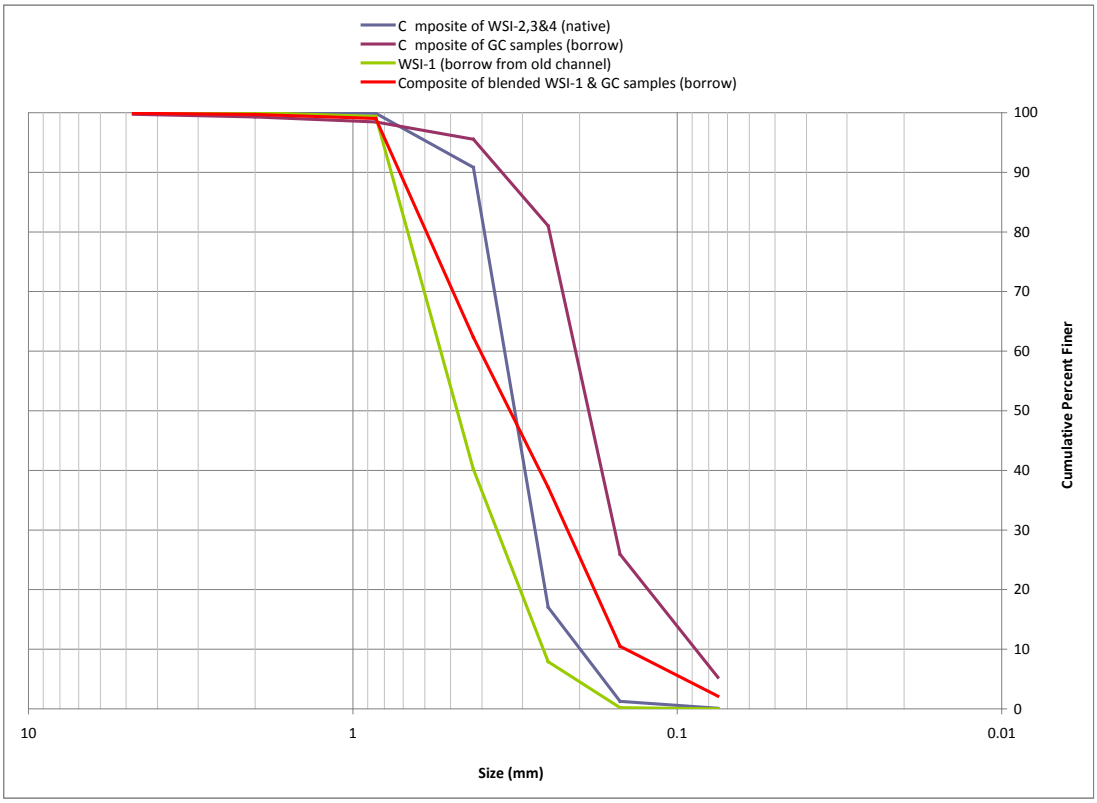

Figure 3.c Comparison of Composite Gradations

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. roemerianus*) 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 100 feet north of the proposed restoration area. The total bed area of shoalweed appears to cover approximately 94 acres (Figure 4).

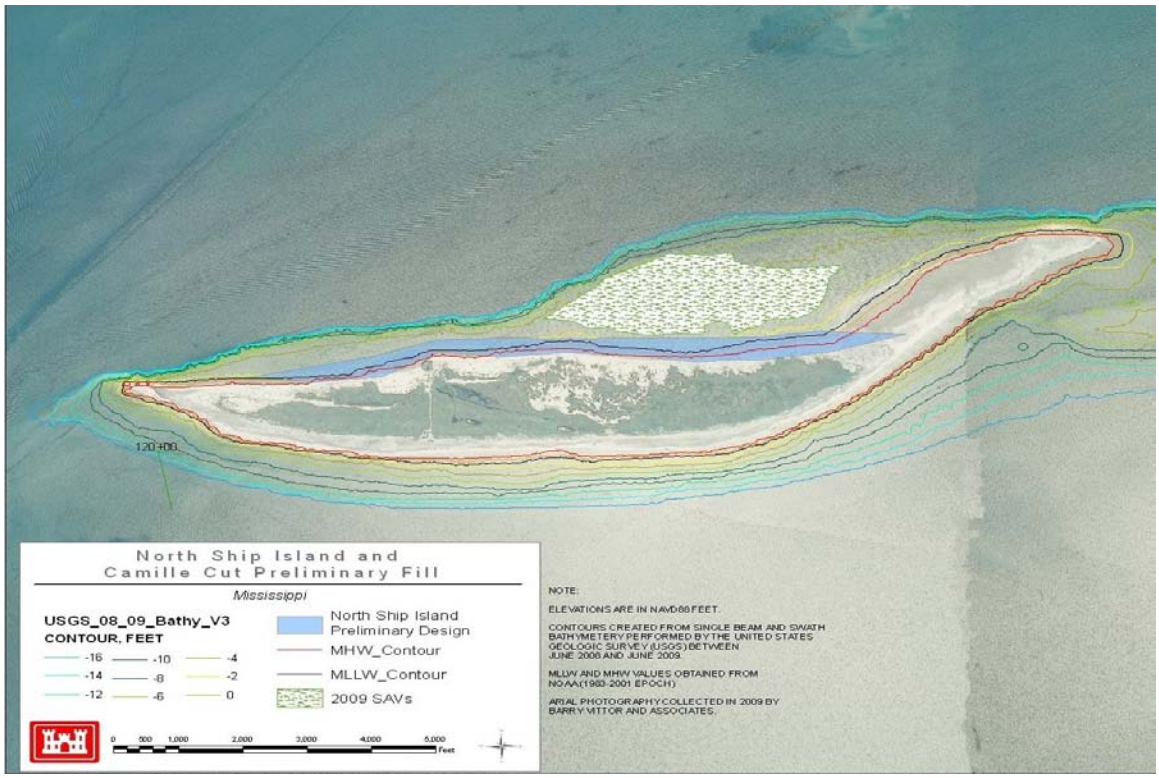

Figure 4: Location of Submerged Aquatic Vegetation at West Ship Island

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 completed 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 Mississippi 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 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*). In Jackson County, primarily the ports of Pascagoula and Moss Point receive 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. 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, and is 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).

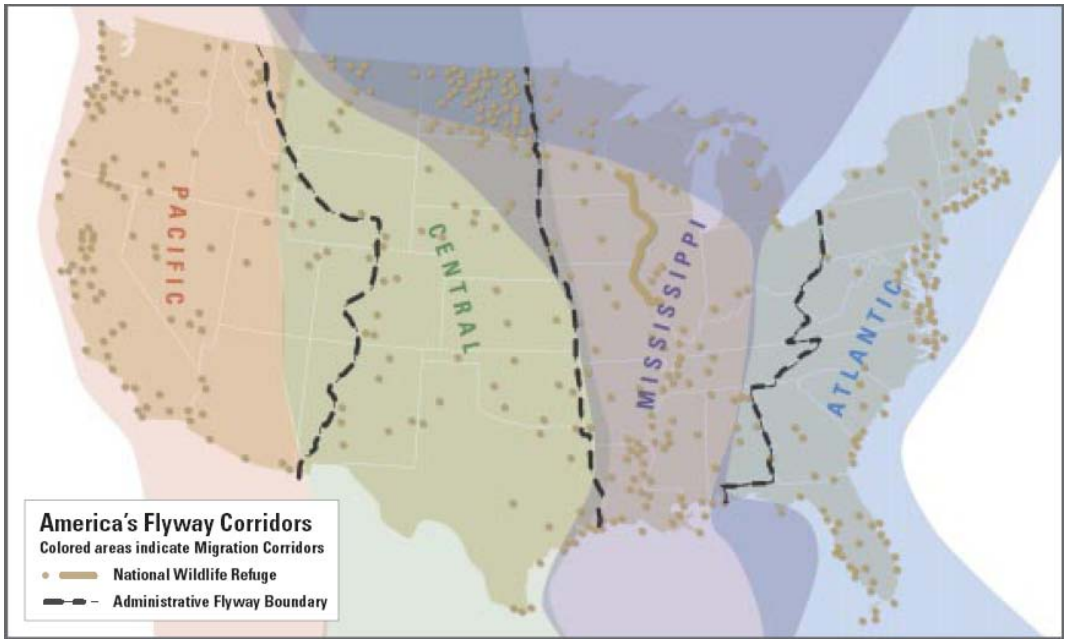

Figure 5. America's Flyway Corridors. **USFWS**

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 3 provides a list of the species that NMFS manages under the federally implemented Fishery Management Plans in the vicinity of the proposed action.

Table 3. EFH species in Project Area Source: NOAA, 2008

Species with EFH in Project Study Area		**Soft bottoms, sand, shell, estuaries, SAV, emergent marsh**
Common Name	**Scientific Name**	**EFH Concern**
Fish		
Red snapper	*Lutjanus campechanus*	Neonate, Juvenile, Adult
Lane snapper	*Lutjanus synagris*	Neonate, Juvenile
Dog snapper	*Lutianus jocu*	Juvenile
Red drum	*Sciaenops ocellatus*	Neonate, Juvenile, Adult
High Migratory Species		
Scaplloped Hammerhead Shark	*Sphyrna lewini*	Neonate
Spinner Shark	*Carcharhinus brevipinna*	Juvenile
Finetooth Shark	*Carcharhinus isodon*	Neonate, Juvenile, Adult
Atlantic Sharpnose Shark	*Rhizoprionodon terraenovae*	Neonate, Juvenile, Adult
Blacktip Shark	*Carcharihinus limbatus*	Neonate, Juvenile, Adult
Bull Shark	*Carcharhinus leucas*	Juvenile
Great Hammerhead Shark	*Sphyrna mokarran*	Neonate, Juvenile, Adult
Shellfish		
Brown Shrimp	*Penaeus aztecus*	Nursery Area, Adult Area
White Shrimp	*Penaeus setiferus*	Nursery Area, Adult Area
Pink Shrimp	*Penaeus duorarum*	Nursery Area, Adult Area
Gulf Stone crab	*Menippe mercenaria*	Nursery Area, Adult Area
Royal Red Shrimp	*Pleoticups robustus*	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 metamorphing 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, *Lutjanus synagris*: 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, *Lutjanus campechanus*: 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 (*Callinectes sapidus*), Americian oyster (*Crassostrea virginica*), Gulf menhaden (*Brevoortia patronus*), spotted and sand seatrout (*Cynoscion nebulosus, Cynoscion arenarius*), Atlantic croaker (*Micropogonias undulates*), striped mullet (*Mugil cephalus*) and southern and gulf flounder (*Paralichthys lethostigma, Paralichthys albigutta*).

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 glaciallis*), and sperm whale (*Physeter catodon*); turtles - green sea turtle (*Chelonia mydas*), hawksbill sea turtle (*Eretmochelys imbricata*), Kemp's ridley sea turtle (*Lepidochelys kempi*), 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 (*Psuedemys 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 kempi*), 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 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 (mi^2) 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 amphiopods, 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 in Table 4 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

Table 4. Occurrence of piping plover on East and West Ship Island – mid-winter survey unless noted* IPCC International Piping Plover
**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 272,000 cubic yards of sand from the abandoned Gulfport Harbor Ship channel and approximately 128,000 cubic yards from the Gulfport channel located at the western tip of Ship Island. The project would result in the 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 400,000 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 overfill 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 overfill 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 and SAVs 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 re-colonization. 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.

<u>No-Action Alternative:</u>

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 a turbidity barrier. 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. The National Marine Fisheries Service-Habitat Conservation Division concurred by letter dated, September 21, 2010 (APPENDIX B). Protective measures such as avoidance and the use of a turbidity barrier as mentioned in Section 6.4.2 would be used to minimize impacts to SAV areas near the project. The proposed project would dredge approximately 400,000 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 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 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 would result in detrimental impacts to the vital economic fisheries industry that the estuarine environment sustains.

6.6 Threatened and Endangered Species. The proposed project has been coordinated with U.S Fish and Wildlife Service and the National Marine Fisheries Service. By letter dated August 31, 2010, the USFWS concurred with the Corps of Engineers determination that no adverse impacts to any Federally-listed endangered or threatened species, including piping plover critical habitat would occur from the project (APPENDIX B). The Biological Assessment (BA) prepared by the Corps of Engineers (APPENDIX C), concluded that the restoration of northern shoreline of West Ship Island may affect, but is not likely to adversely affect and will not jeopardize the continued existence of the gulf sturgeon and endangered or threatened sea turtle species or adversely modify designated Gulf sturgeon critical habitat. The NMFS concurred with the Corps of Engineers determination in the Biological Opinion dated September 28, 2010 (APPENDIX B).

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 Gulf 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 (GRBO) (Consultation Number F/SER/2000/01287) dated November 19, 2003. Conditions of the GRBO 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 obtain borrow from the abandoned Gulfport channel 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. 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. As mentioned in Section 6.6, the BA concluded that the 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

five 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 of Engineers 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 feedings 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 on the north shore of West Ship Island and near 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 West 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 is 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 West 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; 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 National Register of Historic Places) (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).

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 is 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 U.S. Army Corps of Engineers (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 5). 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. Consultation with the Mississippi SHPO was recently conducted. By letter dated, September 15, 2010, the Mississippi SHPO of the Mississippi Department of Achives and History, SHPO concurred that no cultural resources are likely to be impacted from the project (APPENDIX B).

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.

Table 5. Federally-Recognized American Indian Tribes Associated with Southern Mississippi

Muscogee (Creek) Nation of Oklahoma
Choctaw Nation of Oklahoma
Tunica-Biloxi Tribe of Louisiana
Coushatta Tribe of Louisiana
Mississippi Band of Choctaw Indians
Miccosukee Tribe of Indians of Florida
Seminole Nation of Oklahoma
Seminole Tribe of Florida
Poarch Band of Creek Indians

The Chickasaw Nation
Thlopthlocco Tribal Town
Alabama-Coushatta Tribe of Texas
Alabama-Quassarte Tribal Town of the Creek Nation

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 PEMITS AND LAWS

7.1 Coastal Consistency. The USACE, Mobile District determined that the proposed project is consistent with the Mississippi Coastal Management Program (MCMP) to the maximum extent practicable. The State of Mississippi, Department of Marine Resources (DMR) reviewed the proposed project relative to the MCMP and concurred by letter dated August 27, 2010, that the project is consistent with the approved Mississippi Coastal Improvements Program. Therefore, 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), issued a water quality certification for the proposed

project by letter dated September 13, 2010 (APPENDIX B). The water quality certification issued by OPC indicates that the proposed project is in compliance with the applicable provisions of the Clean Water Act of 1972 and the Mississippi Code.

7.3 Protection of Children. The Executive Order 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. The Executive Order 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).

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 EFECTS 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

12.0 REFERENCES

Burns and Griffee. October 30, 2006. Compilation and Analysis of Historical Shoreline and Bathmetry Survey for Quantifying Sediment Transport Pathways, Lateral Inlet and Island Migration, and Detailed Sediment Budgets for Mississippi Sound and Environs. U.S. Army Corps of Engineers, Mobile District, Mobile, Alabama.

CH2M Hill. February 2009, amended April 2009. Supplemental Environmental Impact Statement for Construction of Gulfport Harbor Federal Navigation Project to its Congressionally Authorized Dimensions. U.S. Army Corps of Engineers, Mobile District, Mobile, Alabama.

Clark, S.H. and C.W. Caillouet. 1975. Diel fluctuations in catches of juvenile brown and white shrimp in a Texas estuarine canal. Contrib. Mar. Sci. 19: 119-122.

Culter, J.K., Mahadevan S. 1982. "Long-Term Effects of Beach Nourishment on the Benthic Fauna of Panama City Beach, Florida." Report submitted to the USACE Coastal Engineering Research Center, Vicksburg, MS.

Darnell, R.M. 1958. Food habits of fishes and larger invertebrates of Lake Pontchartrain, Louisiana, an estuarine community. Publ. Inst. Mar Sci., Univ. of Texas 5: 353-416.

Drake, K. R., J. E. Thompson, K. L. Drake, and C. Zonick. 2001. Movements, habitat use, and survival of non-breeding Piping Plovers. Condor 103:259-267.

FMRI. (Florida Marine Research Institute). 2001. Florida's Inshore and Nearshore Species: 2001 Status and Trends Report. St. Petersburg, FL.

Garrison, E. G., C.P. Giamona, J. Jobling, A.R. Tripp, E. N. Weinstein, and G.A. Wolf. 1989 *An Eighteenth-Century Ballast Pile Site, Chandeleur Islands, Louisiana*. Prepared for the U.S. Department of the Interior, Minerals Management Service. OCS Study MMS 89-0092.

Gauthreaux, S.A., Jr. 1971. A Radar and Direct Visual Study of Passerine Spring Migration in Southern Louisiana. Auk 88:343-365.

Hopkins, Gary. June 2010. Personal communication. Gulf Islands National Seashore, Ocean Springs, MS.

Houser, C., Hamilton, S., and Meyer-Arendt, K., 2007. Impacts of Hurricane Katrina on The Geomorphology of the Mississippi Barrier Islands: A research report submitted to the National Park Service. Center for Environmental Science and Research, Department of Environmental Studies, University of West Florida.

Keast, A.E. and Morton, E.S. (eds) 1980. Migrant Birds in the Neotropics. – Smithsonian Press. Washington, DC.

Kilby, J.D. 1955. The fishes of two Gulf coastal marsh areas of Florida. Tulane Stud. Zool. 2(8):175-247.

Lindberg, W.J. and M.J. Marshall. 1984. Species Profiles: Life histories and environmental requirements of coastal fishes and invertebrates (South Florida) – Stone crab. U.S. Fish Wildlife Service. FWS/OBS-82/11.21. U.S. Army Corps of Engineers. TR-EL-82-4.

Mississippi Department of Marine Resources, (2005). Evaluation of the Potential for Seagrass Mapping and Restoration in the Mississippi Sound. Prepared by University of Southern Mississippi, Gulf Coast Geospatial Center.

Miles, D.W. 1950. The life histories of the seatrout, *Cynoscion nebulosus*, and the redfish, *Sciaenops ocellatus*. Texas Game Fish Oyster Comm. Marine Lab. Annu. Rep. 1349-30.

Morton, R.A. 2007. Historical Changes in the Mississippi-Alabama barrier islands and the roles of extreme storms, sea level, and human activities. U.S. Geological Survey Open-File Report 2007-1161, 38p.

Moore, R.H. 1973. Age, growth, respiration, and general biology of the mullets *Mugil cephalus* and *Mugil curema*, on the south Texas coast. Ph. Dissertation University of Texas, Austin. 180 pp

Munsel Soil Color Charts. 2009 (revised). Munsel Color. Grand Rapids, MI

NCDDC. 2008. "Coastal Ecosystems Program - Gulf of Mexico" www.ncddc.noaa.gov, web site accessed May 9, 2008.

NOAA. 1985. Gulf of Mexico coastal and ocean zones strategic assessment: Data Atlas. U.S. Department of Commerce. NOAA, NOS. December 1985.

Otvos, E.G. 1998. Mississippi's Coast: Geology in a Nut shell. In *Marine Resources and History of the Mississippi Gulf Coast*, Volume II. Mississippi Department of Marine Resources, Biloxi, MS.

Otvos, E.G.and Giardino, M.J., 2004. Interlinked barrier island chain and delta lobe development, northern Gulf of Mexico. *Sedimentary Geology*, 20, 1-20.

Pearson, Charles E., Stephen R. James, Jr., Michael C. Krivor, S. Dean El Darragai and Lori Cunningham. 2003. Refining and Revising the Gulf of Mexico Outer Continental Shelf Region High-Probability Model for Historic Shipwrecks. Final Report, Volume I: Executive Summary. Prepared for Minerals Management Service, New Orleans. December 2003.

Pearson, Charles and Mark Forsyth. 2006. "Develop Information Base and Management Protocols for the Coast Guard Debris Removal Mission off the Coast of Mississippi: Relative to Compliance with Section 106 of the National Historic Preservation Act." April 7, 2006.

Perez-Farfante, I. 1969. Western Atlantic shrimps of the genus Penaeus. Fish Bull. 67: 461-591.

Perret, W.S., J.E. Weaver, R.C. Williams, F.L. Johanson, T.D. McIlwain, R.C. Raulerson, and W.M. Tatum. 1980. Fishery profiles of red drum and spotted seatrout. Gulf States Mar. Fish. Comm., Ocean Springs, MS. No. 6, 60p.

Peters, K.M. and R.H. McMichael. 1987. Early life history of the red drum, *Sciaenops ocellatus* (Pisces: Sciaenidae) in Tampa Bay. In: Estuaries. Vol. 10, No. 2, p. 92-107.

Nicholls, J. L., and G. A. Baldassarre. 1990. Habitat associations of piping plovers wintering in the United States. Wilson Bulletin 102:581-590.

Oivanki, Stephen M. 1998. Geology and Geomorphology of the Mississippi Gulf Coast. In *Marine Resources and History of the Mississippi Gulf Coast*, Volume II. Mississippi Department of Marine Resources, Biloxi, MS.

Saloman, C.H., Naughton, S.P., Taylor J.L. 1982. "The Benthic Community Response to Dredging Borrow Pits, Panama City Florida." Report submitted to the USACE Coastal Engineering Research Center.

Schmid, Keil. 2001. *Biennial report of Sand Beaches; Harrison County*. Open-File Report 111B. Mississippi Department of Environmental Quality, Energy and Coastal Geology Division.

Simmons, E.G. and J.P. Brewer. 1962. A study of redfish (*Sciaenops ocellatus* Linnaeus) and black drum (*Pogonias cromis* Linnaeus). Pub. Of Inst. Mar. Sci., Univ. Texas. 8:184-211.

St. Amant, L.S., J.G. Broom and T.B. Ford 1966. Studies of brown shrimp, *Penaeus aztecus*, in Barataria Bay, Louisiana. 1962-1965, Bull. Mar. Sci. Gulf. Carib. 18:1-16.

US Geological Survey. Open-File Report 20007-1161. Historical Changes in the Mississippi-Alabama Barrier Islands and the Roles of Extreme Storms, Sea Level, and Human Activities.

USACE, 2009. Mississippi Coastal Improvements Program, Comprehensive Plan and Integrated Programmatic Environmental Impact Statement, Hancock, Harrison and Jackson Counties, Mississippi.

USFWS, 2004. *Piping Plover Critical Habitat.* http://www.fws.gov/plover/#maps

Vernon, Henry (1974). University of Georgia Marine Institute. *Final Report for West Ship Island and Fort Massachusetts Beach Nourishment and Shoreline Protection Study. Gulf Island National Seashores.* Prepared for the U.S. Department of Interior, National Park Service, Southeastern Region.

Vittor, B. A. and Associates, Inc**.** 1982. *Benthic Macroinfauna Community Characterizations in Mississippi Sound and Adjacent Waters*. Contract Report to U. S. Army Corps of Engineers, Mobile District, Mobile, Alabama.

Williams, A. B. 1958. Substrates as a factor in shrimp distribution. Limnological Oceanography. 3:283-290.

Winstead, Nick. June 2010. Personal communication. Mississippi Department of Wildlife, Fisheries and Parks, Museum of Natural Science, Jackson, MS.

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

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 combined estimate for the amount of sand to be placed on West Ship Island is approximately 400,000 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 know 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 Nephelolmetric 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 received from the State of Mississippi, Department of Environmental Quality, Office of Pollution Control. The water quality certification issued by OPC on September 13, 2010 indicates that the proposed project is in compliance with the applicable provisions of the Clean Water Act of 1972 and the Mississippi Code.

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 10-25-10

Steven J. Roemhildt
Colonel, Corps of Engineers
District Commander

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

APPENDIX B (AGENCY COORDINATION & BIOLOGICAL OPINION)

CESAM-PD-EC **August 10, 2010**
PUBLIC NOTICE NO. FP10-SI01-08

PUBLIC NOTICE

U.S. ARMY CORPS OF ENGINEERS

MISSISSIPPI COASTAL IMPROVEMENTS PROGRAM (MSCIP) - BARRIER ISLAND RESTORATION PLAN
WEST SHIP ISLAND NORTH SHORE RESTORATION

MISSISSIPPI SOUND, HARRISON COUNTY, MISSISSIPPI

A FEDERALLY AUTHORIZED PROJECT

Interested persons are hereby notified that the U.S. Army Corps of Engineers (Corps), Mobile District proposes to restore a narrow band of beach shoreline along the northern part of West Ship Island that has eroded.

This public notice is issued in accordance with the rules and regulations published in the Federal Register on 26 April 1988. These regulations provide for the review of the dredging programs for federally authorized projects. These laws are applicable whenever dredged or fill material may enter navigable waters. The recipient of this notice is requested specifically to review the proposed action as it may impact water quality, relative to the requirements of Section 404(b)(1) of the Clean Water Act. We also request comments on any other potential impacts.

WATERWAY AND LOCATION: Mississippi Sound, Harrison County, Mississippi

DESCRIPTION OF THE AUTHORIZED PROJECT: 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.

DESCRIPTION OF THE PROPOSED ACTION: The MsCIP Barrier Island Restoration Plan as identified in the MsCIP Comprehensive Plan and Integrated Programmatic Environmental Impact Statement includes the comprehensive restoration of Ship Island. The proposed action is an element of the comprehensive plan and includes the placement of sand along the northern shore of West Ship Island (Figure 1). Placement of this sandy material will stabilize West Ship Island and allow continued biological diversity to persist in the Mississippi Sound. 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. Fill placement widths will range from approximately 150 feet to 550 feet (Figure 2). The narrow band of fill will also cover the beach area immediately north, east and west of Fort Massachusetts, a historical site on West Ship Island. The placement area is located approximately 50 feet from submerged aquatic vegetation

Enclosure 1. Public Notice

(Figure 3), but would not adversely impact the SAVs. Adverse impacts to SAVs near the project area would be avoided through the use of heavy duty turbidity barriers. In addition, no pipelines would cross the SAV area.

The sandy material used in the shoreline restoration effort at West Ship Island will come from two identified borrow areas – the federally authorized Gulfport Harbor widening project at the Bar channel funded by the Flood Control and Coastal Emergencies (FCCE) and the old Gulfport Harbor channel which was abandoned in the 1990s. The old Gulfport Navigation Channel alignment is located east of the existing channel and near the western tip of West Ship Island. Borings taken from the alignment of the Gulfport Navigation Channel have demonstrated that a substantial quantity of suitable sand will be removed as the present Bar channel is widened. The sandy material to be used from the channel widening project would be stockpiled on the north shore of the island as it is dredged. Material for the proposed restoration project would be obtained from the stockpile. 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. 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 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.

The Gulfport Federal Navigation Ship Channel was relocated further westward in the early 1990s and the old abandoned section of the Federal project acts as a deposition basin for sand from Ship Island that naturally migrates to west due to littoral drift in this area. The old channel would be excavated down to the limits of the old channel template (i.e. 38 feet deep by 300 feet wide) using either a hydraulic or hopper dredge with pump off capability. This available volume of sand is estimated to be 480,000 cubic yards. The old channel acts as a sediment trap for sand migrating westward from the tip of the island and as prior dredging has proven, the material contained in the old channel is comprised of sand that is fully compatible with sand on the island beaches. Material from this area has been used in the past to provide a sand source for use beach nourishment near Fort Massachusetts by the National Park Service.

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 below. The borrow material in the federally authorized Gulfport Harbor widening project is broken into two sections. One section of the channel widening has sand down to elevation -26.6 (NAVD 88) and another section down to elevation -34.5 (NAVD 88). Only the material (sand) above the elevations noted above would be placed along Ship Island.

The material would be hydraulically dredged by using either a cutter-head pipeline or hopper dredge and placed along the shoreline and in shallow water bottoms to reach the limits of the historic beach template. The material would be evenly spread by using front end loaders and backhoes up to a finished elevation of +5 feet Mean Lower Low Water with a slope of 1V:10H generally following the shoreline around the historic fort and eastward.

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WATER QUALITY CERTIFICATION: Pursuant to the Clean Water Act (CWA), state water quality certification is required for the proposed operations and maintenance action described above. Water quality certification will be requested from the Mississippi Department of Environmental Quality (MDEQ). Upon completion of the required comment period, a decision relative to water quality certification will be made by MDEQ.

COASTAL ZONE CONSISTENCY: Pursuant to the Coastal Zone Management Act (CZMA), the proposed action is consistent with the Mississippi Coastal Program to the maximum extent practicable. Concurrence with this determination will be requested from the Mississippi Department of Marine Resources (MDMR). Upon completion of the required comment period, a decision relative to coastal zone consistency will be made by MDMR.

USE BY OTHERS: The proposed action is not expected to create significant impacts on land and water use plans in the vicinity. Use of the waters in the vicinity of the project area includes fishing and recreational boating.

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) CONSIDERATIONS: NEPA of 1969 and Title 40 of the Code of Federal Regulations (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. In accordance with the requirements of NEPA, a draft Environmental Assessment (EA), written by the Corps, Mobile District, has been tiered from the Programmatic EIS and prepared to address the potential impacts associated with the proposed project. These documents are on file and available for review in the Corps, Mobile District Office or on our website at address http://www.sam.usace.army.mil/pd/Pd1.htm.

SECTION 404 (B)(1) EVALUATION REPORT: Water quality impacts associated with the proposed action have been identified in an evaluation report prepared in accordance with Public Law 92-500, Section 404 (b)(1) Guidelines promulgated by the U. S. Environmental Protection Agency (EPA) under the CWA. The Draft Section 404 (b)(1) Evaluation Report is on file in the Corps, Mobile District office and on the district website at http://www.sam.usace.army.mil/pd/Pd1.htm. The report concludes that only minor and short-term turbidity impacts would result from the implementation of the proposed action.

ENDANGERED/THREATENED SPECIES: Pursuant to Section 7 of the Endangered Species Act (ESA), the proposed project is being coordinated with the U.S. Fish and Wildlife Service (USFWS) and National Oceanic and Atmospheric Administration Fisheries.

Federally protected species include the West Indian Manatee (*T. 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 (*Psuedemys alabamensis*), Eastern indigo snake

(*Drymarchon corais couperi*), Gopher tortoise (*Gopherus polyphemus*), Gulf sturgeon (*Acipenser oxyrinchus desotoi*), Eastern indigo snake (*Drymarchon corais couperi*), Louisiana quillwort (*Isoetes louisianensis*), loggerhead sea turtle (*Caretta caretta*), Kemp's ridley sea turtle (*Lepidochelys kempi*), and the green sea turtle (*Chelonia mydas*). In addition, the bald eagle, although delisted is protected under the Bald and Golden Eagle Act.

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 sea turtles and loggerhead sea turtles, and the Piping plover. Bald eagles may be found, but are not known to nest within the project area. If Manatees are found in the area, the Corps will implement the "Standard Manatee Conditions" issued by the US Fish and Wildlife Service. The project area would not be considered as possible nesting habitat for the loggerhead, green and Kemp's ridley sea turtles.

In the unlikely event a Gulf sturgeon is in the area, the proposed action would not adversely affect the species. A concurrence from the National Marine Fisheries Service is anticipated.

CULTURAL RESOURCES CONSIDERATION: In accordance with Section 106 of the National Historic Preservation Act of 1966 (as amended) and its implementing regulations at 36 CFR 800, the U.S. Army Corps of Engineers (Corps) must consider the potential effects of this project on *historic properties* (cultural resource sites potentially eligible for or listed on the National Register of Historic Places). In addition, the Corps must afford the State Historic Preservation Officer (SHPO) and interested parties including but not limited to Native American Tribes (Tribes), the opportunity to comment on its determination of effects to *historic properties*. In order to assess the effects of the project, the Corps has conducted a records and literature search of the state wide survey and site files at the Mississippi Department of Archives and History, as well as other available, in order to identify existing resources. The search included all areas of potential effect (APE) of the proposed project.

Background research found that in 1989 a survey was conducted of the project area as part of a project to deepen and widen the old Gulfport Harbor Navigation Channel (now known as the "old channel"). The survey found no historic properties located within the area of potential effect (APE) of the currently proposed project. Within the visual range of the site is historic Fort Massachusetts. The proposed project would return the shoreline to its historic condition, thus the project will have no visual affect on the historic property. Therefore, the Mobile District has determined **no historic properties affected** by the proposed Ship Island shoreline restoration project as per 36 CFR 800.4(d)(1).

The results of the background research, previous surveys and effects determination are being coordinated with the SHPO, National Park Service, Tribes, and interested parties. Comments received will be considered and actions taken as appropriate. Should previously undiscovered sites be located during this project, or consultation with the SHPO or Tribe reveal unknown resources or Traditional Cultural Properties, further consultation and evaluation may become necessary.

ESSENTIAL FISH HABITAT ASSESSMENT: The Gulf of Mexico Fishery Management Council, in accordance with the Magnuson-Stevens Fishery Conservation and Management Act

(PL 94-265), has developed management plans for the following fisheries: shrimp, red drum, reef fish, stone crab, spiny lobster, coral and coral reef and coastal migratory pelagic. The dredging and placement of the sand material will not significantly affect coastal habitat identified as Essential Fish Habitat (EFH) in the project area. Based on the extent of this habitat in the general vicinity of the project and the small size of the project, the overall impact to fisheries resources is considered negligible. The Corps, Mobile District has determined a no impact to EFH as a result of this dredging project. The Gulf of Mexico Fishery Management Plans (1999) identifies EFH in the project area to be intertidal wetlands, submerged aquatic vegetation, non-vegetated bottoms, shell reefs, and the estuarine water column. Habitat Areas of Particular Concern have not been identified for the project area.

CLEAN AIR ACT: Air quality in the vicinity of the proposed action would not be significantly affected by the proposed action. The equipment and machinery would generate some air pollution during construction activities, such as increased particulate levels from the burning of fossil fuels. However, these impacts would be minor and temporary in nature. The proposed action is in compliance with the Clean Air Act, as amended. The project area is in attainment with the National Ambient Air Quality Standards parameters. The proposed action would not affect the attainment status of the project area or the region. A State Implementation Plan conformity determination (42 United States Code 7506(c) is not required since the project area is in attainment for all critical pollutants.

EVALUATION: The decision whether to proceed with the proposed action will be based on an evaluation of the overall public interest. That decision would reflect the national concerns for both protection and utilization of important resources. The benefits that may be expected to accrue from this proposal must be balanced against its reasonably foreseeable detriments. The decision whether to proceed and the conditions under which the activity would occur would be determined by the outcome of this general balancing process. All factors that may be relevant to the proposal would be considered. Among these are conservation, economics, esthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, considerations of property ownership, and in general, the needs and welfare of the public. The proposed action would proceed unless it is found to be contrary to the overall public interest.

COORDINATION: Among the agencies receiving copies of this public notice are:

Region 4, U.S. Environmental Protection Agency
U.S. Department of the Interior, Fish and Wildlife Service, Jackson, MS
U.S. Department of the Interior, National Park Service, Atlanta, GA
U.S. Department of Commerce, National Marine Fisheries Service, Panama City, FL
U.S. Department of Commerce, National Marine Fisheries Service, St. Petersburg, FL
Commander, Eighth Coast Guard District
Mississippi Department of Marine Resources
Mississippi Department of Environmental Quality
Gulf of Mexico Fishery Management Council
U.S. Department of Agriculture, Natural Resources Conservation Service

Appropriate federally recognized Indian Tribes

Other Federal, state and local organizations, U.S. Senators and Representatives of the State of Alabama are provided copies of this notice and are invited to participate in coordinating the proposed action. The Corps, Mobile District request the information contained in this notice be communicated to any other parties who may have an interest in the proposed action.

CORRESPONDENCE: Any person who has an interest that may be affected by this proposed activity may request a public hearing. Any comments or requests for a public hearing must be submitted in writing to the District Engineer within 21 days of the date on this public notice. A request for a hearing must clearly set forth the interest, which may be affected, and the manner in which the interest may be affected. Correspondence concerning this public notice should refer to Public Notice No. FP10-SI01-08 and should be directed to the Commander, U.S. Army Engineer District Mobile, Post Office Box 2288, Mobile, Alabama 36628-0001, ATTN: CESAM-PD-EC. For additional information please contact Ms. Caree Crosby at (251) 690-3026, or at email address caree.a.crosby@usace.army.mil.

Curtis M. Flakes
Chief, Planning and Environmental Division,
U.S. Army Corps of Engineers,
Mobile District

Enclosure 1. Public Notice

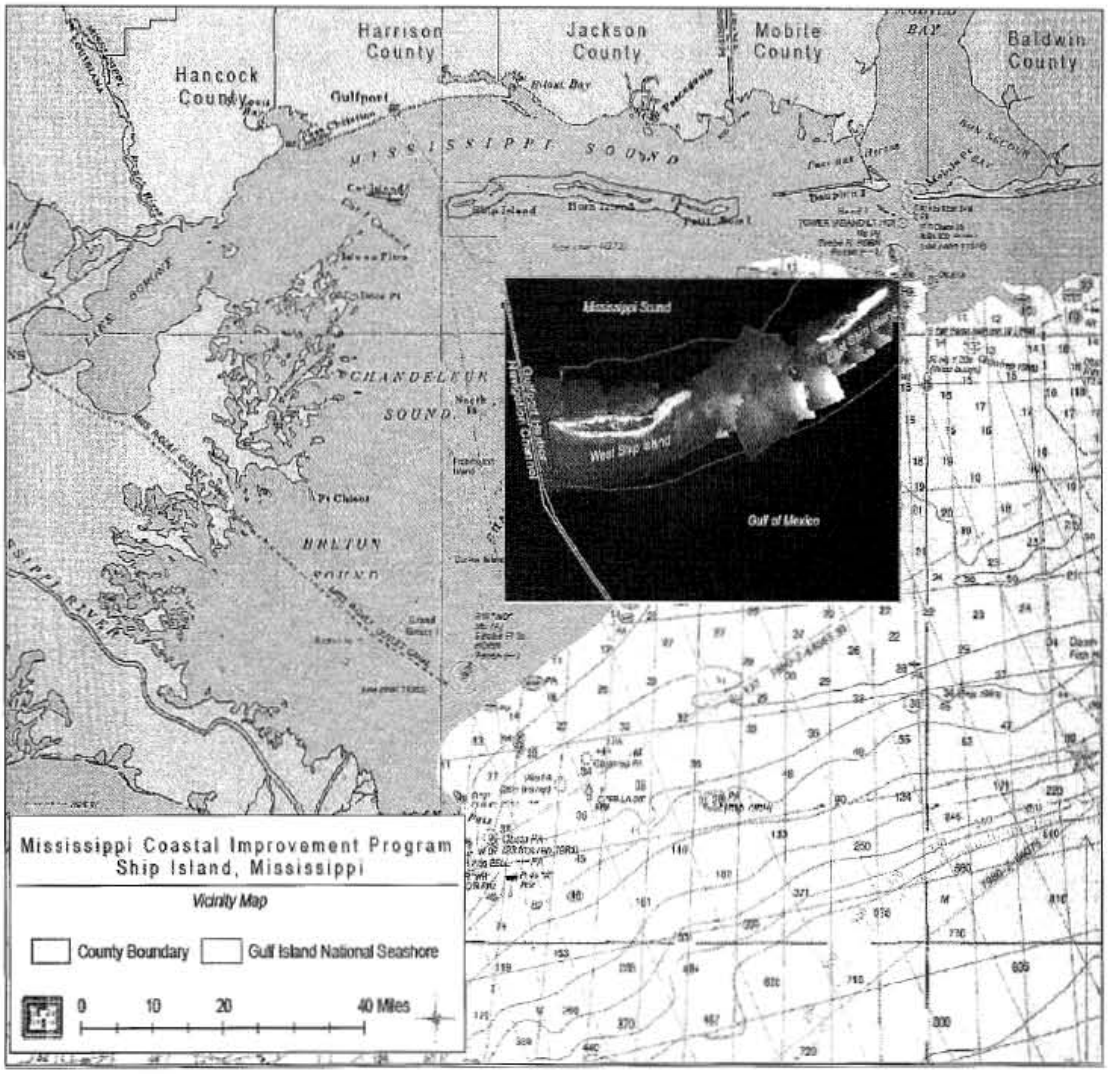

Figure 1. Project Vicinity Map

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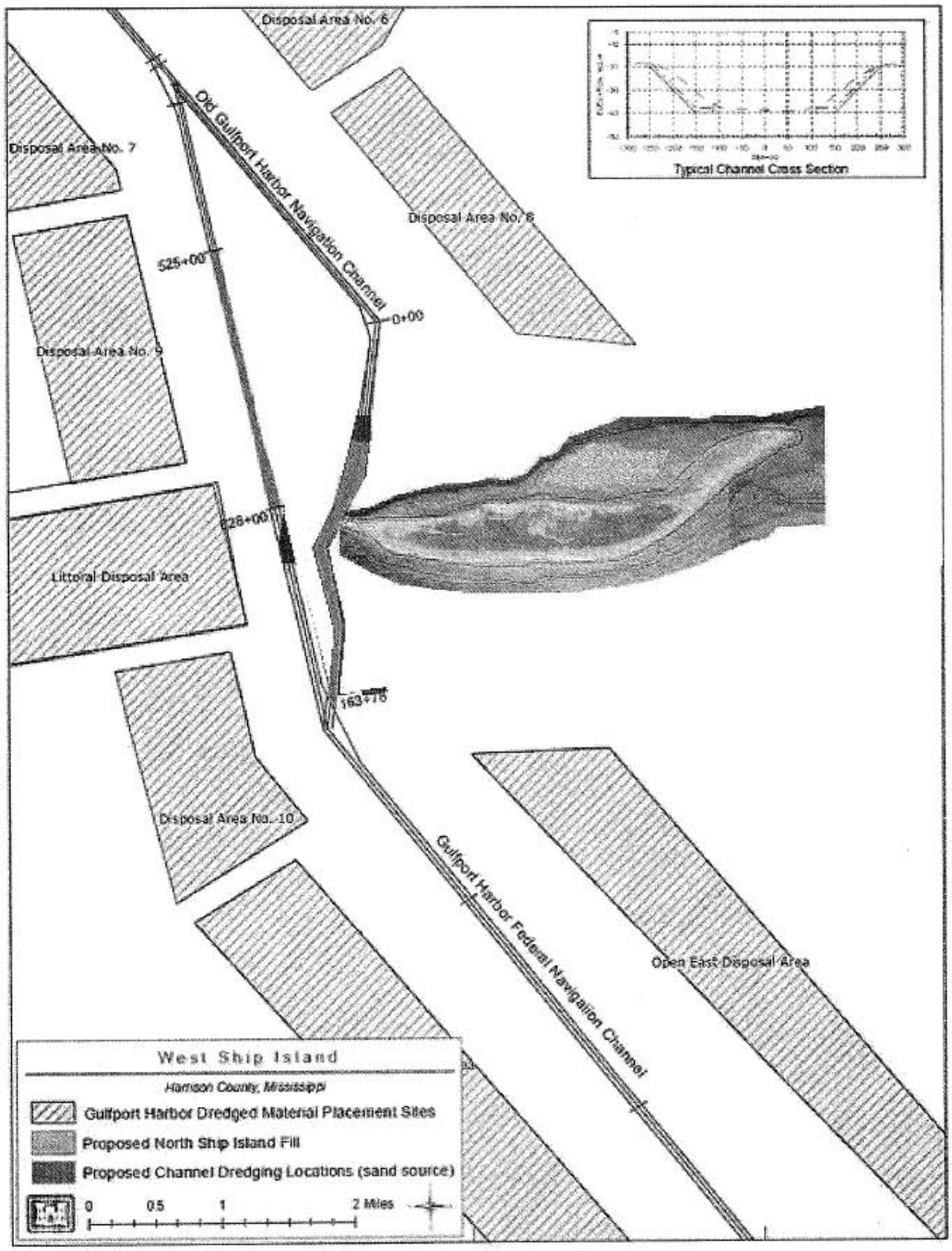

Figure 2. Shoreline Restoration Area and Borrow Areas

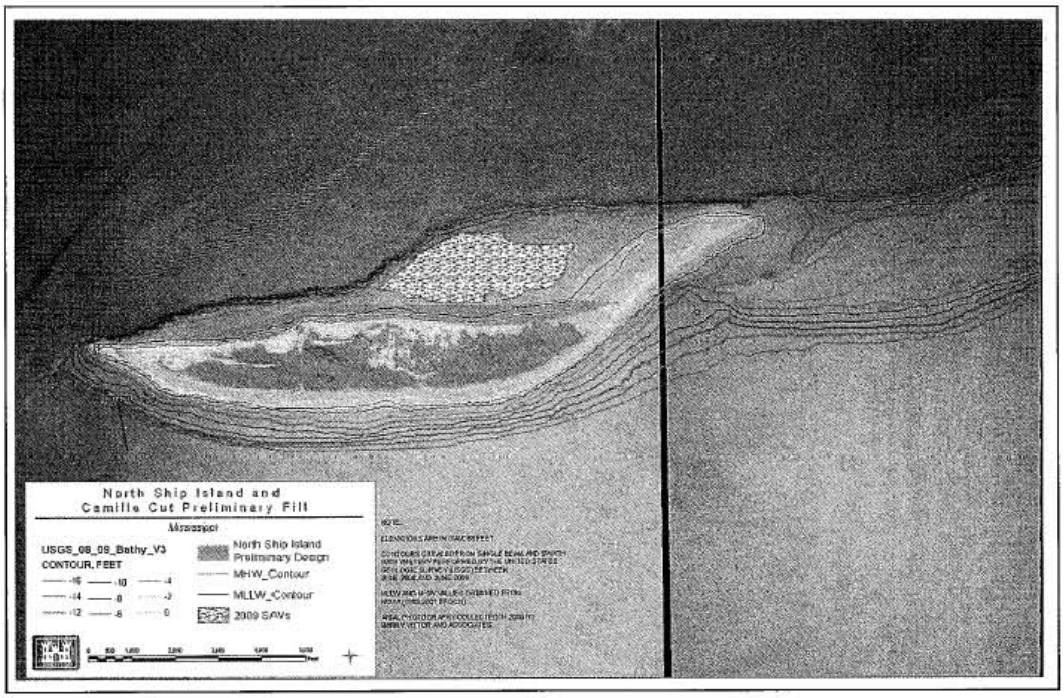

Figure 3. Shoreline Restoration Area and Submerged Aquatic Vegetation

SEMINOLE TRIBE OF FLORIDA
TRIBAL HISTORIC PRESERVATION OFFICE

TRIBAL HISTORIC
PRESERVATION OFFICE

SEMINOLE TRIBE OF FLORIDA
AH-TAH-THI-KI MUSEUM

34725 WEST BOUNDARY ROAD
CLEWISTON, FL 33440

PHONE: (863) 983-6549
FAX: (863) 902-1117

Commander, U.S. Army Engineer
District Mobile
P.O. Box 2288
Mobile, Alabama 36628-0001
Attn: CESAM-PD-EC

THPO#: 006648
P/N #: FP10-SI01-08

August 25, 2010

Subject: MSCIP-Barrier Island Restoration Plan, West Ship Island North Shore Restoration, Harrison County, Mississippi

To Whom It May Concern:

The Seminole Tribe of Florida's Tribal Historic Preservation Office (STOF-THPO) has received the Mobile District Corps of Engineers' correspondence concerning the aforementioned project. The STOF-THPO has no objection to your findings at this time. However, the STOF-THPO would like to be informed if cultural resources that are potentially ancestral or historically relevant to the Seminole Tribe of Florida are inadvertently discovered during the construction process. We thank you for the opportunity to review the information that has been sent to date regarding this project. Please reference ***THPO-006648*** for any related issues.

We look forward to working with you in the future.

Sincerely,

Direct routine inquiries to:

Willard Steele
Tribal Historic Preservation Officer
Seminole Tribe of Florida

Anne Mullins
Compliance Review Supervisor
annemullins@semtribe.com

JLP:am

Enclosure 2. THPO

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Mississippi Field Office
6578 Dogwood View Parkway, Suite A
Jackson, Mississippi 39213

August 31, 2010

U.S. Army Corps of Engineers
Attn: CESAM-PD-EC
Post Office Box 2288
Mobile, Alabama 36628-0001

RE: West Ship Island North Shore Restoration (MsCIP)

Dear Mr. Flakes:

The U.S. Fish and Wildlife Service (Service) has reviewed Public Notice (PN) Number FP10-SI01-08 and the associated Environmental Assessment (EA). The work outlined in the PN and EA is for the West Ship Island North Shore Restoration, which is part of the Mississippi Coastal Improvements Program (MSCIP) – Barrier Island Restoration Plan. The project location is on the North Shore of West Ship Island, which is in the Mississippi Sound in Harrison County, Mississippi. Our comments are submitted in accordance with the Fish and Wildlife Coordination Act (16 U.S.C. 661-667e) and the Endangered Species Act (87 Stat. 884, as amended 16 U.S.C. 1531 et seq.).

West Ship Island is listed as Critical Habitat for piping plover. The sand beach area proposed for restoration is designated as Critical Habitat (MS-14) for the Piping Plover (*Charadrius meladus*). The Piping Plover is a small, stocky, sandy-colored migratory shorebird with a white underside. It is similar to other ringed plovers in size and shape; however, its upper body is paler and its orange legs and the complete white band across the upper tail coverts are distinguishing. This plover spends 6-9 months in the southeastern U.S. (from July to mid-March). Generally, birds from the Great Lakes/Northern Great Plains populations tend to winter along the Gulf of Mexico, while those from the Atlantic coast population winter along the coastline further to the south, but some crossover occurs. In states along the Gulf and Atlantic coasts and in the Great Plains, the Federal status of the piping plover is threatened, while in northern states along the Great Lakes, it is classified as endangered. Piping Plovers begin arriving on the wintering grounds in early July, with some late-nesting birds arriving in September.

At sites on the Gulf of Mexico and Atlantic coasts, piping plover wintering habitat includes beaches, mudflats, and sand or algal flats in protected bays, as well as sandy beaches along the coast and barrier islands. Spoil islands in these areas are also utilized. On the Gulf Coast, Piping Plovers forage in small groups, typically within five meters of the water's edge or on exposed

Enclosure 3. USFWS

sand and mudflats at low tide, with preferred foraging habitats occurring along wider beaches, mudflats, and small inlets. The bird feeds primarily on marine, freshwater, and terrestrial invertebrates, especially mollusks, worms, and crustaceans.

The piping plover migrates either to the Atlantic coast or other northerly locations to breed. Primary threats to the species are modification and destruction of breeding and wintering habitat, and disturbance of nesting adults and chicks. Specific examples of habitat modification include: recreational or commercial development, dune stabilization, beach nourishment, and erosion prevention devices such as seawalls. Off-road vehicle use is also a significant source of mortalities. Hence, Critical Habitat has been designated within these types of habitats, including several areas of the Mississippi Gulf Coast.

The Service has reviewed the proposed work outlined in the above-referenced PN and EA. We have also participated in the interagency planning efforts that have taken place for this project. Initially, the Service had concerns about the restoration of the eastern 1/3 of the north shore of West Ship Island, due to the relatively high frequency of use by piping plovers for this area. However, the project was modified to not include this area. Additionally, we have received concurrence from your office that no staging of equipment will take place in the eastern 1/3 of the north shore of West Ship Island during the course of work. Therefore, based on the information in the PN and EA, the Service has determined that the project may affect, but is not likely to adversely affect designated Critical Habitat Unit MS-14 for the Piping Plover. Therefore, the Service has no objection to the restoration work as proposed.

If you need additional information, please contact Paul Necaise of our coastal office at telephone: (228) 493-6631.

Sincerely,

Paul Necaise for

Stephen Ricks
Field Supervisor

From: Crosby, Caree A. SAM
Sent: Wednesday, August 18, 2010 9:35 AM
To: 'Paul_Necaise@fws.gov'; Jacobson, Jennifer L SAM
Subject: West Ship Island Northern Shoreline Restoration

Coastal Environment Team

Planning and Environmental Division

Paul Necaise
U.S. Fish and Wildlife Service
6578 Dogwood View Parkway
Jackson, MS 39213

Dear Mr. Necaise:

The U.S. Army Corps of Engineers (USACE), Mobile District, proposes to nourish the eroded shoreline fronting historic Fort Massachusetts, located on the northern shore of West Ship Island in the Mississippi Sound as part of the Mississippi Coastal Improvements Program (MsCIP) Comprehensive Report and Integrated Programmatic Environmental Impact Statement (EIS) for Hancock, Harrison, and Jackson Counties, Mississippi. Impacts associated with this project are discussed in the Environmental Assessment (EA) entitled "West Ship Island Northern Shoreline Restoration". This EA is tiered from the MsCIP Comprehensive Report and Integrated Programmatic EIS of June 2009, which was authorized and appropriated by Congress as a result of the hurricanes of 2005. The MsCIP Barrier Island Restoration Plan as identified in the MsCIP Comprehensive Plan and Integrated Programmatic EIS includes restoration of Ship Island.

The Public Notice #FP10-SI01-08 and EA associated with this project can be found on our website at address http://www.sam.usace.army.mil/pd/Pd1.htm. Mobile District does not anticipate any adverse impacts to occur to listed threatened or endangered species as a result of this renourishment project to the West Ship Island area.

We respectfully request your concurrence to the proposed project. If you have any questions or require additional information please contact Ms. Caree Crosby at 251.690.3026 or email at caree.a.crosby@usace.army.mil.

1

Enclosure 3. USFWS

Caree Crosby
Biologist
U.S. Army Corps of Engineers
Mobile District Planning and Environmental Division Coastal Environment Team
109 St. Joseph Street
Mobile, Alabama 36602
Phone: (251)690-3026
Fax: (251)690-2727
Email: caree.a.crosby@usace.army.mil

STATE OF MISSISSIPPI
Haley Barbour
Governor

MISSISSIPPI DEPARTMENT OF MARINE RESOURCES
William W. Walker, Ph.D., Executive Director

August 27, 2010

Curtis M. Flakes
U.S. Army Corps of Engineers, Mobile District
Planning and Environmental Division
Coastal Environment Team
P.O. Box 2288
Mobile, AL 36628

Re: DMR-060871; Mississippi Coastal Improvements Program; Hancock, Harrison and Jackson Counties, Mississippi

Dear Mr. Flakes:

The Department of Marine Resources (DMR) in cooperation with other state agencies is responsible under the Mississippi Coastal Program (MCP) for managing the coastal resources of Mississippi. Proposed activities in the coastal area are reviewed to ensure that the activities are in compliance with the MCP.

The DMR has reviewed the West Ship Island Northern Shoreline Restoration plan within the Mississippi Coastal Improvements Program (MsCIP) Comprehensive Plan and Integrated Programmatic Environmental Impact Statement (EIS) dated June 2009. We concur that the projects discussed in the referenced document are consistent with the approved MCP and that these actions will not have adverse environmental effects on Mississippi's coastal resources.

If you have any questions regarding this letter, please contact James Davis with the Bureau of Wetlands Permitting at 228-523-4115 or james.davis@dmr.ms.gov.

Sincerely,

William W. Walker, Ph.D.
Executive Director

WWW/jdd

cc: Ms. Florance Watson, OPC
Mr. Damon Young, USACE

1141 Bayview Avenue• Biloxi, MS 39530-1613 • Tel: (228) 374-5000 • www.dmr.ms.gov
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DEPARTMENT OF THE ARMY
MOBILE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2288
MOBILE, ALABAMA 36628-0001

REPLY TO
ATTENTION OF

August 19, 2010

Coastal Environment Team
Planning and Environmental Division

Mr. Jan Boyd
Mississippi Department of Marine Resources
1141 Bayview Avenue, Suite 101
Biloxi, Mississippi 39530

Dear Mr. Boyd:

The U.S. Army Corps of Engineers (Corps), Mobile District, proposes to nourish the eroded shoreline fronting historic Fort Massachusetts, located on the northern shore of West Ship Island in the Mississippi Sound as part of the Mississippi Coastal Improvements Program (MsCIP) Comprehensive Report and Integrated Programmatic Environmental Impact Statement (EIS) for Hancock, Harrison, and Jackson Counties, Mississippi. Impacts associated with this project are discussed in the Environmental Assessment (EA) entitled "West Ship Island Northern Shoreline Restoration." This EA is tiered from the MsCIP Comprehensive Report and Integrated Programmatic EIS of June 2009, which was authorized and appropriated by Congress as a result of the hurricanes of 2005. The MsCIP Barrier Island Restoration Plan as identified in the MsCIP Comprehensive Plan and Integrated Programmatic EIS includes restoration of Ship Island.

Under the requirements of the Coastal Zone Management Act, Coastal Zone Consistency is requested for the proposed activities for the West Ship Island Northern Shoreline Restoration MsCIP Project in Harrison County, Mississippi.

The Public Notice No. FP10-SI01-08 and EA associated with this project can be found on our website at address http://www.sam.usace.army.mil/pd/Pd1.htm. Based on our review of the Mississippi Coastal Zone Management Program, we have determined that the proposed action is consistent with the plan to the maximum extent practicable.

Thank you for your assistance in facilitating the proposed action. If you have questions pertaining to this project, please contact Ms. Caree Crosby at (251)-690-3026 or at e-mail address caree.a.crosby@sam.usace.army.mil.

Sincerely,

Curtis M. Flakes
Chief, Planning and Environmental
Division

STATE OF MISSISSIPPI
HALEY BARBOUR
GOVERNOR
MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
TRUDY D. FISHER, EXECUTIVE DIRECTOR

September 13, 2010

Certified Mail No.7005 1160 0004 1776 9011

Mr. Curtis M. Flakes
U.S. Army Corps of Engineers, Mobile District
Planning and Environmental Division
Post Office Box 2288
Mobile, Alabama 36628

Dear Mr. Flakes:

Re: U.S. Army Corps of Engineers
Mobile District
West Ship Island Restoration
Harrison County
COE No. FP10-SI01-08
WQC No. WQC2010042

Pursuant to Section 401 of the Federal Water Pollution Control Act (33 U. S. C. 1251, 1341), the Office of Pollution Control (OPC) issues this Certification, after public notice and opportunity for public hearing, U.S. Army Corps of Engineers, Mobile District, an applicant for a Federal License or permit to conduct the following activity:

> U.S. Army Corps of Engineers, Mobile District: Proposed restoration of a narrow band of beach shoreline along the northern part of West Ship Island. The Mississippi Coastal Improvements Program (MsCIP) Barrier Island Restoration Plan includes the comprehensive restoration of Ship Island. The proposed project is an element of that plan and includes the placement of sand along the northern shore of West Ship Island. Placement of sandy material would stabilize West Ship Island and allow continued biological diversity to persist in the Mississippi Sound. The placement would extend along approximately 62% of the northern shore or about 10,250 feet. The material used in the shoreline restoration would come from two identified borrow areas – the

Enclosure 5. MDEQ

federally authorized Gulfport Harbor widening project at the Bar channel and the old Gulfport Harbor channel. The proposed project area comprises approximately 77 acres. The two sources of sand combined would provide approximately 608,000 cubic yards of sand for use on West Ship Island. The material would be hydraulically dredged by using either a cutter-head pipeline or hopper dredge and placed along the shoreline and in shallow water bottoms to reach the limits of the historic beach template. The material would be evenly spread by using front end loaders and backhoes up to a finished elevation of +5 feet Mean Low Water with a slope of 1V:10H generally following the shoreline around the historic fort and eastward. The proposed project is located on West Ship Island in the Mississippi Sound, Harrison County, Mississippi [FP10-SI01-08, WQC2010042].

The Office of Pollution Control certifies that the above-described activity will be in compliance with the applicable provisions of Sections 301, 302, 303, 306, and 307 of the Federal Water Pollution Control Act and Section 49-17-29 of the Mississippi Code of 1972, if the applicant complies with the following conditions:

1. The dredging activities shall be conducted in such a manner that no sumps are created within the dredge areas.

2. All fill material and excavation areas shall have side slopes of at least 3:1 (horizontal:vertical) and shall be immediately seeded, stabilized, and maintained.

3. Best management practices should be used at all times during construction to minimize turbidity at both the dredge and restoration sites. The restoration sites shall be constructed and maintained in a manner that minimizes the discharge of turbid waters into waters of Mississippi. Best management practices should include, but not be limited to, the use of staked hay bales; staked filter cloth; sodding, seeding and mulching; staged construction; and the installation of turbidity screens around the immediate project site.

4. No sewage, oil, refuse, or other pollutants shall be discharged into the watercourse.

5. Turbidity outside the limits of a 750-foot mixing zone shall not exceed the ambient turbidity by more than 50 Nephelometric Turbidity Units. The turbidity within the West Ship Island restoration project areas may reasonably exceed this turbidity standard for temporary periods of time and shall not result in permanent environmental harm.

The Office of Pollution Control also certifies that there are no limitations under Section 302 nor standards under Sections 306 and 307 of the Federal Water Pollution Control Act which are applicable to the applicant's above-described activity.

This certification is valid for the project as proposed. Any deviations without proper modifications and/or approvals may result in a violation of the 401 Water Quality Certification. If we can be of further assistance, please contact us.
If we can be of further assistance, please contact us.

Sincerely,

Harry M. Wilson III, P.E., DEE
Chief, Environmental Permits Division

HMW: CHB

cc: Caree Crosby, U.S. Army Corps of Engineers, Mobile District
James Davis, Department of Marine Resources
Paul Necaise, U.S. Fish and Wildlife Service
Bill Ainslie, Environmental Protection Agency
Janet Riddell, Office of Budget & Fund Management

39600 WQC20100001

Enclosure 5. MDEQ

DEPARTMENT OF THE ARMY
MOBILE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2288
MOBILE, ALABAMA 36628-0001

REPLY TO
ATTENTION OF

August 19, 2010

Coastal Environment Team
Planning and Environmental Division

Ms. Florance Watson, Chief
Mississippi Department of Environmental Quality
Bureau of Pollution Control
Post Office Box 2261
Jackson, Mississippi 39225-2261

Dear Ms. Watson:

The U.S. Army Corps of Engineers (Corps), Mobile District, proposes to nourish the eroded shoreline fronting historic Fort Massachusetts, located on the northern shore of West Ship Island in the Mississippi Sound as part of the Mississippi Coastal Improvements Program (MsCIP) Comprehensive Report and Integrated Programmatic Environmental Impact Statement (EIS) for Hancock, Harrison, and Jackson Counties, Mississippi. Impacts associated with this project are discussed in the Environmental Assessment (EA) entitled "West Ship Island Northern Shoreline Restoration." This EA is tiered from the MsCIP Comprehensive Report and Integrated Programmatic EIS of June 2009, which was authorized and appropriated by Congress as a result of the hurricanes of 2005. The MsCIP Barrier Island Restoration Plan as identified in the MsCIP Comprehensive Plan and Integrated Programmatic EIS includes restoration of Ship Island.

Under the requirements of the Clean Water Act of 1977, as amended, water quality certification is requested for the proposed activities for the West Ship Island Northern Shoreline Restoration MsCIP Project in Harrison County, Mississippi.

The Public Notice No. FP10-SI01-08 and EA associated with this project can be found on our website at address http://www.sam.usace.army.mil/pd/Pd1.htm.

The Corps does not anticipate water quality problems resulting from the proposed renourishment activities for the West Ship Island Northern Shoreline Restoration, Harrison County, Mississippi. Environmental impacts associated with the proposed action would be minor and short-term. No wetlands would be affected by the proposed action.

Thank you for your assistance in facilitating the proposed action. If you have questions pertaining to this project, please contact Ms. Caree Crosby at (251) 690-3026 or at e-mail address caree.a.crosby@sam.usace.army.mil.

Sincerely,

Curtis M. Flakes
Chief, Planning and Environmental
Division

CESAD-EXPD

PD-E

MISSISSIPPI Department of
MDAH
ARCHIVES & HISTORY

PO Box 571, Jackson, MS 39205-0571
601-576-6850 • Fax 601-576-6975
mdah.state.ms.us
H. T. Holmes, Director

September 15, 2010

Mr. Curtis M. Flakes
Mobile District, Corps of Engineers
Post Office Box 2288
Mobile, Alabama 36628-0001

RE: Proposed deposit of dredged sand along the northern edge of West Ship Island to rebuild and stabilize, MDAH Project Log #09-060-10, Harrison County

Dear Mr. Flakes:

We have reviewed your request for a cultural resources assessment, received on November 5, for the above referenced project in accordance with our responsibilities under Section 106 of the National Historic Preservation Act and 36 CFR Part 800. After reviewing the information provided, it is our determination that no cultural resources are likely to be affected. Therefore, we have no objection with the proposed undertaking.

Should there be additional work in connection with the project, or any changes in the scope of work, please let us know in order that we may provide you with appropriate comments in compliance with the above referenced regulations.

If you have any questions, please do not hesitate to contact us at (601) 576-6940.

Sincerely,

Hal Bell

Hal Bell
Review and Compliance Assistant

FOR: Jim Woodrick
Review and Compliance Officer

DEPARTMENT OF THE ARMY
MOBILE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2288
MOBILE, ALABAMA 36628-0001

REPLY TO
ATTENTION OF:

August 31, 2010

Mississippi Coastal Improvement Program
Planning and Environmental Division

Mr. H.T. Holmes
State Historic Preservation Officer
Mississippi Department of Archives and History
Attention: Mr. Jim Woodrick, Section 106 Review and Compliance
Post Office Box 571
Jackson, Mississippi 39205-0571

Dear Mr. Holmes:

The U.S. Army Corps of Engineers, Mobile District is continuing its efforts to assist in the recovery of the Mississippi Gulf Coastal region devastated by Hurricane Katrina. As part of that effort, the Mobile District's Mississippi Coastal Improvements Program (MsCIP) is proposing to deposit dredged sand along the northern edge of West Ship Island in order to rebuild and stabilize the island. The proposed project is located in Harrison County, Mississippi (Figure 1). The island is part of the Gulf Islands National Seashore owned and administered by the National Park Service (NPS).

As per requirements outlined in Section 106 of the National Historic Preservation Act, the Mobile District, as the lead Federal agency, must consider the effects of the proposed action on historic properties. Initial consultations with your office concerning the MsCIP program 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).

Background research found that in 1989 a survey was conducted of the project area as part of a project to deepen and widen the old Gulfport Harbor Navigation Channel (now known as the "old channel"). The survey found no historic properties located within the area of potential effect (APE) of the currently proposed project. Therefore, the Mobile District has determined **no historic properties affected** by the proposed Ship Island shoreline restoration project as per 36 CFR 800.4(d)(1).

I. Description of the Undertaking – The project calls for the placement of sand along the northern shore of West Ship Island (Figure 1). Placement of this sandy material will stabilize West Ship Island and help protect the island from erosion. 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, on West Ship Island. Figure 2 details the project area. The material used at West Ship Island will come from two identified borrow areas – the federally authorized Gulfport Harbor widening project and the old channel which was abandoned in the 1990s (Figure 3). The dredging of both of these areas was previously consulted on and determined to have no effect on historic properties.

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 previously discussed (see Figure 2). The material would be hydraulically dredged by using either a cutter-head pipeline or hopper dredge. The entire area is located in marine environments in Harrison County, Mississippi.

II. Methodology and Reporting – A literature and background check for previously recorded cultural resource sites and surveys was made of the project area in April of 2008. This research focused on possible shipwreck sites. Investigations included records at the Mobile District office, the NPS, the National Register of Historic Places, the Mississippi Department of Archives and History, and the Automated Wreck and Obstruction Information System (AWOIS) data base.

The study found that the project area including the old channel and the littoral zone near West Ship Island had been previously surveyed and effects determination made in anticipation of the 1989 expansion of the Gulfport Harbor Navigation Channel project by the Mobile District. The survey was conducted by Mr. Jack B. Irion in April 1989. The results of the investigation can be found in the volume entitled: "*Underwater Archaeological Investigations, Ship Island Pass, Gulfport Harbor, Mississipii.*" The survey results found no historic properties within the project APE for the proposed action.

The dredging of the New Gulfport Harbor Navigation Project, including increased depth and width of channel were consulted on in March of 2008 in accordance with the provisions of the Mississippi Coastal Program and the terms of the February 1984 Memorandum of Understanding. A letter concurring with the determination of no significant impact and thus no effect to historic properties was received on April 9, 2008.

III. Resources Identified and Evaluated (Significance Criteria Considered) - The background research and previous field surveys located no historic properties within the project APE. Sites located near the project APE include historic Fort Massachusetts. Construction on the fort began prior to the Civil War, and 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, a kitchen, and bathrooms. Hurricane Camille hit the island in 1969, damaging the lighthouse and cutting the island in two. In 1999, the lighthouse was rebuilt on the historic foundation. Hurricane Katrina destroyed that structure in 2005. An archaeological component of the lighthouse, recorded via state trinomial 22HR640, is reported to date to the Paleoindian period. The condition of that is at present unknown.

Another multi-component archaeological site is recorded on West Ship Island. Known as the French Warehouse site, 22HR638 includes both historic materials as well as prehistoric. Reports, 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.

None of the nearby sites are considered to be within the direct project APE. In addition, the project is not considered to have the potential to visually affect the sites since the action is intended to restore the islands shoreline to historic dimensions.

IV. Effects Determination and Compliance Decision – Effects determinations are the responsibility of the lead Federal agency. The Mobile District has considered the nature of the undertaking and the presence of properties that may possess the qualities of integrity and meet at least one of the criteria necessary to be considered eligible for inclusion in the NRHP. Based on the background study and previous fieldwork, no such historic properties are located within the project APE. Therefore, the Mobile District has determined **no historic properties would be affected** by the proposed shoreline restoration work as per 36 CFR 800.4(d)(1).

V. Coordination - The NPS owns and administers West Ship Island as part of the Gulf Islands National Seashore. As such, NPS is considered an interested party for this project. The MsCIP program includes NPS representatives and cooperates fully with the NPS. In the present case, the NPS concurs with the no historic properties affected determination and supports the proposed action.

Previous consultation with 13 tribes known to have an interest or historic connection with the Mississippi Gulf Coast was conducted. Four tribes expressed interest in further participation on MsCIP projects. The interested tribes included the Choctaw Nation of Oklahoma, Mississippi Band of Choctaw Indians, Thlopthlocco Tribal Town, and the Alabama-Coushatta Tribal Town of the Creek Nation. Those tribes are being concurrently consulted on for this proposed action. Should any tribe have objections or comments, those will be considered during the review process. Your office will also be notified of any objections or comments forwarded by the tribes.

Finally, the project is being reviewed through the National Environmental Policy Act process. **An Environmental Assessment considering the potential impacts of the project is available for your review on the district website at http://www.sam.usace.army.mil/pd/pd1.htm.**

The Mobile District asks that you concur with our finding of **no historic properties affected** by the proposed action as per 36 CFR 800.4(d)(1). If you have questions or require further information, please contact Mr. Joe Giliberti at 251-694-4114 or via email at joseph.a.giliberti@sam.usace.army.mil.

Sincerely,

Curtis M. Flakes
Chief, Planning and Environmental
Division

Enclosure

Re NMFS-HCD response - MsCIP West Ship Island Restoration.txt

From: Mark Thompson [Mark.Thompson@noaa.gov]
Sent: Tuesday, September 21, 2010 10:20 AM
To: Reynolds, Lekesha W. SAM
Cc: Jacobson, Jennifer L SAM; Parson, Larry E SAM; Krick, Jason B SAM; Crosby, Caree A. SAM; Veronica Beech; Ryan Hendren
Subject: Re: FW: FW: U.S. Army Corps of Engineers - MsCIP, West Ship Island Restoration

Ms. Reynolds,

Per our conversation today, NOAA, National Marine Fisheries Service, Habitat Conservation Division, has no further issues with the project at this time and has no objection to finalizing the EA and FONSI. The proposed setback and water quality monitoring for the submerged aquatic protection (SAV) is acceptable. We anticipate that an acceptable SAV plan will be developed by the contractor that will avoid work boat and construction impacts to the SAV. Upon our review of the SAV protection plan, we will provide additional comments.

If you have any questions regarding these comments, please contact me at 850-234-5061 or at this email address.

Sincerely,

Mark Thompson

>>
>> National Marine Fisheries Service,
>>
>> Habitat Conservation Division
>>
>> Panama City Office
>>
>> 3500 Delwood Beach Road
>>
>> Panama City, FL 32404
>>
>> Dear Mr. Thompson:
>>
>> The U.S. Army Corps of Engineers (USACE), Mobile District, proposes
>> to
>>
> nourish the eroded shoreline fronting historic Fort Massachusetts,
> located on the northern shore of West Ship Island in the Mississippi
> Sound as part of the Mississippi Coastal Improvements Program (MsCIP)
> Comprehensive Report and Integrated Programmatic Environmental Impact
> Statement (EIS) for Hancock, Harrison, and Jackson Counties,
> Mississippi. Impacts associated with this project are discussed in
> the Environmental Assessment (EA) entitled "West Ship Island Northern
> Shoreline Restoration". This EA is tiered from the MsCIP
> Comprehensive Report and Integrated Programmatic EIS of June 2009,
> which was authorized and appropriated by Congress as a result of the
> hurricanes of 2005. The MsCIP Barrier Island Restoration Plan as
> identified in the MsCIP Comprehensive Plan and Integrated Programmatic EIS includes
restoration of Ship Island.
>
> The Public Notice #FP10-SI01-08 and EA associated with this project
> can be found on our website at address http://www.sam.usace.army.mil/pd/Pd1.htm.
> Mobile District does not anticipate any adverse impacts to occur to
> EFH as a result of this renourishment project to the West Ship Island area.
>
> We respectfully request your concurrence to the proposed project. If
> you have any questions or require additional information please
> contact Ms. Caree Crosby at 251.690.3026 or email at caree.a.crosby@usace.army.mil.
>
>
> Caree Crosby
> Biologist
> U.S. Army Corps of Engineers
> Mobile District Planning and Environmental Division Coastal
> Environment Team
> 109 St. Joseph Street
> Mobile, Alabama 36602
> Phone: (251)690-3026
> Fax: (251)690-2727
> Email: caree.a.crosby@usace.army.mil
>
>

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701-5505
(727) 824-5312; FAX (727) 824-5309
http://sero.nmfs.noaa.gov

SEP 28 2010 F/SER31:RGH

Ms. Jennifer L. Jacobson
Mobile District, U.S. Army Corps of Engineers
P.O. Box 2288
Mobile, AL 36628-0001

Dear Ms. Jacobson:

This constitutes the National Marine Fisheries Service's (NMFS') biological opinion (opinion) based on our review of the U.S. Army Corps of Engineers, Mobile District (MDCOE), request for formal consultation on the Mississippi Coastal Improvement Plan (MsCIP) Barrier Island Restoration Plan as identified in the MsCIP Comprehensive Plan and Integrated Programmatic Environmental Impact Statement (EIS), which includes the ecosystem restoration effort of West Ship Island, Harrison County, Mississippi. This opinion analyzes the proposed action's effects on Gulf sturgeon (*Acipenser oxyrinchus desotoi*) critical habitat, in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended, and concludes that the action is not likely to destroy or adversely modify designated critical habitat.

This opinion is based on information provided in your March 12, 2010, letter and biological assessment, Final Programmatic EIS, and information from previous NMFS consultations conducted on the use of dredges and disposal of dredged material within Gulf sturgeon critical habitat. A complete administrative record of this consultation is on file at NMFS' Southeast Regional Office.

We look forward to further cooperation with you on other COE projects to ensure the conservation and recovery of our threatened and endangered marine species. If you have any questions regarding this consultation, please contact Ryan Hendren at the number listed above, or by e-mail at Ryan.Hendren@noaa.gov.

Sincerely,

Roy E. Crabtree, Ph.D.
Regional Administrator

Enclosure

File: 1514-22.F.6
Ref: F/SER/2010/01062

Endangered Species Act - Section 7 Consultation
Biological Opinion

Action Agency: U.S. Army Corps of Engineers, Mobile District (MDCOE)

Activity: Dredging and Disposal of Sand Along West Ship Island (Consultation Number F/SER/2010/01062)

Consulting Agency: National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS), Southeast Regional Office, Protected Resources Division, St. Petersburg, Florida

Approved By:

Roy E. Crabtree, Ph.D., Regional Administrator
NMFS, Southeast Regional Office, St. Petersburg, Florida

Date Issued: 9/28/2010

Table of Contents

INTRODUCTION

Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. § 1531 *et seq.*), requires that each federal agency shall ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species; section 7(a)(2) requires federal agencies to consult with the appropriate Secretary on any such action. NMFS and the U.S. Fish and Wildlife Service (USFWS) share responsibilities for administering the ESA.

Consultation is required when a federal action agency determines that a proposed action "may affect" listed species or designated critical habitat. Consultation is concluded after NMFS determines that the action is not likely to adversely affect listed species or critical habitat or issues a biological opinion (opinion) that identifies whether a proposed action is likely to jeopardize the continued existence of a listed species, or destroy or adversely modify critical habitat. The opinion states the amount or extent of incidental take of the listed species that may occur, develops measures (i.e., reasonable and prudent measures - RPMs) to reduce the effect of take, and recommends conservation measures to further conserve the species. Notably, no incidental destruction or adverse modification of critical habitat can be authorized, and thus there are no reasonable and prudent measures, only reasonable and prudent alternatives that must avoid destruction or adverse modification.

This document represents NMFS' opinion based on the March 12, 2010, Biological Assessment (BA) of the dredging and disposal of sand along West Ship Island, produced by MDCOE Planning and Environmental Division. This document represents NMFS' opinion based on our review of impacts associated with the proposed placement of sand along the northern shoreline of West Ship Island. The MDCOE will perform the proposed action as identified in the Mississippi Coastal Improvement Plan (MsCIP) Comprehensive Plan and Integrated Programmatic EIS, which includes restoration of Ship Island, Harrison County, Mississippi. This opinion analyzes project effects on Gulf sturgeon critical habitat in accordance with section 7 of the ESA, and is based on project information provided by MDCOE and other sources of information including the published literature cited herein.

BIOLOGICAL OPINION

1.0 CONSULTATION HISTORY

Due to extensive storm damage endured from Hurricane Katrina in 2005, the State of Mississippi concluded that the extent of the storm damage would have been less had the barrier islands been in a "pre-Hurricane Camille" condition. Since 2006, a combination of agencies have coordinated on the MsCIP, starting with the June 2006 submittal to NMFS for pre-consultation (T/SER/2006/02695) and the draft EIS for the MsCIP submitted in February 2009 (T/SER/2009/00422). The MsCIP Barrier Island Restoration Plan, as identified in the MsCIP Comprehensive Plan and Integrated Programmatic EIS, includes restoration of Ship Island.

An interagency conference call was held on December 7, 2009, to discuss the project scope and requirements from NMFS needed to complete the project BA. We requested early drafts of the BA and other supporting information on January 11, 2010. We received the MDCOE's request for section 7 consultation for West Ship Island, dated March 12, 2010, on March 25, 2010. We requested additional information via e-mail on March 31, 2010, to clarify project revisions. Requested information was received via e-mail on April 20, 2010, and June 4, 2010. The draft Environmental Assessment (EA) for the project was submitted for public notice on August 3, 2010, and was used to revise dredge and placement material volumes and areas. The MDCOE determined the proposed activity may affect, but is not likely to adversely affect five species of sea turtles: (leatherback (*Dermochelys coriacea*); Kemp's ridley (*Lepidochelys kempii*); hawksbill (*Eretmochelys imbricata*); green (*Chelonia mydas*); and loggerhead (*Caretta caretta*); and Gulf sturgeon (*Acipenser oxyrinchus desotoi*), and Gulf sturgeon critical habitat. Formal consultation was initiated on June 4, 2010, after NMFS determined that the action is likely to adversely affect Gulf sturgeon critical habitat. The proposed action identified in the BA provided by MDCOE includes the dredging and placement of sand along the northern shore of West Ship Island. Sand material will be obtained from two identified borrow areas, the Gulfport Harbor Federal Navigation Channel widening project (F/SER/2007/02307) at the Bar Channel (federal navigation channel between Gulf of Mexico barrier islands) and the old Gulfport Harbor Channel (See Figure 3).

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ACTION AREA

2.1 Proposed Action

The MDCOE is the lead agency for the proposed action working in close cooperation with National Park Service under a memorandum of understanding. The restoration of the Mississippi Barrier islands (of which Ship Island is a part of) 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 opinion will restore a segment of the northern shore of West Ship Island. The MDCOE is proposing to restore 10,350 feet of critically eroding shoreline on the northern shore of West Ship Island (see Figure 1). According to information provided in the BA, EA, and the MsCIP EIS, West Ship Island and other islands within the Gulf Islands National Park (Cat, West and East Ship, Horn, Petit Bois, and Dauphin) are experiencing fragmentation and retreat due to ongoing erosion accelerated by hurricane washover and significant reduction in sediment transport along the littoral shelf of the barrier islands. The proposed MsCIP Barrier Island Restoration Plan includes the placement of sand along the northern shore of West Ship Island.

Continued erosion of the existing island is predicted to threaten the structural integrity of Fort Massachusetts, which is a listed Historical Structure on the island. The restoration of West Ship Island will require the dredging and transport of sand from two identified nearshore borrow areas. The project objectives are briefly described below.

The sand placement area comprises approximately 250 acres, of which 77 acres will be in Gulf sturgeon critical habitat Unit 8. 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 below. The material would be hydraulically dredged by using a cutter-head pipeline dredge and placed within a temporary dewatering area, located on the north shore of West Ship Island. Once the material has dewatered, the sand would be placed along the shoreline and in shallow water bottoms to reach the limits of the historic (pre-Hurricane Camille) beach template. The dried material would then be evenly spread by using front-end loaders and backhoes 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 (see Figure 2). 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.

Placement of this sandy material is intended to stabilize Western Ship Island. 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 of Fort Massachusetts. The wider fill will take place east of Fort Massachusetts, taking precautions not to impact submerged aquatic vegetation (SAV) located approximately 600 feet or more from the shoreline.

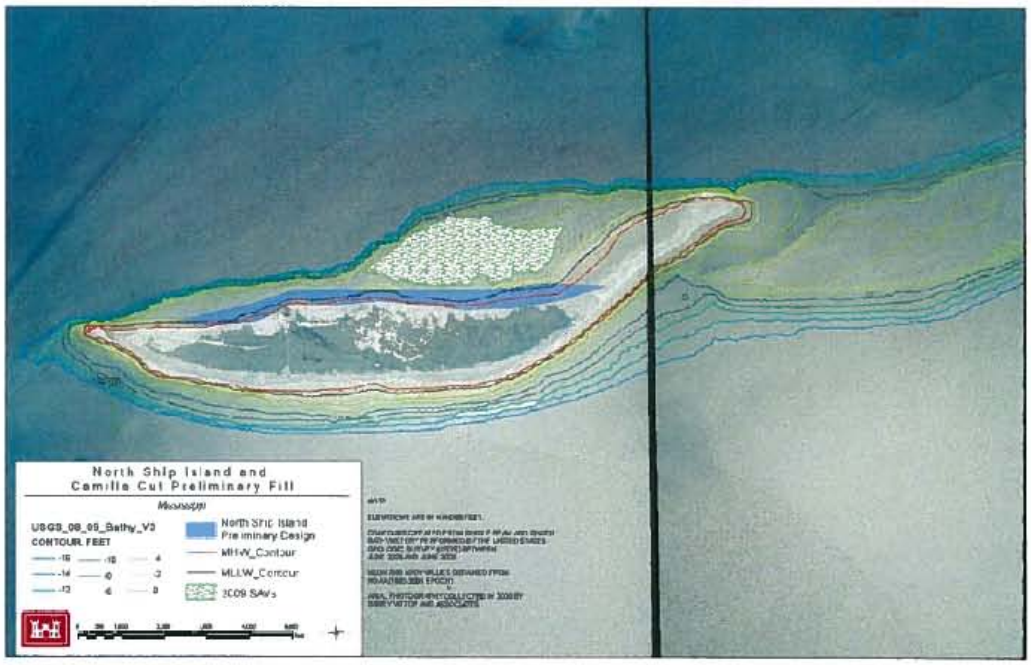

Figure 1: Restoration Area

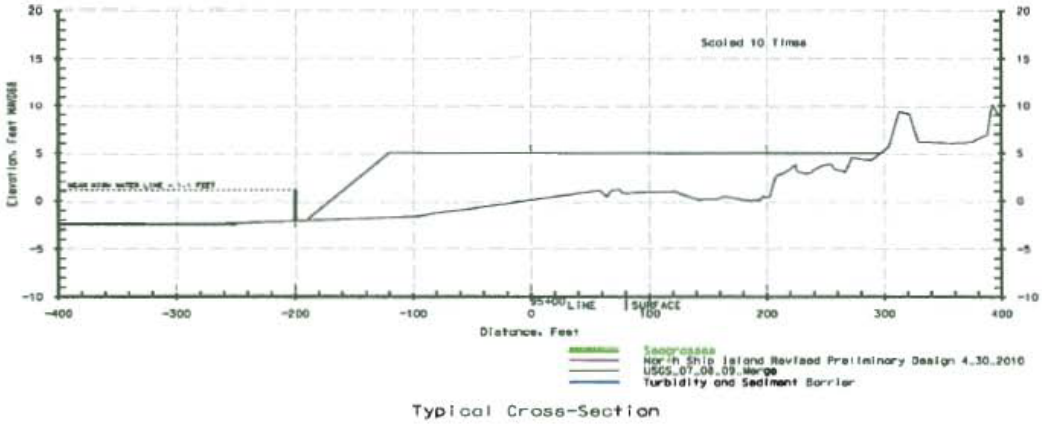

Figure 2: Restoration Area Cross Section

2.2 Construction Activities

Borrow Areas

Two sources of fill material have been identified adjacent to the renourishment area that contain adequate sand volumes needed to satisfy the proposed West Ship Island shoreline restoration: The federally-authorized Gulfport Harbor widening project at the Bar Channel within the Gulfport Harbor Federal Navigation Channel, and the old Gulfport Harbor Navigation Channel which was abandoned in the 1990s. Borings taken from the alignment of the Gulfport Harbor Federal Navigation Channel have demonstrated that a substantial quantity of suitable sand will be removed as the present federally-authorized Bar Channel is widened. The identified borrow areas were found to contain 608,000 cubic yards of sandy sediment suitable for beach renourishment. Sand taken from the old Gulfport Harbor Navigation Channel has not been sampled; however, this channel has been used as a sand source for past renourishments on West Ship Island in 1974, 1984, 1990, 1996, and 2002. The channel acts as a sediment trap for sand removed by longshore transport and has proven to be a reliable source of clean sand. The estimate for the amount of sand available from the Gulfport Harbor Federal Navigation Channel is approximately 128,000 cubic yards. The sand borrow area is located between channel stations 525+00 and 628+00 (Figure 3). The available sand within this borrow area extends down to a depth of elevation -35.0 feet North American Vertical Datum of 1988 (NAVD88), short of the project depth of -42.0 feet NAVD88, which includes allowable overdepth and advanced maintenance. The remaining seven feet of sediment will be removed down to a depth -42.0 feet NAVD88, which will be added to the volume of sediment that is coming from the remaining portion of the widening project, and will be disposed of in accordance with contract guidance in either the littoral zone site or the designated beneficial use site adjacent to the Chandeleur Islands. The estimate for the amount of sand available from the old Gulfport Harbor Navigation Channel is approximately 480,000 cubic yards. While this amount of material is available for use, it is unlikely the full amount will be needed for this project. The old channel alignment is located east of the existing channel and near the western tip of West Ship Island (Figure 3). The old channel would be excavated down to the limits of the old channel template (i.e., 38 feet deep by 300 feet wide) using a hydraulic dredge with pump-off capability. The Federal Navigation Channel will be excavated using a hopper dredge. This hopper dredging is occurring as part of a separate action to dredge the

Navigational Channel, which is also the subject of a separate consultation. The hopper dredging is not considered part of this action; however, the status of consultation for hopper dredging is discussed further in section 3.1.1, below.

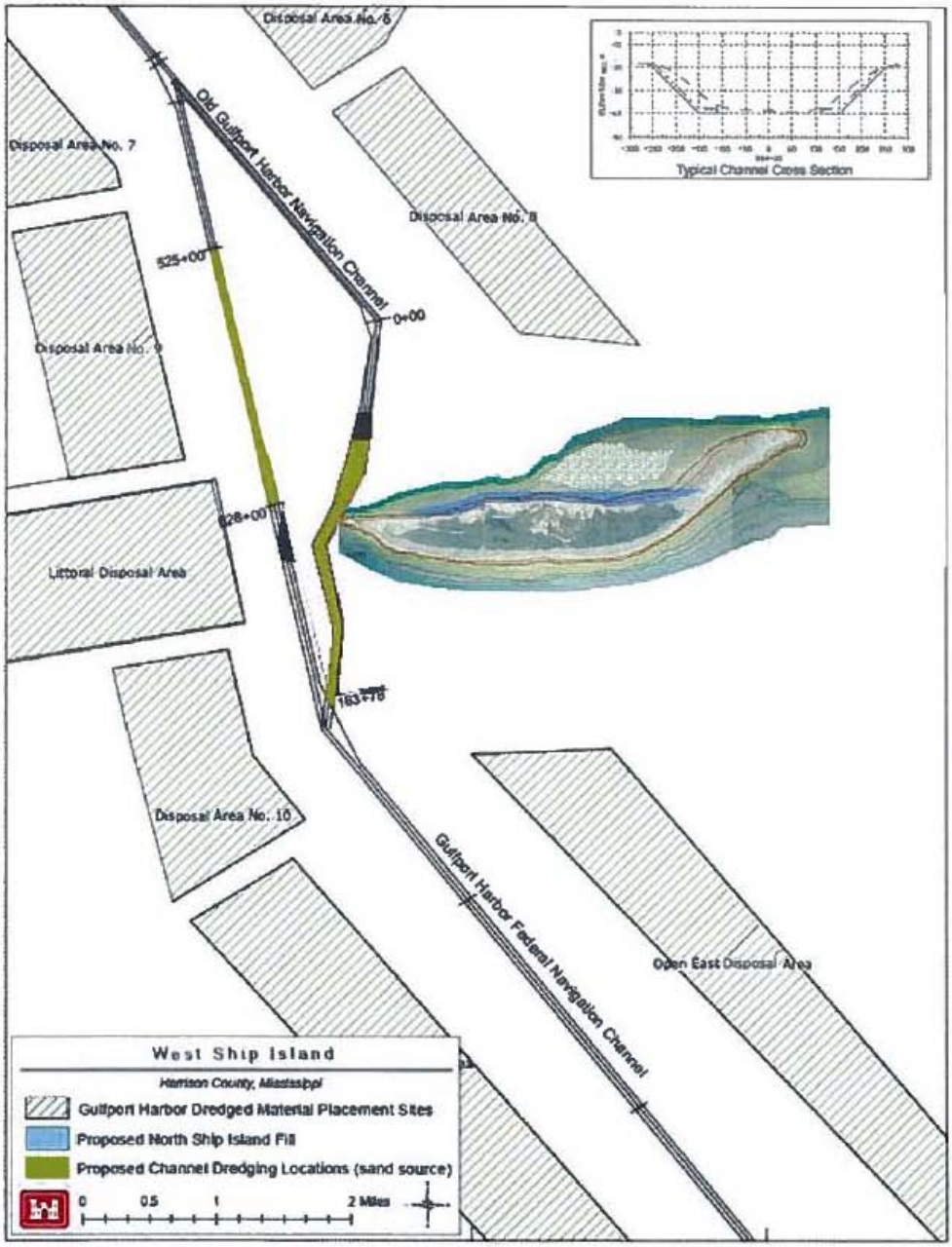

Figure 3: Proposed Borrow Material Locations

2.3 Action Area

50 CFR 404.02 defines action area as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action." The action area for this activity includes the Gulfport Navigation Channel, the old Gulfport Harbor Channel, and the north shore of West Ship Island, as depicted in Table 2.

3.0 STATUS OF LISTED SPECIES AND CRITICAL HABITAT

3.1 Listed Species That May Occur In or Near the Action Area

The following endangered (E) and threatened (T) species under the jurisdiction of NMFS may occur in or near the action area:

Common Name	Scientific Name	Status
Sea Turtles		
Loggerhead sea turtle	*Caretta caretta*	T
Hawksbill sea turtle	*Eretmochelys imbricata*	E
Leatherback sea turtle	*Dermochelys coriacea*	E
Kemp's ridley sea turtle	*Lepidochelys kempii*	E
Green sea turtle	*Chelonia mydas*	E/T [1]
Fish		
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	T
Smalltooth sawfish	*Pristis pectinata*	E[2]

Critical Habitat – Gulf Sturgeon
Unit 8 - Lake Pontchartrain, Lake St. Catherine, the Rigolets, Little Lake, Lake Borgne, Mississippi Sound Critical Habitat Unit.

3.1.1 Sea Turtles

The dredging of the Gulfport navigation channel will provide approximately 128,000 cubic yards of sandy borrow material for this project. However, the dredging itself is part of a separate project, and its impacts on sea turtles (leatherback, hawksbill, loggerhead, green, and Kemp's ridley) are the subject of a separate consultation: the Gulf of Mexico Regional Biological Opinion (GRBO) (NMFS 2003). In that opinion NMFS concluded that sea turtles can be adversely affected by hopper dredges and included an Incidental Take Statement (ITS), pursuant to section 7 of the ESA. The ITS in the GRBO contains reasonable and prudent measures (RPMs) with implementing terms and conditions to help minimize this take. The COE will carry out the Gulfport navigation channel dredging in accordance with the RPMs and implement the terms and conditions of the GRBO.

NMFS notes, however, that the COE has requested reinitiation of consultation on the GRBO, following the exceedance of the GRBO's ITS for sea turtles killed by relocation trawling (three vs. an anticipated level of two). These takes resulted from the State of Louisiana's construction of a series of oil spill

[1] Green turtles in U.S. waters are listed as threatened except for the Florida breeding population, which is listed as endangered.

[2] The U.S. distinct population segment (DPS).

protection barrier berms as an emergency response to the recent Deepwater Horizon (DWH) oil spill incident in the Gulf of Mexico. The COE issued an emergency permit to Louisiana, and the GRBO was applied to the associated hopper dredging. The berm project has resulted in extraordinarily high levels of take. From July 9-23, 2010, a total of 194 sea turtles (185 loggerheads, 8 Kemp's ridley, and 1 green sea turtle) were captured using two trawlers over 584 tows (30-minutes per tow) for a catch-per-unit-effort (CPUE) of 0.33 turtles per tow, or 12.9 turtles per day. There has been a much higher than usual mortality rate for these sea turtles, despite shortened tow times. Three turtles were killed in two weeks of relocation trawling for the Louisiana coastal barrier berm project, compared to four turtles in all U.S. Army Corps of Engineers' dredging projects over the period 1995-2009. This capture rate is far greater than rates previously documented for any other dredging related sea turtle relocation operation in the southeastern U.S. It appears that these sea turtles may have been more vulnerable to drowning in trawls, perhaps because of an as-yet unidentified effect of the BP Deepwater Horizon oil spill.

The New Orleans District COE, submitted a letter on July 23, 2010, requesting re-initiation of their emergency permit to construct a series of oil spill protection barrier berms as an emergency response to the recent DWH oil spill incident. The South Atlantic Division COE prepared a Section 7(a)(2) and 7(d) analysis on August 30, 2010. This analysis focused on the use of an otter trawl to relocate sea turtles from the path of hopper dredges and potential effects on sea turtles under the GRBO. This analysis was focused on three hopper dredging projects and the associated relocation trawls that could be performed under the GRBO through September 30, 2010, one of which is the Gulfport navigation channel. The COE concluded that "there is no reason to believe that relocation trawling for the three projects covered in this analysis will significantly deviate from historic norms where trawl related fatalities of sea turtles have been a rare occurrence. Should conditions in the locale or one or more of these projects differ from that anticipated, the Corps stands ready to address any issues with NMFS." Therefore, the COE determined that the dredging associated with the Gulfport Harbor Federal Navigation Channel (F/SER/2007/02307), under the terms and conditions of the GRBO will not violate Section 7(a)(2) and 7(d). The COE presented historical data supporting that high levels of take in trawls or resulting mortality are extremely unlikely at the Gulfport navigation channel. However, it is unclear how reliable historical data may be, given the unprecedented take levels at the berm project.

NMFS notes that the reinitiated consultation on the GRBO has not been concluded. Conclusion of consultation will be strongly affected by the ongoing impacts of the berm project and any determinations about the possible factors that resulted in high take and mortality there. NMFS reminds the COE that, if additional RPMs are determined to be necessary at the conclusion of the reinitiated consultation, the COE will need to apply them to the Gulfport Navigational Channel hopper dredging. If the reinitiated consultation is not complete when hopper dredging is scheduled to begin, NMFS recommends that the COE conduct an additional Section 7(a)(2) and 7(d) analysis, specific to the Gulfport Navigation Channel project and considering the most recent available information, such as water temperature, any available sea turtle survey information, and any impacts to turtles from other projects the COE is conducting under the GRBO. The COE has a continuing duty to evaluate its ongoing actions and ensure they do not jeopardize listed species, and that duty is heightened during reinitiated consultation.

The Old Gulfport Navigational Channel will require use of a cutterhead pipeline dredge due to the shallow water depth. This dredge would then pump off material to the sand placement areas on the north shore of West Ship Island. Hydraulic cutterhead dredging takes of sea turtles occur very rarely. Previously, these takes have only been documented for previously-injured or cold-stunned turtles; normal, healthy sea turtles are highly mobile and will likely avoid the area due to project activity and noise. Because interactions between sea turtles and cutterhead dredges are so unlikely to occur, NMFS considers these potential effects of cutterhead dredges on sea turtles to be discountable. NMFS believes that any effects to sea turtles stemming from behavioral modifications due to the dredging are insignificant.

The project is not expected to negatively affect sea turtle foraging habitat. Leatherbacks are pelagic feeders and the modification of the benthos through dredge and disposal activities will not affect pelagic resources. Hawksbill and green turtles are specialist feeders that target sponges and seagrass or macroalgae. Because the existing sandy benthos at the project site does not support those food resources, they will not be affected. Kemp's ridley and loggerhead sea turtles are the most likely species to occur in the project area and are generalist carnivores, typically preying on benthic mollusks and crustaceans in the nearshore environment. Both species of sea turtles can be found foraging in shallow sand (similar to the existing conditions) and mud habitats and at high relief rock or reef habitats (which do not occur in the project area). NMFS believes any habitat and food availability effects of the project on turtles will be insignificant since the area impacted is relatively small in comparison to available foraging habitat. Thus, sea turtles are not likely to be adversely affected and will not be discussed further in this opinion.

3.1.2 Smalltooth Sawfish and Gulf Sturgeon

The U.S. distinct population segment of smalltooth sawfish was listed as endangered under the ESA on April 1, 2003 (68 FR 15674). The historic range of the smalltooth sawfish in the United States extends from Texas to New York (NMFS, 2009). Since the 1990s, the distribution of smalltooth sawfish in the United States has been restricted to peninsular Florida (Seitz and Poulakis, 2002; Poulakis and Seitz, 2004; Simpfendorfer and Wiley, 2005a; Mote Marine Laboratory's Sawfish Encounter Database; and the FLMNH National Sawfish Encounter Database [FLMNHNSED]). Encounter data indicate smalltooth sawfish encounters can be found with some regularity only in south Florida from Charlotte Harbor to Florida Bay. A limited number of reported encounters (one in Georgia, one in Alabama, one in Louisiana, and one in Texas) have occurred outside of Florida since 1998. Peninsular Florida is the main U.S. region that historically and currently hosts the species year-round because the region provides the appropriate climate (subtropical to tropical) and contains the habitat types (lagoons, bays, mangroves, and nearshore reefs) suitable for the species. Encounter data and research efforts indicate a resident, reproducing population of smalltooth sawfish exists only in southwest Florida (Simpfendorfer and Wiley, 2005a). Therefore, NMFS believes smalltooth sawfish are rare in the action area and the chances of the proposed action affecting them are discountable. Furthermore, there have been no observed incidental takes of smalltooth sawfish by hydraulic dredge and NMFS believes this species can easily avoid the slow-moving dredge. This species is not likely to be adversely affected.

NMFS and the USFWS jointly listed the Gulf sturgeon as a threatened species on September 30, 1991 (56 CFR 49653). The present range of the Gulf sturgeon extends from Lake Pontchartrain and the Pearl River system in Louisiana and Mississippi east to the Suwannee River in Florida. The Gulf sturgeon is an anadromous fish; adults spawn in freshwater then migrate to feed and grow in estuarine/marine habitats. After spawning in the upper river reaches, both adult and subadult Gulf sturgeon migrate from the estuaries, bays, and the Gulf of Mexico to the coastal rivers in early spring (i.e., March through May) when river water temperatures range from 16°C to 23°C (Huff 1975; Carr 1983; Wooley 1985; Odenkirk 1989; Clugston 1995; Foster 1997; Fox 1998; Sulak 1999; Fox 2000). Generally, fall downstream migration from the river into the estuary/Gulf of Mexico begins in September (at water temperatures around 23°C) and continues through November (Huff 1975; Wooley 1985; Foster 1997). The most recent population estimates show 430 and 234 Gulf sturgeon in the Pearl and Pascagoula Rivers respectively (Rogillio 2001; Heise 2002).

The project area includes winter migration and feeding habitats for adult and subadult Gulf sturgeon in Mississippi Sound, which includes individuals from the Pascagoula and the Pearl River sub-populations. In open-water areas, it is likely that the highly mobile Gulf sturgeon will avoid the area due to project activities (noise and the physical presence of machinery). Dredging operations for this project will be continuous, operating 24 hours each day, 7 days a week. The old Gulfport Harbor channel will be dredged via hydraulic cutterhead dredge (a relatively stationary type of dredge not known to take Gulf

sturgeon), NMFS believes there should be sufficient passage opportunity for Gulf sturgeon to move through the area during, or after completion of, daily dredging activities. From 2003 - 2010 approximately 16 sturgeon have been taken (non-lethal) by relocation trawls and 2 have been taken by hopper dredging (lethal) in the Gulf of Mexico. Additionally, one was taken in a shrimp trawl in federal waters (the first ever reported occurrence) which was not part of a relocation trawl associated with a maintenance project. (Craig Theriot, USACE, pers. comm., September 2010)

Potential impacts on the Gulf sturgeon from hopper dredging activities were assessed in the GRBO. In that opinion NMFS concluded that Gulf sturgeon can be adversely affected by hopper dredges and included an ITS pursuant to section 7 of the ESA. The ITS in the GRBO contains RPMs with implementing terms and conditions to help minimize this take. Any Gulf sturgeon take resulting from this action will be assessed to the annual ITS for the Mobile District pursuant to the GRBO. With respect to Gulf sturgeon, the proposed action will not trigger any of the bases for reinitiation of consultation in 50 CFR 402.16; therefore, reinitiation of consultation for the GRBO on the effects to Gulf sturgeon is not necessary. NMFS believes the chance of a Gulf sturgeon being affected by the proposed action is insignificant. Gulf sturgeon are not likely to be adversely affected.

3.2 Deepwater Horizon Oil Spill Affects to Species

On April 20, 2010, while working on an exploratory well approximately 50 miles offshore Louisiana, the floating semi-submersible mobile offshore drilling unit Deepwater Horizon experienced an explosion and fire. The rig subsequently sank and oil and natural gas began leaking into the Gulf of Mexico. At the time of writing, the total amount of oil and natural gas that has escaped into the Gulf of Mexico is unknown, but is currently believed to be between 35,000 and 65,000 barrels (1,470,000 and 2,730,000 gallons) per day. The Deepwater Horizon oil spill is currently the worst environmental disaster in U.S. history and its full environmental impact will not be known for years to come and may never be known. Assessing the current impacts of this oil spill on ESA-listed species is difficult because so much remains unknown or unclear about the impacts to the environment and ESA-listed species. Given these uncertainties, it is imprudent to speculate on what the impact from this spill will be on the environmental baseline of species at this time. However, we are aware of several types of impacts and potential impacts occurring to species, and the section below briefly discusses the routes of effect from exposure to oil and the subsequent cleanup efforts.

The primary route of effects to ESA-listed species from the release of oil and gas is by exposure to chemicals in oil. There are two routes of exposure: internal (e.g., eating or swallowing oil, consuming prey containing oil based chemicals, or inhaling volatile oil related compounds) and external (e.g., swimming in oil and/or dispersants, or getting oil and/or dispersants on skin and body). Direct contact with oil or dispersants may cause skin irritation, chemical burns, and infections. Inhalation of volatile oil-related compounds or dispersants may also irritate or injure the respiratory tract potentially causing inflammation or pneumonia. Oil ingestion may injure the gastrointestinal tract affecting an animal's ability to absorb or digest foods. Absorption of oil or dispersants may damage the liver, kidney, and/or brain and could cause anemia and immune suppression. Long term chronic effects such as decreased survival and lowered reproductive success may also occur. Egg mortality may also occur as a result of nesting beach oiling. Eggs may also be exposed to oil as they are laid by females nesting on oiled beaches.

The ultimate impact of exposure to the oil and cleanup efforts are dependent on a number of things: the mixture and types of chemicals in the oil those used to clean up the oil; the level of exposure individuals have to oil/chemicals (i.e., amount ingested or time exposed to external sources of oil); and the route of exposure (i.e., inhaled, ingested, absorbed, or external contact). The age, sex, reproductive stage, and health of individuals also affect the severity of oil exposure.

Response and cleanup efforts may also be affecting ESA-listed species. Effects to sea turtles are most easily identified and include: nest relocation; accidental nest compaction or egg destruction during night time beach patrols; capture during oil skimming operations; death or injury during oil burn operations; entanglement in booming apparatus; blocked migratory pathways or access to nesting beaches due to boom placement; changes in beach topography related to cleanup that renders beaches less desirable for nesting; aborted nesting attempts due to the presence of construction equipment on nesting beaches; and area avoidance due to the operational noise. Potential indirect effects to ESA-listed species are more difficult to identify but may include behavioral modification such as area avoidance due to a decline in prey opportunities or environmental degradation. However, some curious individuals may actually be attracted to clean up efforts. The long term impact to ESA-listed species and the environment from exposure to oil and the subsequent response and clean up efforts is currently unknown.

3.3 Critical Habitat Likely to be Adversely Affected

Gulf sturgeon critical habitat was jointly designated by NMFS and USFWS on April 18, 2003 (50 CFR 226.214). Critical habitat is defined in section 3(5)(A) of the ESA as (i) the specific areas within the geographic area occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (I) essential to the conservation of the species and (II) that may require special management considerations or protection; and (ii) specific areas outside the geographic area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. "Conservation" is defined in section 3(3) of the ESA as the use of all methods and procedures that are necessary to bring any endangered or threatened species to the point at which listing under the ESA is no longer necessary.

Gulf sturgeon critical habitat includes areas within the major river systems that support the seven currently reproducing sub-populations (USFWS, GSMFC et al. 1995) and associated estuarine and marine habitats. Gulf sturgeon use the rivers for spawning, larval and juvenile feeding, adult resting and staging, and to move between the areas that support these components. Gulf sturgeon use the lower riverine, estuarine, and marine environments during winter months primarily for feeding and, more rarely, for inter-river migrations. Estuaries and bays adjacent to the riverine units provide unobstructed passage of sturgeon from feeding areas to spawning grounds.

Fourteen areas (units) are designated as Gulf sturgeon critical habitat. Critical habitat units encompass approximately 2,783 river kilometers (km) and 6,042 km^2 of estuarine and marine habitats and include portions of the following Gulf of Mexico rivers, tributaries, estuarine, and marine areas:

Unit 1 Pearl and Bogue Chitto Rivers in Louisiana and Mississippi
Unit 2 Pascagoula, Leaf, Bowie, Big Black Creek and Chickasawhay Rivers in Mississippi
Unit 3 Escambia, Conecuh, and Sepulga Rivers in Alabama and Florida
Unit 4 Yellow, Blackwater, and Shoal Rivers in Alabama and Florida
Unit 5 Choctawhatchee and Pea Rivers in Florida and Alabama
Unit 6 Apalachicola and Brothers Rivers in Florida
Unit 7 Suwannee and Withlacoochee Rivers in Florida
Unit 8 Lake Pontchartrain (east of causeway), Lake Catherine, Little Lake, the Rigolets, Lake Borgne, Pascagoula Bay and Mississippi Sound systems in Louisiana and Mississippi, and sections of the state waters within the Gulf of Mexico
Unit 9 Pensacola Bay system in Florida
Unit 10 Santa Rosa Sound in Florida
Unit 11 Nearshore Gulf of Mexico in Florida
Unit 12 Choctawhatchee Bay system in Florida

Unit 13 Apalachicola Bay system in Florida, and
Unit 14 Suwannee Sound in Florida

Critical habitat determinations focus on those physical and biological features (primary constituent elements – PCEs or "essential features") that are essential to the conservation of the species (50 CFR 424.12). Federal agencies must ensure that their activities are not likely to result in the destruction or adverse modification of the essential features within defined critical habitats. Therefore, proposed actions that may impact designated critical habitat require an analysis of potential impacts to each essential feature.

Features identified as essential for the conservation of the Gulf sturgeon consist of:

(1) Abundant food items, such as detritus, aquatic insects, worms, and/ or molluscs, within riverine habitats for larval and juvenile life stages; and abundant prey items, such as amphipods, lancelets, polychaetes, gastropods, ghost shrimp, isopods, molluscs and/or crustaceans, within estuarine and marine habitats and substrates for subadult and adult life stages;
(2) Riverine spawning sites with substrates suitable for egg deposition and development, such as limestone outcrops and cut limestone banks, bedrock, large gravel or cobble beds, marl, soapstone, or hard clay;
(3) Riverine aggregation areas, also referred to as resting, holding, and staging areas, used by adult, subadult, and/or juveniles, generally, but not always, located in holes below normal riverbed depths, believed necessary for minimizing energy expenditures during fresh water residency and possibly for osmoregulatory functions;
(4) A flow regime (i.e., the magnitude, frequency, duration, seasonality, and rate-of-change of fresh water discharge over time) necessary for normal behavior, growth, and survival of all life stages in the riverine environment, including migration, breeding site selection, courtship, egg fertilization, resting, and staging, and for maintaining spawning sites in suitable condition for egg attachment, egg sheltering, resting, and larval staging;
(5) Water quality, including temperature, salinity, pH, hardness, turbidity, oxygen content, and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages;
(6) Sediment quality, including texture and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages; and
(7) Safe and unobstructed migratory pathways necessary for passage within and between riverine, estuarine, and marine habitats (e.g., an unobstructed river or a dammed river that still allows for passage).

As stated in the final rule designating Gulf sturgeon critical habitat, the following activities, among others, when authorized, funded or carried out by a federal agency, may destroy or adversely modify critical habitat:

(1) Actions that would appreciably reduce the abundance of riverine prey for larval and juvenile sturgeon, or of estuarine and marine prey for juvenile and adult Gulf sturgeon, within a designated critical habitat unit, such as dredging; dredged material disposal; channelization; in-stream mining; and land uses that cause excessive turbidity or sedimentation;
(2) Actions that would appreciably reduce the suitability of Gulf sturgeon spawning sites for egg deposition and development within a designated critical habitat unit, such as impoundment; hard-bottom removal for navigation channel deepening; dredged material disposal; in-stream mining; and land uses that cause excessive sedimentation;
(3) Actions that would appreciably reduce the suitability of Gulf sturgeon riverine aggregation areas, also referred to as resting, holding, and staging areas, used by adult, subadult, and/or juveniles, believed necessary for minimizing energy expenditures and possibly for osmoregulatory functions, such as

dredged material disposal upstream or directly within such areas; and other land uses that cause excessive sedimentation;

(4) Actions that would alter the flow regime (the magnitude, frequency, duration, seasonality, and rate-of-change of fresh water discharge over time) of a riverine critical habitat unit such that it is appreciably impaired for the purposes of Gulf sturgeon migration, resting, staging, breeding site selection, courtship, egg fertilization, egg deposition, and egg development, such as impoundment; water diversion; and dam operations;

(5) Actions that would alter water quality within a designated critical habitat unit, including temperature, salinity, pH, hardness, turbidity, oxygen content, and other chemical characteristics, such that it is appreciably impaired for normal Gulf sturgeon behavior, reproduction, growth, or viability, such as dredging; dredged material disposal; channelization; impoundment; in-stream mining; water diversion; dam operations; land uses that cause excessive turbidity; and release of chemicals, biological pollutants, or heated effluents into surface water or connected groundwater via point sources or dispersed non-point sources;

(6) Actions that would alter sediment quality within a designated critical habitat unit such that it is appreciably impaired for normal Gulf sturgeon behavior, reproduction, growth, or viability, such as dredged material disposal; channelization; impoundment; in-stream mining; land uses that cause excessive sedimentation; and release of chemical or biological pollutants that accumulate in sediments; and

(7) Actions that would obstruct migratory pathways within and between adjacent riverine, estuarine, and marine critical habitat units, such as dams, dredging, point-source-pollutant discharges, and other physical or chemical alterations of channels and passes that restrict Gulf sturgeon movement (68 FR 13399).

Widening of the Gulfport Harbor channel is covered by the formal consultation (F/SER/2007/02307), and will not be considered in this opinion; however the dredging of the old Gulfport Harbor Navigation Channel and the placement of sand during beach renourishment may adversely affect critical habitat. These impacts were not discussed in the above mentioned consultation or within the GRBO. The GRBO requires separate consultation on dredging, or disposal of dredged materials, in Gulf sturgeon critical habitat. The proposed dredging of sandy material from within the old abandoned Gulfport Harbor Navigation Channel, would impact up to 200 acres of area designated as critical habitat. Approximately 608,000 cubic yards of sandy material is available to be placed along the northern shoreline of West Ship Island within an approximately 250-acre area, of which 77 acres is designated critical habitat. The action area (dredge site and placement site) constitutes approximately 0.03 percent of the total area within Unit 8.

Within Unit 8, essential features potentially affected by the proposed project include water quality, migratory pathways, sediment quality, and prey abundance. However, with the exception of prey abundance, NMFS expects that the proposed action will not affect or will only have insignificant effects on these essential features.

Water quality impacts from sediment disturbance as a result of disposal are expected to be temporary and minimal, with suspended particles settling out within a short time frame without measurable effects on water quality. No changes in temperature, salinity, pH, hardness, oxygen content, and other chemical characteristics are expected. NMFS only expects insignificant effects to Gulf sturgeon critical habitat as a result of water quality impacts related to this project.

Within critical habitat Unit 8, sub-adult and adult Gulf sturgeon move from the rivers through estuarine and marine areas to feeding areas. Unit 8 is known to support migratory pathways for Gulf sturgeon from two sub-populations (Pascagoula and Pearl Rivers), as groups of individuals from these sub-populations have been located by telemetry on numerous occasions throughout the unit (Reynolds 1993; Rogillio

2001; Ross 2001a). Data gathered by telemetry shows Gulf sturgeon presence within the Gulfport Harbor Navigation Channel, and possibly use of the channel itself as a migration route. It is likely that Gulf sturgeon swim through the project area during their intermittent inter-riverine movements and winter foraging migrations. However, the lack of Gulf sturgeon captures from localized relocation data from 2006-2008, coupled with the proposed nature of the action (i.e., beach re-nourishment with elevations of +5 ft mean high water), suggest that the proposed action would have insignificant effects on the ability of critical habitat Unit 8 to provide a migratory pathway for Gulf sturgeon.

Substrate modification can impact prey availability and abundance; potential project impacts relative to Gulf sturgeon prey are presented in the next section. The proposed action will directly impact benthos through the removal of material from borrow sites and placement of dredged material into the beach re-nourishment areas. Although the majority of the dredge material will be placed on upland sites, approximately 77 acres of critical habitat will be converted from marine sub-tidal/intertidal beach to intertidal beach/upland dune habitat, coupled with the short-term reduction in prey abundance resulting from 200 acres of dredging impacts in old Gulfport Harbor Navigation Channel. The composition of the dredged materials removed from the channel is expected to be the same as that remaining; sediment quality and texture of the spoil have been described by MDCOE as identical to the existing conditions at all re-nourishment sites, which will aid in the recovery of the benthic communities. NMFS also considered the potential of contamination in the project area; a contaminant sink would impact Gulf sturgeon health. The sediment being removed from the channels are not known to contain any contaminants. Therefore, NMFS concludes the proposed action will have only insignificant effects on sediment quality of critical habitat Unit 8.

4.0 ENVIRONMENTAL BASELINE

This section contains a description of the effects of past and ongoing human activities leading to the current status of the species, their habitat, and the ecosystem, within the action area. The environmental baseline is a snapshot of the factors affecting the species and includes federal, state, tribal, local, and private actions already affecting the species, or that will occur contemporaneously with the consultation in progress. Unrelated, future federal actions affecting the same species that have completed formal or informal consultation are also part of the environmental baseline, as are implemented and ongoing federal and other actions within the action area that may benefit listed species.

4.1 Status of Critical Habitat Within the Action Area

Of the fourteen units designated as Gulf sturgeon critical habitat, only Unit 8 will be impacted by the dredging of the old Gulfport Harbor Navigation Channel and placement of the sand material along the shoreline of West Ship Island. Unit 8 encompasses Lake Pontchartrain east of the Lake Pontchartrain Causeway, Little Lake, The Rigolets, Lake St. Catherine, and Lake Borgne, including Heron Bay, and the Mississippi Sound. Critical habitat follows the shorelines around the perimeters of each included lake. The Mississippi Sound includes adjacent open bays including Pascagoula Bay, Point aux Chenes Bay, Grand Bay, Sandy Bay, and barrier island passes, including Ship Island Pass, Dog Keys Pass, Horn Island Pass, and Petit Bois Pass. Unit 8 critical habitat within Mississippi Sound is defined by the following boundaries:

> The northern boundary of the Mississippi Sound is the shoreline of the mainland between Heron Bay Point, Mississippi, and Point aux Pins, Alabama. Critical habitat excludes St. Louis Bay, north of the railroad bridge across its mouth; Biloxi Bay, north of the U.S.

Highway 90 bridge; and Back Bay of Biloxi. The southern boundary follows along the broken shoreline of Lake Borgne created by low swamp islands from Malheureux Point to Isle au Pitre. From the northeast point of Isle au Pitre, the boundary continues in a straight north-northeast line to the point one nautical mile (nm) seaward of the westernmost extremity of Cat Island (30°13'N, 89°10'W). The southern boundary continues one nm offshore of the barrier islands and offshore of the 72 COLREGS lines at barrier island passes [defined at 33 CFR 80.815 (c), (d) and (e)] to the eastern boundary. Between Cat Island and Ship Island there is no 72 COLREGS line. NMFS has therefore defined that section of the unit southern boundary as one nm offshore of a straight line drawn from the southern tip of Cat Island to the western tip of Ship Island. The eastern boundary is the line of longitude 88°18.8'W from its intersection with the shore (Point aux Pins) to its intersection with the southern boundary. The lateral extent of Unit 8 is the MHW line on each shoreline of the included water bodies or the entrance to rivers, bayous, and creeks. Pascagoula Channel, a major shipping channel, as identified on standard navigation charts and marked by buoys, is excluded.

Unit 8 provides juvenile, sub-adult, and adult feeding, resting, and passage habitat for Gulf sturgeon from the Pascagoula and the Pearl River sub-populations (68 FR 13395); fish are consistently located both inshore and around/between the barrier islands (i.e., Cat, Ship, Horn, and Petit Bois) within this unit (Reynolds 1993; Rogillio 2001; Ross 2001a). Gulf sturgeon have also been documented within one nm of the barrier islands of Mississippi Sound. Substrate in this unit ranges from sand to silt, which contain known Gulf sturgeon prey items, including lancelets (Menzel 1971; Abele 1986; AFS 1989; Heise 1999; Rogillio 2001; Ross 2001a). Four essential features are present in critical habitat Unit 8: abundant prey items for sub-adults and adults, water quality, sediment quality, and safe and unobstructed migratory pathways. Unit 8 of Gulf sturgeon critical habitat encompasses a total of 3,567 km^2 (881,421 acres). The amount of benthos impacted by the dredging and placement of material (1.12 km^2 or 277 acres) constitutes 0.03 percent of the total area within the unit.

Mississippi Sound is an arm of the Gulf of Mexico that extends from Lake Borgne, Louisiana, on the west to Mobile Bay, Alabama, on the east. The Sound is about 100 mi (161 km) long and 7 to 15 mi (11-24 km) wide and is mostly unstratified brackish water. The Sound is part of the Intracoastal Waterway and is separated from the Gulf by a series of narrow islands and sandbars. Two major rivers (Pearl and Pascagoula) flow into Mississippi Sound. In addition, Mississippi Sound receives water from both the Gulf of Mexico to the south and from the drainage basins of Biloxi Bay and St. Louis Bay. About 80 percent of Mississippi Sound has been designated as Gulf sturgeon critical habitat.

Mississippi Sound contains a number of different submerged aquatic communities, including seagrass beds, marine algae, mollusk reef, unconsolidated bottom communities, oyster beds, and salt marsh. The beaches that border Mississippi Sound on the north are manmade and are maintained on an annual and periodic basis; the beaches on the barrier islands are natural. A number of barrier islands exist off the coast including Cat, Ship, Horn, and Petit Bois. The barrier islands significantly reduce the penetration of long swells from the Gulf of Mexico, resulting in relatively low energy waves (< 1 ft) in the sound. However, hurricanes and strong winter cold fronts can produce surges and much larger wave conditions at the coast, which in turn increases sediment transport. Circulation within the Sound is influenced by the freshwater outflow from rivers and bays, seasonal easterly and westerly winds, tidal-driven flow that enters the sound through the barrier island passes, and the Loop Current (ocean current within the Gulf of Mexico) that has a counterclockwise spire just south of the barrier islands.

A substantial portion of coastal Mississippi Sound has been developed into urban, industrial, and residential uses. Much of this urban development is highly concentrated between Pascagoula and Bay St. Louis, Mississippi; some urban growth is centered around industrial development and a commercial fishing industry. Population growth during the past three decades has been characterized by alternating periods of robust growth and stagnation. Over the past decade or so, the development of a casino industry centered around Biloxi, Mississippi, and the construction of a naval base, has spurred both population and economic growth in nearby Harrison, Hancock, and Jackson Counties.

There are many biological and natural resources in the Mississippi Sound; aquatic resources include aquatic plants, invertebrates, reptiles, birds, fish, and marine mammals. There are numerous gas fields in Mississippi Sound and the potential of additional oil and gas reserves. Each individual state regulates drilling, production, and storage at inshore and nearshore sites; the Minerals Management Service (MMS), a bureau in the U.S. Department of the Interior, is the federal agency that manages the nation's natural gas, oil, and other mineral resources on the outer continental shelf.

Sediment layers in the Mississippi Sound are from the Pliocene, Miocene, Oligocene, and Eocene epoch. These sediments and sedimentary rocks consist of clay, silt, sand, gravel, and limestone. Most sediments in the north are a result of a river system (ancestral to the current Mississippi River) that drained the rising continental interior and deposited sediments from throughout the large continental drainage area into the Gulf of Mexico; sediments in the south may be of marine origin. Mississippi Sound sediments are relatively uncontaminated. Mississippi Sound is reported to have limited areas (about 6 percent) with high sediment contamination levels; estimates for nearby Mobile Bay (61 percent), Perdido Bay (92 percent), and Pensacola Bay (62 percent) estimates are much higher (EPA EMAP-E database).

Dredging commonly occurs in Mississippi Sound; the majority is conducted by the MDCOE. Most dredging in Mississippi Sound is conducted to allow for safe navigation; the majority of projects are to maintain waterways, some are for improvement (deepening or widening). Annually, MDCOE dredges and moves about 250 million cubic yards (five-year average), most (75-80 percent) of which occurs in the Sound.

4.2 Factors Affecting Critical Habitat Within the Action Area

Gulf sturgeon critical habitat Unit 8 is a spatially defined area that includes winter-feeding and migratory habitat for two sub-populations. Changing the sediment character could appreciably impair normal Gulf sturgeon behavior; additionally, it could restructure the benthic community, thus reducing the availability of prey items. Channel dredging activities, beach re-nourishment, upland activities, and poor dredge-and-fill practices could impact water quality in the unit.

4.2.1 Federal Actions

Federal agencies that consult on potential impacts to Gulf sturgeon critical habitat include the COE, the Department of Defense (DOD), the Environmental Protection Agency (EPA), the Federal Energy Regulatory Commission (FERC), and the Nuclear Regulatory Commission (NRC). Dredging and dredged material disposal and military activities, including training exercises and ordnance detonation, have the potential to impact designated critical habitat. While numerous formal consultations have been conducted on potential impacts to the species, NMFS has conducted about 40 formal consultations on potential impacts to Gulf sturgeon critical habitat since the April 18, 2003, final rule designating Gulf sturgeon critical habitat. Meanwhile, USFWS has conducted less than 20 total formal consultations to

ascertain potential project impacts on designated Gulf sturgeon critical habitat (Karen Herrington, USFWS, pers. comm., June 2010). The previous formal consultations conducted by NMFS, mostly with the COE but including FERC and DOD, concluded that proposed actions would not result in the destruction or adverse modification of critical habitat. Numerous informal consultations with the DOD, COE, EPA, FERC, and NRC analyzing potential impacts to designated critical habitat have been conducted.

In 2003, the NMFS GRBO replaced the previous 1995 regional biological opinion on hopper dredging in the Gulf of Mexico to include maintenance dredging in Gulf sturgeon critical habitat Units 8-14. The GRBO concluded that when existing navigation channels within designated critical habitat are dredged to only their current depth (i.e., maintenance-dredged), without improvements (e.g., deepening or widening), the project will not destroy or adversely modify Gulf sturgeon critical habitat.

Federally-regulated stormwater and industrial discharges and chemically-treated discharges from sewage treatment systems may impact Gulf sturgeon critical habitat. NMFS continues to consult with EPA to minimize the effects of these activities on both listed species and designated critical habitat. In addition, other federally-permitted construction activities, such as beach restoration, have the potential to impact Gulf sturgeon critical habitat.

Actions impacting wetlands abutting Gulf sturgeon critical habitat throughout Mississippi Sound are regulated, managed, and mitigated via numerous COE nationwide permits. Furthermore, federal EFH consultation requirements pursuant to the Magnuson-Stevens Fishery Management and Conservation Act minimize and mitigate for losses of wetlands and preserve valuable Gulf sturgeon habitat.

4.2.2 State or Private Actions

A number of activities that may indirectly affect Gulf sturgeon critical habitat include discharges from wastewater systems, dredging, ocean pumping and disposal, and aquaculture facilities. The impacts from these activities are difficult to measure. However, where possible, conservation actions through the ESA section 7 process, ESA section 10 permitting, and state permitting programs are being implemented to monitor or study impacts from these sources.

Increasing coastal development and ongoing beach erosion will result in increased demands by coastal communities, especially beach resort towns, for periodic privately-funded or federally-sponsored beach renourishment projects. These activities may affect Gulf sturgeon critical habitat by burying nearshore habitats that serve as foraging areas.

4.2.3 Conservation and Recovery Actions Shaping the Environmental Baseline

Federal EFH consultation requirements pursuant to the Magnuson-Stevens Fishery Conservation and Management Act minimize and mitigate for losses of wetlands, and preserve valuable foraging and developmental habitat for Gulf sturgeon.

The State of Florida recently required the COE to conduct pre- and post-construction prey surveys as part of a permit to remove sand for a beach renourishment project. NMFS is working with Florida to ensure that data and results will be useful in determining project impacts.

5.0 EFFECTS OF THE ACTION ON GULF STURGEON CRITICAL HABITAT

As discussed in Section 3, critical habitat Unit 8 contains four essential features that may be affected by the proposed project: water quality, migratory pathways, sediment quality, and abundant prey items. However, with the exception of prey abundance, NMFS expects the effects of the proposed action will not affect or will only have insignificant effects on these essential features. This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02, which has been invalidated by several federal District and Circuit courts. Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat.

5.1 Prey Abundance

The final rule designating Gulf sturgeon critical habitat states that the abundance of prey items, such as amphipods, lancelets, polychaetes, gastropods, ghost shrimp, isopods, mollusks, and/or crustaceans within estuarine and marine habitats and substrates for subadult and adult life stages, are essential for the conservation of the species. In other opinions, NMFS has considered and analyzed the following seven factors to determine direct and indirect effects of projects impacting Gulf sturgeon prey abundance essential to the conservation of the Gulf sturgeon:

1) Gulf sturgeon sub-populations using the affected critical habitat;
2) Mean generation time;
3) Foraging behavior;
4) Prey items;
5) Benthic community structure;
6) Potential Gulf sturgeon prey in the action area; and
7) Recovery of benthic biota.

Whether individual factors are relevant to a particular action and analyzed within an opinion is highly site and project specific. NMFS determines and assesses relevant factors in order to predict the persistence and resilience of the prey resource with regard to density of current and recovering Gulf sturgeon populations. That is, numerous variables depicting Gulf sturgeon prey are utilized to determine the likelihood of appropriate and abundant prey in the unit following the project to ensure that the action is not likely to result in the destruction or adverse modification of the essential feature.

5.1.1 Gulf Sturgeon Sub-populations Using Affected Critical Habitat

Overall, Gulf sturgeon critical habitat Unit 8 provides juvenile, sub-adult, and adult feeding, resting, and passage habitat for Gulf sturgeon from the Pascagoula and the Pearl Rivers. The project area is located about midway between the Pearl and Pascagoula Rivers. (Ross 2001a; Ross 2001b) have investigated the movement of fish exiting the nearby Pascagoula River (n=19) and concluded that the fish locate in or near the barrier island (Cat, Ship, Horn, and Petit Bois Islands) passes (Ross 2001a) in the clean sand substrates. (Rogillio 2001) tracked fish from the Pearl River (n=25) and all fish relocated (n=7) were also found near the barrier islands. After three months of systematic survey, no fish were located nearshore, or in Lakes Pontchartrain or Borgne. Incidental capture of a sturgeon tagged in the Pearl River near Breton Island, Louisiana, supports the concept that Gulf sturgeon utilize barrier island sites in the winter

(Rogillio 2001). Preference for sandy habitat is supported by studies in other areas that have correlated Gulf sturgeon presence to sandy substrate (Fox 2002).

The actual number of Gulf sturgeon utilizing the project area for foraging and movement is, at this time, likely several dozen (Table 2), but likely to increase as species recovery occurs.

Table 2. Estimated size of known reproducing Gulf sturgeon populations by river. All estimates listed apply to a portion of the population exceeding a minimum size that varies by sampling method utilized. N/A indicates data are not available.

Reproducing riverine population	**Estimated population size**	**Source**
Pearl River	292 430	Morrow et al. 1998 Rogillio et al. 2002
Pascagoula River	193-206 234	Heise et al. 2002 Heise et al. 2002
Escambia/Conecuh Rivers	N/A	
Yellow River	500-911	Berg 2004
Choctawhatchee River	2000-3000	USFWS 2001
Apalachicola River	88-218 270-321	Zehfuss et al. 1999 USFWS 1999
Suwannee River	7650 5500	Sulak and Clugston 1999 Pine et al. 2001

5.1.2 Mean Generation Time

Mean generation time (mean period elapsing between the birth of the parents and the birth of the offspring) is a useful tool to estimate the period of time for a population to increase in size. While mean generation time is unknown for the Gulf sturgeon, it has been calculated for the shortnose sturgeon (*A. brevirostrum*), a congener, to be between 10 and 30 years (NMFS 1998). A self-sustaining Gulf sturgeon population has been defined as one where the average rate of natural recruitment is at least equal to the average mortality rate in a 12-year period; 12 years is the approximate age at maturity for a female Gulf sturgeon (USFWS, GSMFC et al. 1995). Mean generation time is evaluated respective to the proposed action as it provides an estimated time frame to expect an increase in population size. Given current measures to protect individuals, sub-populations, and habitat, NMFS is hopeful that the number of Gulf sturgeon will increase as many threats have been reduced with the protection afforded via section 7 of the ESA.

5.1.3 Foraging Method

Gulf sturgeon possess a highly protrusible mouth that extends downward to vacuum up sediments containing their prey (i.e., infaunal macroinvertebrates). This suction feeding requires an expandable mouth cavity and a relatively narrow mouth through which to funnel water and food items (Westneat 2001). Success of suction feeding relies on the ability of the predator's mouth to protrude into the proximity of prey (Westneat 2001); the suction tube of the sturgeon's mouth must be able to maintain contact with the benthos their prey inhabit. (Findeis 1997) described sturgeon as exhibiting evolutionary

traits adapted for cruising the benthos in search of prey. Notably, their caudal fin morphology has presumably been adapted for benthic cruising; the hypochordal lobe is often reduced to allow sweeping of the tail while close to the substrate (Findeis 1997).

Research supports that Gulf sturgeon are typically found foraging in depths greater than 1 meter. Lower energy areas, where water depth is greater than 1 to 2 meters, would likely assist foraging success given their feeding biology and the dissipation of wave energy. The protrusible mouth of these suction feeders must make contact with the benthos in order to vacuum prey out of the sediments while benthic cruising. The slightly deeper depths (2 to 4 meters (6.6 to 13.1feet)) the sturgeon seem to prefer would have less wave energy at the substrate compared to the shallower swash zone. Downward cycloidal movement of waves dissipates energy through the water column (i.e., wave energy is exponentially dissipated with depth). A sturgeon attempting to forage in a high-energy, shallow-water environment (i.e., the swash zone) would likely be challenged to retain position and maintain contact with the benthos. Therefore, Gulf sturgeon foraging success would likely be greater in the slightly deeper, lower energy areas compared to the high-energy swash zone.

As benthic cruisers, sturgeon forage extensively in an area, presumably until preferred prey is depleted/reduced, then relocate, and resume foraging. Tracking observations by (Sulak 1999; Fox 2002; Edwards 2003) support that individual Gulf sturgeon move over an area until they encounter suitable prey type and density, at which time they forage for extended periods of time. Individual Gulf sturgeon often remain in localized areas (less than 1 square kilometer) for extended periods of time (greater than two weeks) and then move rapidly to another area where localized movements occurred again (Fox 2002). While the exact amount of benthic area required to sustain Gulf sturgeon health and growth is unknown (and likely dependent on fish size and reproductive status), Gulf sturgeon have been known to travel long distances (greater than 161 kilometers) during their winter feeding period. This supports the likelihood that any Gulf sturgeon in the project area will find appropriate and abundant prey in the areas adjacent to the project location as many other nearby sandy areas exist.

5.1.4 Prey Items

Ontogenetic changes in Gulf sturgeon diet and foraging area have been documented. Young-of-the-year forage in freshwater on aquatic invertebrates and detritus (Mason 1993; Sulak 1999); juveniles forage throughout the river on aquatic insects (e.g., mayflies and caddis flies), worms (oligochaete), and bivalves (Huff 1975; Mason and Clugston 1993); adults forage sparingly in freshwater and depend almost entirely on estuarine and marine prey for their growth (Gu, Schell et al. 2001). Both adult and subadult Gulf sturgeon are known to lose up to 30 percent of their total body weight while in freshwater, and subsequently compensate the loss during winter feeding in marine areas (Carr 1983; Wooley 1985; Clugston 1995; Morrow 1998; Heise 1999; Sulak 1999; Ross 2000). Therefore, once Gulf sturgeon leave the river after having spent at least six months in the river fasting, it is presumed that they immediately begin feeding. Upon exiting the rivers, Gulf sturgeon concentrate around the mouths of their natal rivers in lakes and bays. These areas are very important for the Gulf sturgeon as they offer the first foraging opportunity for the Gulf sturgeon exiting the rivers. Few data have been collected on the food habits of Gulf sturgeon; their threatened status limits sampling efforts and gastric lavaging has only recently become successful. Gulf sturgeon have been described as opportunistic and indiscriminate benthivores; their guts generally contain benthic marine invertebrates including amphipods, lancelets, polychaetes, gastropods, shrimp, isopods, mollusks, and crustaceans (Huff 1975; Mason 1993; Carr 1996; Fox 2000; Fox 2002). During the early fall and winter, immediately following downstream migration, Gulf sturgeon are most often located in depths less than 20 feet in sandy areas that support burrowing macro

invertebrates, where the fish are presumably foraging (Craft 2001; Parauka 2001; Ross 2001a; Fox 2002). Generally, Gulf sturgeon prey are burrowing species (e.g., annelids: polychaetes and oligochaetes, amphipods, isopods, and lancelets) that feed on detritus and/or suspended particles, and inhabit sandy substrate.

5.1.5 Benthic Community Structure

NMFS is not aware of any research or surveys to fully describe benthic composition in or nearby the proposed project area. Without a comprehensive benthic survey, availability of Gulf sturgeon prey remains uncertain. Data collected within Choctawhatchee Bay (Fox 1998; Parauka 2001; Fox 2002) indicate that Gulf sturgeon show a preference for sandy shoreline habitats with the majority of fish being located in areas lacking seagrass. (Craft 2001) found that Gulf sturgeon in Pensacola Bay prefer shallow shoals with unvegetated, fine- to medium-grain sand habitats such as sandbars and sub-tidal energy zones resulting in sediment sorting and a preponderance of sand supporting a variety of prey items. Habitats used nearby the Mississippi Sound barrier islands tend to have a clean sand substrate and all benthic samples from the area contained lancelets (Ross 2001a). Other nearshore Gulf of Mexico locations where Gulf sturgeon are often located (via telemetry and tag returns) consist of unconsolidated, fine-medium grain sand habitats, including natural inlets and passes that are known to support Gulf sturgeon prey items (Menzel 1971; Abele 1986; AFS 1989). It has been concluded that Gulf sturgeon are foraging in these sandy areas where they are repeatedly located, as this habitat supports their prey (see preceding Section 5.2.4 "Prey items" for specifics).

5.1.6 Potential Gulf Sturgeon Prey in the Action Area

Research in Choctawhatchee Bay (Fox 1998; Fox 2002) indicates that Gulf sturgeon show a preference for sandy shoreline habitats with the majority of fish being located in areas lacking seagrass. (Craft 2001) found that Gulf sturgeon in Pensacola Bay prefer shallow shoals with unvegetated, fine- to medium-grain sand habitats such as sandbars and sub-tidal energy zones resulting in sediment sorting and a preponderance of sand supporting a variety of prey items. Habitats used nearby the Mississippi Sound barrier islands tend to have a clean sand substrate and all benthic samples from the area contained lancelets (Ross 2001a). Other nearshore Gulf of Mexico locations where Gulf sturgeon are often located (via telemetry and tag returns) consist of unconsolidated, fine-medium grain sand habitats, including natural inlets and passes that are known to support Gulf sturgeon prey items (Menzel 1971; Abele 1986; AFS 1989). It has been concluded that Gulf sturgeon are foraging in these sandy areas where they are repeatedly located, as this habitat supports their prey (see preceding "Prey items" section for specifics).

5.1.7 Recovery of Benthic Biota

Maintenance dredging of the old Gulfport Harbor Navigation Channel will remove benthic prey items from a 200-acre area of designated Gulf sturgeon critical habitat in Unit 8. Placement of dredged material within a portion of the 250-acre shoreline disposal area will bury benthic prey within Unit 8 of Gulf sturgeon critical habitat. Rate and success of benthic recovery resulting from removal of materials during maintenance dredging is a function of sediment texture, depth, time of year, and habitat type. Placement of materials similar to ambient sediments (e.g., sand on sand or mud on mud) has been shown to produce less severe impacts in contrast to placement of dissimilar sediments, which generally results in more severe, long-term impact (Maurer 1978). The materials that will be removed (dredged) from the project area are homogenous with those that will remain in the channel and, therefore, no alteration of habitat composition is occurring. The dredge area will remain a shallow-water (defined as depths shallower than

46 feet) neritic zone that can support sub-littoral benthic biota. Therefore, similar habitat, in terms of both sediment composition and depth, will be present pre- and post-dredging. Deposition of dredged material in extremely thin layers (<10 cm; 4 in) can minimize impacts by allowing many populations of small, shallow-burrowing infauna with characteristically high reproductive rates and wide dispersal capabilities to recover quickly. Deposits greater than 20-30 cm (8-12 in) generally eliminate all but the largest and most vigorous burrowers (Maurer 1978). However, the finished elevation of +5 feet MLLW with a slope of 1V:10H generally following the shoreline around the historic fort and eastward will essentially smother most benthic prey within the placement area. A total of 77-acres of submerged habitat will be modified by sand deposition, and advance the existing MHW line approximately 370 feet seaward in the project area, essentially moving the critical habitat unit seaward. This conversion of submerged habitat and seaward movement of MHW is expected to reverse over time (1 to 5 years) as coastal processes erode the beach. Benthic invertebrates utilized by Gulf sturgeon are expected to recolonize the borrow area and intertidal area rapidly, as they have been found in multiple studies to recolonize within one year when sediment composition and depth remain consistent (Nelson 1989; Nelson 1993; Rakocinski 1996). The sediment placed in the intertidal placement area is of the same texture and composition as the existing sediments.

5.1.8 Summary of Effects on Gulf Sturgeon Prey Abundance

Gulf sturgeon prey abundance, the only essential feature likely to be adversely affected by the proposed action, has the ability to recover and recolonize, and therefore its resilience to the action should be considered. Recovery of the macrobenthic assemblages is expected to be rapid as sediment composition pre- and post-construction will be similar, and nearshore benthic assemblages are known to recover relatively quickly from physical disturbance.

Unit 8 is known to support migratory pathways for Gulf sturgeon from two sub-populations (Pascagoula and Pearl Rivers), as groups of individuals from these sub-populations have been located by telemetry on numerous occasions throughout the unit (Reynolds 1993; Rogillio 2001; Ross 2001a). Data gathered by telemetry shows Gulf sturgeon presence within the Gulfport Harbor Navigation Channel, and possibly use of the channel itself as a migration route. It is likely that when Gulf sturgeon enter the project area following their fall migration, they will find appropriate and abundant prey in the areas adjacent to the project location. Given that the sturgeon forage opportunistically while benthic cruising, they can readily locate prey and fulfill nutritional requirements in areas adjacent to those impacted. Additionally, Gulf sturgeon are known to occasionally forage in very shallow waters, however, average foraging depths are usually deeper than 5 feet. The most detailed investigation of Gulf sturgeon foraging habitat, conducted in Choctawhatchee Bay, Florida, indicated that sturgeon were typically found foraging in water 2 to 4 meters (6.6 to 13 feet) deep (Fox, 2002). Other studies support this finding that Gulf sturgeon utilize waters deeper than 1.5 meters (5 feet) for foraging. Alternatively, habitats used by Gulf sturgeon in the vicinity of the barrier islands (a known foraging area) averaged 4.2 meters deep (minimum 1.9 meters, maximum 5.9 meters) (Ross, 2001).

The reduction of benthic prey availability in the 200 acres of old Gulfport Harbor Navigation Channel and the conversion of 77 acres of submerged habitat and seaward movement of MHW is expected to reverse over time (1 to 5 years) as coastal processes erode the beach. As noted above, the majority of sand placed below MHW will be in water depths less than 5 feet (1.5 meters). It is likely that any Gulf sturgeon in the project area will find appropriate and abundant prey in the areas adjacent to the project location as many other nearby sandy areas in the preferred foraging depths exist. Given the fairly uniform nature of benthic habitats offshore of the project area, the temporary minor shift of the unit seaward will not measurably

reduce the availability of these habitats. Therefore, Gulf sturgeon prey availability and abundance will be insignificantly affected by the project.

6.0 CUMULATIVE EFFECTS

ESA section 7 regulations require NMFS to consider cumulative effects in formulating their biological opinions (50 CFR 402.14). Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this opinion.

Within the action area, major future changes are not anticipated in the ongoing human activities described in the environmental baseline. The present, major human uses of the action area are expected to continue at the present levels of intensity in the near future.

Throughout the coastal Gulf of Mexico, the loss of numerous acres from barrier islands is occurring due to natural erosion and retreat, as well as reduced sediment input from many of the river systems that flow into the Mississippi Sound. Impacts caused by storms, relative sea level rise, and anthropogenic activities, including dredging of sand from the various federal navigation channels between Gulf of Mexico barrier islands (Bar Channels), appear to be the primary causes of barrier island loss. Such activities have likely resulted in a progressive reduction in sand supply downdrift to Horn Island and Ship Island (now East and West Ship Island).

The actions causing the effects mentioned above have been ongoing for many years. Despite this, both NMFS and the FWS determined that the areas affected by these actions contain the physical and biological characteristics essential for the conservation of Gulf sturgeon. Based on this determination, the action area, as well as other areas in the northeastern Gulf of Mexico, were designated critical habitat for Gulf sturgeon on April 18, 2003 (68 FR 13370, March 19, 2003). Many of the future actions affecting the critical habitat involve some degree of federal authorization (e.g., through MMS or COE) and will require consultation under section 7 of the ESA. Therefore, NMFS will monitor and consult on actions that may cause future degradation of Gulf sturgeon critical habitat.

7.0 DESTRUCTION OR ADVERSE MODIFICATION ANALYSIS

This section analyzes the effects of this action relative to the ecological function of designated critical habitat; that is, within Unit 8 the essential features continuing to provide juvenile, subadult and adult feeding, resting, and passage habitat for Gulf sturgeon from the Pascagoula and the Pearl Rivers (68 FR 13395).

As discussed above, Gulf sturgeon are opportunistic feeders that forage over large distances, and thus will be able to locate prey throughout portions of Unit 8 unaffected by this action. Given that sturgeon forage opportunistically while benthic cruising, they can easily locate prey and fulfill nutritional requirements in available sandy-areas adjacent to those impacted. While habitat known to support prey will be impacted, it is likely that any Gulf sturgeon in the project area will find appropriate and abundant prey in the areas adjacent to the project location as many other nearby sandy areas exist. Gulf sturgeon prey abundance has the ability to recover and recolonize, and therefore its resilience to the action should be considered. Recovery of the macrobenthic assemblages is expected as sediment composition pre- and post-construction at the deposition areas will be similar, and nearshore benthic assemblages are known to recover relatively quickly from physical disturbance. Conversion of sub-tidal habitat to emergent beach is expected to reverse over time as coastal erosion processes continue to erode the beach. Therefore, the

loss is expected to be a temporary (1 to 5 years) modification. Furthermore, limiting the placement of sand into the shallow areas and swash zone adjacent to the placement area reduces impacts to foraging Gulf sturgeon, as they are not likely to forage within this high-energy area.

Thus, the reduction of benthic prey availability for 200 acres and the conversion of 77 acres of submerged habitat and seaward movement of MHW, which is expected to reverse over time as coastal processes erode the beach, 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 proposed action will not interfere with actions or tasks identified in the Gulf sturgeon recovery plan (USFWS, GSMFC et al. 1995). Based on these findings, NMFS believes that although the areas affected within the project are critical habitat, the adverse effect will not adversely modify the prey availability and abundance function of critical habitat within Unit 8.

8.0 CONCLUSION

After reviewing the current status of Gulf sturgeon critical habitat Unit 8, the environmental baseline, the effects of the proposed action, and the cumulative effects, it is NMFS' biological opinion that the removal of material from the old Gulfport Harbor Navigation Channel and current Gulfport Harbor Federal Navigation Channel, and placement of material onto the beach and into the sub-tidal/intertidal zone in the project area will not reduce the critical habitat's ability to support the Gulf sturgeon's conservation, despite temporary adverse effects to sturgeon prey abundance from the dredging and filling. Following the dredging from the proposed borrow areas and dredged material placement along the shoreline, the benthic community structure will return to, or return nearly to, pre-dredging status (i.e., species diversity, species richness, species abundance) with some inherent natural variability within the borrow area. NMFS does not expect measurable impacts to Gulf sturgeon critical habitat as a result of impacts to water quality, migratory pathways, sediment quality, or prey abundance related to this project. NMFS concludes the action, as proposed, is not likely to destroy or adversely modify designated Gulf sturgeon critical habitat.

9.0 INCIDENTAL TAKE STATEMENT

NMFS does not anticipate that the proposed action will incidentally take any species and no take is authorized. However, any takes of sea turtles or Gulf sturgeon shall be immediately reported to takereport.nmfs.ser@noaa.gov and will be counted against the ITS of the GRBO, and the RPMs and terms and conditions of that ITS are applicable to this action.

10.0 CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authority to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species, to help implement recovery plans, or to develop information. NMFS believes that MDCOE should implement the following conservation recommendations:

1. Gather data describing community structure of the benthos in and near the project area that would help to determine local Gulf sturgeon prey availability and thereby assist in future assessments of impacts to designated critical habitat.

2. Gather data describing recovery rates of benthic assemblages impacted by the nearshore sand removal and the deposition of material into the sub-tidal/intertidal beach zone that would assist in future assessments of impacts to Gulf sturgeon prey items.

3. Gather data describing Gulf sturgeon location and movement in estuary, barrier island passes and littoral shelves, which would assist in future assessments of impacts to Gulf sturgeon migratory and feeding behavior.

In order for NMFS to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, NMFS requests notification of the implementation of any conservation recommendations.

11.0 REINITIATION OF CONSULTATION

This concludes formal consultation on the dredging and disposal of sand along West Ship Island in Mississippi Sound, Harrison County, Mississippi. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if (1) the amount or extent of taking specified in the incidental take statement is exceeded, (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered, (3) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the biological opinion, or (4) a new species is listed or critical habitat designated that may be affected by the identified action.

12.0 LITERATURE CITED

Abele, L. G. a. W. K. (1986). "An illustrated guide to the marine crustaceans of Florida. Technical Series Vol. 1 Number 1 Part 1. November 1986. Department of Environmental Regulation, State of Florida. p. 326.".

AFS (1989). "Common and scientific names of aquatic invertebrates from the United States and Canada: decapod crustaceans. Special Publication 17, Bethesda, Maryland. 77 pp.".

Carr, A. (1983). "All the way down upon the Suwannee River." Audubon Magazine **85**: 78-101.

Carr, S. H., F. Tatman, and F.A. Chapman (1996). "Observations on the natural history of the Gulf of Mexico sturgeon *Acipenser oxyrinchus desotoi* Vladykov 1955 in the Suwannee River, southeastern United States." Ecology of Freshwater Fish **5**: 169-174.

Clugston, J. P., A.M. Foster, and S.H. Carr. (1995). "Gulf sturgeon, *Acipenser oxyrinchus desotoi*, in the Suwannee River, Florida, USA. Pp. 215-224 *in:* A.D. Gershanovich and T.I.J. Smith, eds. Proceedings of International Symposium on Sturgeons. Moscow, Russia. September 6-11, 1993. 370 pp.".

Craft, N. M., B. Russell, and S. Travis (2001). "Identification of Gulf sturgeon spawning habitats and migratory patterns in the Yellow and Escambia River systems. Final Report to the Florida Marine Research Institute, Fish and Wildlife Conservation Commission. 19 pp."

Edwards, R. E., K.J. Sulak, M.T. Randall, and C.B. Grimes. (2003). "Movements of Gulf sturgeon (*Acipenser oxyrinchus desotoi*) in nearshore habitat as determined by acoustic telemetry." Gulf of Mexico Science **21**: 59-70.

Findeis, E. K. (1997). "Osteology and phylogenetic interrelationships of sturgeons (Acipenserids)." Environmental Biology of Fishes **48**: 73-126.

Foster, A. M., and J.P. Clugston. (1997). "Seasonal migration of Gulf sturgeon in the Suwannee River, Florida." Transactions of the American Fisheries Society **126**: 302-308.

Fox, D. A., and J.E. Hightower. (1998). "Gulf sturgeon estuarine and nearshore marine habitat use in Choctawhatchee Bay, Florida." Annual Report for 1998 to the National Marine Fisheries Service and the U.S. Fish and Wildlife Service. Panama City, Florida.: 29 pp.

Fox, D. A., J.E. Hightower, and F.M. Parauka. (2000). "Gulf sturgeon spawning, migration, and habitat in the Choctawhatchee River System, Alabama-Florida." Transactions of the American Fisheries Society **129**: 811-826.

Fox, D. A., J.E. Hightower, and F.M. Parauka. (2002). "Estuarine and nearshore marine habitat use by Gulf sturgeon from the Choctawhatchee River system, Florida." American Fisheries Society Symposium **28**: 111-126.

Gu, B., D. M. Schell, et al. (2001). "Stable Carbon Isotope Evidence for Reduced Feeding of Gulf of Mexico Sturgeon during Their Prolonged River Residence Period." Estuarine, Coastal and Shelf Science **53**(3): 275-280.

Heise, R., S.T. Ross and M. Dugo. (2002). "Population demographics of Gulf sturgeon in the Pascagoula drainage. Chapter 1 *In:* Ross, S.T., R.J. Heise, W.T. Slack, J.A. Ewing, III, and M. Dugo. 2002. Movement and habitat use of the Gulf sturgeon *Acipenser oxyrinchus desotoi* in the Pascagoula drainage of Mississippi: year VI. Mississippi Department of Wildlife, Fisheries, and Parks and Museum of Natural Science. Funded by U.S. Fish and Wildlife Service, Project No. E-1, Segment 17.".

Heise, R. J., S.T. Ross, M.F. Cashner, and W.T. Slack. (1999). "Movement and habitat use for the Gulf sturgeon *Acipenser oxyrinchus desotoi* in the Pascagoula drainage of Mississippi: year III. Museum Technical Report No. 74. Funded by U.S. Fish and Wildlife Service, Project No. E-1, Segment 14.".

Huff, J. A. (1975). Life history of Gulf of Mexico sturgeon, Acipenser oxyrhynchus desotoi, in Suwannee River, Florida. St. Petersburg, Fla., Florida Dept. of Natural Resources, Marine Research Laboratory.

Mason, W. T., Jr., and J.P. Clugston. (1993). "Foods of the Gulf sturgeon *Acipenser oxyrhynchus desotoi* in the Suwannee River, Florida." Transactions of the American Fisheries Society **122**: 378-385.

Maurer, D., R. Keck, J. Tinsman, W. Leathem, C. Wethe, M. Hutzinger, C. Lord, and T. Church (1978). "Vertical migration of benthos in simulated dredged material overburdens. Volume I: Marine benthos. U. S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, Mississippi. Dredged Material Research Program. Technical Report No. D-78-35."

Menzel, R. W. (1971). "Checklist of the marine fauna and flora of the Apalachee Bay and the St. George Sound area. Third Edition. Department of Oceanography, Florida State University, Tallahassee, Florida. 126 pp.".

Morrow, J. V. J., K.J. Killgore, J.P. Kirk, and H.E. Rogillio. (1998). "Distribution and population attributes of Gulf Sturgeon in the lower Pearl River System, Louisiana." Proceedings of the Annual Conference Southeastern Association of Fish and Wildlife Agencies **50 1996**: 79-90.

Nelson, W. G. (1989). "An overview of the effects of beach nourishment on the sand beach fauna. Pp. 295-310 *In:* L.S. Tait (ed.), Beach Preservation Technology >88: Problems and Advancements in Beach Nourishment. Tallahassee, Florida Shore and Beach Preservation Association."

Nelson, W. G. (1993). "Beach restoration in the southeastern US: environmental effects and biological monitoring." Ocean & Coastal Management **19**: 157-182.

NMFS (1998). "Recovery plan for the shortnose sturgeon (*Acipenser brevirostrum*). Prepared by the shortnose sturgeon recovery team for the National Marine Fisheries Service, Silver Spring, Maryland. 104 pp.".

NMFS (2003). Endangered Species Act section 7 consultation on the dredging of Gulf of Mexico navigation channels and sand mining ("borrow") areas using hopper dredges by COE Galveston, New Orleans, Mobile, and Jacksonville Districts. Revised Biological Opinion (November 2003).

Odenkirk, J. S. (1989). "Movements of Gulf of Mexico sturgeon in the Apalachicola River, Florida." Proceedings of the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies **43**: 230-238.

Parauka, F. M., S.K. Alam, and D.A. Fox (2001). "Movement and habitat use of subadult Gulf sturgeon in Choctawhatchee Bay, Florida." Proceedings Annual Conference Southeast Association of Fish and Wildlife Agencies **55**: 280-297.

Rakocinski, C. F., R.W. Heard, S.E. LeCroy, J.A. McLelland, and T. Simons (1996). "Responses by macrobenthic assemblages to extensive beach restoration at Perdido Key, Florida, U.S.A." Journal of Coastal Research **12**: 326-353.

Reynolds, C. R. (1993). "Gulf sturgeon sightings, historic and recent-a summary of public responses." U.S. Fish and Wildlife Service. Panama City, FL. 40 pp.

Rogillio, H. E., E.A. Rabalais, J.S. Forester, C.N. Doolittle, W.J. Granger, and J.P. Kirk. (2001). "Status, movement and habitat use study of Gulf sturgeon in the Lake Pontchartrain Basin, Louisiana." Louisiana Department of Wildlife and Fisheries.: 43 pp.

Ross, S. T., R.J. Heise, M.A. Dugo, and W.T. Slack. (2001b). "Movement and habitat use of the Gulf sturgeon (*Acipenser oxyrinchus desotoi*) in the Pascagoula drainage of Mississippi: year V. Department of Biological Sciences, University of Southern Mississippi, and Mississippi Museum of Natural Science. Funded by U.S. Fish and Wildlife Service, Project No. E-1, Segment 16.".

Ross, S. T., R.J. Heise, W.T. Slack, and M. Dugo. (2001a). "Habitat requirements of Gulf Sturgeon (*Acipenser oxyrinchus desotoi*) in the northern Gulf of Mexico. Department of Biological Sciences, University of Southern Mississippi and Mississippi Museum of Natural Science. Funded by the Shell Marine Habitat Program, National Fish and Wildlife Foundation. 26 pp.".

Ross, S. T., R.J. Heise, W.T. Slack, J.A. Ewing, III, and M. Dugo. (2000). Movement and habitat use of the Gulf sturgeon *Acipenser oxyrinchus desotoi* in the Pascagoula drainage of Mississippi: year IV. Mississippi Department of Wildlife, Fisheries, and Parks, and Mississippi Museum of Natural Science. Funded by U.S. Fish and Wildlife Service, Project No. E-1, Segment 15. 58 pp.

Sulak, K. J., and J.P. Clugston. (1999). "Recent advances in life history of Gulf of Mexico sturgeon *Acipenser oxyrinchus desotoi* in the Suwannee River, Florida, U.S.A.: a synopsis." Journal of Applied Ichthyology. **15**: 116-128.

USFWS, GSMFC, et al. (1995). "U.S. Gulf Sturgeon Recovery/Management Plan. Atlanta, Georgia.": 170 pp.

Westneat, M. W. (2001). "Ingestion in fish." Encyclopedia of Life Science **12**: 1-6.

Wooley, C. M., and E.J. Crateau. (1985). "Movement, microhabitat, exploitation, and management of Gulf of Mexico sturgeon, Apalachicola River, Florida." North American Journal of Fisheries Management **5**: 590-605.

APPENDIX C (BIOLOGICAL ASSESSMENT)

Biological Assessment
West Ship Island North Shore Restoration
Mississippi Coastal Improvements Program (MsCIP)
Mississippi Sound, Harrison County, Mississippi

The MsCIP Barrier Island Restoration Plan as identified in the MsCIP Comprehensive Plan and Integrated Programmatic Environmental Impact Statement (EIS) includes restoration of Ship Island. The proposed action identified in this Biological Assessment (BA) includes the placement of sand along the northern shore of West Ship Island. Placement of this sandy material will stabilize Western 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. 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 of Fort Massachusetts, a historical site on West Ship Island. The wider fill will take place east of the Fort. A vicinity map of the project area is shown in Figure 1.

Project Description

The sandy material used in the ecosystem restoration effort at West Ship Island will come from two identified borrow areas – the federally authorized Gulfport Harbor widening project at the Bar channel funded by the Flood Control and Coastal Emergencies (FCCE) and the old Gulfport Harbor channel which was abandoned in the 1990s as shown on Figure 2. A Supplemental EIS was prepared in February 2009 to address environmental impacts of widening the Federal Gulfport Harbor navigation channel to its authorized dimensions. The material dredged from that channel is to be placed in either the existing littoral zone disposal site or the designated beneficial use site adjacent to the Chandeleur Islands. The National Marine Fisheries Service (NMFS) was consulted regarding potential impacts to threatened and endangered species and designated critical habitat and in a letter dated May 7, 2009, concluded no effects to listed species and the project would not likely adversely modify or destroy Gulf sturgeon critical habitat, (I/SER/2007/01483) and additionally stated the Gulfport Harbor Navigation Project is considered a major shipping channel and is identified on standard navigation charts, is excluded from, and not considered as part of Gulf sturgeon critical habitat, as specified by 50 CFR 226.214(h)(2).

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 from the Gulfport Harbor Channel is approximately 128,000 cubic yards. The sand borrow area is located between channel stations 525+00 and 628+00. 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. The material from the Gulfport Harbor Channel would be dredged by using a hopper dredge and directly pumped onto the beach.

The Gulfport Federal Navigation Ship Channel was relocated further westward in the early 1990s and the old abandoned section of the Federal project acts as a deposition basin for sand from Ship Island that naturally migrates to west due to littoral drift in this area. Additional sand that would be used for the placement along the northern shore 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 272,000 cubic yards. Work in the old navigation channel would require use of a pipeline dredge due to the shallow water depth. Material from this area has been used five times in the past to provide a sand source for use beach nourishment near Fort Massachusetts by the National Park Service (NPS).

The project area comprises approximately 77 acres. The two sources of sand combined will provide approximately 400,000 cubic yards of sand for use on West Ship Island and will be placed in the designated area shown in Figure 3. Best management practices would be used to minimize turbidity impacts to adjacent biological resources and submerged aquatic vegetation (SAV)s 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.

The project area is located within Gulf sturgeon (*Acipenser oxyrinchus desotoi*) critical habitat Unit 8, which consists of areas within Lake Pontchartrain (east of causeway), Lake Catherine, Little Lake, the Rigolets, Lake Borgne, Pascagoula Bay, and Mississippi Sound systems in Louisiana and Mississippi, and sections of the state waters within the Gulf of Mexico as shown on Figure 4. The U.S. Army Corps of Engineers (Corps), Mobile District has prepared this BA to address potential impacts to threatened or endangered species including designated critical habitat associated with the proposed project.

Previous Coordination

1. Formal consultation under Section 7 of the Endangered Species Act for the proposed Gulfport Harbor Navigation Project Improvements, i.e., widening of the existing channel to its authorized dimensions (F/SER/2007/02307), dated May 7, 2007.

2. Regional Biological Opinion (RBO) for Dredging of Gulf of Mexico Navigation Channels and Sand Mining Areas Using Hopper Dredges by COE Galveston, New Orleans, Mobile, and Jacksonville Districts (Consultation Number F/SER/2000/01287) dated November 19, 2003 and subsequent revisions.

Description of Listed Species

The NMFS, Protected Resource Division, St. Petersburg Field Office lists the following species under their purview as either threatened and/or endangered that may occur within the area:

Marine Mammals
E-blue whale - (*Balaenoptera musculus*)
E- finback whale - (*Balaenoptera physalus*)
E-humpback whale - (*Megaptera novaeangliae*)
E- sei whale - (*Balaenoptera borealis*)
E- sperm whale - (*Physeter macrocephalus*)

Turtles
T- green sea turtle - (*Chelonia mydas*)
E- hawksbill sea turtle - (*Eretmochelys imbricate*)
E- Kemp's ridley sea turtle - (*Lepidochelys kempii*)
E- leatherback sea turtle - (*Dermochelys coriacea*)
T- loggerhead sea turtle - (*Caretta caretta*)

Fish
T- Gulf sturgeon- (*Acipenser oxyrinchus desotoi*)

Federally protected species, such as the blue whale, finback whale, humpback whale, sei whale, and sperm whale are not considered in this BA as these species are unlikely to be found in or near the project area due to the shallowness of the project area in Mississippi Sound. Of particular concern in this BA are the species that may likely occur within the project vicinity which include: loggerhead, leatherback, Kemp's ridley, and green sea turtles, and the Gulf sturgeon.

<u>Loggerhead Sea Turtle</u>
The loggerhead sea turtle is a medium to large turtle. Adults are reddish-brown in color and generally 31 to 45 inches in shell length with the record set at more than 48 inches. Loggerheads weigh between 170 and 350 pounds with the record set at greater than 500 pounds. Young loggerhead sea turtles are brown above and whitish, yellowish, or tan beneath, with three keels on their back and two on their underside.

Loggerhead sea turtles occur throughout the temperate and tropical regions of the Atlantic, Gulf of Mexico, Pacific, and Indian Oceans. This species may be found hundreds of miles out to sea, as well as in inshore areas such as bays, lagoons, salt marshes, creeks, and the mouths of large rivers. In shallow Florida lagoons, loggerheads were found during the morning and evening, leaving the area during mid-day when temperatures reached 87° F. At dusk, turtles moved to a sleeping site and remained there until morning, possibly in response to changes in light or water temperature (Nelson 1986).

Loggerhead turtles are essentially carnivores, feeding primarily on sea urchins, sponges, squid, basket stars, crabs, horseshoe crabs, shrimp, and a variety of mollusks. Their strong beak-like jaws are adapted for crushing thick-shelled mollusks. Although loggerhead sea turtles are primarily bottom feeders, they also eat jellyfish and mangrove leaves obtained while swimming

and resting near the sea surface. Presence of fish species such as croaker in stomachs of stranded individuals may indicate feeding on the by-catch of shrimp trawling (Landry, 1986). Caldwell et al. (1955) suggest that the willingness of the loggerhead to consume any type of invertebrate food permits its range to be limited only by the presence of cold water.

As loggerheads mature, they travel and forage through nearshore waters until their breeding season, when they return to the nesting beach areas. The majority of mature loggerheads appear to nest on a two or three year cycle. Major nesting beaches for loggerheads include the Sultanate of Oman, southeastern United States, and eastern Australia. From a global perspective, the southeastern U.S. nesting aggregation is of paramount importance to the survival of the species and is second in size only to the nesting aggregation on Masirah Island, Oman. This species nests within the U.S. from Texas to Virginia, although the major nesting concentrations are found along the Atlantic coast of Florida, Georgia, South Carolina, and North Carolina. About 80 percent of all loggerhead nesting in the southeastern U.S. occurs in six Florida counties (Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward Counties). Total estimated nesting in the U.S. is approximately 50,000 to 70,000 nests per year. Nesting in the northern Gulf outside of Florida occurs primarily on the Chandeleur Islands in Louisiana and to a lesser extent on adjacent Ship, Horn, and Petit Bois Islands in Mississippi (Ogren 1977). Ogren (1977) reported a historical reproductive assemblage of sea turtles, which nested seasonally on remote barrier beaches of eastern Louisiana, Mississippi, and Alabama.

Loss or degradation of suitable nesting habitat may be the most important factor affecting the nesting population in northern Gulf of Mexico. Overall the loss of nesting beaches, hatchling disorientation from artificial light, drowning in fishing and shrimping trawls, marine pollution, plastics, and styrofoam have led to the decline of loggerheads.

Loggerhead sea turtles are considered turtles of shallow water. Juvenile loggerheads are thought to utilize bays and estuaries for feeding, while adults prefer waters less than 165 feet deep (Nelson 1986). Aerial surveys suggest that loggerheads (benthic immatures and adults) in U.S. waters are distributed in the following proportions: 54% in the southeast U.S. Atlantic, 29% in the northeast U.S. Atlantic, 12% in the eastern Gulf of Mexico, and 5% in the western Gulf of Mexico. During aerial surveys of the Gulf of Mexico, the majority (97 percent) of loggerheads was seen off the east and west coasts of Florida (Fritts 1983). Most were observed around mid-day near the surface, possibly related to surface basking behavior (Nelson 1986). Although loggerheads were seen off the coast of Alabama, Mississippi, and Louisiana, they were 50 times more abundant in Florida than in the western Gulf. The majority of the sightings were in the summer (Fritts et al. 1983). An individual tagged in Perdido Bay, Alabama was recaptured one year later only about a mile from the original capture site.

Loggerheads are frequently observed near offshore oil platforms, natural rock reefs, and rock jetties along the Gulf Coast. Large numbers of stranded turtles were observed inshore of such areas (Rabalais and Rabalais 1980). Fishermen reported sightings of large turtles near the Gulf Coast. In a recent tracking study, loggerheads spent more than 90 percent of the time underwater, tended to avoid colder water, and spent much of the time in the vicinity of oil and gas structures, such as those found offshore of Mississippi and Alabama.

Green Sea Turtle

The green sea turtle is mottled brown in color. The name is derived from the greenish fat of the body. The carapace is light or dark brown. It is sometimes shaded with olive, often with radiating mottled or wavy dark markings or large dark brown blotches. This species is considered medium to large in size for sea turtles with an average length of 36 to 48 inches. The record was set at about 60 inches in length. Its weight ranges from about 250 to 450 pounds with the record at more than 650 pounds. The upper surfaces of young green turtles are dark brown, while the undersides are white.

Although green sea turtles are found worldwide, this species is concentrated primarily between the 35° North and 35° South latitudes. Green sea turtles tend to occur in waters that remain warmer than 68° F; however, there is evidence that they may be buried under mud in a torpid state in waters to 50° F (Ehrhart 1977; Carr et al. 1979).

This species migrates often over long distances between feeding and nesting areas (Carr and Hirth 1962). During their first year of life, green sea turtles are thought to feed mainly on jellyfish and other invertebrates. Adult green sea turtles prefer an herbivorous diet frequenting shallow water flats for feeding (Fritts et al. 1983). Adult turtles feed primarily on seagrasses, such as *Thalassia testudinum*. This vegetation provides the turtles with a high fiber content and low forage quality (Bjorndal 1981a). Caribbean green sea turtles are considered by Bjorndal (l981b) to be nutrient-limited, resulting in low growth rate, delayed sexual maturity, and low annual reproductive effort. This low reproductive effort makes recovery of the species slow once the adult population numbers have been severely reduced (Bjorndal 1981). In the Gulf of Mexico, principal foraging areas are located in the upper west coast of Florida (Hirth 1971). Nocturnal resting sites may be a considerable distance from feeding areas, and distribution of the species is generally correlated with grassbed distribution, location of resting beaches, and possibly ocean currents (Hirth 1971).

Major nesting areas for green sea turtles in the Atlantic include Surinam, Guyana, French Guyana, Costa Rica, the Leeward Islands, and Ascension Island in the mid-Atlantic. Historically in the U.S., green turtles have been known to nest in the Florida Keys and Dry Tortugas. Yet, these turtles primarily nest on selected beaches along the coast of eastern Florida, predominantly Brevard through Broward Counties. However, they probably nested along the Gulf Coast before their decline. In the southeastern U.S., nesting season is roughly June through September. Nesting occurs nocturnally at 2, 3, or 4-year intervals. Only occasionally do females produce clutches in successive years. Estimates of age at sexual maturity range from 20 to 50 years (Balazs 1982; Frazer and Ehrhart 1985) and they may live over 100 years. Immediately after hatching, green turtles swim past the surf and other shoreline obstructions, primarily at depths of about 8 inches or less below the water surface, and are dispersed both by vigorous swimming and surface currents (Balzas 1980). The whereabouts of hatchlings to juvenile size is uncertain. Green turtles tracked in Texas waters spent more time on the surface, with fewer submergences at night than during the day, and a very small percentage of the time was spent in the Federally maintained navigation channels. The tracked turtles tended to utilize jetties, particularly outside of them, for foraging habitat (Renaud et. Al. 1993).

Most green turtle populations have been depleted or endangered because of direct exploitation or incidental drowning in trawl nets (King 1981). A major factor contributing to the green turtle's decline worldwide is commercial harvest for eggs and meat. In Florida, the nesting population was nearly extirpated within 100 years of the initiation of commercial exploitation (King 1981). Fibropapillomatosis, a disease of sea turtles characterized by the development of multiple tumors on the skin and internal organs, is also a mortality factor and has seriously impacted green turtle populations in Florida, Hawaii, and other parts of the world. These tumors interfere with swimming, eating, breathing, vision, and reproduction, and turtles with heavy tumor burdens become severely debilitated and die. Other threats include loss or degradation of nesting habitat from coastal development and beach armoring; disorientation of hatchlings by beachfront lighting; excessive nest predation by native and non-native predators; degradation of foraging habitat; marine pollution and debris; watercraft strikes; and incidental take from commercial fishing operations.

Kemp's ridley turtle

The Kemp's ridley occurs mainly in coastal areas of the Gulf of Mexico and the northwestern Atlantic Ocean with occasional individuals reaching European waters. Adults of this species are generally confined to the Gulf of Mexico, although some adults are sometimes found on the east coast of the U.S. Females return to their nesting beach about every other year with nesting occurring from April into July and usually limited to the western Gulf of Mexico. The mean clutch size for this species is about 100 eggs per nest and an average of 2.5 nests per female per season.

Benthic immature turtles have been found along the eastern seaboard of the U.S. and in the Gulf of Mexico. In Gulf, studies suggest that immature turtles stay in shallow, warm, nearshore waters in the northern Gulf until cooling waters force them offshore or south along the Florida coast (Renaud 1995). Little is known of the movements of the post-hatching stage (pelagic stage) within the Gulf. Studies have indicated that this stage varies from 1 to 4 or more years and the benthic immature stage lasts about 7 to 9 years (Schmid and Witzell 1997). The maturity age of this species is estimated to be 7 to 15 years.

Of the seven extant species of sea turtles, the Kemp's ridley has declined to the lowest population level. However, recent studies have indicated that increased nesting activities and suggest that the decline in ridley population has stopped and the population is now increasing (USFWS 2000). A period of steady increase in the benthic immature turtles has been occurring since 1990 and suggests a result of increased hatchling production and survival rates of the immature turtles. The increased survival of immature individuals is believed to be in part a result of the use of turtle exclusion devices (TEDs) in the commercial shrimping fleets. Future threats to the species include interaction with fishery gear; marine pollution; destruction of foraging habitat; illegal poaching; and impacts to nesting beaches associated with rising sea level, development, and tourism pressure.

Leatherback Sea Turtle

The leatherback sea turtles are the largest of all sea turtles. These turtles may reach a length of about 7 feet and weigh as much as 1,600 pounds. The carapace is smooth and is colored gray,

green, brown, and black. The plastron is yellowish white. Juveniles are black on top and white on the bottom.

This species is highly migratory and is the most pelagic of all sea turtles (NMFS and USFWS 1992). They are commonly found along continental shelf waters (Pritchard 1971; Hirth 1980; Fritts et al. 1983). Leatherback sea turtles' range extends from Cape Sable, Nova Scotia, south to Puerto Rico and the U.S. Virgin Islands. Leatherbacks are found in temperate waters while migrating to tropical waters to nest (Ross 1981). Distribution of this species has been linked to thermal preference and seasonal fluctuations in the Gulf Stream and other warm water features (Fritts et al. 1983). General decline of this species is attributed to exploitation of eggs (Ross 1981).

Leatherback sea turtles are omnivorous. Leatherbacks feed mainly on pelagic soft-bodied invertebrates, such as jellyfish and tunicates. Their diet may also include squid, fish, crustaceans, algae, and floating seaweed. Highest concentrations of these prey animals are often found in upwelling areas or where ocean currents converge. They will also ingest plastic bags and other plastic debris, which are commonly generated by oil drilling rigs and production platforms in coastal Florida, Alabama, Mississippi, and Louisiana (Fritts et al. 1983).

Nesting of leatherback sea turtles is nocturnal with only a small number of nests occurring in the United States in the Gulf of Mexico (Florida) from April to late July (Pritchard 1971; Fuller 1978; Fritts et al. 1983). Leatherback sea turtles prefer open access beaches possibly to avoid damage to their soft plastron and flippers. Unfortunately, such open beaches with little shoreline protection are vulnerable to beach erosion triggered by seasonal changes in wind and wave direction. Thus, eggs may be lost when open beaches undergo severe and dramatic erosion. The Pacific coast of Mexico supports the world's largest known concentration of nesting leatherbacks. There is very little nesting in the U. S. (Gunter 1981).

Disturbance of the nesting grounds is the most serious threat to leatherback sea turtles. Although the flesh of this sea turtle is not eaten, the population has been threatened by egg-harvesting in countries, such as Malaysia, Surinam, the Guianas, the west coast of Mexico, Costa Rica, and in several Caribbean islands. Leatherbacks were killed in the past for the abundant oil they yield, which was used for oil lamps and for caulking wooden boats. Ingesting plastic bags and other plastic wastes are another cause of death for leatherbacks turtles. The sea turtles confuse plastic wastes with one of their favorite foods jellyfish. When swallowed, plastics can clog a turtle's throat, esophagus, and intestines.

Gulf Sturgeon

The NMFS and U.S. Fish and Wildlife Service (USFWS) listed the Gulf sturgeon as a threatened species on September 30, 1991. The Gulf sturgeon, also known as the Gulf of Mexico sturgeon, is a subspecies of the Atlantic 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 180 to 240 cm (71-95 inches) in length, with adult females larger than adult males. The skin is scaleless, brown dorsally and pale ventrally and imbedded with 5 rows of bony plates.

Adult fish are bottom feeders, eating primarily invertebrates, including brachiopods, insect larvae, mollusks, worms and crustaceans. Gulf sturgeon are anadromous, with reproduction occurring in fresh water. Most adult feeding takes place in the Gulf of Mexico and its estuaries. The fish return to breed in the river system in which they hatched. Spawning occurs in areas of deeper water with clean (rock and rubble) bottoms. The eggs are sticky and adhere in clumps to snags, outcroppings, or other clean surfaces. Sexual maturity is reached between the ages of 8 and 12 years for females and 7 and 10 years for males.

Historically, the Gulf sturgeon occurred from the Mississippi River to Charlotte Harbor, Florida. It still occurs, at least occasionally, throughout this range, but in greatly reduced numbers. The fish is essentially confined to the Gulf of Mexico. River systems where the Gulf sturgeon are known to be viable today include the Mississippi, Pearl, Escambia, Yellow, Choctawhatchee, Apalachicola, and Suwannee Rivers, and possibly others.

Gulf Sturgeon Critical Habitat

NMFS and USFWS jointly designated Gulf sturgeon critical habitat on April 18, 2003 (68 FR 13370, March 19, 2003). The term "critical habitat" is defined in section 3(5)(A) of the Endangered Species Act (ESA) as (i) the specific areas within the geographic area occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (I) essential to the conservation of the species and (II) that may require special management considerations or protection; and (ii) specific areas outside the geographic area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. "Conservation" is defined in section 3(3) of the ESA as the use of all methods and procedures that are necessary to bring any endangered or threatened species to the point at which listing under the ESA is no longer necessary. Critical habitat for the Gulf sturgeon within the project vicinity is identified as Unit 8 (approximately 881,280 acres), Lake Pontchartrain, (east of causeway), Lake Catherine, Little Lake, the Rigolets, Lake Borgne, Pascagoula Bay, and Mississippi Sound systems in Louisiana and Mississippi, and sections of the state waters within the Gulf of Mexico.

This unit provides juvenile, subadult and adult feeding, resting, and passage habitat for Gulf sturgeon from the Pascagoula and the Pearl River subpopulations (68 FR 13395). One or both of these subpopulations have been documented by tagging data, historic sightings, and incidental captures as using Pascagoula Bay, the Rigolets, the eastern half of Lake Pontchartrain, Little Lake, Lake St. Catherine, Lake Borgne, Mississippi Sound, within 1 nautical mile of the nearshore GOM adjacent to the barrier islands and within the passes (Reynolds, 1993; Morrow et al., 1998; and Ross et al., 2001). Substrate in these areas range from sand to silt, all of which contain known Gulf sturgeon prey items (Menzel, 1971; Abele and Kim, 1986; and American Fisheries Society, 1989). Incidental captures and recent studies confirm that both Pearl River and Pascagoula River adult Gulf sturgeon winter in the Mississippi Sound, particularly around barrier islands and barrier islands passes (Reynolds, 1993 and Ross et al., 2001). Gulf sturgeon exiting the Pascagoula River move both east and west, with telemetry locations as far east as Dauphin Island and as far west as Cat Island and the entrance to Lake Pontchartrain, Louisiana (Ross et al., 2001a). Tagged Gulf sturgeon from the Pearl River subpopulation have been located between Cat Island, Ship Island, Horn Island, and east of Petit Bois Island to the Alabama state line (Rogillio et al., 2002). Habitat used by Gulf sturgeon in the vicinity of the

barrier islands is 6.2 to 19.4 feet deep (average 13.8 feet), with clean sand substrata (Heise et al., 1999 and Ross et al., 2001). Inshore locations where Gulf sturgeon were located were 6.2 to 9.2 feet deep and all had mud (mostly silt and clay) substrata (Heise et al., 1999), typical of substrates supporting known Gulf sturgeon prey.

The primary constituent elements essential for the conservation of the Gulf sturgeon are those habitat components that support foraging, water quality, sediment quality, and safe unobstructed migratory pathways. The Mississippi Sound provides: foraging, water quality, sediment quality, and migration habitat for Gulf sturgeon.

Foraging: Unit 8 provides foraging habitat for the Gulf sturgeon. Little data is available on Gulf sturgeon feeding habitats. Their threatened status limits sampling efforts. Generally, adults and subadults could be described as opportunistic benthivores typically feeding on benthic marine invertebrates including amphiopods, lancelets, polychaetes, gastropods, shrimp, isopods, mollusks, and crustaceans. The benthic community noted by Vittor and Associates (1982) within Mississippi Sound provides suitable forage habitat for adult and subadult fish.

As Gulf sturgeon feed principally on benthic invertebrates, potential impacts to the foraging constituent element would be confined to possible impacts to the benthic community. Vittor and Associates (1982) classified the benthic community in a study of Mississippi Sound and selected sites in the Gulf of Mexico (GOM). In the Sound, a total of 437 taxa were collected at densities ranging from 1,097 to 35,537 individuals per square meter. Generally, densities increase from fall through the spring months since most of the dominant species exhibit a late winter to early spring peak in production. Species diversity, evenness, and species richness (number of taxa) demonstrate only minor inconsistent temporal fluctuations. Biomass per unit area also increases from fall to spring, primarily as a result of higher densities. Vittor and Associates (1982) named several opportunistic species that are ubiquitous in Mississippi Sound and nearshore GOM. These species, though sometimes low to moderate in abundance, occur in a wide range of environmental conditions. They are usually the most successful at early colonization and thus tend to strongly dominate the sediment subsequent to disturbances. These species include *Mediomastus* spp., *Paraprionospio pinnata, Myriochele oculata, Owenia fusiformis, Lumbrineris app.,Sigambra tentaculata,* the *Linopherus-Paraphinome* complex, and *Magelona cf. phyllisae*. The *phoronid, Phoronis* sp., and the *cumacean, Oxyurostylis smithi,* also fit this category. *M. oculata* and *O. fusiformis* are predominate species in Mississippi Sound. The numerically dominant species collected during the study, were *Mediomastus californiensis* and *Paraprionospio pinnata*.

Water Quality: 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. Water quality within the Mississippi Sound is influenced by several factors, including the discharge of freshwater from rivers, seasonal climate changes, and variations in tide and currents. The primary driver of water quality is the rivers, including the Pascagoula River that feed into the Sound. Freshwater inputs provide nutrients and sediments that serve to maintain productivity both in the Sound and in the extensive salt marsh

habitats bordering the estuaries of the Sound. The salt marsh habitats act to regulate the discharge of nutrients to coastal waters and serve as a sink for pollutants. Suspended sediments enter the Sound from freshwater sources, but are hydraulically restricted due to the barrier islands. The barrier islands, combined with the Sound's shallow depth and mixing from wind, tides, and currents, promote re-suspension of sediments. These suspended sediments give Mississippi Sound a characteristic brownish color (MDEQ, 2006).

Sediment Quality: 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.

Migration Habitat: 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. Gulf sturgeon exiting the Pascagoula River move both east and west, with telemetry locations as far east as Dauphin Island and as far west as Cat Island and the entrance to Lake Pontchartrain, Louisiana (Ross et al., 2001). Tagged Gulf sturgeon from the Pearl River subpopulation have been located between Cat Island, Ship Island, Horn Island, and east of Petit Bois Island to the Alabama state line (Rogillio et al., 2002). The species could potentially migrate through the project area.

Effects of Proposed Action

<u>Sea Turtles</u>

The Proposed Action will utilize a hydraulic cutter head and hopper dredge. Existing Biological Opinions on hopper dredging in the U.S. South Atlantic and GOM waters (most recently, 9 January 2007, regional biological opinion (RBO) to the Corps four GOM districts) have established that non-hopper type dredging methods have discountable effects on, or are not likely to adversely affect, currently listed sea turtles (I/SER/2006/02953); I/SER/2006/01096). Hydraulic or mechanical dredging is not known to take sea turtles; sea turtles are highly mobile and will likely avoid the area due to project activity and noise. Normal behavior patterns of sea turtles are not likely to be significantly disrupted by the project activities because of the short-term localized nature of the activities and the ability of sea turtles to avoid the immediate area.

A dredge would be used in conjunction with widening of the existing Gulfport Harbor Federal Navigation Project. This project was previously coordinated regarding impacts to listed species and designated critical habitat (I/SER/2007/01483). Hopper dredges are known to adversely impact federally-listed species (i.e. sea turtles and Gulf sturgeon) by entrainment in the suction dragheads. To reduce the possibility of protected species interactions, the Corps intends to have the dredge dragheads equipped with sea turtle deflector devices. In addition, 100% of the material dredged will pass through 4-inch screening boxes where it will be screened by a NMFS-approved observer for evidence of protected species interactions. There will be 100% observer coverage aboard the dredge (i.e. two observers) according to the RBO. The Corps will adhere to the terms and conditions of the RBO and will incorporate relocation trawling as described in the Reasonable and Prudent Measures of the RBO. These trawling relocation efforts are currently

perceived as an effective method of protection for both sea turtles and Gulf sturgeon during hopper dredging projects where the species are likely to be present. As such, the Corps has no reason to believe that properly conducted trawling efforts as described in the Reasonable and Prudent Measures of the 2003 RBO would result in significant adverse impacts to the species.

Considering the lack of potential effects by hydraulic dredges and the precautionary steps taken when utilizing a hopper dredge, we believe the proposed project will not jeopardize the continued existence of the species.

Gulf Sturgeon

The Proposed Action will utilize a hydraulic cutter head and hopper dredge. Existing Biological Opinions on hopper dredging in the U.S. South Atlantic and GOM waters (most recently, 9 January 2007, RBO to the Corps four GOM districts) have established that non-hopper type dredging methods have discountable effects on, or are not likely to adversely affect, currently listed Gulf sturgeon (I/SER/2006/02953; I/SER/2006/01096). Hydraulic or mechanical dredging is not known to take Gulf sturgeon; Gulf sturgeon are highly mobile and will likely avoid the area due to project activity and noise. Normal behavior patterns of Gulf sturgeon are not likely to be significantly disrupted by the project activities because of the short-term localized nature of the activities and the ability of Gulf sturgeon to avoid the immediate area.

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Considering the lack of potential effects by hydraulic dredges and the precautionary steps taken when utilizing a hopper dredge, we believe the proposed project will not jeopardize the continued existence of the species.

Gulf Sturgeon Critical Habitat

The Corps believes alteration of Gulf sturgeon critical habitat is likely as a result of dredging the sandy material to be used for restoration around the fort. The dredging site would be deepened

and the remaining substrate would be similar to that of which exists prior to the dredging event. This conclusion is derived after evaluation of the impacts to the Primary Constiuent Elements (PCEs) present in the project area. Unit 8 is listed due to four of the six constituent elements that identify critical habitat. These PCEs consist of the following: foraging, water quality, sediment quality, and migration habitat.

Direct Effects. Critical habitat Unit 8 encompasses Lake Pontchartrain east of the Lake Pontchartrain Causeway, Little Lake, The Rigolets, Lake St. Catherine, and Lake Borgne, including Heron Bay, and the Mississippi Sound. The Mississippi Sound includes adjacent open bays including Pascagoula Bay, Point aux Chenes Bay, Grand Bay, Sandy Bay, and barrier island passes, including Ship Island Pass, Dog Keys Pass, Horn Island Pass, and Petit Bois pass. The action area, restoration of the northern shoreline of West Ship Island, is located within the boundaries of Unit 8, one nautical mile seaward of the westernmost extremity of Cat Island continuing one nautical mile offshore of a straight line drawn from the southern tip of Cat Island to the western tip of Ship Island and within Mississippi Sound.

Unit 8 provides juvenile, subadult, and adult feeding, resting, and passage habitat for Gulf sturgeon from the Pascagoula and the Pearl River subpopulations (68 FR 13395); fish are consistently located both inshore and around/between the barrier islands (i.e., Cat, Ship, Horn, and Petit Bois) within this unit (Reynolds, 1992; Rogillio et al., 2001; Ross et al., 2001a). Four PCEs are present in critical habitat Unit 8 and include abundant prey items for subadults and adults, water quality, sediment quality, and safe and unobstructed migratory pathways. Unit 8 of Gulf sturgeon critical habitat encompasses a total of approximately 881,421 acres. The proposed action, dredging of sandy material from within the old abandoned Gulfport ship channel would impact up to 200 acres of area designated as critical habitat. Dredging of the existing Gulfport Federal channel to its widened dimensions as stated earlier would be considered excluded. Approximately 675,000 cubic yards of sandy material would be placed along the northern shoreline of West Ship Island within approximately 250 acres, of which 80 acres is designated critical habitat. The action area constitutes .03 percent of the total area within Unit 8.

Temporary Effects.

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 a few months upon completion of the project remaining functionally identical to the existing habitat. The project area constitutes a fraction of one percent of the total available forage habitat for the species in that area. As this is a borrow area that has been dredged routinely in the past, the sandy dredged material will be of the same composition as that of the adjacent sandy disposal areas at Western Ship Island since the material in the borrow area (i.e. abandoned ship channel) came from Western Ship Island and previous maintenance of the channel. Therefore, no long-term change in community structure is expected to occur.

Water Quality.

Potential water quality impacts as a result of dredging and disposal from the widening project were considered through previous coordination, I/SER/2007/01483. Dredging within the old abandoned ship channel and subsequent placement at Western Ship Island will create some degree of turbidity in excess of the natural condition. This turbidity is generated by the fines fraction of the sediments. Impacts from sediment disturbance during these operations are expected to be temporary, minimal, and similar to conditions present as seen during routine frontal storm events. It is expected during dredging and placement that suspended particles will settle out within a short time frame, with no measurable effects on water quality, especially in that this is predominantly sandy material.

During dredging and placement operations, turbidity levels would be monitored, to ensure compliance with state water quality certification. Temperature, salinity, and density profiles would be affected as a result of water column mixing during dredging and placement activities. Profiles would return to previous conditions following completion of the operations. 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.

Sediment Quality.

The non-motile benthic community within the project area would be temporarily, adversely impacted as a result of the dredging and placement operations. The material remaining in and adjacent to the existing Gulfport Harbor ship channel and the old abandoned ship channel would remain the same sediment quality. The material from within the channels consists primarily of fine sands. This material is consistent with that of the northern shoreline of West Ship Island since it is within the littoral drift system. The non-motile benthic community would recover within a few months following the dredging event. The majority of the motile species present within the project area will abandon the area during dredging and placement activities. They will return once the activities have been completed.

Prey Abundance.

Past observances have recorded subpopulations found within the Pearl and Pascagoula Rivers utilize the project area located within and around the barrier islands. The NMFS, in previous biological opinions that addressed impacts associated with maintenance activities 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 GOM. Studies supporting the critical habitat rule indicate that the Gulf sturgeon's diet includes amphipods, lancelets, polychaetes, gastropods, shrimp, isopods, mollusks, and crustaceans.

The direct removal of sediments as a result of dredging and placement of approximately 675,000 cubic yards at West Ship Island would result in the mortality of a small percentage of the

existing benthic assemblages. As quantified previously, the area within the proposed action is very small relative to the dimension of Unit 8.

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 habitat alteration due to the fact that the areas will re-colonize with similar benthic species within a few months upon completion of the project remaining functional as the existing habitat.

The dredged area within the old abandoned Gulfport ship channel will remain a shallow-water (defined as depths shallower than 46 feet) neritic zone that can support sub-littoral benthic biota. Therefore, because similar habitat, in terms of both sediment composition and depth will be present pre- and post dredging, it is expected that the benthic biota in the dredging areas will recover and re-colonize.

In a companion study for the 1976 Panama City Beach Project, Saloman et al. (1982) compared the pre- and post-benthic sample at the borrow pits used for the project. Information from the studies designed to indicate sample-to-sample faunal variation and the time period required for faunal recovery indicated that benthic recovery at the borrow site began soon after construction and was complete, or nearly so, within 1-year.

Estuarine and nearshore areas subject to chronic natural disturbance through wave-induced substrate motion or periodic sedimentation are among the most resilient benthic ecosystems (Copeland 1970; Holling 1973; Boesch 1974; Rhoads et al. 1978). This is because rapidly colonizing opportunistic species are likely to be present continuously (Vittor 1982). For example, *Mediomastus* spp., *Myriochele oculata*, and *Prionospio perkinsi* are expected to be early colonizers. These species, along with a number of other small, opportunistic tube-dwellers (i.e. *Owenia fusiformis*) may rapidly colonize and dominate large areas of the benthos for some time due to their competitiveness for space (as tube dwellers) (Woodin 1974) and their ability to stabilize, through the physical presence of their tubes, the soft sediments from further low amplitude wave disturbance (McCall 1978). Other suspected Stage I colonizers include a number of small crustaceans (*Acanthohaustorius uncinus* and *Oxyurostylis smithi*) and small pelecypods (i.e. *Mulinia lateralis*). Stage II species are larger, more errant (free-moving), surface and subsurface burrowing animals comprised of less opportunistic polychaetes, echinoderms, gastropods, and nemerteans. Trophically, the majority of species in this group are carnivores, presumably preying on the dense concentration of Stage I species in the area. These include the echinoderms, *Hemipholis elongata* and *Micropholis atra*, the gastropods *Nassarius acutus* and *Haminoea succinea*, and the polychaetes, *Sigambra tentaculata*, *Cossura soyeri*, and *Glycinde solitaria*. Stage III organisms include the hemichordate *Balanoglossus aurantiacus*, the gastropod *Caecum johnsoni*, and the bivalve *Macoma tenta*.

Previous biological opinions have stated that when Gulf sturgeon enter the project area following their fall migration, it is likely they will find appropriate and abundant prey within the areas adjacent to the proposed action and given that the sturgeon forage opportunistically, it is believed they can easily locate prey and fulfill nutritional requirements in areas adjacent to those impacted. This would be especially applicable in the action area that is nearest the old

abandoned Gulfport Ship channel at Ship Island. Additionally, within the placement area, water depths vary up to 3 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.

Migratory Pathways.

Within Unit 8, subadult and adult Gulf sturgeon move from the rivers through estuarine and marine areas to feeding areas. Unit 8 is known to support migratory pathways for Gulf sturgeon sub-populations (Pascagoula and Pearl Rivers). It is believed that Gulf sturgeon swim through the action area during intermittent inter-riverine movements. No significant short-term or long-term effects to migratory passage have been identified as a result of this proposed project. 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; no adverse impacts to Gulf sturgeon migratory pathways are anticipated.

Approximately 675,000 cubic yards of sandy material would be placed along the northern shoreline of West Ship Island within approximately 250 acres, of which 80 acres is designated critical habitat. As quantified previously, this area is very small relative to the dimension of Unit 8 (less than 0.03%). Construction would occur in water depths of around 3 feet and less. Given this information, no adverse impacts to migratory pathways are anticipated.

Conservation Measures

The following conservation measures and conditions are provided for the dredging work within the borrow and beach placement areas.

"While hopper dredging equipment is being used, all operations will abide by the terms and conditions of the Gulf of Mexico Regional Biological Opinion, November 19, 2003 and subsequent amendments. While pipeline dredging equipment is being used, in an effort to minimize adverse affects to sea turtles, Gulf sturgeon, and other marine wildlife, the following measures will be observed: a) disengage dredging pumps when the cutter heads are not in the substrate to reduce entrainment of animals in the dredging equipment and b) monitor the dredge discharge as appropriate for turtle or fish carcasses or parts to document the occurrence of mortality due to dredging operations. Should such evidence occur, dredging operations will be suspended and proper authorities notified immediately."

Conclusions

Based upon the findings of this BA, the Corps has found that the proposed action "may affect" the following species under the purview of the NMFS:

Loggerhead Sea Turtle - The dredging operations associated with this project may affect, but not likely to adversely affect and will not jeopardize the continued existence of the species.

Green Sea Turtle - The dredging operations associated with this project may affect, but not likely to adversely affect and will not jeopardize the continued existence of the species.

Leatherback Sea Turtle - The dredging operations associated with this project may affect, but not likely to adversely affect and will not jeopardize the continued existence of the species.

Gulf Sturgeon - May affect, but not likely to adversely affect and will not jeopardize the continued existence of the species.

Gulf Sturgeon Critical Habitat - The old abandoned Gulfport ship channel and placement areas along the northern shoreline of West Ship Island do fall within Gulf sturgeon critical habitat; however, it has been determined that the disposal activities associated with this project will not adversely modify designated Gulf sturgeon critical habitat.

References

Balazs, G.H. 1982. Growth rates of immature green turtles in the Hawaiian Archipelago, pp. 117-125. In: K.A.

Bjorndal (ed.), Biology and Conservation of Sea Turtles. Smithsonian Institution Press, Washington, DC.

Bjorndal, K.A. (ed.). 1981. Biology and Conservation of Sea Turtles. Proceedings of the World Conference on Sea Turtle Conservation, Washington, D.C., 26-30 November, 1976. Smithsonian Institution Press, Washington, D.C.

Bjorndal, K.A. (ed.). 1981a. Biology and conservation of sea turtles. Proceedings of the world conference on sea turtle conservation. 26-30 November 1979, Washington, D.C., Smithsonian Institution Press, Washington, D.C.

Caldwell, D.K., A. Carr, T.R. Heller, Jr. 1955. Natural history notes on the Atlantic loggerhead turtle, *Caretta caretta*. Quart. J. Fla. Acad. Sci. 18(4): 292-302.

Carr, A. 1980. Some problems of sea turtle ecology. Amer. Zool. 20:489-498.

Carr, A. and H. Hirth. 1962. The ecology and migrations of sea turtles, five
comparative features of isolated green turtle colonies. Am. Mus. Nov. 2091: 1-42.

Carr, A.F., D.R. Jackson, and J.B. Iverson. 1979. Marine turtles. Chapter XIV In A summary and analysis of environmental information on the Continental Shelf and Blake Plateau from Cape Hatteras to Cape Canaveral (1977). Vol. I, Book 3. Center for Natural Areas, South Gardiner, Maine.

Ehrhart, L.M. 1977. Cold water stunning of marine turtles in Florida east coast lagoons: rescue measures, population characteristics and evidence of winter dormancy.

Frazer, N.B. and L.M. Ehrhart. 1985. Preliminary growth models for green, *Chelonia mydas*, and loggerhead, *Caretta caretta*, turtles in the wild. Copeia 1985:73-79.

Fish and Wildlife Service and National Marine Fisheries Service. 1992. Recovery Plan for the Kemp's ridley sea turtle (*Lepidochelys kempi*). National Marine Fisheries Service, St. Petersburg, Fl.

Fritts, T. 1983. Distribution of cetaceans and sea turtles in the Gulf of Mexico and nearby Atlantic Waters, p. 3-5, In C.E. Keller and J.K.Adams (eds).

Fritts, T.H., in. Hoffman, and M.A. McGehee. 1983. The distribution and abundance of marine turtles in the Gulf of Mexico and nearby Atlantic waters. J. Herpetology 17(4): 327-344.

Fuller, D.A. 1978. The habitats, distribution, and incidental capture of sea turtles in the Gulf of Mexico. Appendix A. Shrimp Fishery Management Plan of the U.S. Gulf of Mexico. Center for Wetland Resources, Louisiana State University, Baton Rouge.

Gunter, G. 1981. Status of turtles on Mississippi coast. Gulf Research Report 7(1):89-92.

Hirth, H.F. (1971) Synopsis of biological data of the green turtle. FAO Synopsis series, Rome, 79 p.

King, F.W. 1981. Historical review of the decline of the green turtle and the hawksbill. *In* K.A. Bjorndal (Editor), Biology and conservation of sea turtles, p. 183-188. Smithson. Inst. Press, Wash, D.C.

Landry, A. 1986. Stranding and natural history of sea turtles in the northern Gulf of Mexico. Presented at Seventh Annual Minerals Management Service, Gulf of Mexico OCS Region, Information Transfer Meeting. Session IV. D. Sea turtle problems in the Gulf of Mexico, 5 November, 1986.

Nelson, D.A. 1986. Life History and Environmental Requirements of Loggerhead Turtles. Technical Report EL-86-2, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Ms.

Ogren, L. 1977. Survey and reconnaissance of sea turtles in the northern Gulf of Mexico. Unpublished report NMFS.

Pritchard, P.C.H. 1971. The leatherback or leathery turtle. *Dermochelys coriacea*. IUCN Monog. No. 1.

Rabalais, S.C. and N.H. Rabalais. 1980. The occurrence of sea turtles on the South Texas Coast. Contrib. Mar. Sci. 23:123-129.

Renaud, M.L. and J.A. Carpenter, in press. Movements and submergence patterns of Loggerhead turtles (*Caretta caretta*) in the Gulf of Mexico determined through Satellite Telemetry. Bulletin of Marine Science.

Ross, J.P. 1981. Historical decline of Loggerhead, Ridley, and Leatherback sea turtles, p. 189-195, In K.A. Bjorndal, 1981.

Schmid, J.R. and W.N. Witzell. 1997. Age and growth of wild Kemp's ridley turtles (Lepidochelys kempii): cumulative results of tagging studies in Florida. Chelonian Conserv. Biol. 2: 532-537.

Vittor, B. A. and Associates, Inc. 1982. Benthic Macroinfauna Community Characterizations in Mississippi Sound and Adjacent Waters. Contract Report to U. S. Army Corps of Engineers, Mobile District, Mobile, Alabama. 442 pp.

FIGURES

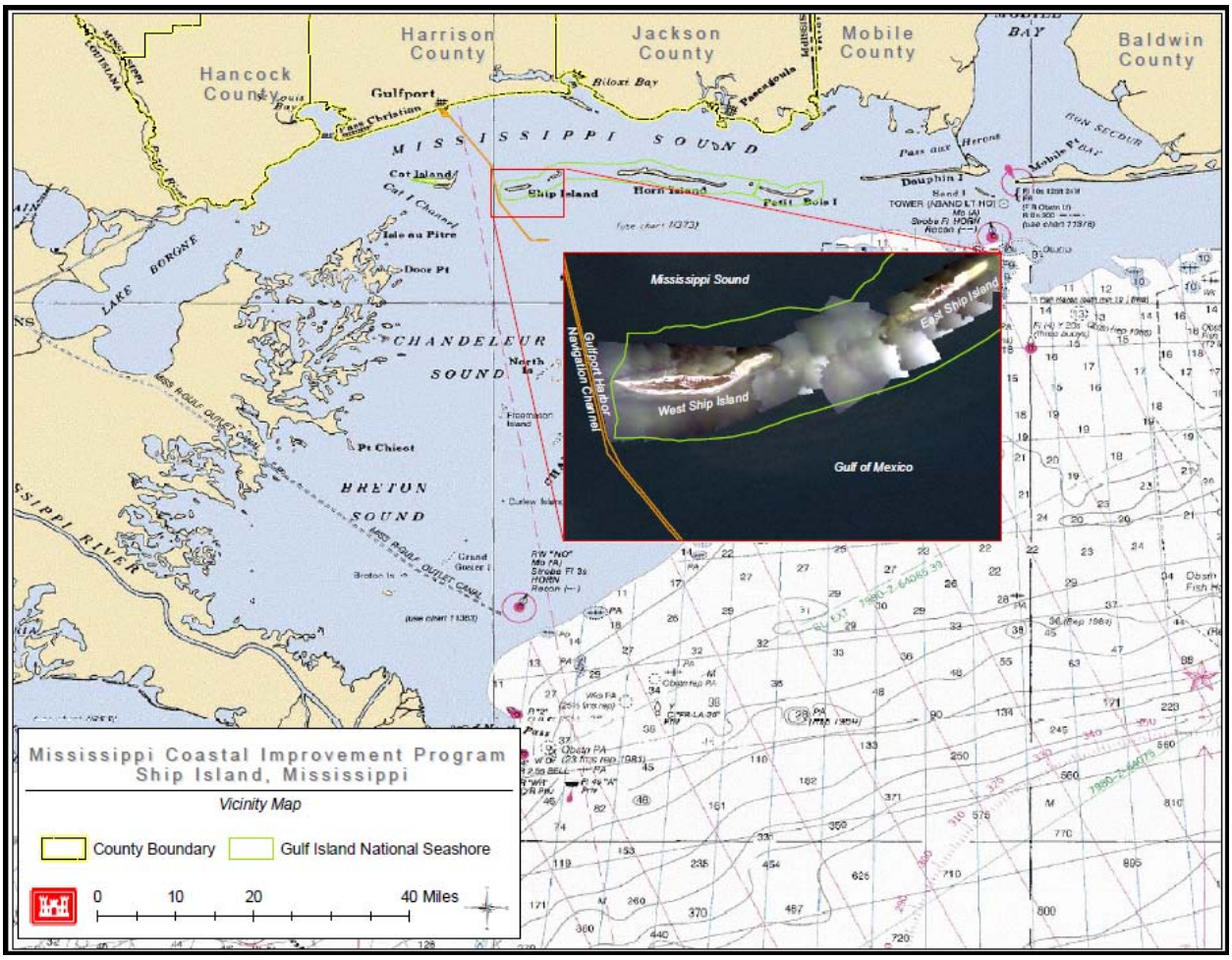

Figure 1. Vicinity Map

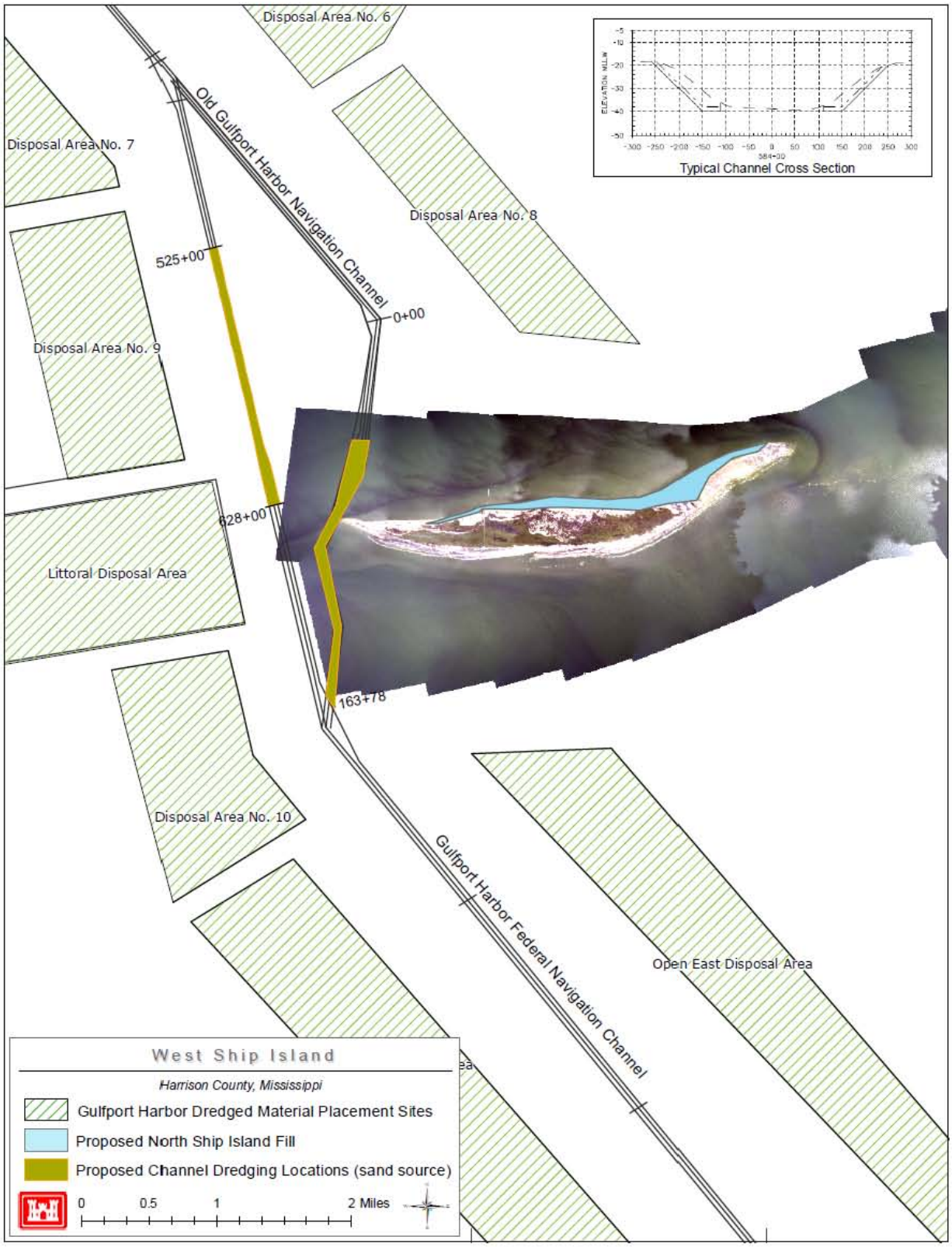

Figure 2. Proposed Dredged Locations

Figure 3. Project and Placement Area

Figure 4. Gulf sturgeon Critical Habitat Unit 8