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LIST OF ACRONYMS & ABBREVIATIONS

ADEM - Alabama Department of Environmental Management
ADCNR - Alabama Department of Conservation and Natural Resources
BMP - Best Management Practices
CAA - Clean Air Act
CEQ - Council on Environmental Quality
CFR - Code of Federal Regulations
CWA - Clean Water Act
CZC - Coastal Zone Consistency
CZMA - Coastal Zone Management Act
DC - District Commander
EA - Environmental Assessment
EFH - Essential Fish Habitat
EIS - Environmental Impact Statement
EO - Executive Order
EPA - Environmental Protection Agency
ER - Engineer Regulation
ESA - Endangered Species Act
F - Fahrenheit
FEIS - Final Environmental Impact Statement
FONSI - Finding of No Significant Impact
GMFMC - Gulf of Mexico Fisheries Management Council
HCD - Habitat Conservation Division
mg/L - Milligrams per Liter
MSFCMA - Magnuson – Stevens Fishery Conservation and Management Act
NAAQS - National Ambient Air Quality Standards
NEPA - National Environmental Policy Act
NHPA - National Historic Preservation Act
NMFS - National Marine Fisheries Service
O&M - Operations and Maintenance
ODMDS - Ocean Dredged Material Disposal Site
ppt - Parts per Thousand
SHPO - State Historical Preservation Office
USACE - U.S. Army Corps of Engineers
USFWS - U.S. Fish and Wildlife Service
WQC - Water Quality Certification

ENVIRONMENTAL ASSESSMENT

FEDERALLY AUTHORIZED FOWL RIVER NAVIGATION PROJECT CONTINUED OPERATIONS AND MAINTENANCE

CITY OF MOBILE, MOBILE COUNTY, ALABAMA

1.0 INTRODUCTION

This Environmental Assessment (EA) presents the impacts that would potentially result from continued operations and maintenance (O&M) dredging of the federally authorized Fowl River Navigation Project. In addition, impacts associated with disposal of this dredged material at its designated open-water and upland disposal sites are also evaluated. The proposed project is located on Fowl River, Mobile County, Alabama.

The purpose of this EA is to determine whether or not the proposed action has the potential for creating significant impacts to the environment and would thereby warrant a more detailed study on possible impacts, mitigation, or an alternative course of action.

2.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

The purpose and need for the proposed action is to provide disposal options for the long-term maintenance of material dredged from Fowl River.

2.1 Authority and Scope: The Fowl River Navigation Project was federally authorized by Congress on May 16, 1969 under Section 107 of the Rivers and Harbors Act of 1960. The existing project provides for an 8-foot deep by 100-foot wide channel from the Mobile Bay into, and up, Fowl River to deep water about 6,700 feet above its mouth. The total length of the channel is about 2.6 miles (Figure 1).

Under the National Environmental Policy Act (NEPA) of 1969 an EA is prepared for an action that is not clearly categorically excluded, but does not clearly require an Environmental Impact Statement (EIS) [40 Code of Federal Regulations (CFR) §1501.3 (a) and (b)]. Based on the EA, the U.S. Army Corps of Engineers (USACE) either prepares an EIS, if one appears warranted, or issues a "Finding of No Significant Impact "(FONSI), which satisfies the NEPA requirement. This EA is prepared according to the Engineer Regulation (ER) 200-2, Procedures for Implementing NEPA, and the Council on Environmental Quality (CEQ) Regulations (40 CFR § 1508.27) for Implementing the Procedural Provisions of NEPA (40 CFR § 1500-1508).

2.2 Scope: The objective of the EA is to determine the magnitude of the environmental impacts from the continued O&M dredging activities of the Fowl River Navigation Project. If such impacts are relatively minor, a FONSI would be issued and the U.S. Army Corps of Engineers (USACE), Mobile District will proceed with the Federal action. If the environmental impacts are significant according to CEQ's criteria (40 CFR Pt. 1508.27), an EIS would be prepared before a decision is reached to implement the proposed action.

Applicable laws under which these impacts will be evaluated include NEPA, Endangered Species Act (ESA), the Clean Water Act (CWA), the Clean Air Act (CAA), National Historic Preservation Act (NHPA), Magnuson – Stevens Fishery Conservation and Management Act (MSFCMA), and Coastal Zone Management Act (CZMA).

2.3 Applicable Environmental Laws and Regulations: Potential water quality impacts associated with dredging and placement of fill material associated with coastal operations must be considered. Such activities include evaluation of sediment from identified dredged material sources for placement within the littoral zone of the study area. The proposed dredged material is similar to that of sediments currently at the proposed open-water disposal site. This information was utilized in the preparation of the CWA Section 404(b)(1) Evaluation Report and also in developing management requirements to minimize impacts to threatened and/or endangered species under Section 7 of the ESA. Coordination with the U.S. Fish and Wildlife Service (USFWS) concerning potential impacts to listed species is required and ongoing for the proposed continued O&M dredging activities.

The MSFCMA identified habitats within the marine and estuarine areas of the United States that are essential to the management of specific fin and shellfish. Areas identified by the Gulf of Mexico Fishery Management Council (GMFMC) as essential fish habitat (EFH) include all marine and estuarine areas of Mobile County. Consultation with National Marine Fisheries Service (NMFS), Habitat Conservation Division (HCD) focuses on activities to minimize EFH impacts. Of particular concern has been avoidance or minimization of impacts or the enhancement of EFH.

All Federal activities affecting any land, water use, or natural resources of the coastal zone shall be carried out in a manner which is consistent, to the maximum extent practicable, with enforceable policies of the Alabama coastal management program. These activities have been evaluated to assess coastal zone management compliance. In addition, water quality certification (WQC) and coastal zone consistency (CZC) from the Alabama Department of Environmental Management (ADEM) is required for all actions to be implemented. A request for WQC/CZC will be submitted to the state to obtain the necessary certifications.

3.0 DESCRIPTION OF THE PROPOSED ACTION

The proposed action consists of continued maintenance dredging of the entire federally authorized Fowl River Navigation Project. A channel 8-foot deep by 100-foot wide commences at the 8-foot contour depth of Mobile Bay and continues up into Fowl River to deep water about 6,700 feet above its mouth for a total length of approximately 2.6 miles. The project is divided into two portions, a river portion and a bay portion (Figure 2). Dredging of the river portion requires upland disposal of 50,000 to 100,000 cubic yards of dredged material by hydraulic pipeline each maintenance cycle. Maintenance of the bay portion requires the dredging of 75,000 to 150,000 cubic yards of dredged material by hydraulic pipeline each maintenance cycle. The sediment proposed for removal and placement is primarily composed of fine silt and sandy clay particles and highly plastic clays. A 2,800-foot portion of the bay channel near the mouth of Fowl River requires -6 feet of advance maintenance below the authorized project depth of -8 feet in order to minimize dredging frequency. Shoaling rates and maintenance dredging quantities

for the bay channel are not significantly changed as a result of this advance maintenance. The proposed dredging action would be performed with a tolerance of up to -2 feet overdepth dredging. Maintenance dredging of soft-dredged material with hopper, mechanical, and/or hydraulic cutterhead dredges tends to disturb the bottom sediments several feet deeper than the target depth due to the inaccuracies of the dredging process. An additional -3 feet of sediment below the -2-foot paid allowable dredging cut may be disturbed in the dredging process with minor amounts of the material being removed (Tavolaro *et al*., 2007). Maintenance dredging of the entire project would be required every two to three years.

Upland disposal site: The area provided by Mobile County, the local sponsor, is a diked upland disposal site for the Fowl River Navigation Project, which is approximately 50 acres in size. The site is located to the east of and adjacent to Pioneer Road, to the west of and adjacent to Cedar Point Road, and just to the south of Fowl River Road in south Mobile County, Alabama (Figure 3). Specifically, the site is in Range 1 west, Township 7 south, Sections 7 and 9, approximately 200 feet of frontage on Cedar Point Road and approximately 1,000 feet of frontage on Pioneer Road. The site drains to the southwest into Fowl River.

Open-water disposal site: The open-water disposal site proposed for use is the previously certified open-water area located in Mobile Bay just south of the Fowl River channel. The limits of the disposal site encompasses approximately 240 acres (Figure 4), however due to the nature of the disposal activity (open-water) and natural phenomenon, such as variable currents in the area, wind and wave action, dredged material is typically transported to the south of the defined site.

4.0 ALTERNATIVES TO THE PROPOSED ACTION

The proposed action involves dredging and disposal operations of the federally authorized Fowl River Navigation Project to maintain sufficient project depths. A thorough discussion of the alternatives is presented below, including comparative evaluations leading to the recommended alternative for continued O&M of the navigation project at Fowl River.

4.1 No Action: In addition to the proposed action and possible newly proposed disposal site(s), another alternative evaluated was the 'no action' alternative. Implementation of the 'no action' alternative would severely compromise channel reliability into the federally authorized Fowl River Navigation Project. Channel shoaling would drastically reduce the number of vessels utilizing the river, thus adversely impacting economics in the area. This alternative was deemed as not acceptable due to possible economic and safety impacts.

4.2 Utilizing New Disposal Sites: Identifying additional disposal sites to maintain the Fowl River Navigation Project have been evaluated in the past. However, there is currently one upland disposal site and one open-water disposal site certified for this project. These disposal sites provide adequate capacity to accommodate the material dredged from the river and bay portions during its maintenance dredging cycles.

Additional environmental impacts would occur to the project area if new disposal sites were utilized. These impacts are not warranted due to the current capacity of existing disposal sites. Furthermore, new disposal sites would result in additional cost to the non-Federal sponsor

for the lands, easements, and rights of way to the property that are not justified given the current vessel traffic use and existing disposal sites capacity. Thus, it was determined the designation of any new disposal sites are not environmentally or economically justified.

5.0 PREVIOUS ENVIRONMENTAL DOCUMENTATION

A Final Environmental Impact Statement (FEIS), filed with the CEQ on October 8, 1971, addressed the impacts of constructing the project and the impacts of disposing of dredged material in both upland and open-water disposal sites. In the 1970s, resource agencies objected to disposal of dredged material at the open-water site. As a result, in 1975 and again in 1977, material dredged from the river was disposed of at a confined area located at the mouth of Fowl River. The dike failed during both dredging events despite efforts to strengthen and reduce quantities of material within. In May 1979, the resource agencies agreed to a one-time placement of dredged material at the open-water site in the bay. The agencies allowed open-water placement of material again in November 1979 because the river required dredging as a result of impacts incurred by Hurricane Fredric. In early 1984, as a result of the Feasibility Report: Mississippi Sound and Adjacent Areas Study Areas – Dredged Material Disposal Study (USACE, 1984), thin-layer disposal emerged as a means of developing a long-range plan with a limited upland disposal site(s). This allowed the Federal navigation project to be effectively maintained to its authorized depth. An EA, Section 404(b)(1) Evaluation Report, and FONSI addressing impacts from a long-range dredging and disposal plan for the Fowl River project was signed by the District Commander (DC) on April 15, 1986. The USACE, Mobile District has initiated individual consultation with the USFWS regarding specific dredging events since that EA and FONSI.

6.0 AFFECTED ENVIRONMENT

Mobile Bay empties into the Gulf of Mexico about 130 miles east of New Orleans, Louisiana, and 55 miles west of Pensacola, Florida. Mobile Bay is about 3 to 30 miles long, from 8 to 20 miles wide, and averages about 10 feet in depth. It is the mouth of the Mobile River Basin, which drains 44,000 square miles in Alabama, Mississippi, Georgia, and Tennessee. The Port of Mobile, on the west side of the Mobile River at the head of the bay, is connected with the Gulf by the 35-mile-long federally authorized Mobile Harbor ship channel.

Fowl River is a shallow tidal stream that empties into the western portion of Mobile Bay approximately 16 miles south of central Mobile, Alabama and approximately 14 miles north of Dauphin Island (Figure 1). This river is a small portion of the Mobile Basin's drainage system. This navigation project is one of several small projects located within Mobile Bay. Mean tide is 1.5 feet; however, tides may increase to 3.6 feet (excluding storms). The Fowl River Bridge crosses the river at its mouth.

A more detailed description of the affected environment pertaining to climate, topography, geology, soils, surface water, flora, and fauna can be found in the following document: FEIS Fowl River, Alabama (USACE, 1975), the Feasibility Report: Mississippi Sound and Adjacent Areas – Dredged Material Disposal Study (USACE, 1984), EA for the Long-Term Maintenance Dredging of Fowl River, Mobile County, Alabama (USACE, 1986), Monitoring Environmental Impacts Associated with Open-water Thin-Layer Disposal of

Dredged Material at Fowl River (USACE, 1988), and An EA of the Effects of Open-water Disposal of Maintenance Dredged Material on Benthic Resources in Mobile Bay, Alabama (USACE, 1992).

6.1 History: Fowl River rises in Mobile County west of Theodore, Alabama and flows generally southeastward about 14 miles, then turns abruptly northeastward for 2.5 miles. The river enters Mobile Bay about 8.5 miles south of Dog River. The lower reach of Fowl River is part of continuous tidal water between Mobile Bay and Mississippi Sound. Other streams included in the tidal waterway are: East Fowl River, the "Narrows", and West Fowl River. The lower reach of Fowl River and two miles of East Fowl River ranges from 200 to 1,000 feet wide. The depths in these rivers have historically ranged from 3.5 to 7 feet deep. The State of Alabama improved the "Narrows", a shallow meandering stream, to provide a 6-foot by 40-foot canal, 6,000 feet long, connecting East and West Fowl Rivers.

In the late 1800's through the early 1900's, Mobile was as much an expanding community as it is today. Being a seaport city certainly helped spur this growth, and both the railroads and the maritime shipping lines took advantage of the transportation opportunities Mobile's location offered. People were also utilizing hotels and pavilions. The seafood industry, which had existed since the earliest days of Mobile's history, expanded with the arrival of the tourists. Tourism might seem to be a highly unusual niche market for such times as the late 1800's in the South, but Mobile fared perhaps better than average; a distinction it still retains in today's fluctuating economy. To provide the connection between the City of Mobile and the southern county areas, the Mobile & Ohio (M&O) Railroad in the late 1890's built the 39-mile M&BS branch line. Bellingrath Gardens along Fowl River attracted thousands of people to the botanical garden every year during the later part of the 1900s and continues to attract thousands today.

In the past, vessels navigating Fowl River faced many obstacles due to insufficient depths, the meandering nature of the channels, inadequate channel markers, and the presence of logs and snags at a number of locations along the river and its tributaries. The natural channel was particularly difficult to locate during periods of limited visibility. Many boat operators timed their exits and entries in the channel to coincide with the time of high tides. These conditions severely limited navigation on Fowl River.

Increased development, both private and commercial, has occurred along the Alabama coastal zone. Development that was constructed in the quarter century between 1950 and 1975 has particularly occurred on former wetlands. This has severely altered watersheds throughout Mobile County. Prior to this development increase, Fowl River consisted of wetlands or forested upland areas. Runoff into the watershed consisted primarily of precipitation that was filtered by those surrounding forested and wetland areas. In addition, these described forested and wetland areas also trapped sediment particulates. The construction of Interstate 65, Bel Air and Springdale Malls, and Hank Aaron Stadium has further contributed to the influx of sediment into the river. Historically, this channel must be maintained to provide access into the river for boaters utilize.

Vessels depending on this channel consist of both recreational and commercial entities. Shrimping vessels dock along Fowl River's banks and utilize the channel to access Mobile Bay

for their daily catch. In addition, various sailing and motor vessels docked at the Fowl River Marina and at various private docks utilize the channel to navigate north into the river and south out into the Bay. Both the recreational and commercial vessels provide economic benefits to the surrounding area of Mobile County.

The Fowl River Marina is located on the river's northerly banks, just east of the Fowl River Bridge. Fowl River Marina provides anchorage for vessels drawing 6 feet or less that can clear the 24-foot fixed Fowl River Bridge. This marina not only offers excellent transient dockage for cruising craft of all descriptions, but it boasts one of the quietest settings on the bay. Fixed wooden piers, with full power and water hook-ups, provide a spacious area for numerous vessels to dock. Air conditioned showers, a restaurant, and a fuel dock offering gasoline and diesel fuel are provided at the Fowl River Marina. Minor mechanical repairs are also available through independent technicians. Historically, Fowl River has been maintained to provide access into the river for both commercial and recreational boaters.

6.2 Climate: The Fowl River coastal area is a humid, warm-temperature to sub-tropical climate with occasional subfreezing temperatures. The Gulf of Mexico greatly influences air temperatures of the coastal counties. During the spring months of March through May, synoptic scale weather systems, highlighted by very active frontal passages, move through the region on an average of every 5 to 7 days. The average temperature is 67° Fahrenheit (F) with a mean minimum of 57° F and a mean maximum of 77° F. The prevailing wind direction is typically east-southeast to southeast at 6 to 12 knots outside of thunderstorms. Passage of frontal systems is significantly reduced during the summer months of June through August. Hot and hazy conditions are normal with an average temperature of 81.7° F while the mean minimum temperature is 72.8° F and the mean maximum is 91.2° F. The prevailing wind direction maintains a southerly component at 4 to 8 knots, outside of thunderstorms. Thunderstorms and rain showers diminish from September through November. The average temperature is 69° F with a mean minimum temperature of 58.5° F and a mean maximum temperature of 78.5° F. A 4 to 7 knot north-northwest prevailing wind is dominant during this period. From December to February, synoptic scale weather systems pass through the region with a northerly prevailing wind direction of 5 to 11 knots. The average temperature is 52° F with a mean minimum of 41.5° F and a mean maximum of 62.1° F. The record low temperature for the region, 5° F, was recorded during this period. Annual rainfall is between 55 and 64 inches per year (USACE, 1984).

6.3 Topography: Fowl River is a tributary stream to Mobile Bay located on the western shoreline. Mobile Bay is about 3 to 30 miles long, from 8 to 20 miles wide, and averages about 10 feet in depth. The Port of Mobile, on the west side of the Mobile River at the head of the bay, is connected with the Gulf by the 35-mile-long federally authorized Mobile Harbor ship channel.

Mobile County ranges from sea level to about 200 feet in elevation. This area is part of the coastal zone system, which includes both Coastal Lowlands and Southern Pine Hills. The Coastal Lowlands, which includes Mobile County, ranges from sea level to about 30 feet in elevation. This area consists of level to gently sloping broad flood plains and low terraces. Most of the area is low-lying flatlands. Southern Pine Hills begins at about 30 feet in the south and extends to about 400 feet in the north. This area consists of gently rolling hills and broad, flat

floodplains. The majority of streams are deep to moderately deep, fast flowing perennial streams.

Numerous private piers, docks, dredged canals, and boat slips have been constructed along both sides of the shores. In addition, several fishing camps, boat repair facilities, and marinas are located along the lower reach of the river. Fowl River is highly developed with some upland vegetation and marshes.

6.4 Geology: Mobile County is located in the coastal plain region of the state, in the Southeastern Plains and Southern Coastal Plains ecoregions. The land is nearly level to gently undulating.

Mobile Bay is a geologically young estuary. Mobile Bay and estuaries along the Gulf of Mexico margin typically originate as incised fluvial valleys that formed during the most recent drop in sea level, and were then drowned by the subsequent postglacial sea-level rise. Most of these estuaries have been filling with sediment from fluvial and marine sources. The Mississippi-Alabama shelf province is defined by characteristics resulting from deltaic deposition advancing and receding as sea level rose and fell. Some 15,000 to 18,000 years ago, sea level was about 300 feet lower than today and the coastline was near the edge of the continental shelf; that is, the abyssal deep was only a short distance offshore. About 6,000 years ago, sea level rose to a level about 15 feet below its present level. Tectonic forces are believed responsible for the north-south configuration of the eastern shore with high scarps of late Miocene and Pliocene deposits, and also for the western shore with much lower scarps cut in the late Pleistocene (USACE, 1984). Sea level continues to rise, and portions of the Gulf coast are subsiding.

6.5 Soils: Alabama has seven major soil areas (Figure 5). Most of the soils within each area were formed from materials with similar characteristics. Detailed soil surveys, available for most counties, show that each area has several major soil series. A soil series is a part of the landscape with similarities among its properties such as color, texture, arrangement of soil horizons, and depth to bedrock.

Most of the soils in this area are derived from marine and fluvial sediments eroded from the Appalachian and Piedmont plateaus. The area consists of the Upper and Lower Coastal Plains. Smithdale, Luverne and Savannah soils are extensive in the Upper Coastal Plains. These soils have either loamy or clayey subsoils and sandy loam or loam surface layers. Savannah soils have fragipans. Topography is level to very steep. Narrow ridgetops and broad terraces are cultivated, but most of the area is in forest. Elevations range from 200 to 1,000 feet.

Dothan and Orangeburg soils are very extensive in the eastern part of the Lower Coastal Plains. These soils have loamy subsoils and sandy loam or loamy sand surface layers. Smithdale and Troup soils are very extensive in the western part. These soils have loamy subsoils and loamy sand or sand surface layers. Most slopes are less than 10 percent. Major crops are corn, peanuts, soybeans and horticultural crops. Timber products and hogs are very important. Elevations range from sea level to 500 feet.

The soils are not extensive but important where they are found along streams and river terraces. Soils are derived from alluvium deposited by the streams. Cahaba, Myatt, and Urbo series represent major soils of this area. A typical area consists of cultivated crops on the nearly level terraces and bottomland hardwood forests on the flood plain of streams.

The soils are not extensive and found only on nearly level bottomlands and tidal flats along the Mobile River, Mobile Bay, and Gulf of Mexico. Most of the soils are deep and very poorly drained. Dorovan and Lafitte series have very dark grayish brown, muck surfaces over a thick blackish muck, which is over brownish sand. Axis soils have a very dark grayish brown sandy clay loam surface over very dark gray sandy loam subsoil. Levy soils have a gray silty clay loam surface over thick gray clay. Osier and Pactolus soils have a dark grayish, sandy surface over grayish and yellowish brown sandy layers. Elevation is from sea level to a few feet above sea level.

A brief summary of the soils located in the area is provided below in **Table 1**.

Table 1:

NAME	DESCRIPTION
Benndale sandy loam - 0 to 2 percent slope - 2 to 5 percent slope - 0 to 8 percent slope	- Well drained, nearly level soil on ridgetops and broad flats of the coastal plain uplands
Dorovan-Bibb association - 0 to 1 percent slope	- Very poorly drained soils in a regular and repeating pattern on stream bottoms and in swamps along streams
Escambia-Urban land Complex - 0 to 2 percent slope	- Somewhat poorly drained, nearly level Escambia soils and areas of Urban land
Harleston sandy loam - 0 to 2 percent slope	- Moderately well drained, nearly level soils on coastal plain terraces and uplands
Harleston –Urban land Complex - 0 to 2 percent slope	- Moderately well drained, nearly level Harleston soils and areas of Urban land
Lafitte muck - 0 to 1 percent slope	- Very poorly drained, nearly level organic soils along the mouth of the streams and river in tidal marsh areas of the Gulf Coast Flatwoods
Osier loamy sand - 0 to 2 percent slope	- Poorly drained, nearly level soil on low uplands and flood plains of the Coastal Plain and Gulf Coast Flatwoods
Pactolus loamy sand - 0 to 2 percent slope	- Moderately well drained to somewhat poorly drained, nearly level soil on low uplands of the Coastal Plain and Gulf Coast Flatwoods
Poarch sandy loam - 0 to 2 percent slope	- Well drained to moderately well drained, nearly level soil on Coastal Plain uplands in the southern half of the county
Troup loamy sand - 0 to 5 percent slope	- Well drained, nearly level to gently sloping soil on ridgetops of Coastal Plain uplands
Troup-Urban land Complex - 0 to 8 percent slopes	- Well drained, nearly level to sloping Troup soils and areas of Urban land

6.6 Surface Water: The southern portion of Mobile County is experiencing rapid growth from both residential and commercial/industrial activities. Agriculture and forestry are also competing for increasingly less space. The abundance of surface water and the high water tables, proximity to Alabama's commercial/ public oyster reefs, and large areas of natural cover allow this area to act as a barometer of Alabama's coastal quality of life. In the predominantly forested watershed (Fowl River), the majority of the flux is in the form of organic nitrogen and phosphorus. In Fowl River, the primary nutrient source is derived from decomposed terrestrial

plant material. A high load of dissolved organic nutrients in Fowl River delivers a recalcitrant form of nutrient to the estuary. Fowl River is a tributary stream of Mobile Bay.

A phenomenon known as a Jubilee occurs in the Mobile Bay area. Although jubilees have been reported in other areas, Mobile Bay is probably the only body of water in which this phenomenon occurs fairly regularly. It happens most often along the Bay's upper eastern shore from Point Clear to just north of Daphne. Jubilees also occasionally occur south of Point Clear to Mullet Point and on the western shores at Deer River and Dog River (just north of Fowl River). Jubilees are caused primarily by upwellings movement of oxygen-poor bottom waters forcing bottom-type fish and crustaceans ashore. Bottom waters low in oxygen result from several coincidental circumstances. For a jubilee to take place, a very specific set of conditions must exist. They occur only in the summer, usually in the early morning before sunrise. The previous day's weather conditions must include an overcast or cloudy day, a gentle wind from the east, and calm or slick bay surface. Also, a rising tide is necessary; a change to a falling tide will stop the jubilee (Figures 6 & 7). It takes a combination of all these conditions to produce the phenomenon.

6.7 Flora: The vegetative communities in Mobile County are diverse; however, existing land use patterns have resulted in a great deal of modification to the natural plant associations. Terrestrial uplands dominate higher ground areas that are not normally subjected to riverine flooding or tidal inundation. Natural upland vegetation complexes found in the area include longleaf pine-oaks, moist pinelands, bay forest, monoculture pines, maritime strand, and beach dune associations. The most dominant upland association, longleaf pine-oaks, is well adapted to the dry, sandy sites in the coastal plain region. This association is usually found above the 10-foot contour but sometimes integrates into the moist pinelands along streams and rivers (Stout 1981). Long-leaf pine (*Pinus palustris*) is the most dominant species in this community and hardwoods such as southern red oak (*Quercus falcata*), laurel oak (*Q. laurifolia*), turkey oak (*Q. laevis*), sand post oak (*Q. margaretta*), flowering dogwood (*Cornus florida*), and persimmon (*Diospyros virgininana*) are associated with this community (USACE, 1984).

Forest coverage opens up when entering sandy areas near the coast. Vegetation consists mainly of slash pine (*P. elliotti*) with an understory of saw palmetto (*Serenoa repens*) and wax myrtle (*Myrica cerifera*) (USACE 1984). This area, known as moist pinelands, differs from longleaf pine-oaks due to its higher water table. A thin strip of moist pinelands usually divides the flood plain swamps and longleaf pine-oak forests. Sedges, grasses, and other herbaceous plants grow in the understory area. Pitcher plant bogs are very noticeable with thousands of plants occupying a relatively small area. Depressions in the land combined with the high water table produce standing water which supports dense growths of freshwater, floating and submerged, aquatic plants. Mobile County is comprised of large expanses of moist pine savannahs or bogs that occur inland of the coastal marshes.

A shrub zone, very well developed in Mobile County, occurs between elevations below the savannah zone but above the coastal marsh. Sea myrtle (*Baccharis halimifolia*), marsh elder (*Iva frutescens*), and yaupon (*Ilex vomitoria*) occur in brackish to saline conditions with swamp tupelo (*Nyssa sylvatica* var. *bilflora*) in fresher areas. Along certain locations of Mobile County and 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. Longleaf pine-oaks are found landward of the dune system along the coast and on the barrier islands. Monoculture stands of pines, both natural and planted, are scattered throughout the area.

Along flood plains of small and moderately sized streams, forested wetlands occur. Vegetation depends upon the amount and duration of flooding. Pond cypress and swamp tupelo are most notably common in extensively flooded areas. Lowland elevations bordering Mobile Bay are subject to daily tidal inundation. Three zones of emergent wetlands can be identified within Mobile County and along the Gulf coast. Saline marshes bordering the Mobile Bay integrate into brackish marshes. Further inland freshwater marshes exist. Mainland marshes are sheltered from direct exposure to the Gulf of Mexico by barrier islands, shoals, or land masses.

Freshwater marshes are most notable along the upper reaches of streams and along borders of bays and ponds. Although black needlerush (*Juncus roemarianus*) is the dominant marsh species in saline and brackish communities, it also marks the upper limits of the freshwater marsh areas. Sedges, grasses, and rushes are typically the dominant vegetation, which also includes reed (*Phragmites australis*), switch grass (*Panicum virgatum*), wild rice (*Zizania aquatica*), sawgrass (*Cladium jamaicense*), cattails (*Typha* spp.), spike rush (*Eleocharis spp.*), and bullrushes (*Scirpus spp.*).

The vegetative community in brackish to saline marshes consists of plants that have adapted physiologically to higher levels of salinity. Brackish marshes are more diverse than saline marshes and are characterized by black needlerush and saltmeadow cordgrass (*Spartina patens*). *S. patens* is characteristic of the saline environment. A distinct zonation exists within brackish and saline marshes. Proceeding seaward from the upland, the number of species composing the community decreases until in the most saline conditions only smooth cordgrass (*S. alterniflora*) or black needlerush composes the marsh.

The Fowl River area supports diverse saline and brackish marshes. Saline marshes exist along the southern banks of the river. In the northern area, brackish marshes are much more extensively developed. These areas are characterized by smooth cordgrass in the intertidal areas backed by large meadows of black needlerush. Brackish marshes merge with saline marshes and species such as big cordgrass, bullrush, reed, sawgrass, and marsh mallow (*Hibiscus mascheutos* and *Kosteletzkya virginica*) become conspicuous. The barrier islands of Mississippi and Alabama support saline marsh development along their protected shores.

High turbidity and lack of suitable substrate have limited distribution of submerged aquatic vegetation (SAVs) in Alabama. Their occurrence is restricted to relatively quiet waters along mainland and barrier island 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 less than six feet deep, most in two feet or less. Stout and Lelong (1981) mapped a total of 2,763 acres of submersed vegetation in coastal Alabama. Of the 21 species frequently encountered in their study, 19 were restricted to freshwater habitats in upper Mobile and Perdido Bays and tributary waters. Two of these species, tape grass (*Vallisneria americana*) and Erasian watermilfoil (*Myriophyllum spicatum*), dominated the freshwater beds, though the

beds were frequently diverse. Significant quantities of benthic and epibenthic macroalgae, such as red, brown, and green species are found in areas where SAVs are present. Mobile Bay National Estuary Program recently (2008 and 2009) conducted mapping surveys of SAVs in Mobile Bay showing incidence of vegetation outside of the proposed action footprint.

In conclusion, flora indigenous to the Alabama study area is extremely diverse. This vegetation provides habitat, food, and shelter for various species of fauna while also providing a continual recycling of nutrients to the system.

6.8 Fauna: Fowl River ecosystem supports a diversity of fauna. Many species of invertebrates and vertebrates make up the various fauna population along the Gulf Coast. Invertebrate populations in Mobile Bay and the nearshore area of the Gulf of Mexico transfer energy through the coastal food web. Microscopic estuarine zooplankton 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 stages of many fish species are often interspersed throughout zooplankton. Many important commercial species feed upon zooplankton.

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 832 to 17,864 individual/ meter^2 for the offshore and 1,097 and 35,537 individual/ meter^2 for the Sound area. Abundance of macrofauna is temporal with greatest densities occurring from fall to spring.

The oyster (*Crassostrea viginica*) is an estuarine species, which requires a bottom consisting of a good mixture of sand and mud, firm enough to support clutch material such as oyster shells or clam shells. In the coastal counties of Mississippi and Alabama, most of the bottom suitable for growing oysters is located shoreward of the 6-foot contour, which ranges between 500 feet and 1.5 miles distance from the shoreline. In Mobile Bay, the majority of the suitable area is located south of a line between East Fowl River on the west and Great Point Clear on the east typically within three miles of the shoreline.

Oysters being euryhaline tolerate a wide range of salinity; however, where extremely high or low salinities are found, they do not grow in abundance and are short lived. Optimum salinities for growing oysters are between 15 and 20 parts per thousand (ppt). These optimum conditions are found near shore, in bays and where major rivers have a marked influence on salinity. Lower salinities for short periods of time, however, are beneficial because they destroy oyster pests and predators that may become established on the reefs. The American Oyster is also able to tolerate a wide range of temperatures and oysters along the northern Gulf coast do not experience a dormant period as experienced by oysters in northern climates. In Mississippi and Alabama water, the growing season is year round and in some areas oysters may attain the legal catch size of three inches in less than 20 months.

Temperatures and salinity fluctuations both affect oysters' spawning and reproduction. By late spring when waters have begun to warm, male and female oysters develop sperm and eggs, respectively. Spawning is triggered by a slight, rapid increase in water temperature and usually occurs at about 68º to 72º F. Peak spawning in Mississippi Sound and Mobile Bay

occurs in June and July with a lesser spawning peak in September. Planktonic larval oysters, or spat, are carried by the currents and eventually will attach themselves or "set" to cultch material including hard or semihard, clean surfaces such as oyster or clamshells. They then metamorphose and begin to grow. Approximately 12,871 acres of established oyster reefs occur within Mississippi Sound and Mobile Bay.

Approximately 12,871 acres of established oyster reefs occur within Mississippi Sound and Mobile Bay. In a report published by USACE, Mobile District (1984), it was noted that oysters were prevalent in the area in Mobile Bay (Table 2).

Table 2: Oyster Reefs in the Alabama/Mobile Bay Study Area

Reef	Size (Acres)	Location
Klondike Reef	161	Mobile Bay South of Great Point Clear
Great Point Clear Reef	206	Mobile Bay West of Great Point Clear
Hollingers Island Reef *	12	East Side Mobile Bay, North Hollingers Island Channel
Whitehouse Reef	453	East Side Mobile Bay South of East Fowl River
Kings Bayou Reef	69	Mobile Bay, East of Heron Bay
Bouy Reef	208	Mobile Bay, East of Heron Bay
Cedar Point Reef	1410	Mobile Bay-Mississippi Sound, South Cedar Point
Sand Reef	38	Mobile Bay, East of Little Dauphin Island

∗ Designated Oyster Reefs are permanently closed

The nearest oyster reef to the proposed Fowl River dredging and disposal operation is the Whitehouse Reef located approximately two miles south of Fowl River according to consultation with the Alabama Department of Conservation and Natural Resources (ADCNR), Marine Resources Division. USACE, Mobile District was informed that productivity of each oyster reef may express annual variability although slight changes in reef acreages would not affect the proposed action (ADCNR pers. comm.).

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

Mobile County supports an array of reptiles, amphibians, birds, and mammals. Reptiles and amphibians found in the area include snakes, turtles, lizards, toads, frogs, salamanders, and crocodilians. Coastal Alabama and Mississippi have a great diversity of reptiles including 23 species of turtles, 10 species of lizards, 39 species of snakes, and the alligator. Eighteen species of salamanders and 22 species of frogs and toads are indigenous to the coastal region.

Mammals found within the area include marsupials, moles and shrews, bats, armadillos, rabbits, rodents, carnivores, even-toed hoofed mammals, and dolphins. Mammals occur within all habitats of the system, using underground burrows, the soil surface, vegetative strata, the air, and the water for feeding, resting, breeding, and bearing and rearing young. There are 57 species of mammals found in the area. Several species of mammals include the raccoon, river otter, grey fox, striped skunk, mink, whitetailed deer, bottlenose dolphin, beaver, possum, and nine-banded armadillo. A number of whales are known to inhabit offshore waters of Mississippi and Alabama and occasionally are sighted within Mississippi Sound.

Over 300 species of birds, such as gulls, terns, skimmers, sandpipers, plovers, rails, herons, egrets, and pelicans, have been reported as migratory or permanent residents within the area, several of which breed there as well. Shorebirds include osprey, 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.

Fowl River and its tributaries support numerous species of fish, such as the gulf menhaden (*Brevoortia patronus*), bay anchovy (*Anchoa mitchilli*), spot (*Leiostomus xanthurus*), tidewater silverside (*Menidia beryllina*), rough silverside (*Membras martinica*) and striped mullet (*Mugil cephalus*). The fauna associated with the Fowl River ecosystem is extremely diverse.

6.9 Endangered and Threatened Species: The USFWS lists the following species (**Table 3**) as either threatened and/or endangered that may occur within Mobile County, Alabama and may be in the project vicinity:

Table 3:

LISTED SPECIES	SCIENTIFIC NAME	STATUS	DATE LISTED
Marine Mammals			
West Indian manatee	*Trichechus manatus*	Endangered	03/11/67
Reptiles			
green sea turtle	*Chelonia mydas*	Threatened	07/28/78
hawksbill sea turtle	*Eretmochelys imbricata*	Endangered	06/02/70
Kemp's ridley sea turtle	*Lepidochelys kempii*	Endangered	12/02/70
leatherback sea turtle	*Dermochelys coriacea*	Endangered	06/02/70
loggerhead sea turtle	*Caretta caretta*	Threatened	07/28/78
Alabama red-bellied turtle	*Pseudemys alabmensis*	Endangered	06/16/87
Eastern Indigo Snake	*Drymarchon corais coupen*	Threatened	03/03/78
Black Pine Snake	*Pitouphis melanoleucus lodingi*	Candidate	N/A
Gopher tortoise	*Gopherus polyphemus*	Threatened	07/07/87
Fish			
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	Threatened	09/30/91
Birds			
Piping Plover	*Charadrius melodus*	Threatened	12/11/85
Wood stork	*Mycteria americana*	Endangered	02/28/84

The West Indian manatee migrates along the Gulf coast from Florida to Louisiana as a seasonal transient. The project area does provide habitat requirements and it is very unlikely that the species would be adversely impacted due to their mobility and the likelihood individuals would avoid the project area during operations.

Sea turtles are more commonly found in marine waters, not within Mobile Bay or its associated rivers. Therefore, sea turtles would likely not be found within the immediate project vicinity. Gulf sturgeon will likely avoid the immediate project vicinity during dredging or placement due to noise from vessels and machinery. Hydraulic pipeline dredges are not known to adversely impact these species (GRBO 2003). The proposed project falls outside of designated critical habitat for Gulf sturgeon.

The Alabama red-bellied turtles primarily inhabit backwater areas of the bays that are 3.3 to 6.6 feet in depth. These turtles have a limited range of habitat, which is located between Interstate 10 and U.S. Highway 90 (0.8 miles) and just north of Highway 90. These areas provide broad, vegetated expanses of shallows to a great number of Alabama red-bellied turtles. Dense beds of aquatic vegetation provide turtles with substrate for basking, predator avoidance, and food. Alabama red-bellied turtles have been found in the Fowl River study area.

The gopher tortoise is a member of the class reptilia. Its carapace is grayish-brown and unmarked in adults, while its plastron, legs, head and neck are golden-yellow. Gopher tortoises dig burrows typically ranging in size from 20 to 30 feet long and from six to eight feet deep with their shovel-like front legs. Biologists have found some burrows as big as 40 feet long and 10 feet deep. The burrows are found in dry places such as sandhills, flatwoods, prairies and coastal

dunes or in human-made environments such as pastures, grassy roadsides and old fields. The gopher tortoise is a keystone species, meaning its extinction would result in measurable changes to the ecosystem in which it occurs. Specifically, other animals, such as gopher frogs, several species of snakes and several small mammals, depend on tortoise burrows. For the gopher tortoise to thrive, the animal generally needs three things: well-drained sandy soil (for digging burrows), plenty of low plant growth (for food) and open, sunny areas (for nesting and basking). The gopher tortoise is found along the dry sand ridges of the southeastern Coastal Plain. The tortoise is found in Florida and the southern parts of South Carolina, Georgia, Alabama and Mississippi. Gopher tortoises usually mate during April and May. Shortly after mating, the female lays between three and 15 eggs, either in a sandy mound in front of her burrow or a nearby sunny place. The eggs mature and hatch from 70 to 100 days later. The hatchlings spend much of their time in their mother's burrow until they're old enough to dig their own. They don't reach maturity until they are between 10 and 15 years old, when their shells are about 9 inches long. Gopher tortoises usually eat low-growing plants found in bright sunshine, primarily grasses such as wiregrass. Some tortoises have been known to eat gopher apples, blackberries and other fruits. Gopher tortoises will also scavenge and are opportunistic feeders, occasionally feeding on dead animals or excrement. Fowl River and its tributaries along with the proposed upland disposal site could be possible habitat for the Gopher tortoise.

Approximately 35 percent of the piping plover’s total breeding population winters on the Gulf coast between Florida and Texas (NatureServe, 2007). The USFWS has designated the Gulf of Mexico coastline, Horn Island, Petit Bois Island, and Round Island as critical habitat for the wintering piping plovers (USFWS, 2001). The proposed project at Fowl River is located outside piping plover critical habitat.

The eastern indigo snake is a large, black, non-venomous snake found in the southeastern U.S. It is widely distributed throughout central and South Florida, but primarily occurs in sandhill habitats in northern Florida and southern Georgia. Georgia and Florida currently support the remaining, endemic populations of the eastern indigo snake (Lawler, 1977). In 1982, only a few populations remained in the Florida panhandle, and the species was considered rare in that region. Nevertheless, based on museum specimens and field sightings, the eastern indigo snake still occurs throughout Florida, even though they are not commonly seen (Moler, 1985).

The black pine snake is distributed throughout the Coastal Plain from extreme southeastern Louisiana through southern Mississippi into southwestern Alabama. The species has been ecorded in Alabama from Mobile, Clarke, and Washington Counties, and probably occurs in southern Choctaw County (Mount 1975). Individuals inhabit xeric, fire-maintained longleaf pine forest having sandy, well-drained soils preferred, usually on hilltops, ridges, and toward the tops of slopes, with open canopy, reduced midstory, and dense herbaceous understory. Riparian areas, hardwood forests, or other closed-canopy conditions not regularly used (Duran, 1998). The Eastern indigo and black pine snakes may be in the vicinity of the project area but the type of habitat it occupies is not in either the dredging or disposal sites.

Wood storks are birds of freshwater and estuarine wetlands, primarily nesting in cypress or mangrove swamps. They feed in freshwater marshes, narrow tidal creeks, or flooded tidal pools. Particularly attractive feeding sites are depressions in marshes or swamps where fish

become concentrated during periods of falling water levels. Nesting has been restricted to Florida, Georgia, and South Carolina; however they may have formerly bred in most of the southeastern United States and Texas. Wood storks may be in the vicinity of the project area but the type of habitat it occupies is not in either the dredging or disposal sites.

6.10 Essential Fish Habitat: Congress defines EFH 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 GMFMC and NMFS have identified EFHs 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, and mud, sand, shell, and rock substrates. In addition, marine areas, such as the water column, vegetated and non-vegetated bottoms, artificial and coral reefs, geologic features and continental shelf features have also been identified.

Open-water and estuarine marshes provide habitat for various species of invertebrates and vertebrates. Epibenthic crustaceans and infaunal polychaetes dominate the diets of higher trophic levels, such as flounder, catfish, croaker, porgy, and drum. The fish species composition of the estuarine and offshore areas along the northern Gulf of Mexico is of a high diversity due to the variety of environmental conditions, which exist within the area. The major fisheries landed along the Mississippi and Alabama Gulf coast are Spanish mackerel (*Scomberomerus maculatus*), king mackerel (*Scomberomerus cavalla*), cobia (*Rachycentron canadum*), bluefish (*Pomatomus saltatrix*), pompano (*Trachinotus carolinus*), little tunny (*Euthynnus alletteratus*), spotted sea trout (*Cynoscion nebulosus*), red drum (*Sciaenops ocellatus*), and several shark species. In addition, numerous species of less interest may be taken, including ladyfish (*Elops saurus*), crevalle jack (*Caranx hippos*), blue runner (*Caranx crysos*), and black drum (*Pogonias cromis*). Trawlers work the area primarily for brown and white shrimp (*Peneus aztecus* and *P. setiferous*), but occasional trawlers seeking finfish species, including menhaden (*Brevoortia patronus*) and croaker (*Micropogonias undulatus*), as well as other industrial species may trawl this bottom (GMFMC-1998, 2004 & 2005, & Fishbase, 2007).

Mississippi Sound and adjacent waters have been identified as important nursery areas for nine sharks, primarily Atlantic sharpnose, blacktip, finetooth, and bull sharks. Less prevalent species are the spinner, blacknose, sandbar, bonnethead, and scalloped hammerhead. 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 Mississippi Sound waters give birth during late spring and early summer, with young sharks spending just a few months of their life's in shallow coastal waters. Most shark species are abundant around barrier islands, with adult sharks commonly located south of the barrier islands (Carlson *et al.*, 2004).

Within the project area, EFH has been designated for managed species of Gulf of Mexico dolphin, wahoo, red drum, blue marlin, sharks (11 species), coastal migratory pelagic (3 species), reef fish (43 species), stone crab (2 species) and shrimp (4 species). No habitat areas of particular concern were identified for this area.

Species managed by the GMFMC are listed in **Table 4** below.

Table 4: Fishery Management Plans and Managed Species for the Gulf of Mexico. (NMFS 2011)

Shrimp Fishery Management Plan
- brown shrimp – *Farfantepenaeu aztecus*
- pink shrimp - *F. duorarum*
- royal red shrimp - *Pleoticus robustus*
- white shrimp - *Litopenaeus setiferus*

Reef Fish Fishery Management Plan
- almaco jack – *Seriola rivoliana*
- anchor tilefish - *Caulolatilus ntermedius*
- banded rudderfish – *S. zonata*
- blackfin snapper - *Lutjanus buccanella*
- blackline tilefish - *Caulolatilus cyanops*
- black grouper- *Mycteroperca bonaci*
- blueline tilefish – *C. microps*
- cubera snapper – *L. cyanopterus*
- dog snapper – *L. jocu*
- dwarf sand perch - *Diplectrum ivittatum*
- gag grouper - *M. microlepis*
- goldface tilefish – *C. chrysops*
- goliath grouper - *Epinephelus itajara*
- gray snapper – *L. griseus*
- gray triggerfish - *Balistes capriscus*
- greater amberjack – *S. dumerili*
- hogfish - *Lachnolaimus maximus*
- lane snapper - *Lutjanus synagris*
- lesser amberjack - *S. fasciata*
- mahogany snapper – *L. mahogoni*
- marbled grouper – *E. inermis*
- misty grouper – *E. mystacinus*
- mutton snapper – *L. analis*
- Nassau grouper – *E. striatus*
- queen snapper - *Etelis oculatus*
- red hind - *Epinephelus guttatus*
- red grouper – *E. morio*
- red snapper - *L. campechanus*
- rock hind – *E. adscensionis*
- sand perch - *Diplectrum formosum*
- scamp grouper - *M. phenax*
- schoolmaster – *L. apodus*
- silk snapper – *L. vivanus*
- snowy grouper – *E. niveatus*
- speckled hind - *E. drummondhayi*
- tilefish - *Lopholatilus chamaeleonticeps*
- vermilion snapper - *Rhomboplites aurorubens*
- Warsaw grouper – *E. nigritus*
- wenchman - *Pristipomoides aquilonaris*
- yellowedge grouper *E .lavolimbatus*
- yellowfin grouper – *M. venenosa*
- yellowmouth grouper – *M. interstitialis*
- yeloowtail snapper – *Ocyurus chrysurus*

Stone Crab Fishery Management Plan FL
- stone crab - *Menippe mercenaria*
- gulf stone crab – *M. adina*

Spiny Lobster Fishery Management Plan
- spiny lobster - *Panulirus argus*
- slipper lobster - *Scyllarides nodife*

Coral and Coral Reef Fishery Management Plan
- varied coral species and coral reef communities comprised of several hundred species

Coastal Migratory Pelagic Fishery Management Plan
- cobia - *Rachycentron canadum*
- king mackerel – *Scomberomorus cavalla*
- Spanish mackerel - *S. maculatus*

Red Drum Fishery Management Plan
- red drum - *Sciaenops ocellatus*

6.11 Water Quality. Water quality within Mobile Bay, Mississippi Sound and adjacent Gulf of Mexico waters 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 rivers that feed into the Bay and Sound. Freshwater inputs from local watersheds provide nutrients and sediments that serve to maintain productivity both in the Sound and in the extensive salt marsh habitats bordering estuaries of the Bay and 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 Bay and Sound from freshwater sources, but are hydraulically restricted due to barrier islands and near shore areas. In addition, dynamic features such as the Loop Current, eddies, and river plumes create variations in temperature, salinity, and water density. Temperature and salinity strongly influence chemical, biological, and ecological patterns and processes. Differences in water density affect vertical ocean currents and may also concentrate buoyant materials such as detritus, and plankton. Greatest stratification in the water occurs in summer (Thompson, 1999).

ADEM has classified the coastal waters in the project area as suitable for recreation, propagation of fish and wildlife and shellfish harvesting. Sufficient dissolved oxygen concentrations, water clarity, and typical salinity ranges with little to no stratification in the water column occur within this site. Water quality within the project area is influenced mainly by non-point source pollution. According to the 2010 Section 303(d) list prepared by ADEM, the main causes of water quality degradation within the area are pathogens, introduced into the system by urban runoff and storm sewers.

6.12 Air Quality: Existing air quality in coastal Mobile and Baldwin counties was assessed in terms of types of sources contributing to emissions that are regulated by National Ambient Air Quality Standards (NAAQS). NAAQS have been developed for oxides of nitrogen, hydrocarbons, particulate matter, carbon monoxide, sulfur dioxide, lead, volatile organic compounds and other hazardous air pollutants. Sources of air pollution in the project area are mainly from non-point sources, such as boat motors and vehicular traffic emissions. No major sources of air pollution were found within the vicinity of the project area. Mobile and Baldwin counties are in attainment for all NAAQS (Environmental Protection Agency (EPA), 2009).

6.13 Hazardous Toxic and Radioactive Waste: The upland disposal site is a currently used disposal site for the Federally authorized Fowl River navigation project, thus, a Preliminary Assessment Screening (PAS) is not required.

6.14 Esthetics: Several hundred permanent residents populate the area surrounding Fowl River. Commercial and recreational vessels and dredges have concurrently utilized the same area in the past without incident. Only temporary degradation to the esthetic environment would occur as a result of the proposed action. Impacts would primarily occur as a result of the physical presence of heavy equipment. Some minor increases in turbidity may be noted in the immediate vicinity during dredging and open-water disposal operations, but these increases would be minor and short term in nature.

6.15 Noise: Noise levels in the area are typical of recreational, boating, and fishing activities. Noise levels fluctuate with the highest levels usually occurring during the spring and summer months due to increased recreational activities.

6.16 Cultural Resources: There are no recorded archeological or historic sites or reported shipwrecks in the vicinity of the proposed action. No properties listed on or eligible for inclusion on the National Register of Historic Places are known to exist which would be affected by the proposed work. Coordination with the Alabama State Historical Preservation Officer (SHPO) will be conducted before work proceeds on the proposed action.

7.0 ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

The proposed O&M project at Fowl River would have minor adverse environmental impacts on the existing environment. The impacts of the proposed O&M activities are discussed in the following paragraphs.

Impacts associated with the proposed dredging and disposal activities include: 1) temporary water quality degradation during maintenance operations; 2) minor loss of bottom dwelling organisms; 3) avoidance of the operation area by pelagic and benthic fauna; and 4) a temporary reduction in air quality due to exhaust emissions. In addition to these described impacts, the placement of dredged material at either the open-water or upland sites is also anticipated to have temporary impacts on the environment, such as avoidance of the upland sites by terrestrial fauna and an increase in noise emissions due to the operations. These described impacts to the environment are temporary in nature and are anticipated to return to pre-operation conditions within several months after completion.

7.1 Fish and Wildlife Resources:

Oyster Reefs. No significant adverse impacts to oyster reefs from the continued operations and disposal of maintenance material at Fowl River were identified in this evaluation. The closest oyster reefs are located approximately two miles from the dredging and placement activities associated with this project.

Submerged Aquatic Vegetation. No impacts to SAVs were identified in this evaluation. Vittor and Associates, Inc. (2009) conducted a survey of SAV in Mobile Bay and no SAV is located within proposed dredging and placement area, nor are SAVs located within the expected 400-foot turbidity mixing zone of channel dredging.

Wetlands. Emergent wetlands are not located in the immediate vicinity of the project channels or placement areas and will not be impacted.

Sediments. Dredging and disposal operations will result in temporary increases of suspended sediments, the loss of benthic organisms, increases in nutrients, and bathymetry changes of the water bottom. The increase in turbidity will reduce light penetration through the water column, thereby reducing photosynthesis, surface water temperatures, and esthetics. These conditions could potentially alter visual predator-prey relations in the immediate project vicinity. In addition, sediment adheres to fish gills, resulting in respiratory stresses, and natural movement of eggs and larvae could be potentially altered as a result of the sediment adherence. However, the salinity of water associated with the proposed project area is high enough to promote rapid settling of finer particles. Ninety-eight percent of discharged sediments from hydraulic dredging have been observed to settle out within 200 feet of discharge points during similar operations in the project vicinity (USACE, 1978). All of these described impacts are temporary and are anticipated to return to previous conditions shortly after disposal operations. In addition, the Section 404(b)(1) Evaluation Report concluded that the proposed maintenance and dredging action will not jeopardize or adversely impact any oyster reefs, SAVs, wetlands or other critical

habitat. The sediment quality and texture of the Fowl River dredged material is expected to be homogenous to that existing at the proposed open-water disposal site.

*Deepwater Horizon Oil Spill Impacts***.** On April 20, 2010, while working on an exploratory well approximately 50 miles south of the Louisiana coastline, 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. The total amount of oil and natural gas that had escaped into the Gulf of Mexico is yet to be finally determined. On September 19, 2010, the capping of the relief well process was successfully completed and the Federal government declared the well "effectively dead". The spill has caused extensive damage to marine and wildlife habitats as well as the Gulf's fishing and tourism industries.

The USACE, Mobile District conducted sediment sampling in November and December of 2010 associated with the Mobile Harbor Federal Navigation Project and the Mobile Ocean Dredged Material Disposal Site (ODMDS). Although this material is not specifically associated with the proposed O&M dredging at Fowl River, it does give a generalized picture of the impacts to the surrounding environment. The results of this testing were provided in the *Final Post-Oil Spill Surface Sediment Evaluation: Mobile Harbor Federal Navigation Channels Mobile, Alabama* completed in March 2012. Results showed there were no discernible increases in target analytes tested compared to past sampling events pre-spill.

The long term impacts of the oil spill on the northern Gulf Coast are uncertain at this time. 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, Mobile District 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 this proposed action as well as the generation of supplemental environmental analysis and documentation for specific projects/studies as warranted by changing conditions.

7.2 Benthos, Motile Invertebrates, and Fishes: There would be temporary disruption of the aquatic community caused by the proposed dredging and disposal operations. Non-motile benthic fauna within the area would be destroyed by dredging but should repopulate upon project completion. 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.

Rates of benthic community recovery observed after dredged material placement ranged from a few months to several years. The relatively species-poor benthic assemblages associated with low salinity estuarine sediments can recover in periods of time ranging from a few months to approximately one year (Leathem *et al*., 1973; McCauley *et al*., 1976 and 1977; Van Dolrah *et al*. 1979; Clarke and Miller-Way, 1992), while the more diverse communities of high salinity estuarine sediments may require a year or longer (e.g. Jones, 1986).

Several studies of turbidity from total suspended solids (TSS) associated with dredging operations have concluded that dredging had no substantial effects on nekton (Ritchie, 1970; Wright, 1978); however, other studies have shown that elevated TSS levels and prolonged exposure can suffocate and reduce growth rates of adult and juvenile nekton and reduce viability of eggs (Moore, 1977; Stern and Stickle, 1978). Detrimental effects are generally recognized at TSS concentrations greater than 500 milligrams per liter (mg/L) and for durations of continuous exposure ranging from several hours to a few days. Turbidities exceeding 500 mg/L have been observed around maintenance dredging and placement operations (EH&A, 1977) and such turbidities may affect some aquatic organisms near the active dredges. They also found that TSS from maintenance dredging in Corpus Christi Bay is not greater than that from shrimping and affects the bay for much shorter time periods. Elevated turbidities during construction and maintenance dredging may affect some aquatic organisms near the dredging activity; however, turbidities in open-water habitats can be expected to return to near ambient conditions within a few hours after dredging ceases or moves out of a given area. Schidler (1984) reported similar TSS levels from dredging and storm events. Overall, motile organisms are mobile enough to avoid highly turbid areas (Hirsch *et al*., 1978). Under most conditions, fish and other motile organisms are only exposed to localized suspended-sediment plumes for short durations (minutes to hours) (Clarke & Wilber, 2000).

7.3 Wildlife/Wildlife Habitat: The previously approved upland disposal site regularly attracts birds, raccoons, deer, and other similar wildlife. These birds and wildlife rest, feed, and breed in the area. Disposal operations may temporarily impact this wildlife and its habitat. However, these motile animals are able to avoid the operations and are anticipated to return to the area shortly after completion. Temporary increases in food abundance due to the disposal of dredged material are typical during and shortly after operations are completed. This increase would temporarily benefit wildlife. No adverse impacts are anticipated to occur to wildlife or its associated wildlife habitat.

7.4 Esthetics: Esthetics will be temporarily reduced in the immediate vicinity of the proposed project operations. Some residents and visitors to the river may be disturbed by the presence of the dredge and associated heavy equipment. However, this action is temporary in nature so the disturbance will be minimal. Upon completing the operations, the restored depths will provide most residents and visitors operating recreational and commercial vessels in the river the required depth to safely navigate the conduit.

The upland disposal site utilized for the maintenance dredging of the federally authorized Fowl River navigation project was constructed solely for the purpose of dredged material disposal. Public use of the disposal site is restricted; however, the site has several private homes adjacent to the property. A forested buffer exists between the disposal site and the private residential homes. This buffer area reduces or completely obstructs individuals at these private houses from viewing this site. Furthermore, this activity is temporary and is anticipated to return to prior conditions upon completion of the disposal operations. Therefore, esthetic impacts associated with the dredging and its disposal activities would be minimal and of a temporary duration.

7.5 Water Quality: Water quality in the immediate vicinity of the dredge and disposal sites would be slightly impaired for a short period of time due to the removal of material by the dredge and the disturbance at the disposal sites. Material placed at the open-water disposal site south of the channel is anticipated to quickly settle out of the water column. Pre- and post-monitoring of water quality suggests turbidity and TSS are temporarily affected by disposal operations (USACE 1999). However, the magnitude of the increases with disposal operations is consistent with those caused by frontal storms. In addition, TSS have been shown to be elevated in bottom waters of disposal sites; however, this limitation to the bottom waters suggests rapid settling rates of the material or low wave and current energy unable to re-suspend sediments. Disposal of material at this open-water site would temporarily impact water quality and is anticipated to return to prior conditions upon completion of the disposal operations. Disposal of dredged material at the previously utilized upland placement site would provide suitable time for particulates to settle out from the water column. Thus, no adverse impacts are anticipated as a result of return water entering the waters of the United States. Best management practices (BMP) would be implemented to reduce disturbance to the area. Furthermore, these operations are minor, short-duration, and insignificant impacts that are typical of these operations.

7.5.1 Turbidity: Minor increases in turbidity will occur from the proposed project operations in the vicinity. Mechanical dredges typically result in higher turbidity levels, in comparison, to that of hydraulic pipeline dredges. Turbidity increases from dredging sediment from the channel will reduce light penetration through the water column, thereby reducing photosynthesis, surface water temperatures, and esthetics. These conditions could potentially alter visual predator-prey relations in the immediate project vicinity. In addition, sediment adheres to fish gills, resulting in respiratory stresses, and natural movement of eggs and larvae could be potentially altered as a result of the sediment adherence. Particulates suspended in the water column at the upland disposal site would have sufficient time to settle out before the return water enters waters of the United States. The return water is anticipated to be clear water that would not adversely impact the area. As a result of this assessment, the short duration of the operations would minimize the described adverse impacts.

7.5.2 Suspended Sediment: Re-suspension of sediment will likely occur within the vicinity of the proposed operations. A hydraulic dredge typically conducts Fowl River maintenance dredging operations. Less re-suspension of sediment is anticipated because mechanical dredges typically result in increased re-suspension of sediment beyond that which is expected from the actions of hydraulic pipeline dredges. Suspended sediment conveyed to the existing upland disposal site would be allowed to settle out of the water column. Return water exiting the upland site is typically clear water. This clear water is not anticipated to have an impact on the area. Mobile District anticipates TSS to be elevated during disposal operations at the open-water site south of the channel. It is anticipated that suspended solids would rapidly settle out of the water column, thus not adversely impacting water quality. Although these described impacts will likely occur in the project vicinity, the impact will be typically minor and of short duration.

7.6 Noise: Noise from the engine and other job-related equipment is expected to increase during the proposed operations in the project vicinity. Noise levels will resume to prior

conditions once the dredging and disposal operations are completed. Noise is not anticipated to be a significant impact.

7.7 Navigation: Navigation will be temporarily affected due to associated dredging and disposal operations. The restricted maneuverability associated with a hydraulic dredge may result in incoming/outgoing vessels waiting for short periods of time. While the presence of the dredge is expected to be a slight inconvenience, no adverse impacts are expected to occur to navigation due to these operations being of a short duration. If not maintained, recreational and commercial vessels operating on Fowl River would have difficulty safely navigating portions of the river due to its shallow depths. As a result of the proposed project, vessels will be able to better navigate Fowl River.

7.8 Air Quality: Mobile County has been designated in attainment with the NAAQS according to ADEM. Air quality in the immediate vicinity of the heavy equipment would be slightly affected for a short period of time by the fuel combustion and resulting engine exhausts. The standards would not be violated by the implementation of the proposed project. In light of prevailing winds in the area, these emissions are insignificant.

7.9 Environmental Justice: Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations* (February 11, 1994) requires that federal agencies conduct their programs, policies, and activities that substantially affect human health or the environment in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons (including populations) from participation in, denying persons (including populations) the benefits of, or subjecting persons (including populations) to discrimination under such programs, policies, and activities because of their race, color, or national origin. On February 11, 1994, the President also issued a memorandum for heads of all departments and agencies, directing that EPA, whenever reviewing environmental effects of proposed actions pursuant to its authority under Section 309 of the 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 individual. The maintenance dredging of Fowl River navigation project does not create disproportionately high or adverse human health or environmental impacts on minority or low-income populations of the surrounding community. Review and evaluation of the proposed project have not disclosed the existence of identifiable minority or low-income communities that would be adversely impacted by the proposed project.

7.10 Protection of Children: Executive Order (EO) 13045, *Protection of Children from Environmental Health Risks and Safety Risks* (April 21, 1997), recognizes a growing body of scientific knowledge that demonstrates that children may suffer disproportionately from environmental health risks and safety risks. These risks arise because children's bodily systems are not fully developed; because children eat, drink, and breathe more in proportion to their body weight; because their behavior patterns may make them more susceptible to accidents. Based on these factors, the President directed each federal agency to make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children. The President also directed each federal agency to ensure that its policies, programs, activities,

and standards address disproportionate risks to children that result from environmental health risks or safety risks.

No changes in demographics, housing, or public services would occur as a result of the proposed project. With respect to the protection of children, the likelihood of disproportionate risk to children is not significant. Maintenance dredging of Fowl River does not involve activities that would pose any disproportionate environmental health risk or safety risk to children.

7.11 Cultural Resources: The National Register of Historic Places has been consulted and no properties listed on, being nominated to or determine for the National Register are located in the vicinity. There are no reported historic shipwrecks in the vicinity of Fowl River. In 1986, the Alabama SHPO concurred with the maintenance dredging and upland disposal operation for the Fowl River project. A public notice will be published for review and comment. A copy of this public notice will be furnished to the SHPO's office. Concurrence with our determination from SHPO is expected.

7.12 Threatened and Endangered Species: Significant impacts to threatened and endangered species would be the loss of or long term reduction in the size of a population; a habitat modification that causes a permanent disruption to breeding, foraging or other life history requirement; permanent interference with the movement of native resident or migratory protected species; and loss of any area designated as critical habitat.

The West Indian manatee migrates along the Gulf coast from Florida to Louisiana as a seasonal transient. The project area does provide habitat requirements and it is very unlikely that the animal would be adversely impacted due to their mobility and the likelihood individuals would avoid the project area during operations. To minimize potential adverse impacts, "Standard Manatee Construction Conditions" set forth under Section 7 of ESA consultations on other navigation projects would be implemented. Piping plovers and Wood storks occur along the Gulf Coast and also may occur on Fowl River or other nearby land forms. The proposed project is located outside designated piping plover critical habitat. Any impacts these birds along the exposed upland disposal site on Fowl River would be short in duration and temporary. In summary, any impacts may affect but are not likely to adversely affect manatees or protected birds and would be temporary or negligible.

Sea turtles, however, are more commonly found in marine waters, not within Mobile Bay or tributaries. Therefore, sea turtles would likely not be found within the immediate project vicinity. Gulf sturgeon will likely avoid the immediate project vicinity during dredging or placement due to noise from vessels and machinery. Hydraulic pipeline dredges are not known to adversely impact these species (GRBO 2003). The proposed project falls outside of designated critical habitat for Gulf sturgeon.

Federally protected species, such as the gopher tortoise, eastern indigo snake, and black pine snake would not be adversely impacted by dredging operations because these species are not indigenous to Fowl River. Furthermore, if the gopher tortoise, eastern indigo snake, and black pine snake were to be in the upland disposal site vicinity, it is anticipated that these motile

species would avoid the upland area during disposal operations. These species may inhabit the area surrounding the upland disposal site. Precautionary measures, such as walking the pipeline route and avoiding snakes, turtles and tortoise burrows identified within the disposal site vicinity, would be implemented prior to site use. During a past site visit with the USFWS, the location where the dredge pipeline would exit Fowl River onto land was investigated for potential effects to the endangered Alabama red-bellied turtle. This area had approximately a 1 to 2.5-foot bluff that would hinder Alabama red-bellied turtles from utilizing this area as a nesting ground. Furthermore, it is anticipated that the motile Alabama red-bellied turtle and gopher tortoise would return to this area shortly after dredging and disposal operations conclude. Thus, the proposed action may affect but is not likely to adversely affect these species. ESA coordination with USFWS will be conducted before project implementation.

7.13 Hazardous, Toxic, and Radioactive Waste (HTRW). The upland disposal site is a currently used disposal site for the federally authorized Fowl River navigation project, thus, a Preliminary Assessment Screening (PAS) is not required.

7.14 Essential Fish Habitat. EFH is defined by Congress 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. NMFS has identified EFH habitats 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.

A total of 233 species of fish representing 173 genera and 80 families, 15 species of shrimp, numerous species crabs, and one species of oyster known as *Crassostrea virginica* occur in the Mobile Bay area (USACE, 1985). The proposed project is not anticipated to adversely alter the present EFH. The proposed Fowl River project is routine maintenance of the existing channel and disposal of that dredged material into existing open-water and upland sites. No new work is proposed in the EA. Impacts of open-water disposal on benthic communities and fisheries resources have been undertaken nationwide for the last 30 years. Pre- and post-monitoring of water quality suggests turbidity and TSS are temporarily affected by disposal operations (USACE 1999). However, the magnitude of the increases with disposal operations is consistent with those caused by frontal storms. Studies on adult, pre-adult, and juvenile form of fisheries resources indicate that most species are able to avoid the area of disposal or are unaffected. No change is anticipated to occur to the habitat types. Furthermore, the operations will only result in short-term impacts to a small area percentage of the habitat. Therefore, the Mobile District does not anticipate any adverse impacts to occur to EFH. The USACE, Mobile District will coordination with NMFS on EFH in the project vicinity by letter, and through public notice FP13-FR01-13 requesting concurrence with our determination.

8.0 COASTAL ZONE MANAGEMENT

Following the advertisement of the Public Notice, Legal Notice in the Mobile Register, and comment period, the USACE, Mobile District will request coastal zone consistency from

ADEM. The USACE, Mobile District anticipates receiving concurrence from ADEM with the proposed project being consistent with Alabama Coastal Program.

9.0 STATE WATER QUALITY CERTIFICATION

Following advertisement of the Public Notice, Legal Notice in the Mobile Register, and comment period, the USACE, Mobile District will request water quality certification. The USACE, Mobile District anticipates receiving concurrence from the ADEM for water quality certification for the propose maintenance project.

10.0 CONCLUSION

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.

11.0 LIST OF AGENCIES, INTERESTED GROUPS AND PUBLIC CONSULTED

Alabama Department of Conservation & Natural Resources
Alabama Department of Environmental Management
Alabama State Historic Preservation Officer
Alabama Wildlife and Freshwater Fisheries Division, Nongame Wildlife Program,
National Marine Fisheries Service
National Register of Historic Places
U.S. Army Corps of Engineers, Mobile District
U.S. Environmental Protection Agency, Region IV
U.S. Fish and Wildlife Service

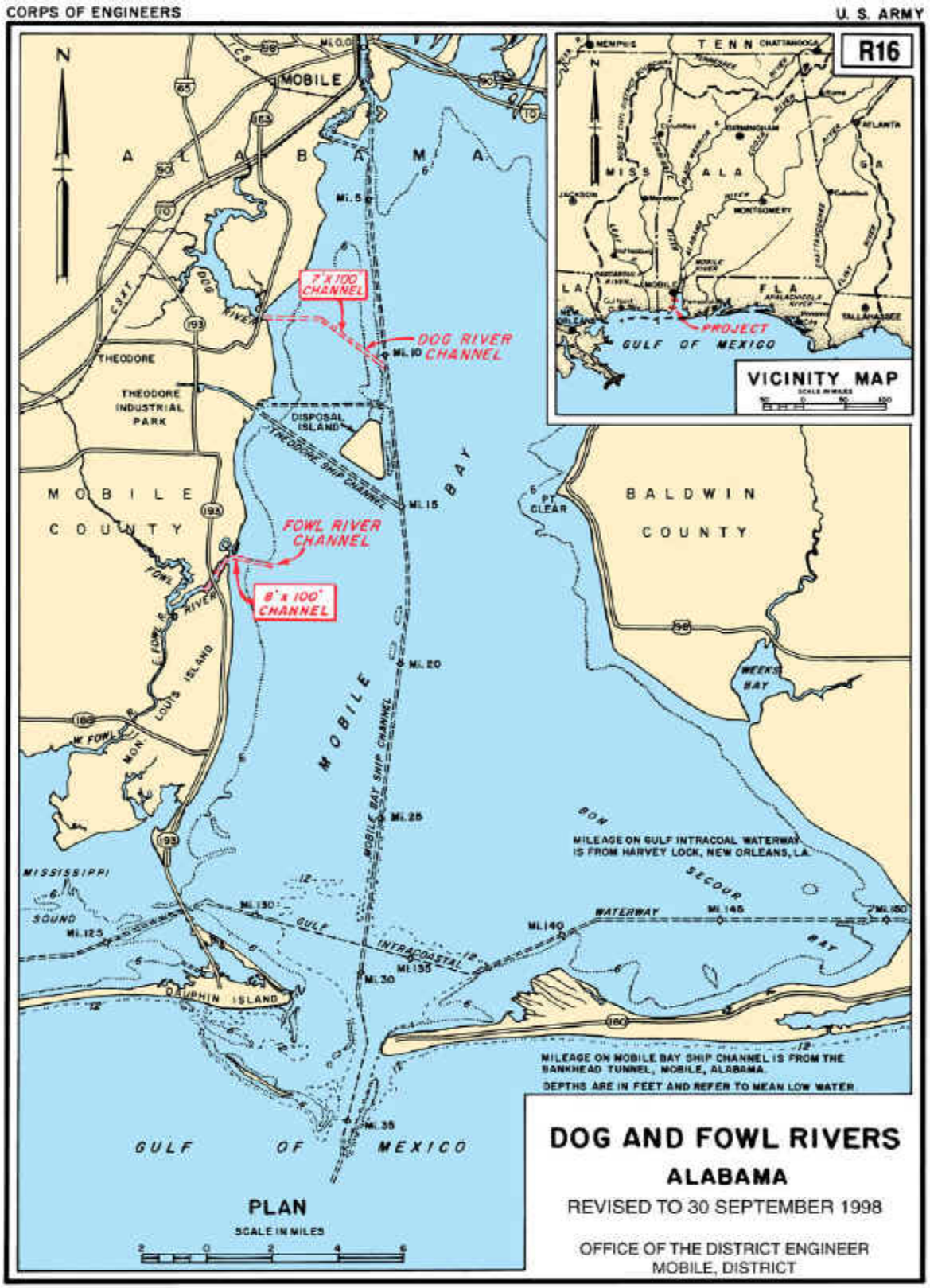

Figure 1: Project Vicinity Map

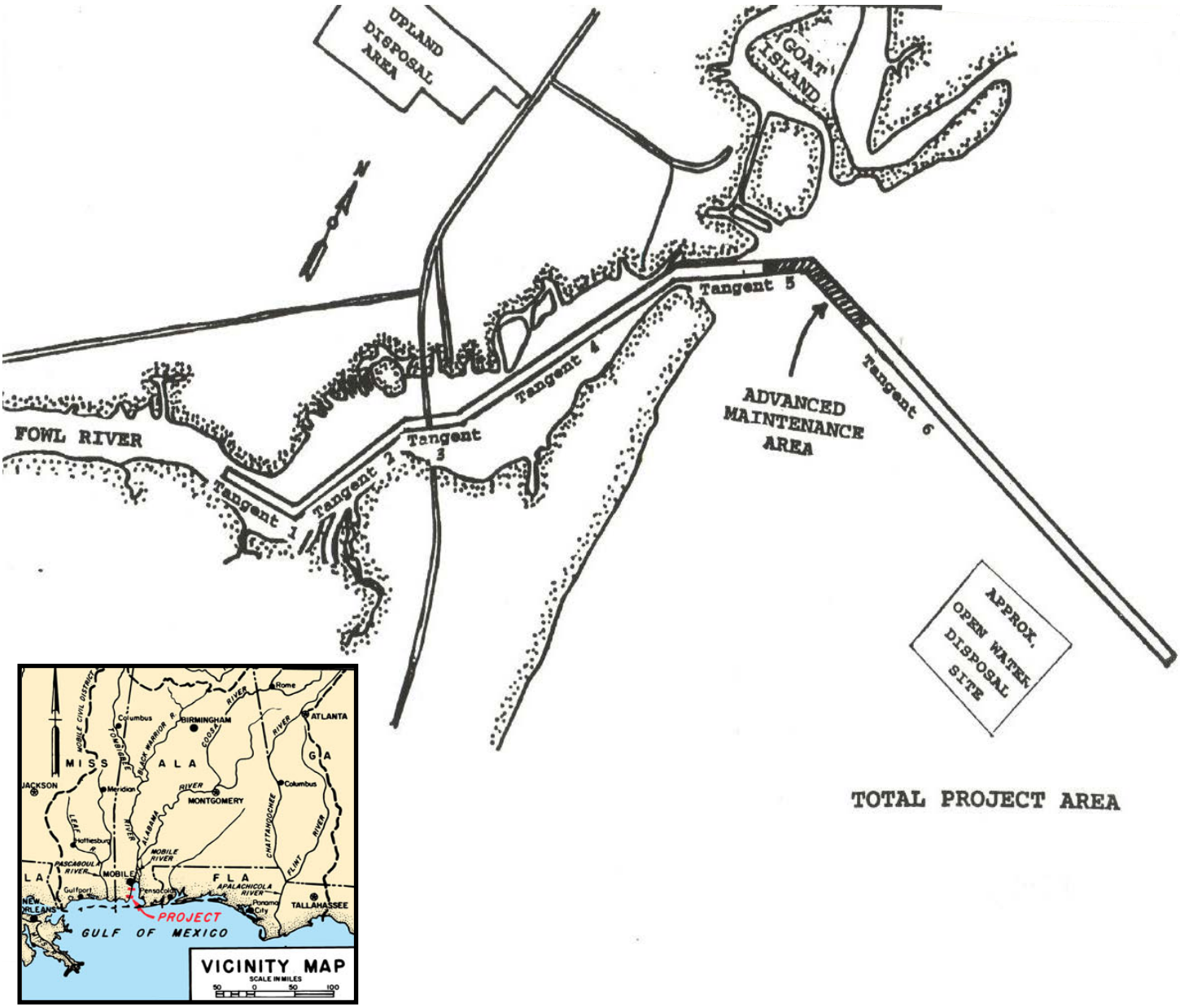

Figure 2: Project Segments

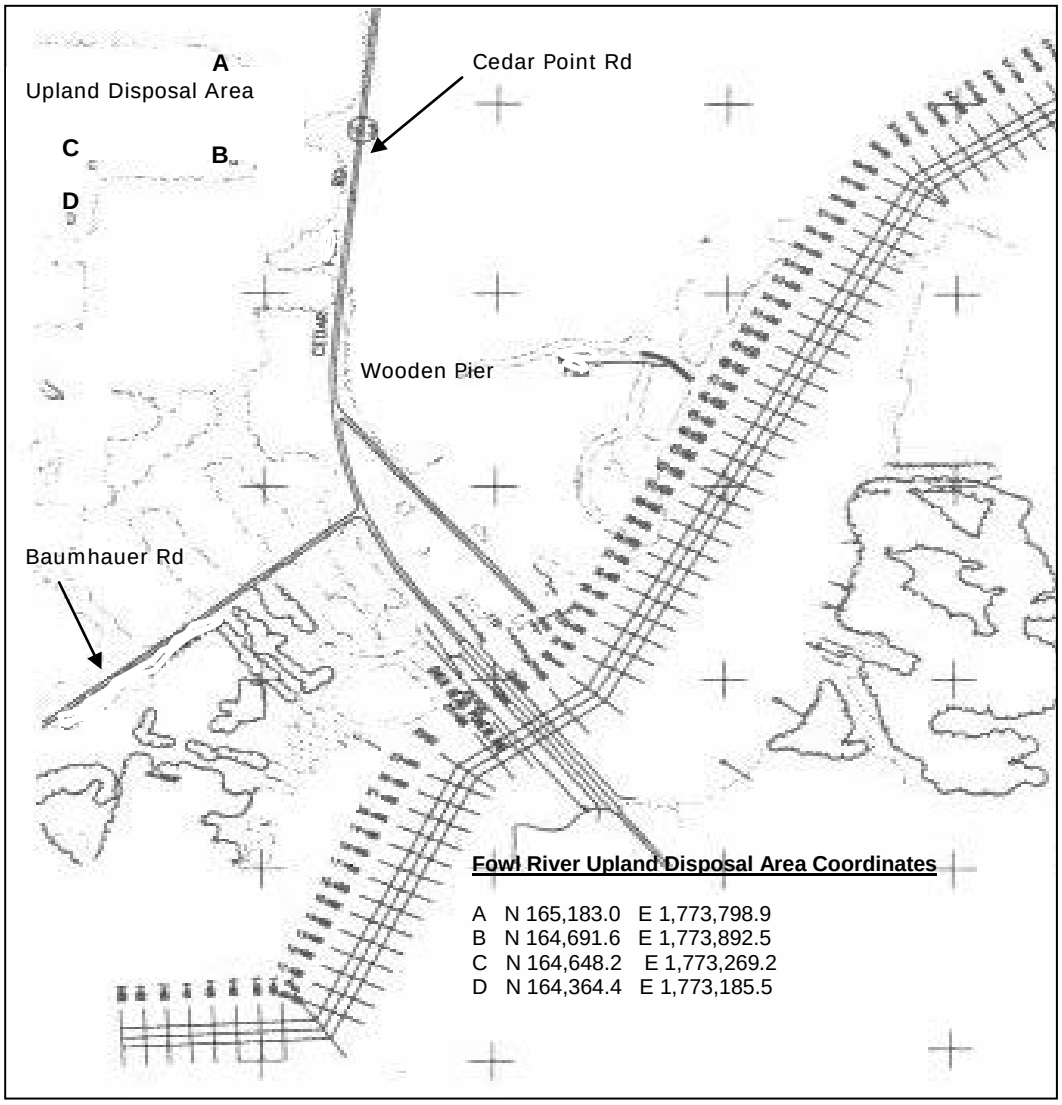

Figure 3: Upland Disposal Site

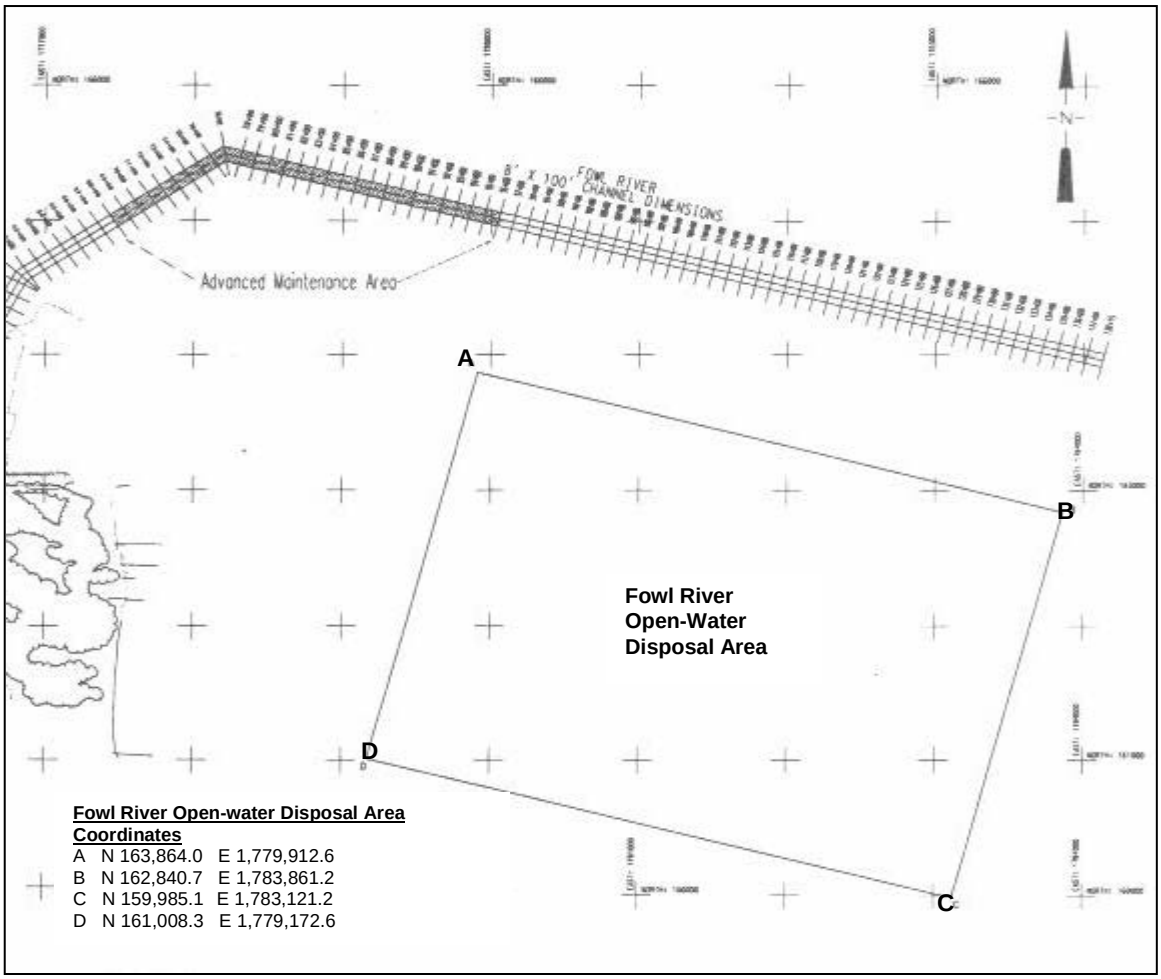

Figure 4: Open-Water Disposal Site

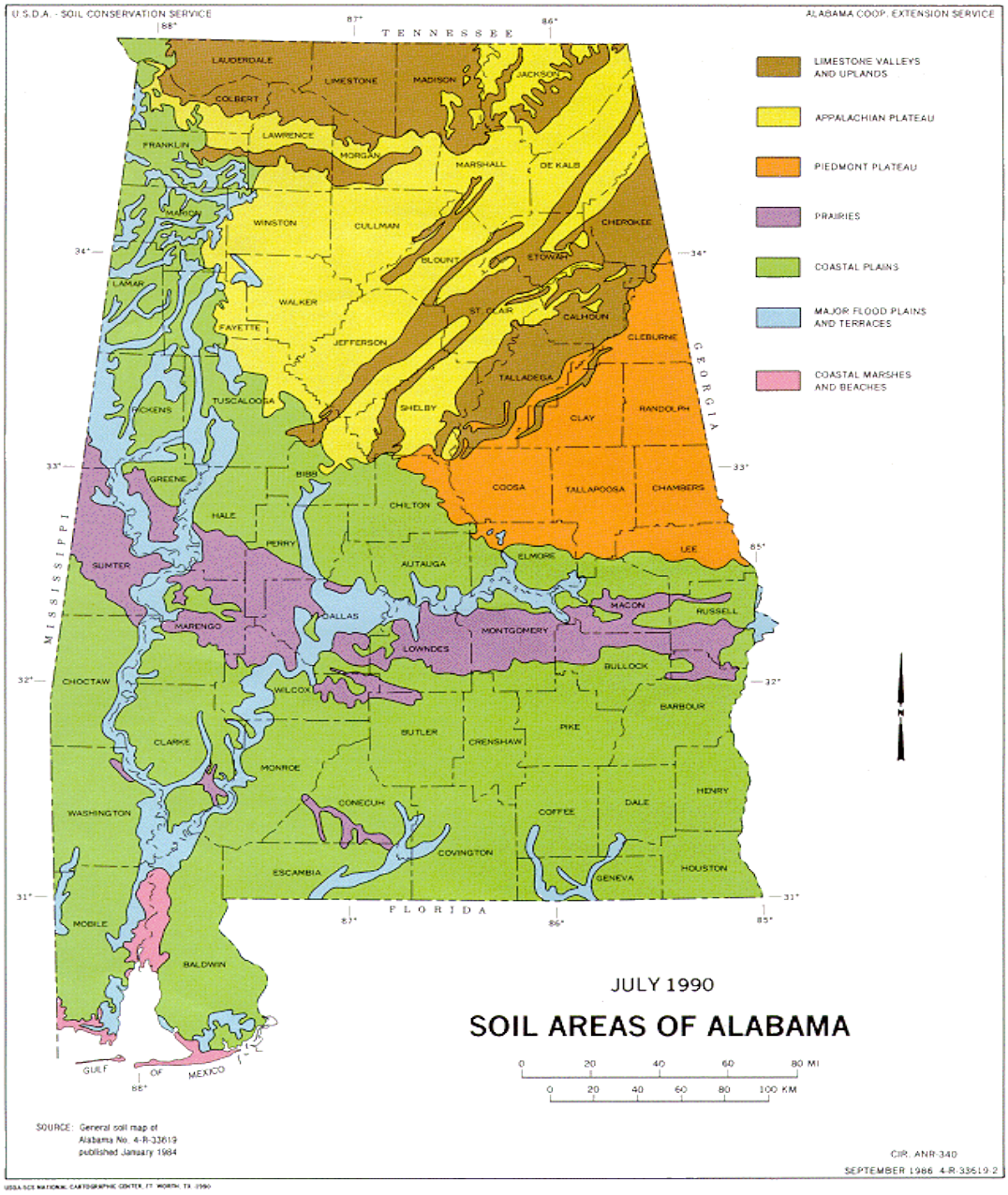

Figure 5: Soils of Alabama

Figure 6: Low Dissolved Oxygen in Mobile Bay, Alabama (shaded areas)

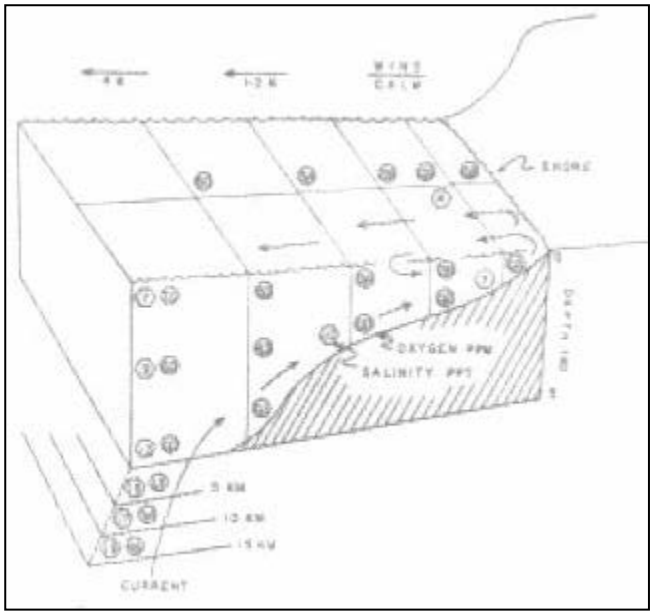

Figure 7: Typical wind, salinity, and dissolved oxygen measured during a Jubilee

12.0 REFERENCES

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Appendix A: 404(b)(1) Evaluation Report

APPENDIX A

SECTION 404 (b)(1) EVALUATION REPORT

FEDERALLY AUTHORIZED FOWL RIVER NAVIGATION PROJECT CONTINUED OPERATIONS AND MAINTENANCE

CITY OF MOBILE, MOBILE COUNTY, ALABAMA

A FEDERALLY AUTHORIZED PROJECT

I. PROJECT DESCRIPTION:

A. Location: This Section 404(b)(1) Evaluation presents the impacts that would potentially result from continued operations and maintenance (O&M) dredging of the federally authorized Fowl River Navigation Project. In addition, impacts associated with disposal of this dredged material at designated upland and open-water disposal sites are also evaluated. The proposed project is located on Fowl River, Mobile County, Alabama (EA Figure 1).

B. General Description: The proposed action undertaken by the U.S. Army Corps of Engineers (USACE), Mobile District, addressed in this Section 404(b)(1) evaluation report provides for the following:

The proposed action consists of continued maintenance dredging of the entire federally authorized Fowl River Navigation Project. A channel 8-foot deep by 100-foot wide commences at the 8-foot contour depth of Mobile Bay and continues up into Fowl River to deep water about 6,700 feet above its mouth for a total length of approximately 2.6 miles. The project is divided into two portions, a river portion and a bay portion (Figure 2). Dredging of the river portion requires upland disposal of 50,000 to 100,000 cubic yards of dredged material by hydraulic pipeline each maintenance cycle. Maintenance of the bay portion requires the dredging of 75,000 to 150,000 cubic yards of dredged material by hydraulic pipeline each maintenance cycle. The sediment proposed for removal and placement is primarily composed of fine silt and sandy clay particles and highly plastic clays. A 2,800-foot portion of the bay channel near the mouth of Fowl River requires -6 feet of advance maintenance below the authorized project depth of -8 feet in order to minimize dredging frequency. Shoaling rates and maintenance dredging quantities for the bay channel are not significantly changed as a result of this advance maintenance. The proposed dredging action would be performed with a tolerance of up to -2 feet overdepth dredging. Maintenance dredging of soft-dredged material with hopper, mechanical, and/or hydraulic cutterhead dredges tends to disturb the bottom sediments several feet deeper than the target depth due to the inaccuracies of the dredging process. An additional -3 feet of sediment below the -2-foot paid allowable dredging cut may be disturbed in the dredging process with minor amounts of the material being removed (Tavolaro *et al*., 2007). Maintenance dredging of the entire project would be required every two to three years.

Upland disposal site: The area provided by Mobile County, the local sponsor, is a diked upland disposal site for the Fowl River Navigation Project, which is approximately 50 acres in size. The site is located to the east of and adjacent to Pioneer Road, to the west of and adjacent to Cedar Point Road, and just to the south of Fowl River Road in south Mobile County, Alabama (Figure 3). Specifically, the site is in Range 1 west, Township 7 south, Sections 7 and 9, approximately 200 feet of frontage on Cedar Point Road and approximately 1,000 feet of frontage on Pioneer Road. The site drains to the southwest into Fowl River.

Open-water disposal site: The open-water disposal site proposed for use is the previously certified open-water area located in Mobile Bay just south of the Fowl River channel. The limits of the disposal site encompasses approximately 240 acres (Figure 4), however due to the nature of the disposal activity (open-water) and natural phenomenon, such as variable currents in the area, wind and wave action, dredged material is typically transported to the south of the defined site.

C. <u>Authority and Purpose</u>: The existing project was authorized May 16, 1969 by the Chief of Engineers under authority of Section 107, Rivers and Harbors Act of 1960. A Final Environmental Impact Statement (FEIS), filed with the Council on Environmental Quality (CEQ) on October 8, 1971, addressed the impacts of constructing the project and the impacts of disposing of dredged material in both upland and open-water disposal sites. Construction on the Fowl River segment of the authorized project was commenced in August and completed in November 1973. In the 1970s, resource agencies objected to disposal of dredged material at the open-water site. As a result, in 1975 and again in 1977, material dredged from the river was disposed of at a confined area located at the mouth of Fowl River. The dike failed during both dredging events despite efforts to strengthen and reduce quantities of material within. In May 1979, the resource agencies agreed to a one-time placement of dredged material at the open-water site in the bay. The agencies allowed open-water placement of material again in November 1979 because the river required dredging as a result of impacts incurred by Hurricane Fredric. In early 1984, as a result of the Feasibility Report: Mississippi Sound and Adjacent Areas Study Areas – Dredged Material Disposal Study (USACE, 1984), thin layer disposal emerged as a means of developing a long-range plan with a limited upland disposal site. This allowed the Federal navigation project to be effectively maintained to its authorized depth. An Environmental Assessment (EA) and Finding of No Significant Impacts (FONSI) addressing impacts from a long-range dredging and disposal plan for the Fowl River project was signed by the District Engineer (DE) on April 15, 1986. The Corps, Mobile District has initiated individual consultation with the U.S. Fish and Wildlife Service (USFWS) regarding specific dredging events since that EA and FONSI.

D. <u>General Description of Dredged or Fill Material</u>:

1) General Characteristics of Material: The sediment proposed for removal and placement is primarily composed of fine silt and sandy clay particles and highly plastic clays. Total organic carbon (TOC) within Fowl River is typically highest in the upper portions of the river and the proportions of TOC decrease moving down river.

2) Quantity of Material: Maintenance dredging of the river portion requires upland disposal of between 50,000 to 100,000 cys of material while maintenance of the bay portion requires dredging of 75,000 to 150,000 cys of material.

3) Source of Material: The material is being dredged from the Fowl River Federal Navigation Project, Mobile County, Alabama (EA Figure 1). The dredging cycle is dependent upon where shoaling occurs within both channel portions.

E. General Description of the Discharge Site:

1) Location: Previously certified disposal sites include an upland site in proximity to the upper portion of the Fowl River channel and an open-water site south of the channel within Mobile Bay (EA Figures 2, 3 & 4).

2) Size: The upland disposal site consists of approximately 50 acres. The open-water disposal area consists of a 240-acre site.

3) Type of Site: The disposal site types utilized for maintenance of the project are contained upland and open-water areas.

4) Type of Habitat: The upland disposal site is contained (diked) upland disposal, and the open-water area is brackish to marine open-water habitat. Both of these sites have been historically used for disposal of dredged material from Fowl River.

5) Timing and Duration of Discharge: Timing and duration of the proposed action are dependent upon where, and how frequently, shoaling occurs in the navigation project. A typical dredging cycle occurs approximately every two to three years.

F. Description of Disposal Method: Hydraulic pipeline dredging equipment will be used to maintain both channel portions the Fowl River Federal Navigation project.

II. FACTUAL DETERMINATIONS (Section 230.11):

A. Physical Substrate Determinations:

1) Substrate Elevation and Slope: the upland disposal area is contained with a 5-foot dike there surrounds the perimeter of the disposal area. The inner and outer dike slopes are 1-foot vertical to 2.7 feet horizontal (1V:2.7H). The open-water disposal area is located south of the Fowl River navigation channel and is maintained via thin layer disposal techniques not to exceed 12 inches of lift.

2) Sediment Type: Dredged material proposed for disposal ranges from fine silt, sandy clay particles, and highly plastic clays.

3) Dredged Material Movement: Disposal of dredged material at the upland site would be confined to within the diked area. The residence times of return water within the

upland disposal site would be such that no impacts would result from the movement of materials. Currents are anticipated to transport material out of the open-water disposal site.

4) Physical Effects on Benthos: Some benthic organisms would be impacted by the proposed action; however, these impacts would be minimal and short in duration. Return water from the proposed upland site would have no impact on benthos. Non-motile benthic fauna within the open-water disposal site may be impacted by the proposed operations, but should repopulate within several months after completion. 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. Studies on adult, pre-adult and juvenile fisheries resources indicate that most species are able to avoid the area of disposal or are unaffected. Larval and juvenile stages of these forms may not be able to avoid the activity due to limited mobility. Pre- and post-monitoring of water quality suggests turbidity and total suspended solids are temporarily affected by disposal operations. However, the magnitude of the increases with disposal operations is consistent with those caused by frontal storms. In addition, total suspended solids were shown to be elevated in bottom waters of disposal areas; however, this limitation to the bottom waters suggests rapid settling rates of the material or low wave and current energy unable to re-suspend sediments. Research conducted by the U.S. Army Corps of Engineers, Engineering, Research and Development Center (ERDC) under the Dredged Material Research Program suggests that the benthic community is adapted to a wide range of naturally occurring environmental changes and that no significant or long-term changes in community structure or function are expected.

5) Other Effects: No other effects are anticipated.

6) Actions Taken to Minimize Impacts (Subpart H): No other actions to minimize impacts to the physical substrate are deemed appropriate for this project.

B. <u>Water Column Determinations</u>:

1) Salinity: There would be no change in salinity gradients or patterns.

2) Water Chemistry (pH, etc.): No effect.

3) Clarity: Minor increases in turbidity may be experienced in the immediate vicinity of the project during dredging and open-water disposal operations. However, these increases will be temporary and would return to pre-project conditions shortly after completion.

4) Color: No effect.

5) Odor: No effect.

6) Taste: No effect.

7) Dissolved Gas Levels: Temporary decreases in dissolved oxygen will likely result from the disposal operations at the open-water site, but this will only be of a short duration. No

long-term effect to the water column is anticipated. The return water from the upland site is not anticipated to adversely impact dissolved gas levels.

8) Nutrients: Slight increases in nutrient concentrations may occur from disposal operations; however, these concentrations would rapidly disperse. These described increases would have no significant effect to the water column.

9) Eutrophication: No effect.

C. <u>Water Circulation, Fluctuation, and Salinity Gradient Determinations</u>:

1) Current Patterns and Circulation:

a) Current Patterns and Flow: Placement of dredged material into a confined upland disposal area is not anticipated to affect flows due to the location of this site. The subsequent return water flows are not anticipated to affect current patterns and flow in the vicinity of the project area. The USACE, Mobile District utilizes thin layer disposal technique to maintain open-water disposal sites to preclude any adverse impacts. Material disposed of at open-water sites is managed to not exceed 12 inches of lift.

b) Velocity: No effect.

2) Stratification: No effect.

3) Hydrologic Regime: No effect.

4) Normal Water Level Fluctuations: No effect.

5) Salinity Gradient: No effect.

D. <u>Suspended Particulate/Turbidity Determination</u>:

1) Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Placement Site: No effect.

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

a) Light Penetration: Light penetration through the water column at the open-water disposal site may be temporarily affected but is anticipated to return to previous conditions upon completion of operation activities. The return water from the upland site is not anticipated to adversely impact light penetration.

b) Dissolved Oxygen: No effect.

c) Toxic Metals and Organics: No effect.

d) Pathogens: No effect.

e) Esthetics: No effect.

3) Effects on Biota:

a) Primary Production Photosynthesis: No effect.

b) Suspension/Filter Feeders: No effect.

c) Sight Feeders: Shorebirds tend to be attracted to disposal sites and placement activities due to the presence of food items in the dredged material. The impact of these operations at the upland and open-water disposal sites on sight feeders is expected to be a beneficial, short-term impact.

4) Actions Taken to Minimize Impacts (Subpart H): No further actions are deemed appropriate.

E. Contaminant Determinations: The materials proposed for placement are naturally occurring materials and are not precluded from placement in the previously utilized disposal areas. Therefore, the materials are excluded from testing under Section 404(b)(1)(d).

F. Aquatic Ecosystem and Organism Determinations: No effect.

1) Effects on Plankton: No effect.

2) Effects on Benthos: Temporary disruption of the aquatic community is anticipated in the open-water disposal site. Non-motile benthic fauna within the area may be destroyed by the proposed dredging operations, but should repopulate within several months after completion. Due to the dredging cycle occurring every two to three years, repopulation of non-motile benthic fauna should not be adversely impacted. 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.

3) Effects on Nekton: No effect.

4) Effects on Aquatic Food Web: No effect.

5) Effects on Special Aquatic Sites: Not applicable.

a) Sanctuaries: Not applicable.

b) Wetlands: No effect.

c) Mud Flats: Not applicable.

d) Vegetated Shallows: Not applicable.

e) Coral Reefs: Not applicable.

f) Riffle and Pool Complexes: Not applicable.

6) Effects on Threatened and Endangered Species: Under Section 7 coordination of the Endangered Species Act (ESA) and the Marine Mammal Protection Act, the USACE, Mobile District requested concurrence from the U.S. Fish and Wildlife Service (USFWS) on the proposed threatened and endangered species in the project vicinity. Through consultation the USACE, Mobile District had determined that the following threatened and endangered species may be affected by the project action: West Indian manatee, Gulf sturgeon, Eastern indigo snake, pine snake, piping lover, wood stork, Alabama red-bellied turtle, gopher tortoise, and the leatherback, hawksbill, loggerhead, green and Kemp's ridley sea turtles. Coordination with USFWS will request concurrence with the District's may affect but is not likely to adversely affect determination of listed threatened and/or endangered species or their associated critical habitat.

7) Effects on Other Wildlife: No effect.

8) Actions to Minimize Impacts: No other actions to minimize impacts on the aquatic ecosystem are deemed appropriate.

G. <u>Proposed Disposal Site Determinations</u>:

1) Mixing Zone Determination: The State of Alabama will specify a mixing zone for turbidity compliance. Material placed at the open-water disposal area is anticipated to quickly settle out of the water column. Pre- and post-monitoring of water quality suggests turbidity and total suspended solids are temporarily affected by disposal operations. However, the magnitude of the increases with disposal operations is consistent with those caused by frontal storm events. Disposal of material at the open-water area is not anticipated to exceed the proposed turbidity compliance issued. Due to the fact the other proposed disposal action is upland placement, and that sufficient retention time would be provided for the return water, no mixing violations are expected.

2) Determination of Compliance with Applicable Water Quality Standards: The proposed activity has been determined to be in compliance with all applicable water quality standards.

3) Potential Effects on Human Use Characteristics:

a) Municipal and Private Water Supply: Not applicable.

b) Recreational and Commercial Fisheries: No effect.

c) Water Related Recreation: No effect.

d) Esthetics: No effect.

e) Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites and Similar Preserves: Not applicable.

f) Other Effects: No effect.

H. Determination of Cumulative Effects on the Aquatic Ecosystem: The proposed action is not expected to have significant cumulative adverse impacts.

I. Determination of Secondary Effects on the Aquatic Ecosystem: The proposed action is not expected to have any significant secondary adverse effects on the aquatic ecosystem.

III. FINDING OF COMPLIANCE WITH RESTRICTIONS ON DISCHARGE:

A. No significant adaptations of the Section 404(b)(1) guidelines were made relative to this evaluation.

B. The proposed discharge represents the least environmentally damaging practicable alternative.

C. The planned placement of dredged materials would not violate any applicable State water quality standards; nor will it violate the Toxic Effluent Standard of Section 307 of the Clean Water Act (CWA).

D. Use of the proposed disposal sites will not jeopardize the continued existence of any Federally-listed endangered or threatened species or their critical habitat.

E. The proposed placement of dredged material will not contribute to significant degradation of waters of the United States. Nor will it result in significant adverse effects on human health and welfare, including municipal and private water supplies; recreation and commercial fishing; life stages of organisms dependent upon the aquatic ecosystem; ecosystem diversity, productivity and stability; or recreational, aesthetic or economic values.

F. Appropriate and practicable steps will be taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem.

DATE_____ _____

STEVEN J. ROEMHILDT
Colonel, Corps of Engineers
District Commander