CHAPTER 3 AFFECTED ENVIRONMENT

3.1 GENERAL

This chapter describes the climate, geomorphic and physiographic setting, and the historic and existing conditions for the following important resources: soils; coastal vegetation; wildlife; fisheries; plankton; benthos; essential fish habitat (EFH); threatened and endangered species; hydrology (including flow and water levels, and sediment); water quality; recreation; public lands; cultural and historic resources; aesthetics; air quality; socioeconomic and human resources (including population; infrastructure; employment and income; navigation; oil, gas, and utilities; pipelines; commercial fisheries; oyster leases; and flood control and hurricane protection). In addition, the characterization of noise and hazardous, toxic, and radioactive waste (HTRW) in the project area are presented.

A resource is considered important if it is recognized by statutory authorities including laws, regulations, Executive Orders (EO), policies, rules, or guidance; if it is recognized as important by some segment of the general public; or if it is determined to be important based on technical or scientific criteria. The following sections discuss historic and existing conditions of each important resource occurring within the project area.

3.2 CLIMATE

Climate is one of the major factors necessitating implementation of the proposed action. The climate of the project area, subtropical marine with long humid summers and short moderate winters, is governed by various terrestrial and atmospheric controls. Situated along the northern Gulf of Mexico between 29° and 33° north latitude, Louisiana's climate and temperature patterns are strongly influenced by seasonal changes in atmospheric circulation.

Louisiana is susceptible to tropical waves, tropical depressions, tropical storms, and hurricanes due to its proximity to the Gulf of Mexico. Historical data from 1899 to 2007 indicate that 30 hurricanes and 41 tropical storms have made landfall along the Louisiana coastline (National Weather Service, http://www.srh.noaa.gov/lch/research/tropical5.php and National Hurricane Center, http://www.nhc.noaa.gov).

The total amount of marsh lost as a result of Hurricanes Katrina and Rita was over one third of the total predicted wetland losses predicted by the Coast 2050 Report (LCWCRTF and WCRA, 1999). Within the 92,217-acre (37,361 ha) Lake Borgne and MRGO project area, about 663 acres (269 ha) of wetlands were converted to open water (Barras, 2006). This loss rate exceeded the average background loss rate of about 144 acres per year (58 ha/yr) for the period from 1988 to 2004 (Wicker, 1980; Barras et al., 1994; Barras et al., 2003; Morton et al., 2005). In the northern and eastern shorelines of Lake Borgne, new water bodies formed and existing water bodies expanded (USGS, 2006). These changes occurred largely as a result of Hurricanes Katrina and Rita. The combined land-water changes caused by Hurricanes Katrina and Rita exceeded coastal land change from previous recent hurricanes combined, such as Hurricanes Andrew (1992), Lili (2002), and Tropical Storm Isidore (2002) (Barras, 2006).

While no tropical storms or hurricanes made landfall in Louisiana in 2007, Hurricane Gustav made landfall near Cocodrie, Louisiana, on September 1, 2008. Initial observations from the U.S. Geological Survey (USGS) of imagery from the PALSAR satellite indicated no major damage from the passage of Hurricane Gustav on the project area (Michelle Fischer, USGS, personal communication, 2008). However, these images were taken when water levels were still high, and some erosion below the detectable spatial resolution of the imagery may have taken place. As water levels recede, this can be more accurately assessed. The USGS also collected oblique photography from areas impacted by Hurricane Gustav from a fixed-wing aircraft (Scott Wilson, USGS, personal communication, 2008). While the USGS did not specifically fly the MRGO channel, there have been no reports of large-scale impacts in Breton Sound or Lake Borgne areas from this storm. Furthermore, based on the storm characteristics (storm path, surge, and intensity) the USGS did not anticipate any large-scale impacts in the MRGO area (Scott Wilson, USGS, personal communication, 2008).

3.3 GEOMORPHIC AND PHYSIOGRAPHIC SETTING

The geomorphic and physiographic setting is technically significant because geologic conditions can place constraints on the nature, design, or location of the proposed action, as well as determine the impacts that the proposed action would have on other important resources.

The project area is located within the St. Bernard delta complex, the oldest deltaic complex within the Mississippi Deltaic Plain Region. The USGS Open File Report 98-36 (1998) describes the St. Bernard delta complex as a distinct physiographic unit, formed by Mississippi River deposits between 700 and 4,700 years ago. The most prominent features are the vast expanses of fresh, intermediate, brackish, and salt marsh. The majority of the remaining surface features are comprised of inland swamp, tidal channels, shallow lakes and bays, natural levee ridges along active and abandoned distributaries, sandy barrier islands and beaches.

The St. Bernard delta complex began receiving Mississippi River deltaic sediments from the middle to late Holocene. The first deltaic deposits to enter the area were homogenous prodelta clays. This was followed by the deposition of interdistributary bay deposits as the Mississippi River and its distributaries prograded. The deposits were finer sediments (silty clay and clay) that were transported away from the distributary channel and settled out of suspension as interdistributary deposits.

Construction of the MRGO channel, which began in 1958 and was completed in 1968, has impacted the natural geomorphology and hydrology of the St. Bernard deltaic complex in general and the project area in particular. A hydrologic study across areas of the current channel was conducted from 1959 – 1961 to evaluate the major hydrologic parameters, including circulation and salinity, prior to opening the MRGO to marine traffic in 1963 (Rounsefell, 1964). These data indicated that the Bayou La Loutre ridge provided a basin boundary that limited the flow of saline water from the Breton Sound area into Lake Borgne. The Bayou La Loutre ridge was breached during construction of the MRGO (**Figure 3.1**). An analysis of typical tidal flow across the region indicates that since construction of the MRGO, circulation patterns have been altered along its length in areas between Breton Sound and Lake Borgne (Wicker et al., 1982). Breaching the Bayou La Loutre ridge, which served as a basin boundary, has altered circulation patterns in areas along the lower southeastern length of the channel and across areas between Breton Sound and Lake Borgne.

Until recently, emergent wetlands located adjacent to the MRGO have been impacted by wave-action from deep-draft navigation vessel traffic, and other man-made and natural causes resulting in erosion rates between 27 and 38 feet (ft) per year (8.2 and 11.6 meters [m] per year) (USACE, 2004). The Lake Borgne shoreline continues to be eroded by factors such as wind and tidal surge at a rate of seven to 15 ft per year (2.1 to 4.6 m per year) (Barras, 2006). Interior wetlands in the project area have also been subject to natural subsidence at a rate of 0.50 ft per century (0.15 ms per century) due to natural deltaic processes. With a projected eustatic sea level rise of 1.3 ft per century (0.40 m per century), this combines for an increase in relative sea level of 1.8 ft per century (0.55 m per century) (personal communication, Del Britsch, CEMVN, 2007). This results in an interior wetland loss rate of 0.65 to 1.02 percent per year (Barras, 2006).

The following information is based upon review of CEMVN Operations and Maintenance records, files, and reports. In 1993, 1995, and 2004, dredged material removed from the Inland Reach was placed on the land bridge north of the navigation channel to create wetlands in the vicinity of Bayou Dupre as well as near Shell Beach, Hopedale, and Bayou La Loutre. In general, dredged material was pumped into shallow, open water areas confined with earthen retention dikes to prevent sediments from flowing into the channel, oyster leases, or other non-work areas. The dredged material slurry was allowed to flow into adjacent broken marsh to nourish it where practicable. The amount of material used beneficially varied among maintenance cycles, but in FY 2004, a total of 792,361 cubic yards (605,009 cubic meters) was placed to create 145.4 acres (58.9 ha) of marsh from one cycle, and another cycle in FY 2004 created a total of 600.7 acres (243.4 ha) and nourished 132.5 acres (53.7 ha) of marsh in four disposal areas on the land bridge in the Shell Beach vicinity.

Shoreline protection measures have been installed along the north and south banklines of the MRGO Inland Reach to lower maintenance costs, reduce shoreline erosion, protect the Chalmette Loop Hurricane Protection Levee, and protect wetland creation sites. In general, shoreline protection along the north bank consisted of rock dikes constructed parallel to narrow segments of the MRGO/Lake Borgne land bridge. Shorter segments of rock dikes were constructed along the north bank near Bayou La Loutre to protect wetland creation sites. Poor foundations provided by underlying channel sediments require frequent maintenance of rock dikes on the north bank. A nearly continuous rock dike was constructed along the south bankline from Mile 60 to Mile 47 fronting the Hurricane Protection Levee. Shorter "test sections" of Articulated Concrete Mattresses (ACM) were placed in two reaches of the south bankline near Mile 37 and Mile 39 to evaluate the performance of ACM as an alternate shoreline protection measure. The extent of shoreline protection measures constructed to date and the previously approved disposal areas along the upper MRGO channel are depicted in **Figure 3.2**.

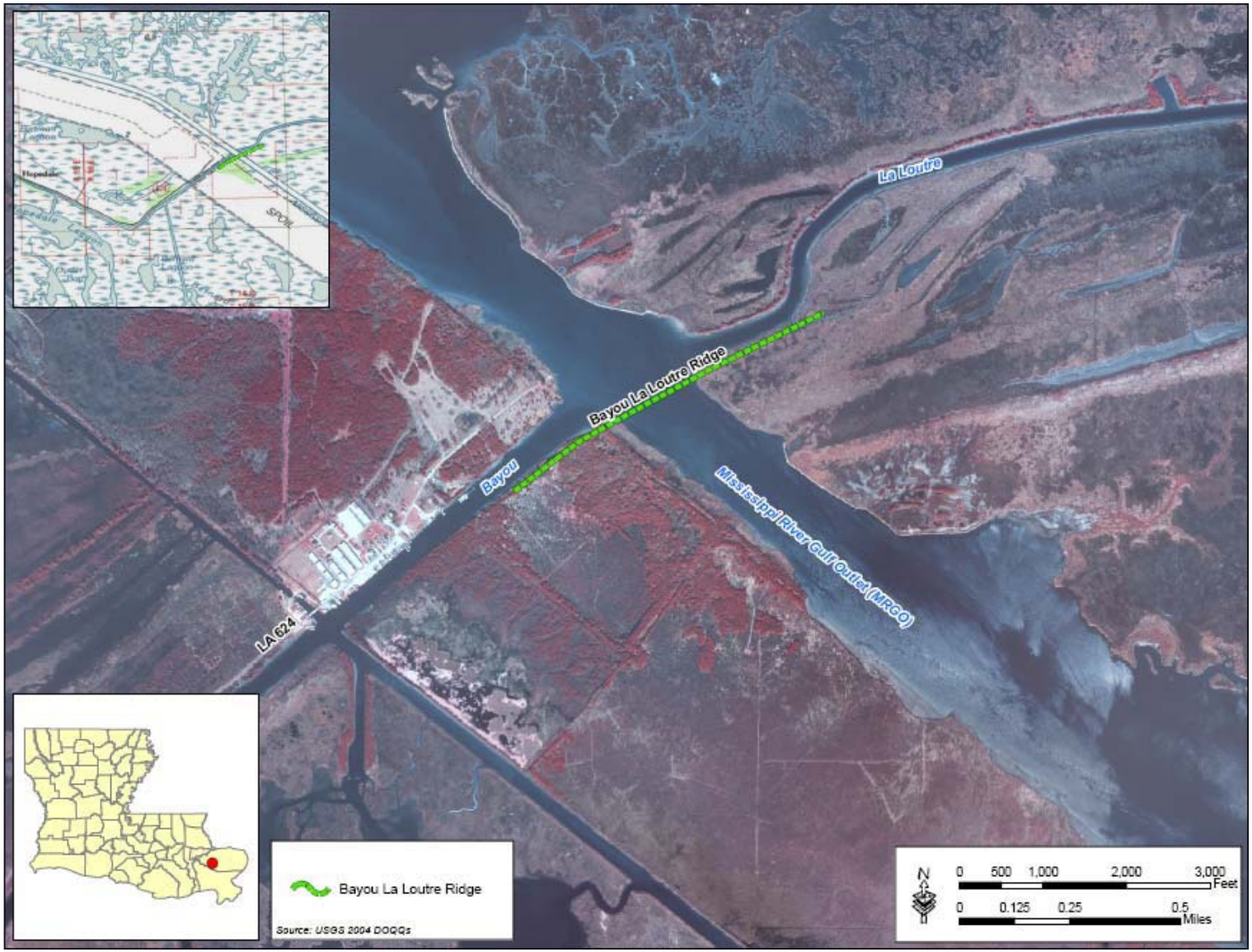

Figure 3.1 Intersection of the Bayou La Loutre Ridge and the MRGO (USACE, 2007)

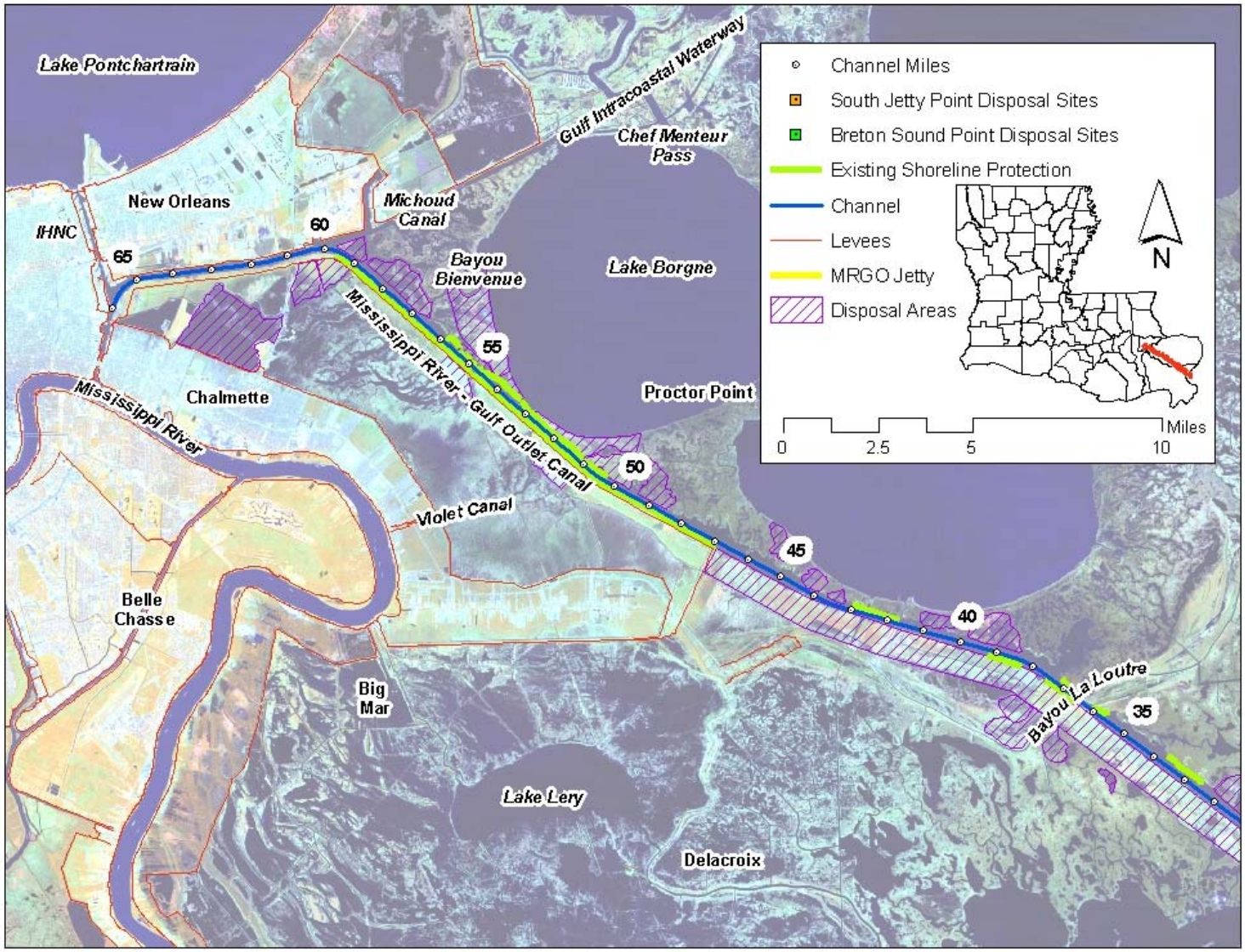

Figure 3.2 Existing Shoreline Protection Measures and Disposal Areas along the Upper MRGO Channel

3.4 SOILS

3.4.1 Historic and Existing Conditions

This resource is institutionally significant because of the Council on Environmental Quality (CEQ) memorandum of August 11, 1980, entitled "Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing the National Environmental Policy Act (NEPA);" Executive Order 11990 – Protection of Wetlands; and Agriculture and Food Act of 1981 (Public Law 97-98) containing the Farmland Protection Policy Act (Public Law 97-98; U.S.C. 4201 *et seq*.). This resource is technically significant because it is a critical element of coastal habitats, and supports vegetation growth and open-water benthic productivity. This resource is publicly significant because of the high value the public places on wildlife and fisheries supported by the soils in the area.

Deltaic processes have played a significant role in the types of soil present in the project area. The dynamic and episodic deltaic building processes alternates between periods of seaward progradation of deltas (regressive deposition) and the subsequent landward retreat of deltaic headlands as deltas are abandoned, reworked, and submerged by marine waters (transgressive deposition). The types of soils present today in much of the project area are characterized by the depositional environments associated with both of these phases of the deltaic cycle. The Soil Conservation Service (now Natural Resources Conservation Service) characterizes the soil types found in the project area as Clovelly muck, Fausse clay, and Lafitte muck (USDA, 1989). Clovelly muck is well suited for wetland wildlife habitat and combined with brackish marshes and shallow open water supports marine life of the Gulf of Mexico.

3.5 COASTAL VEGETATION RESOURCES

3.5.1 Historic and Existing Conditions

Coastal vegetation resources are institutionally significant because of the Coastal Barrier Resources Act of 1982; Coastal Zone Management Act of 1972; Emergency Wetlands Resources Act of 1986; Estuary Protection Act of 1968; Fish and Wildlife Conservation Act of 1980; the Fish and Wildlife Coordination Act of 1958, as amended; Migratory Bird Conservation Act; Migratory Bird Treaty Act; Endangered Species Act of 1973 (ESA); Magnuson Fishery Conservation and Management Act 1990; National Environmental Policy Act of 1969; the North American Wetlands Conservation Act; the Water Resources Development Acts of 1976, 1986, 1990, and 1992; and Executive Order 13186 Migratory Bird Habitat Protection. Coastal vegetation resources are technically significant because they are a critical element of the coastal habitats. In addition, coastal vegetation resources serve as the basis of productivity, contribute to ecosystem diversity, provide various habitat types for fish and wildlife, and are an indicator of the health of coastal habitats. Coastal vegetation resources are publicly significant because of the high priority that the public places on their aesthetic, recreational, and commercial value.

The U.S. Fish and Wildlife Service (USFWS), in a letter dated December 20, 2006 (**Appendix B**), formally requested that significant fish and wildlife resources and important habitats be fully considered and addressed in the Draft EIS including: emergent marsh, submerged aquatic vegetation, and shallow open water habitats. The National Marine Fisheries

Service (NMFS) in a letter dated December 22, 2006 (**Appendix C**), indicated that in addition to being designated as essential fish habitat (EFH), the water bodies and wetlands in the project area provide nursery and foraging habitats supportive of a variety of important marine fishery species. The Louisiana Department of Wildlife and Fisheries (LDWF), in a letter dated December 28, 2006, emphasized the importance of the wetlands and shallow-water habitats in the project area to estuarine fishes and invertebrates.

Existing coastal vegetation resources in the 92,217-acre (37,361 ha) project area are predominantly classified as brackish (13,328 acres/5,400 ha) and saline (7,627 acres/3,090 ha) marsh (**Figure 3.3**; Barras, 2006). There are presently no fresh or intermediate marshes, scrub/shrub, forest, or swamp habitats within the project area (Barras, 2006). There are no submerged aquatic vegetation (SAV) species currently in the project area. The dominant vegetation in the area is smooth cordgrass (*Spartina alterniflora*), with concentrations of common threesquare (*Schoenoplectus pungens*), seashore saltgrass (*Distichlis spicata*), and marshhay cordgrass (*Spartina patens*). The remainder of the area is primarily classified by the USGS as open water.

Prior to construction of the MRGO the project area was classified as brackish marsh - three-cornered grass (O'Neill, 1949; see also **Figure 3.4, reference 1956 habitat map**). By 1978 the project area marsh was entirely brackish (**Figure 3.4, reference 1978 habitat map**). The project area was predominantly brackish marsh in 1988; however, saline marsh was present along the southern-most lobe of Lake Borgne extending along the northern MRGO bank from the southern-most portions of the project area, near Bayou La Loutre, to as far north as Bayou Dupre (**Figure 3.4, reference 1988 habitat map**). In 2000, the project area was still predominantly brackish marsh; however, saline marsh no longer extended along the MRGO northern bank as far north as Bayou Dupre as it had in 1988 (**Figure 3.4, reference 1988 and 2000 habitat maps**). **Table 3.1** depicts pre-Hurricanes Katrina and Rita vegetation types in the project area (years 1956, 1978, 1988, and 2000), as well as post-Hurricanes Katrina and Rita data from October 25, 2005.

Construction and use of the MRGO contributed to changes in habitat types, as well as to direct and indirect losses of wetlands in the project area (**Figure 3.4**). The Bayou La Loutre ridge formed a natural barrier to the more saline waters of the Gulf of Mexico. Construction of the MRGO channel breached this ridge, allowing greater tidal connectivity and saltwater intrusion thereby increasing the average salinity throughout the project area (Tate et al., 2002). Submerged aquatic vegetation (SAV) formerly observed in the wetlands north of MRGO, Proctor Point, and Lower Proctor Point marshes declined as the average salinity increased. Salinities in the project area average about 16 parts per thousand (ppt) in the lower reaches and about 13 ppt in the upper reaches since the construction of the MRGO (Tate et al., 2002).

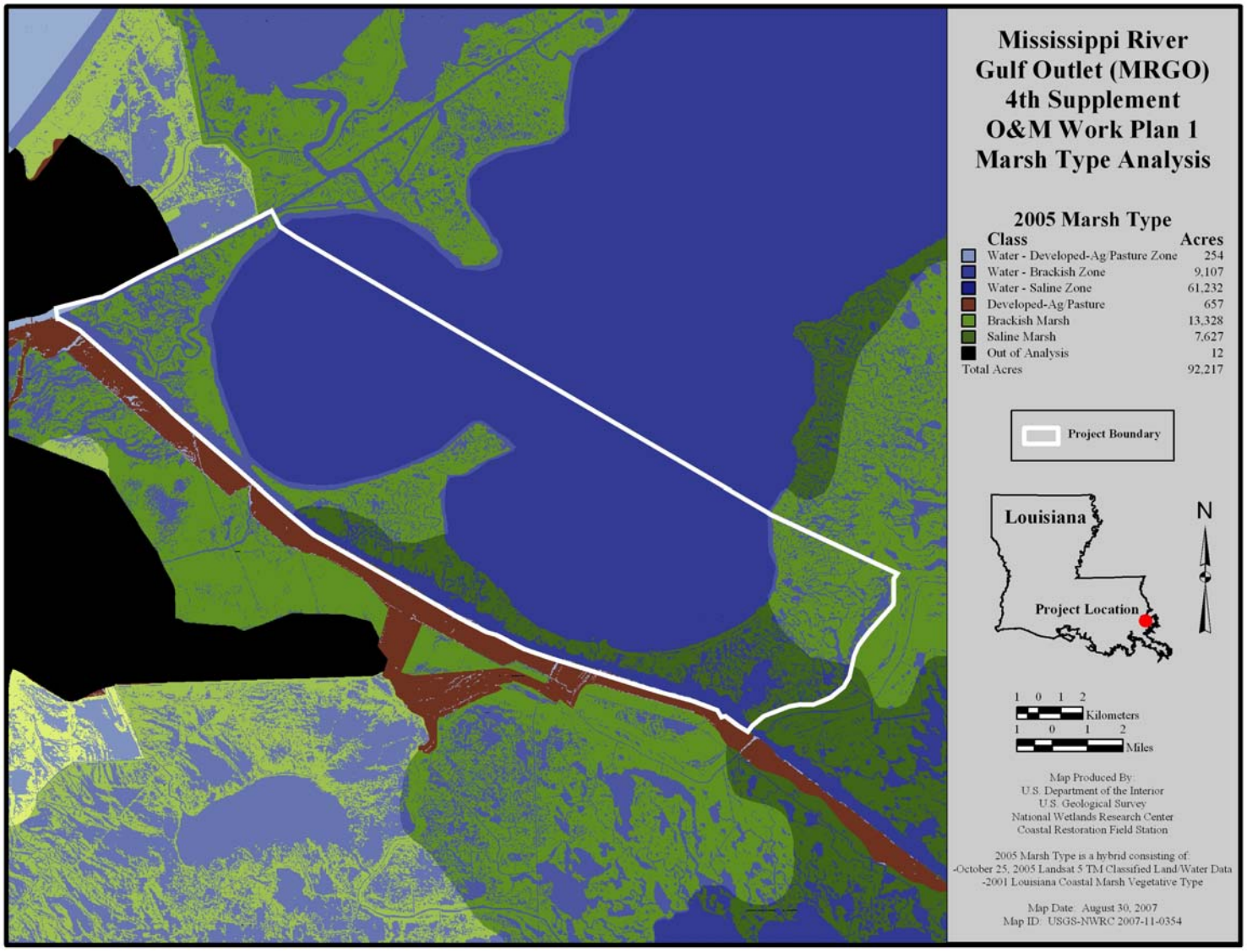

Figure 3.3 Habitat Analysis of the Project Area from 2005 (Barras, 2006)

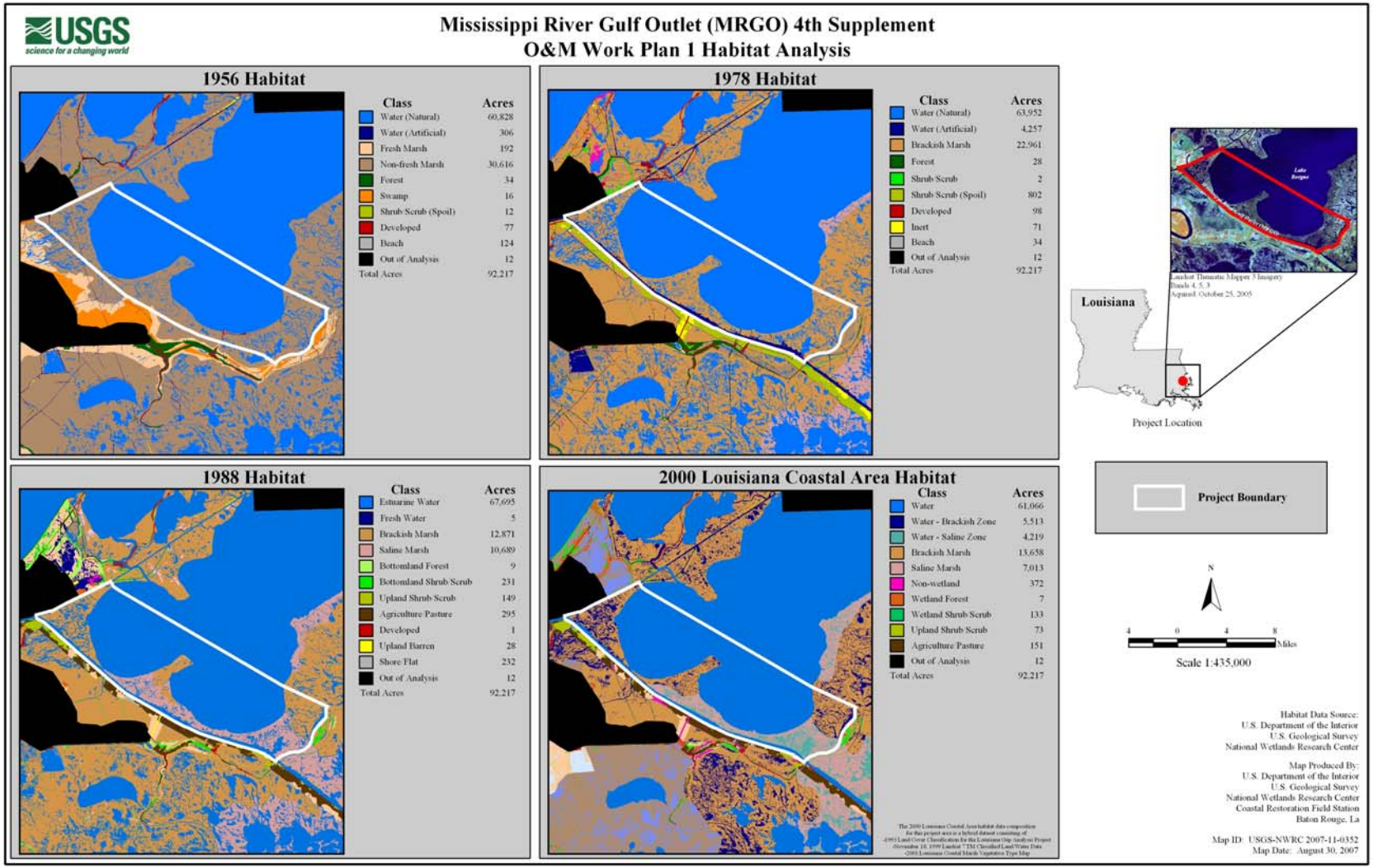

Figure 3.4 Habitat Analysis in Project Area for Years 1956, 1978, 1988, and 2000 (Wicker, 1980; Barras et al., 1994; Barras et al., 2003; Morton et al., 2007)

Table 3.1 Pre-Hurricane Katrina Habitat Types in the Project Area (Years 1956, 1978, 1988, and 2000), as well as Post-Hurricane Katrina Vegetation Types in 2005 (Wicker, 1980; Barras et al., 1994; Barras et al., 2003; Morton et al., 2005; Barras, 2006)

Habitat Types	Total Acreage in Project Area: 92,217 acres Change in vegetation type over time expressed in acres 1956	1978	1988	2000	2005
Water (Natural)	60,828	63,952		61,066	
Water (Artificial)	306	4,257			
Water- Brackish Zone				5,513	9,107
Water-Saline Zone				4,219	61,232
Estuarine Water			67,695		
Water- Developed-Ag/Pasture Zone					254
Fresh Marsh	192				
Non-fresh Marsh	30,616	(22,961)*	(23,560)*	(20,671)*	(20,955)*
Brackish Marsh		**22,961**	**12,871**	**13,658**	**13,328**
Saline Marsh			**10,689****	**7,013**	**7,627**
Shrub/Scrub		2			
Shrub/Scrub (Spoil)	12	802			
Wetland Shrub/Scrub				133	
Upland Shrub/Scrub			149	73	
Bottomland Shrub/Scrub			231		
Swamp	16				
Forest	34	28			
Wetland Forest				7	
Bottomland Forest			9		
Beach	124	34			
Shore/Flat			232		
Non-wetland				372	
Upland Barren			28		
Agriculture Pasture			295	151	
Developed	77	98	1		
Developed-Ag/Pasture					657
Inert		71			
Out of Analysis	12	12	12	12	12

*** acreages in parentheses are the total of brackish and saline marsh acreages for comparison to 1956**

**** note that 20 years after MRGO construction, saline marshes in the southeastern Lake Borgne and MRGO channel vicinity are documented for the first time**

3.6 WILDLIFE RESOURCES

3.6.1 Historic and Existing Conditions

This resource is institutionally significant because of the National Environmental Policy Act of 1969; the Coastal Zone Management Act; Estuary Protection Act; the Fish and Wildlife Coordination Act of 1958, as amended; the Migratory Bird Conservation Act of 1929, as amended; the Migratory Bird Treaty Act of 1918; the Endangered Species Act of 1973 (ESA), as amended; the Fish and Wildlife Conservation Act of 1980; the North American Wetlands Conservation Act; Executive Order 13186 Migratory Bird Habitat Protection; Migratory Bird Conservation Act; and the Marine Mammal Protection Act. Wildlife resources are technically significant because they are a critical element of the coastal barrier ecosystem, they are an important indicator of the health of coastal habitats, and many wildlife species are important recreational and commercial resources. Wildlife resources are publicly significant because of the high priority that the public places on their aesthetic, recreational, and commercial value.

The USFWS, in a letter dated December 20, 2006, formally requested that significant fish and wildlife resources be fully considered and addressed in the Draft EIS, including: seabirds, shorebirds, wading birds, migratory and resident waterfowl, and estuarine-dependant fishes and shellfishes. In addition, USFWS requested that important habitats, such as emergent marsh, submerged aquatic vegetation, and shallow open water, should also be addressed in the Draft EIS. Furthermore, the USFWS identified two threatened and endangered species (Gulf sturgeon and West Indian manatee) of concern within the project area. The LDWF, in a letter dated December 28, 2006, indicated the Draft EIS should address the importance of natural waterways remaining accessible to both fish and wildlife resources, and resource users.

Coastal Louisiana's wetlands support millions of neotropical and other migratory avian species such as rails, gallinules, shorebirds, wading birds, and numerous songbirds, as well as many different furbearers, rabbits, deer, and alligators. The rigors of long distance flight requires most neotropical migratory birds to rest and refuel several times before they reach their final destination. Louisiana coastal wetlands provide neotropical migratory birds essential stopover habitat on their annual migration route. The coastal wetlands in the project area provide important and essential fish and wildlife habitats, especially transitional habitat between estuarine and marine environments, used for shelter, nesting, feeding, roosting, cover, nursery, and other life requirements.

Table 3.2 shows the status, functions of interest, trends, and projections through 2050 for avifauna, furbearers, game mammals, and reptiles within the project area (LCWCRTF & WCRA, 1999). Emergent brackish wetlands are typically utilized by many different wildlife, including: seabirds; wading birds; shorebirds; dabbling and diving ducks; raptors; rails, coots, and gallinules; other emergent brackish marsh residents and migrants; nutria; muskrat; mink, otter, and raccoon; rabbits; deer; and American alligator. Emergent saline marshes are typically utilized by: seabirds; wading birds; shore birds; dabbling and diving ducks; rails, coots, and gallinules; other saline marsh residents and migrants; nutria; muskrat; mink, otter, and raccoon; rabbits; deer; and American alligator. Open water habitats in Lake Borgne provide wintering and multiple use functions for brown pelicans; seabirds; and other open water residents and migrants. Open water habitats in the project area provide wintering and multiple use functions for brown pelicans; seabirds; dabbling and diving ducks; rails, coots, and gallinules; other open

Table 3.2 Status, Functions of Interest, Trends, and Projections through 2050 For Avifauna, Furbearers, Game Mammals, and Reptiles within the Project Area (LCWCRTF & WCRA, 1999)

Mapping Unit	Type	% of unit	Furbearers												Game Mammals								Reptiles				Avifauna															
			Nutria				Muskrat				Mink, Otter, and Raccoon				Rabbit				Deer				Alligator				Brown Pelican				Seabirds				Wading Birds							
			function	status	trend	projection	function	status	trend	projection	function	status	trend	projection	function	status	trend	projection	function	status	trend	projection	function	status	trend	projection	function	status	trend	projection	function	status	trend	projection	function	status	trend	projection				
South Lake Borgne (Project Area)	OW	42	Mu	Lo	D	D	Mu	Lo	D	D	Mu	Lo	D	D		NH				NH			Mu	Lo	D	D	W	Mo	I	I	Mu	Hi	Sy	Sy		NH						
	BM	24	Mu	Lo	D	D	Mu	Lo	D	D	Mu	Lo	D	D	Mu	Lo	D	D	Mu	Lo	D	D	Mu	Lo	D	D		NH			Mu	Hi	Sy	D	Mu	Hi	Sy	D				
	SM	32	Mu	Lo	D	D	Mu	Lo	D	D	Mu	Lo	D	D	Mu	Lo	D	D	Mu	Lo	D	D	Mu	Lo	D	D		NH			Mu	Hi	Sy	D	Mu	Hi	Sy	D				
Lake Borgne	OW	100		NH				NH				NH				NH				NH				NH			W	Mo	I	I	Mu	Hi	Sy	Sy		NH						

Table 3.2 (cont.):

Mapping Unit	Avifauna (cont.)																															
	Shorebirds				Dabbling Ducks				Diving Ducks				Raptors				Rails, Coots Gallinules				Other Marsh/ Wetland Residents				Other Marsh/ Wetland Migrants							
	function	status	trend	projection	function	status	trend	projection	function	status	trend	projection	function	status	trend	projection	function	status	trend	projection	function	status	trend	projection	function	status	trend	projection				
South Lake Borgne (Project Area)		NH			W	Lo	D	D	W	Lo	D	D		NH			W	Lo	D	D	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy				
	Mu	Hi	Sy	D	W	Lo	D	D	W	Lo	D	D	Mu	Lo	Sy	D	Mu	Lo	D	D	Ne	Hi	Sy	D	Mu	Hi	Sy	D				
	Mu	Hi	Sy	D	W	Lo	D	D	W	Lo	D	D		NH			Mu	Lo	D	D	Ne	Hi	Sy	D	Mu	Hi	Sy	D				
Lake Borgne		NH				NH			W	Hi	Sy	Sy		NH				NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy				

Type: OW = Open Water; BM = Brackish Marsh; SM = Salt Marsh
Function: Ne = Nesting; St = Stopover Habitat; W = Wintering; Mu = Multiple Use
Status: NH = Not Historically Present; NL = No Longer Present; Lo = Low Numbers; Mo = Moderate Numbers; Hi = High Numbers

Trends **(since 1985)**/Projections **(through 2050): Sy = Steady; D = Decrease; I = Increase; U = Unknown**

water residents and migrants; nutria; muskrat; mink, otter, and raccoon; and American alligators (LCWCRTF & WCRA, 1999). The nutria (*Myocastor coypus*) and feral hogs (*Sus scrofa*) are two mammals found within the project area that are identified as invasive species in Louisiana (LDWF et al., 2003).

3.7 FISHERY RESOURCES

3.7.1 General

Fishery resources are institutionally significant because of the Fish and Wildlife Coordination Act of 1958, as amended; the Endangered Species Act of 1973; the Magnuson-Stevens Fishery Conservation and Management Act of 1976, as amended (Magnuson-Stevens Act); the Magnuson-Stevens Act Reauthorization of 2006; the Coastal Zone Management Act; and the Estuary Protection Act. Fishery resources are technically significant because: they are a critical element of many valuable freshwater and marine habitats; they are indicators of the health of various freshwater and marine habitats; and many species are commercially important. Fishery resources are publicly significant because of the high priority placed on their aesthetic, recreational, and commercial value.

By letter dated December 22, 2006, the NMFS indicates fishery resources in the project area include marine and estuarine finfish and shellfish (**Appendix C**). In addition, aquatic and tidally influenced habitats within the project area are designated as EFH for various life stages for shrimp, red drum (*Sciaenops ocellatus*), reef fish, and stone crab (see **Table 3.3**) managed by the Gulf of Mexico Fishery Management Council (GMFMC**)**. In addition, the waterbodies and wetlands in the project area provide nursery and foraging habitats supportive of a variety of economically important fishery species, such as striped mullet, Atlantic croaker, Gulf menhaden, spotted and sand seatrout, southern flounder, black drum, and blue crab. Some of these species serve as prey for other fish species managed under the Magnuson-Stevens Act by the GMFMC. The LDWF, by letter dated December 28, 2006, indicated the Draft EIS should address the importance of natural waterways remaining accessible to both fish and wildlife resources, and resource users.

Emergent wetlands and shallow open water areas in the project area provide important and essential fishery habitats including transitional habitat between estuarine and marine environments used by migratory and resident fish and other aquatic organisms for nursery, foraging, breeding and spawning, and other life requirement. The area historically and currently provides valuable habitat for recreational and commercial fishing, oyster culture, and nursery areas for a wide variety of finfish and shellfish (Rounsefell, 1964; Penland et al., 2002). Population trends for fishery species within the project area are displayed in **Table 3.4** (LCWCRTF & WCRA, 1999). Lake Borgne data indicate an existing and projected steady population for finfish, shellfish, bivalves, and shrimp through 2050. In the project area, existing populations are projected to decrease for all finfish, shellfish, bivalves, and shrimp (**Table 3.4**). Globally, overfishing and habitat change have resulted in the depletion of 90% of the world's seafood resources (Worm et al., 2006). Of the species studied, 38% have experienced more than 90% depletion. Seven percent of the species studied have become extinct (Worm et al., 2006).

Table 3.3 Essential Fish Habitat (EFH) for Various Life Stages for Shrimp, Red Drum, Reef Fish, and Stone Crab (Personal Communication, NMFS, 2006)

Species	Life Stage	System	EFH
Brown Shrimp	Larvae	Marine	<82 m depth; planktonic, sand/shell/soft bottom, SAV, emergent marsh, oyster reef
	Juvenile	Estuarine	<18 m; SAV, sand/shell/soft bottom, SAV, emergent marsh, oyster reef
White Shrimp	Juvenile	Estuarine	<30 m; SAV, soft bottom, emergent marsh
Pink Shrimp	Juvenile	Estuarine	<65 m; sand/shell substrate
Gulf Stone Crab	Eggs	Estuarine/Marine	<18 m; sand/shell/soft bottom
	Larvae/ Postlarvae	Estuarine/Marine	18 m; planktonic/oyster reefs, soft bottom
	Juvenile	Estuarine	<18 m; sand/shell/soft bottom, oyster reef
Red Drum	Larvae/ Postlarvae	Estuarine	All estuaries planktonic, SAV, sand/shell/soft bottom/ emergent marsh
	Juvenile	Estuarine/Marine	Gulf of Mexico <5 m west from Mobile Bay; all estuaries SAV, sand/shell/soft/hard bottom, emergent marsh
	Adults	Marine/Estuarine	Gulf of Mexico 1-46 m west from Mobile Bay; all estuaries SAV, pelagic, sand/shell/soft/hard bottom, emergent marsh
Lane Snapper	Larvae	Estuarine/Marine	4-132 m; reefs, SAV
	Juvenile	Estuarine/Marine	<20 m; SAV, mangrove, reefs, sand/shell/soft bottom
Dog Snapper	Juvenile	Estuarine/Marine	SAV, mangrove, emergent marsh

Table 3.4 Population Trend And Projection through 2050 for Fishery Guilds within the Project Area (LCWCRTF & WCRA, 1999)

Fishery Guild	Mapping Unit	
	Lake Borgne	***South Lake Borgne (Project Area)***
	Trend/Projection	**Trend/Projection**
Red Drum	Steady/Steady	Steady/Decline
Black Drum	Steady/Steady	Steady/Decline
Spotted Seatrout	Steady/Steady	Steady/Decline
Gulf menhaden	Steady/Steady	Steady/Decline
Southern flounder	Steady/Steady	Steady/Decline
American Oyster	Steady/Steady	Steady/Decline
White Shrimp	Steady/Steady	Steady/Decline
Brown Shrimp	Steady/Steady	Steady/Decline
Blue Crab	Steady/Steady	Steady/Decline
Spanish Mackerel	Steady/Steady	Steady/Decline
Largemouth Bass*	Not Applicable/ Not Applicable	Not Applicable/ Not Applicable
Channel Catfish*	Not Applicable / Not Applicable	Not Applicable/ Not Applicable

*** Largemouth Bass and Channel Catfish guilds are not presently observed in the project area**

3.7.2 Historic and Existing Conditions

3.7.2.1 Finfish

Rounsefell (1964) characterized fishery resources in the marsh and bayou areas now traversed by the MRGO using bimonthly sampling data collected by the Texas Agricultural and Mechanical Research Foundation during the period July 1959 to March 1961 (El-Sayed, 1961). Estuarine-marine species dominated the fish communities with spot, Atlantic croaker, anchovy, and seatrout ranked among the top ten species in every area sampled. Only two freshwater species, blue catfish and sunfish, ranked among the top ten species. Four non-migratory estuarine species ranked among the top ten species in each of the lower salinity areas. Four marine species were among the top ten most abundant species in the higher salinity areas (El-Sayed, 1961). The five most widespread and economically important fish species (spot, Atlantic croaker, anchovy, seatrout, and Gulf menhaden) were more abundant in the higher salinity areas. Neither brown shrimp nor white shrimp exhibited notable salinity preferences and were transient residents of the marshes. Small blue crabs were most abundant in low salinity waters (Rounsefell, 1964).

A list of the most abundant species sampled from 1959-1961 are presented in **Table 3.5** (Rounsefell, 1964). Of the 22 species of freshwater fishes documented by Fontenot and Rogillo (1970) in the study region, nine freshwater species disappeared after the completion of the MRGO channel (**Table 3.6**). These species included shovelnose sturgeon, chain pickerel, yellow bass, four species of sunfish (genus *Lepomis*), largemouth bass, and sauger. Fontenot and Rogillo (1970) attributed their disappearance "…during the latter half of the project due to an increase in

salinity as a result of salt water intrusion from the newly constructed Mississippi River – Gulf Outlet."

The most significant source of recent data identified for the project area was a very large sampling database developed and maintained by the LDWF (2000). The LDWF conducted extensive sampling of the coastal marshes, bayous, and lakes extending between Lake Pontchartrain and Breton Sound for several decades. The data received from the LDWF were collected from 1967 until 2000, with the exception of three missing years: 1970, 1971 and 1972. However, the LDWF (2000) data did not assess conditions prior to the construction of the MRGO channel.

The first three years of data included shellfish and finfish. Beginning in 1976, the majority of reported catch data were brown, white, and pink shrimp. Due to the size of the database and lack of any summarized information, two sampling stations located closest to the project area were chosen to evaluate the possible effects on fisheries. As presented below, the findings from two key monitoring stations support the trend of aquatic species conversion in the project area to a predominately marine species composition.

The LDWF trawl data (LDWF, 2000) shows the response of the fisheries in the project area to the introduction of saline waters. Estuarine fishes remained dominant in the area along with a few freshwater fishes. The most likely of the freshwater fishes to be found in marine conditions were white crappie (*Pomoxis annularis*), alligator gar (*Lepisosteus spatula*), and blue catfish (*Ictalurus furcatus*). However, finfish species collected from two sampling stations indicate the beginning of a trend toward the emergence of a predominately marine species in these areas. As the salinity levels increased in the areas immediately adjacent to the MRGO channel, more marine fishes, like the Atlantic midshipman (*Porichthys plectodon*), Leatherjacket (*Oligoplites saurus*), Gray snapper (*Lutjanus griseus*), and Crevalle jack (*Caranx hippos*) began to appear in the sampling trawls (LDWF, 2000).

3.7.2.2 Shrimp

Statewide, a total of 39.1 million pounds (17.8 million kg) of brown and 62.1 million pounds (28.2 million kg) of white shrimp were landed in 2005, with a value of $41.3 million and $91.9 million, respectively (personal communication, NMFS, Fisheries Statistics Division, Silver Spring, MD, 2007). Whereas historically in the Lake Pontchartrain basin white shrimp were more predominant than brown in the inland fisheries (Schexnayder and Caffey, 2002), NMFS annual shrimp landings data from 1988-2000 show a continuing trend of brown shrimp landings exceeding those of white shrimp. With the exception of 1985, which showed exceptionally high landings of brown shrimp, peak landings of brown shrimp and white shrimp were similar to those observed in the 1970s.

Table 3.5 Pre-Construction Percent Relative Abundance of Top Ten Most Abundant Fish Species Collected by Otter Trawl in Areas in and Near Lake Borgne Along the Current MRGO Channel Alignment, 1959-61 (Rounsefell, 1964)

Species		Ecological Affinity[b]	Area of Capture							
Common Name	**Scientific Name**		**1**	**2a**	**2b**	**3**	**6**	**7**	**8**	**%**
Spot	*Leiostomus xanthurus*	EM	6.8	11.3	32.1	23.5	44.2	57.5	52.3	32.5
Atlantic croaker	*Micropogonias undulatus*	EM	21.1	40.2	26.8	11.2	19.4	11.9	10.6	20.5
Anchovy	*Anchoa sp.*	EM	19.9	22.6	23.6	18.5	8.6	4.1	12.3	15.4
Seatrout	*Cynoscion sp.*	EM	5.7	4.7	7.7	2	7.8	3.6	2.5	4.5
Blue catfish	*Ictalurus furcatus*	FW	24.3	-	-	-	-	-	-	3.2
Sunfish	*Lepomis sp.*	FW	-	-	-	25.3	-	-	-	3.6
Hogchoker	*Trinectes maculatus*	ES	7.9	6.8	2.1	1.2	-	-	-	2.8
Gulf menhaden	*Brevoortia patronus*	EM	9.1	4.6	0.8	2.6	0.7	-	-	2.7
Hardhead catfish	*Arius felis*	EM	1	2.3	0.7	-	4.0	5.8	3.4	2.7
Fringed flounder	*Etropus crossotus*	MA	-	-	-	-	-	3.5	5.0	1.4
Pinfish	*Lagodon rhomboides*	ES	-	4.1	-	-	1.8	-	-	1.2
Bay whiff	*Citharichthys spilopterus*	EM	-	0.6	-	-	4.3	1.5	1.2	1.0
Lined sole	*Achirus lineatus*	EM	1.2	1.9	1.4	-	-	-	-	0.9
Atlantic threadfin	*Polydactylus octonemus*	MA	-	-	-	-	-	1.7	2.9	0.9
Gulf killifish	*Fundulus grandis*	ES	-	-	-	-	-	-	-	0.8
Puffer	*Sphoeroides sp.*	MA	-	-	-	5.5	1.6	2.5	-	0.7
Silver perch	*Bairdiella chrysoura*	EM	-	-	0.8	-	2.2	-	-	0.7
Gafftopsail catfish	*Bagre marinus*	EM	-	-	1.2	-	0.7	1.2	1.1	0.6
Bighead searobin	*Prionotus tribulus*	MA	-	-	-	-	0.7	-	1.9	0.6
Southern flounder	*Paralichthys lethostigma*	EM	0.4	-	-	-	-	-	-	0.3
Sheepshead minnow	*Cyprinodon variegatus*	ES	-	-	-	1.4	-	-	-	0.2
Striped mullet	*Mugil cephalus*	EM	-	-	-	1.4	-	-	-	0.2
	Top Ten Species		97.4	99.1	97.2	92.6	96	93.3	93.2	97.4

a: Ties for top ten species included. Percent composition not provided if species not in top ten for that area.

b: Ecological affinity groups of Thompson and Fitzhugh (1985) : FW= Freshwater; ES = Estuarine, ; EM= Estuarine- marine; MA= Marine

Table 3.6 Freshwater Species That Were Not Collected after the Completion of the MRGO Channel (Fontenot and Rogillo, 1970)

Common Name	Scientific Name
Shovelnose sturgeon	*Scaphirhynchus platorynchus*
Chain pickerel	*Esox niger*
Yellow bass	*Morone mississippiensis*
Warmouth	*Lepomis gulosus*
Orange-spotted sunfish	*Lepomis humilis*
Bluegill	*Lepomis macrochirus*
Redspotted sunfish	*Lepomis miniatus*
Largemouth bass	*Micropterus salmoides*
Sauger	*Stizostedion canadense*

3.7.2.3 Blue Crab

Statewide, a total of 38.1 million pounds (17.3 million kg) of blue crab were landed in 2005, with a value of $27.4 million (personal communication, NMFS, Fisheries Statistics Division, Silver Spring, MD, 2007). The blue crab is an important commercial species in the Lake Pontchartrain Basin. A decline in blue crab landings in Lake Pontchartrain in the 1970s resulted in a mean annual catch of 1.4 million pounds (636,000 kg), or only about nine percent of the total state landings, compared to 2.6 million pounds (1.4 million kg), or about 27 percent, in 1959-64 (Thompson and Stone, 1980). By 1978-81, the mean annual catch had increased to 2.1 million pounds (950,000 kg) or about 12 percent of the total state catch (Thompson and Stone, 1980).

In otter trawls surveys in the project area (Rounsefell, 1964) blue crab abundance declined as salinity increased. Rounsefell (1964) observed that small blue crabs (less than 50 mm [2 inches]) were most abundant in the open, low salinity waters of Lake Borgne. The slightly larger crabs (50-99 mm [2-4 inches]) were more abundant in the Bayou Dupre area, indicating that smaller crabs migrate toward shallow and low salinity areas as they grow (Rounsefell, 1964). Mature female crabs eventually migrate considerable distances over just a few days to reach the higher salinity water of the sounds for spawning and hatching.

3.7.2.4 Oyster

The American oyster (*Crassostrea virginica*) is indigenous to coastal Louisiana, and provides a rich ecological and commercial resource. Salinity plays a key role in oyster sustainability (Eastern Oyster Biological Review Team, 2007). Adult oyster can tolerate salinities from 0 to 42 ppt, but the optimal range is 14 to 28 ppt (EOBRT, 2007). Fresher waters fail to support biological function, and more saline waters promote disease and predation. Adult oysters are more prone to impacts from changes in water quality than commercially harvested fishes and crustaceans because they are sessile, and cannot relocate in response to changes in water quality parameters.

Statewide, a total of 12.1 million pounds (5.5 million kg) of oyster were harvested in 2005, with a value of $33.3 million (personal communication, National Marine Fisheries Service, Fisheries Statistics Division, Silver Spring, MD, 2007). Production of oysters in Louisiana has been

relatively stable for the last 50 years, with harvest from public beds replacing the decreasing harvest from private leases. The Louisiana oyster industry has been experiencing many stressors over the past several decades that threaten the long-term sustainability of both the industry and the resource (Coleman, 2003). Increasing coastal land loss is reducing the amount of marsh that provides shelter to reefs, and saltwater intrusion is exacerbating disease and predation. In addition, the industry is faced with changing environmental conditions, fluctuating market demands, public perception issues, and increased competition.

3.8 PLANKTON RESOURCES

This resource is institutionally significant because of the National Environmental Policy Act of 1969, the Coastal Zone Management Act, and the Estuary Protection Act. This resource is technically significant because plankton provide a major, direct food source for animals in the water column and in the sediments; plankton are responsible for at least 40 percent of the photosynthesis occurring on the earth; plankton are important for their role in nutrient cycling; plankton productivity is a major source of primary food-energy for most estuarine systems throughout the world; and phytoplankton production is the major source of autochthonous organic matter in most estuarine ecosystems (Day et al., 1989). This resource is publicly significant because plankton form the lowest trophic food level for many larger organisms important to commercial and recreational fishing. In addition, there is a public health concern with noxious plankton blooms (red and brown tides) that produce toxins, and large-scale blooms can lead to hypoxic conditions, which can result in fish kills.

3.8.1 Historic and Existing Conditions

Plankton communities serve an important role in the coastal waters of Louisiana. Phytoplankton are the primary producers of the water column, and form the base of the estuarine food web. Zooplankton provide the trophic link between the phytoplankton and the intermediate level consumers such as aquatic invertebrates, larval fish, and smaller forage fish species (Day et al., 1989). Microzooplankton appear to be important consumers of bacterioplankton, which are typically enumerated primarily by culture and microscopic techniques. Culture techniques are selective and invariably underestimate bacterial densities (Day et al., 1989). "The Cooperative Gulf of Mexico Estuarine Inventory and Study, Louisiana," prepared by the Louisiana Wildlife and Fisheries Commission in 1971 provides a summary of plankton across the coastal estuaries of Louisiana in the late 1960s (Perret et al., 1971). The dominant member of the zooplankton community throughout that study was the copepod *Acartia tonsa*. The greatest concentrations of zooplankton were encountered in Breton Sound. The lowest concentrations were encountered in Chandeleur Sound and Lake Borgne east of the Mississippi River, Lakes Barre and Raccourci, and Terrebonne and Timbalier Bays. Species diversity was greatest in the Breton Sound and Mississippi River, East Bay, Garden Island Bay, and West Bay areas.

Historically, salinity appears to be the chief controlling factor in the number of species present, while temperature, competition, and predation control the number of individuals present (Day et al., 1989). In addition, the abundance of certain zooplankton may be indicative of good fishing areas. While some zooplankton are euryhaline, others have distinct salinity preferences (Day et al., 1989). Therefore, introduction of river water into estuarine systems may have dramatic short-term impacts on plankton populations in adjacent coastal waters (Hawes and Perry, 1978).

3.9 WATER BOTTOMS AND BENTHIC RESOURCES

These resources are institutionally significant because of the NEPA of 1969; the Coastal Zone Management Act; and the Estuary Protection Act. These resources are technically significant because the bottom of an estuary regulates or modifies most physical, chemical, geological, and biological processes throughout the entire estuarine system via what is called a "benthic effect." Benthic animals are directly or indirectly involved in most physical and chemical processes that occur in estuaries (Day et al., 1989). Benthic resources are publicly significant because members of the epibenthic community (e.g., oysters, mussels, etc.) provide commercial and recreational fisheries as well as creating oyster reef habitats used by many marine and estuarine organisms.

The bottom estuarine substrate or benthic zone regulates or modifies most physical, chemical, geological, and biological processes throughout the entire estuarine system via what is commonly called a "benthic effect" (Day et al., 1989). Within a salt marsh, less than ten percent of the above-ground primary production of the salt marsh is grazed by aerial consumers. Most plant biomass dies and decays and its energy is processed through the detrital pathway. The major consumer groups of the benthic habitat include: bacteria and fungi, microalgae, meiofauna, and microfauna (Mitsch and Gosselink, 1993).

Benthic community structure is not static; it provides a residence for many sessile, burrowing, crawling, and even swimming organisms. The benthic community is a storehouse of organic matter and inorganic nutrients, as well as a site for many vital chemical exchanges and physical interactions. Day et al. (1989) describe the functional groups of estuarine benthic organisms. These groups include: macrobenthic (e.g., molluscs, polychaetes, decapods); microbenthic (e.g., protozoa); meiobenthic (e.g., nematodes, harpacticoid copepods, tubillaria), epibenthic; infauna (e.g., most bivalves); interstitial fauna (e.g., beach meiofauna, tardigrades); suspension-feeders (e.g., bryozoans and many bivalves); filter-feeders (e.g., poriferans, tunicates, bivalves); nonselective deposit feeders (e.g., gastropods); selective deposit feeders (e.g., nematodes, sand dollars, fiddler crabs); raporial feeders and predators (e.g., star fish and gastropod drills); and parasites and commensuals (e.g., parasitic flatworms, copepods, and pea crabs).

According to Mitsch and Gosselink (1993), the salt marsh is a major producer of detritus for both the salt marsh system and the adjacent estuary. Mitsch and Gosselink (1993) point out that the detritus material exported from the marsh is more important to the estuary than the phytoplankton-based production in the estuary. Detritus export and the shelter found along marsh edges make salt marshes important nursery areas for many commercially important fish and shellfish. Salt marshes have been shown at times to be both sources and sinks of nutrients, particularly nitrogen.

Additionally, in response to concerns by the USFWS and the NMFS, a benthic survey was performed by the USACE Engineering Research and Development Center (ERDC) to assess the potential for impacts to potential prey items for the Gulf sturgeon (Gary Ray, ERDC, personal communication, 2007). To evaluate the potential for such impacts, benthos and sediments were sampled from the proposed dredging sites, nearby reference sites, and proposed access and floatation channels, to determine if foraging habitat for the Gulf sturgeon exists in the project area. A total of 111 infaunal samples and seven sediment grain size samples were taken between May 21 and May 24, 2007. Depths of the sample sites ranged from 5 ft to 10 ft (1.5 m – 3.0 m), salinities ranged from 9.1 ppt to 11.2 ppt and dissolved oxygen concentrations ranged from 6.0 mg/l to 8.0 mg/l. Sediments in the proposed borrow areas are poorly sorted sandy mud with a

mean grain size in the range of very coarse silts. Total silts and clays accounted for more than 64% of the sediment with the remainder dominated by very fine sand. Sediments in the proposed access channel sites differ somewhat with the innermost (shoreward) stations dominated by peat and the outermost resembling those of the borrow areas.

The benthic assemblage of the study area is dominated by polychaetes (62%), bivalves (14%) and amphipods (11%). The most abundant species, the polychaete *Mediomastus ambiseta* accounts for more than 28% of all animals collected. Other important polychaete species include *Parandalia americana, Streblospio benedicti, Sigambra bassi, Glycinde solitaria, Nereis succinea, Pectinaria gouldii,* and *Capitella* sp. The most abundant bivalve mollusks are *Macoma mitchelli, Mulinia lateralis,* and *Mulinia pontchartrainensis*. The amphipods are dominated by *Ampelisca abdita, Ameroculodes sp.* A, and *Cerapus benthophilus*. Other numerically abundant species include the gastropod *Acetocina canaliculata,* two unidentified species of nemerteans, and the oligochaete *Tubificoides* sp. Together these eighteen species comprise nearly 94% of all animals encountered. This assemblage is typical of soft bottom, mesohaline (5.0 ppt–18 ppt) communities throughout the northern Gulf of Mexico and similar to previous reports from Lake Borgne.

3.10 ESSENTIAL FISH HABITAT

3.10.1 Historic and Existing Conditions

Essential Fish Habitat is institutionally significant because of the Magnuson-Stevens Fishery Conservation and Management Act of 1996. EFH is technically significant because EFH includes "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity." The high value that the public places on seafood, recreational and commercial opportunities makes EFH a publicly significant resource. Specific categories of EFH include all estuarine waters and substrates (mud, sand, shell, rock, and associated biological communities), including the sub-tidal vegetation (sea grasses and algae) and adjacent inter-tidal vegetation (marshes and mangroves). There is no submerged aquatic vegetation within the project area.

By letter dated December 22, 2006, the NMFS identified EFH resources in the project area as including aquatic and tidally influenced habitats designated as essential fish habitat (EFH) for various life stages for shrimp, red drum, reef fish, and stone crab managed by the GMFMC (see **Table 3.3**). **Table 3.3** lists life stages and subcategories of EFH for Federally managed fishery species potentially impacted by the SP. Primary categories of EFH in the project area include estuarine emergent wetlands; sand, mud, and shell substrates; and estuarine and marine water column.

By letter dated December 20, 2006, the USFWS indicates that EFH resources in the project area include critical habitat for the Gulf sturgeon. They also indicated that the Draft EIS should address all significant resources and important habitats, such as emergent marsh, SAV, and shallow open water habitat.

The Gulf of Mexico Fishery Management Plan applies to several fisheries occurring in St. Bernard Parish and adjoining waters, including brown shrimp, white shrimp, red drum, gray snapper, Spanish mackerel, and sharks. Of these, white shrimp, brown shrimp, red drum, and sharks are likely to be present in Lake Borgne and the MRGO. In addition, the waterbodies and coastal wetlands in the project area provide nursery and foraging habitat that supports

economically important marine fishery species such as spotted and sand seatrout, southern flounder, Atlantic croaker, gulf menhaden, striped mullet, black drum, and blue crab. These species serve as prey for Federally-managed fish species such as mackerels, snappers, groupers, billfishes and sharks.

3.11 ENDANGERED AND THREATENED SPECIES

This resource is institutionally significant because of the Endangered Species Act of 1973, as amended, and the Marine Mammal Protection Act of 1972. Endangered (E) and threatened (T) species are technically significant because the status of such species provides an indication of the overall health of an ecosystem. These species are publicly significant because of the desire of the public to protect them and their habitats.

3.11.1 Historic and Existing Conditions

Federally-Listed Endangered and Threatened Species

Within the State of Louisiana there are thirty animal and three plant species (some with critical habitats) under the jurisdiction of the USFWS and/or the NMFS, presently classified as endangered or threatened (**Table 3.7**). The USFWS and the NMFS share jurisdictional responsibility for sea turtles and the Gulf sturgeon. Of the animals and plants under USFWS and/or NMFS jurisdiction, nine animal species and no plant species are potentially found within the project area (see also **Appendix A – Biological Assessment**). Although some of these species may be occasionally found in the project area, those species that may be potentially impacted by the proposed action are described below.

Two Federally listed avian species occur or may occur in the project area: the brown pelican and the piping plover. The listed brown pelican, completely extirpated from Louisiana by the 1960s (source: http://www.lacoast.gov/articles/bps/2/index.htm), now commonly feeds in adjacent shallow estuarine waters, using sand spits and offshore sand bars as resting and roosting areas. Brown pelicans commonly breed on Breton Island, which is outside of the project area. They also forage in the waters of Breton and Chandeleur Sounds, and Lake Borgne. Major threats to this species include chemical pollutants, colony site erosion, disease, and human disturbance.

Piping plovers (including the threatened [Great Plains] and endangered [Great Lakes] populations) winter on barrier islands along the Gulf coast, including Louisiana. The most recent (January-February 2001) survey coordinated by the USFWS recorded no piping plovers at the mouth of the channel (personal communication, USFWS, 2006). The species may occasionally use exposed flats in the area, especially around the Chandeleur and Breton islands, but are unlikely to utilize habitats in the project area. Wintering plovers feed by probing for invertebrates at or just below the surface on exposed wet sand in wash zones; intertidal ocean beach; wrack lines; washover passes; mud-, sand-, and algal-flats; and shorelines of streams, ephemeral ponds, lagoons, and salt marshes. Beaches adjacent to foraging areas are used for roosting and preening. Small sand dunes, debris, and sparse vegetation within these adjacent beaches provide shelter from wind and extreme temperatures (source: http://www.fws.gov/plover/facts.html). Major threats to this species include: loss and degradation to breeding habitat, disturbance of breeding plovers by humans and pets, non-motorized beach activities, motor vehicles, beach cleaning, predation, winter habitat loss, severe cold weather and storms, hurricanes, and oil spills and other contaminants (source: http://www.fws.gov/northeast/pipingplover/recplan/threats.html).

Table 3.7 Endangered and Threatened Plant and Animal Species in Louisiana (E=Endangered; T= Threatened; C=Candidate; species in bold type are those potentially found within the study area)

Species Under Jurisdiction of the USFWS Status Common Name (*Scientific Name*)	Species Under Jurisdiction of NMFS Status Common Name (*Scientific Name*)
Mammals E[1] -- Florida Panther (*Felis concolor coryl*) E[1] -- Red wolf (*Canis rufus*) **E -- West Indian manatee (*Trichechus manatus*)** T -- Louisiana black bear (*Ursus americanus luteolus*) Birds E[2] -- Bachmans's warbler (*Vermivora bachmanii*) **E -- Brown pelican *(Pelecanus occidentalis*)** E[1] -- Eskimo curlew (*Numenius borealis*) E[1] -- Ivory-billed woodpecker (*Campephilus principalis*) E -- Least tern; interior population (*Sterna antillarum*) E -- Red-cockaded woodpecker (*Picoides borealis*) **T -- Piping plover (*Charadrius melodus*)** Reptiles **E[3] -- Hawksbill sea turtle (*Eretomchelys imbricata*)** **E[3]-- Kemp's (Atlantic) Ridley sea turtle (*Lepidochelys kempii*)** **E[3]-- Leatherback sea turtle (*Dermochelys coriacea*)** T(S/A)[4] --American alligator (*Alligator mississippiensis*) T -- Gopher tortoise (*Gopherus polyphemus*) **T[3]-- Green sea turtle (*Chelonia mydas*)** **T[3] -- Loggerhead sea turtle (*Caretta caretta*)** T -- Ringed sawback turtle (*Graptemys oculifera*) Fish E -- Pallid sturgeon (*Scaphirhynchus albus*) **T[3] -- Gulf sturgeon (*Acipenser oxyrinchus desotoi*)** Invertebrates E -- Mussel, Fat pocketbook (*Potamilus capax*) E -- Pink pearlymussel Mucket (*Lampsilis abrupta*) T -- Inflated (Alabama) heelsplitter (*Potamilus inflatus*) T -- Louisiana pearlshell (*Margaritifera hembeli*) Plants E -- American chaffseed (*Schwalbea americana)* E -- Louisiana quillwort (*Isoetes louisianensis*) T -- Earth fruit (*Geocarpon minimum*) Candidate Species[5] C -- Snake, Louisiana pine (*Pituophis ruthveni*)	Marine Mammals E -- Sperm whale (*Physeter macrocephalus*) E -- Sei whale (*Balaenoptera borealis*) E -- Humpback whale (*Megaptera novaeangliae*) E -- Finback whale (*Balaenoptera physalus*) E -- Blue Whale (*Balaenoptera musculus*) Sea Turtles[3] **E -- Hawksbill sea turtle (*Eretomchelys imbricata*)** **E -- Kemp's (Atlantic) Ridley sea turtle (*Lepidochelys kempii*)** **E -- Leatherback sea turtle (*Dermochelyscoriacea*)** **T -- Green sea turtle (*Chelonia mydas*)** **T -- Loggerhead sea Turtle (*Caretta caretta*)** Fish **T -- Gulf sturgeon (*Acipenser oxyrinchus desotoi*)** Candidate Species[5] Dusky shark (*Carcharhinus obscurus*) Sand tiger shark (*Odontaspis taurus*) Night shark (*Carcharinus signatus*) Speckled hind (*Epinephelus drummondhayi*) Saltmarsh topminnow (*Fundulus jenkensi*) Jewfish (*Epinephelus itajara*) Warsaw grouper (*Epinephelus striatus*) _____ [1] Florida panther, red wolf, Eskimo curlew, and ivory-billed woodpecker presumed extirpated in the state. [2] No confirmed sightings of Bachman's warbler on U.S. nesting grounds since mid-1960s. Species may be extirpated in Louisiana. [3] USFWS and NMFS share jurisdictional responsibility for sea turtles and the Gulf sturgeon. [4] Alligator in Louisiana is classified for law enforcement purposes as "Threatened due to Similarity of Appearance." They are biologically neither endangered nor threatened. Regulated harvest is permitted under state law. [5] Candidate species are not protected under the ESA, but concerns regarding their status indicate they may warrant listing in the future. Federal agencies and the public are encouraged to consider these species during project planning so that future listings may be avoided.

The West Indian manatee may occasionally enter Lakes Pontchartrain and Maurepas, and associated coastal waters and marshes of Louisiana (personal communication, USFWS, 2006). In 2001, a manatee was observed passing through the Inner Harbor Navigation Canal Lock into the Mississippi River (personal communication, USFWS, 2006). Manatees are found within local waterways only during months with warm enough conditions. Manatee populations have

declined due to collisions with watercraft, entrapment in flood control structures, poaching, habitat loss, and pollution. Populations may also be adversely affected by cold weather and red tide outbreaks. While rare, the potential exists for the manatee to be within the project area.

Gulf sturgeon have been reported in rivers and lakes of the Lake Pontchartrain basin, and adjacent estuarine areas (personal communication, USFWS, 2006). Within Louisiana, portions of the Pearl and Bogue Chitto Rivers, Lake Pontchartrain east of the Causeway Bridge, Little Lake, the Rigolets, Lake St. Catherine, and Lake Borgne were designated as critical habitat for the Gulf sturgeon on March 19, 2003 (Federal Register Volume 68, No. 53). According to the final critical habitat designation, elements essential for Gulf sturgeon conservation are habitat components supporting feeding, resting, sheltering, reproduction, and migration. Important physical features include: abundant prey items within riverine habitats; riverine spawning sites; riverine aggregation areas; appropriate flow regime and water quality characteristics; sediment quality; and safe and unobstructed migratory pathways (e.g., a river unobstructed by a permanent structure, or a dammed river that still allows for passage). Poor water quality, over-fishing and habitat alterations that limit or prevent spawning have negatively affected Gulf sturgeon populations.

Five listed sea turtle species may occur in the project area, but typically are found in Gulf of Mexico waters: the Kemp's Ridley sea turtle, Atlantic green sea turtle, hawksbill sea turtle, loggerhead sea turtle, and leatherback sea turtle. All sea turtles occurring within the Gulf of Mexico are generally found south of the project area in Breton and Chandeleur Sounds. However, sea turtles have been rarely sighted in the project area.

Louisiana State Rare, Threatened and Endangered Species and Natural Communities

The Louisiana Natural Heritage Program (LNHP), founded in 1984 through a partnership with the state of Louisiana and The Nature Conservancy, is maintained by the Louisiana Department of Wildlife and Fisheries (source: http://www.wlf.state.la.us/experience/naturalheritage/). The LNHP was founded with the goal of developing and maintaining a database on rare, threatened and endangered species of plants and animals, and natural communities for Louisiana. The LNHP lists forty-three species and natural communities (see **Table 3.8**) as occurring in Orleans Parish and St. Bernard Parish (sources: http://www.wlf.louisiana.gov/pdfs/experience/naturalheritage/orleans.pdf and http://www.wlf.louisiana.gov/pdfs/experience/naturalheritage/st.%20bernard.pdf, respectively).

However, several of these listed species and natural communities are generally found or located outside the project area including: coastal live oak-hackberry forest and live oak forest natural communities. The chorus frog is typically found in extreme eastern Louisiana in cypress ponds, pine barren ponds, flooded meadows, flatwoods, ditches and their associated environs (source: http://amphibiaweb.org/index.html). In Louisiana, the American oystercatcher is typically found on the muddy strands of the Chandeleur Islands and nearby islands (source: http://www.losbird.org/labirds/amoy.htm). The USFWS Pallid Sturgeon Recovery Plan indicates the pallid sturgeon is found in the freshwater rivers and tributaries of the Mississippi and Atchafalaya Rivers (USFWS, 1993).

Table 3.8 Rare, Threatened, & Endangered Species & Natural Communities Tracked by the Louisiana Natural Heritage Program, Orleans and St. Bernard Parishes - March 2007
(source: http://www.wlf.louisiana.gov/experience/naturalheritage/rarespeciesandparishhabitats/)

Scientific Name	Common Name	State Rank[1]
Accipiter cooperii	Cooper's Hawk	S2B,S3N
Acipenser oxyrinchus desotoi	Gulf Sturgeon	S1S2
Ajaia ajaja	Roseate Spoonbill	S3
Brackish Marsh	Brackish Marsh	S3S4
Caretta caretta	Loggerhead Sea Turtle	S1
Cenchrus tribuloides	Dune Sandbur	S2
Chamaesyce bombensis	Sand Dune Spurge	S1
Charadrius alexandrinus	Snowy Plover	S1B,S2N
Charadrius melodus	Piping Plover	S2N
Coastal Dune Grassland	Coastal Dune Grassland	S1S2
Coastal Live Oak-hackberry Forest	Coastal Live Oak-Hackberry Forest	S1S2
Coastal Mangrove-marsh Shrubland	Coastal Mangrove-marsh Shrubland	S3
Echinochloa polystachya	River Grass	S1?
Egretta rufescens	Reddish Egret	S2B,S2N
Eleocharis fallax	Creeping Spike-rush	S1?
Eptesicus fuscus	Big Brown Bat	S1S2
Fuirena scirpoidea	Southern Umbrella-sedge	S1
Galium virgatum	Southwest Bedstraw	S2
Haematopus palliatus	American Oystercatcher	S1
Haliaeetus leucocephalus	Bald Eagle	S2N,S3B / Endangered
Halophila engelmannii	Gulf Halophila	S1
Intermediate Marsh	Intermediate Marsh	S3S4
Lipocarpha micrantha	Small Flower Hemicarpha	SH
Live Oak Forest	Live Oak Forest	S1S2
Malaclemys terrapin	Diamondback Terrapin	S2
Marine Submergent Vascular Vegetation	Marine Submergent Vascular Vegetation	S1S2
Pelecanus occidentalis	Brown Pelican	S2
Physalis angustifolia	Coastal Ground Cherry	S1?
Plegadis falcinellus	Glossy Ibis	S2
Potamogeton perfoliatus	Clasping-leaf Pondweed	S1
Pseudacris ornata	Ornate Chorus Frog	S1
Sabatia arenicola	Sand Rose-gentian	S1
Salt Marsh	Salt Marsh	S3S4
Scaphirhynchus albus	Pallid Sturgeon	S1
Serenoa repens	Saw Palmetto	S1
Smilax auriculata	Eared Greenbrier	S1?
Sterna caspia	Caspian Tern	S1S2B,S3N
Sterna nilotica	Gull-billed Tern	S2B,S2S3N
Submergent Vascular Vegetation (Estuarine)	Estuarine Submergent Vascular Vegetation	S1S2
Thalassia testudinum	Turtle-grass	S2?
Trichechus manatus	Manatee	SZN
Uniola paniculata	Sea Oats	S2
Waterbird Nesting Colony	Waterbird Nesting Colony	SNR

[1]State Element Ranks: S1 = critically imperiled in Louisiana because of extreme rarity; S2 = imperiled in Louisiana because of rarity; SZ = transient species in which no specific consistent area of occurrence is identifiable; B = breeding occurrence; N = nonbreeding occurrence; S? = rank uncertain.

3.12 HYDROLOGY

This resource is institutionally significant because of the National Environmental Policy Act of 1969; Clean Water Act; Flood Control Act of 1944; Coastal Barrier Resources Act; Rivers and Harbors Act of 1899; River and Harbor and Flood Control Act of 1970; Watershed Protection and Flood Prevention Act; Submerged Land Act; Coastal Zone Management Act; Safe Drinking Water Act; Estuary Protection Act; Resource Conservation and Recovery Act (RCRA); Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); and Executive Order 11988 Floodplain Management. This resource is technically significant because Civil Works water resources development projects typically impact (positively or negatively) the interrelationships and interactions between water and its environment. This resource is publicly significant because the public demands clean water, hazard-free navigation, protection of estuaries and floodplains.

The project area is situated within the Pontchartrain Basin, a 9,700-square-mile (25,152 square km) drainage basin. The Pontchartrain Basin contains three major estuarine lakes, Maurepas, Pontchartrain, and Borgne, that cover a total of 965 square miles (2,502 square km). Early in the 18th century, Lake Borgne was formed from the coalescence of three smaller lakes (LPBF, 2005) resulting in its tri-lobed shape with an area of about 254 square miles (659 square km). Lake Borgne is directly connected to the Gulf of Mexico through the Mississippi Sound (LPBF, 2005). Construction of the MRGO breached the Bayou La Loutre ridge resulting in direct connection to the Gulf of Mexico through Breton Sound. The project area is a rural uninhabited coastal wetlands area that is not used as a source of potable water or for agricultural irrigation purposes. There are no major sources of fresh groundwater available in the lower Lake Pontchartrain Basin (USGS and LDOTD, 2002).

3.12.1 Flow and Water Levels

3.12.1.1 Historic and Existing Conditions

Isolation of the project area from Mississippi River influences has reduced fluctuations in water levels that occurred prior to construction of the Mississippi River levee system. Thus, current conditions are described by a relatively flat hydrograph, whereas distinct peaks associated with intense flooding events and lower baseline flow characterized historic conditions.

Water levels in the project area are presently influenced primarily by wind and tides. Wind-driven set-up can alter water levels to a greater extent than tides, which are diurnal and of low magnitude in this area. The maximum tidal range is about two ft (0.6 m).

The project area falls within the Lake Pontchartrain basin. Rivers draining into this basin, in order of magnitude of average annual flow, include the Pearl, Amite, Tangipahoa, Tickfaw, and Tchefuncte. Predominant land use around the project area varies from agriculture and forestry to petroleum and fisheries. Overall runoff in the project area has increased over time due to nearby urbanization. Navigation channels, drainage canals, and access canals have further altered the hydrology of the basin. These channels may alter flow patterns within the project area by confining flows, crossing natural drainage boundaries, or conveying more saline waters inland. Existing channel banks may also alter overland flow patterns within the project area.

Recent study and modeling for the ongoing Hurricane Protection System has found that during storm events, such as tropical storms or hurricanes, emergent wetlands can reduce both wave heights and storm surge locally (personal communication, Ron Elmer, Senior Project Manager, USACE, 2007). The roughness factor of the vegetation increases bottom friction, which reduces wave energy thereby resulting in lower wave heights over flooded wetlands compared to heights predicted for unvegetated areas. Additionally, large expanses of wetlands can reduce the storm surge that propagates over them. Modeling has shown that the removal of a wetland buffer would likely result in a greater storm surge maximum height.

The closure structure on the MRGO channel south of Bayou La Loutre would inhibit the flow of water from Breton Sound to the project area via the MRGO channel (USACE, 2007). Tidal flows from Mississippi Sound would still influence the area. Additionally, the closure structure and sector gates on the GIWW and Bayou Bienvenue planned for the authorized improvements to the Greater New Orleans Hurricane and Storm Damage Risk Reduction System would alter flow patterns in and near the western end of the project area (USACE, 2008). For construction of this structure (**Figure 3.5**), an access channel would be dredged on the Lake Borgne side of the floodwall. This would connect the MRGO channel with the GIWW across the Golden Triangle, but would close off an existing connection. The net effect would likely be negligible. The gates across Bayou Bienvenue and the GIWW would remain open, except when a storm surge is present or anticipated. This would prevent salt-water intrusion into the interior marshes in storm situations, while not impeding tidal flows under normal circumstances. The concrete floodwall across the MRGO channel south of Bayou Bienvenue would stop tidal flow on the channel, but the closure structure at Bayou La Loutre would have a greater impact on flows in the MRGO channel. Nevertheless, the water flows near the sector gates are anticipated to be greater than preconstruction conditions. Additionally, modeling scenarios indicate that the proposed flood protection levee would raise the water levels by up to 0.1 ft (0.03 m), with marshes experiencing up to seven hours additional wetted period per day (USACE, 2008).

3.12.2 Sediment

3.12.2.1 Historic and Existing Conditions

Sediment quality is defined as the suitability of the habitat for supporting designated uses, including, but not limited to, benthic fauna and emergent wetland plants. Storm events, flowing water, and other factors can potentially re-mobilize sediments. Aquatic sediments are essential in maintaining the structure (assemblage of organisms) and function (processes) of aquatic ecosystem. Sediment quality is important due to the role that sediments play in supporting community productivity. The productivity of green plants, algae, and bacteria build the foundation of food webs upon which higher aquatic organisms depend. Sediments provide essential habitats for epibenthic (live on sediments) and infaunal (live in sediments) invertebrates and demersal fish, which represent important food sources for amphibians, reptiles, fish, birds, and mammals. In addition, many fish and amphibian species utilize sediments at stages in their life cycles for the purposes of spawning, incubation, refuge, and over-wintering (LDEQ, 2005).

The sediment budget into the Lake Borgne estuary has changed dramatically in recorded history. The construction of the levees along the Mississippi River as a result of the Mississippi River and Tributaries Act of 1928 (MR&T) reduced the amount of sediment introduced to the estuary during spring flood events (Kesel, 1988). Prior to the MR&T project, the high waters would

result in overbank flow from the Mississippi River into the Lake Borgne estuary. The introduction of sediments and nutrients into the system would help to offset naturally-occurring subsidence to maintain the wetland acreage. The MR&T project created a barrier to sediment and nutrient introduction (Kesel, 1988).

Sediments beneath navigable waters proposed as a source of borrow were evaluated for their suitability for disposal into waters of the U.S. in accordance with the appropriate guidelines and criteria adopted pursuant to Section 404 of the Clean Water Act and/or for ocean disposal in accordance with Section 103 of the Marine Protection Research and Sanctuaries Act (MPRSA) and supplemented by the Corps of Engineers Management Strategy for Disposal of Dredged Material: Containment Testing and Controls (or its appropriate updated version) as cited in Title 33 Code of Federal Regulations, Section 336.1. The method for dredged material testing is specified in the Inland Testing Manual (Evaluation of dredged material proposed for discharge in waters of the U.S. – Testing Manual [EPA/USACE, 1998]) or the Ocean Testing Manual (Evaluation of dredged material proposed for ocean disposal – Testing Manual [EPA/USACE, 1991]). The potential for the presence of contaminants in the dredged material was determined using the protocols in the Inland Testing Manual or the Ocean Testing Manual. For additional information see the section on water quality (**Section 3.13**).

An evaluation of existing contaminant reports and data was conducted to determine if there is "reason to believe" contaminants may be present in lake sediments near the project area, and to determine if further testing of sediment from borrow areas in the lake would be required (see also **Appendix D 404(b)(1) Evaluation**). The U.S. Coast Guard (USCG), National Response Center, maintains a database of reported oil and chemical spills for U.S. waterways. A search of this database was conducted for any spills reported within the last 20 years in the general vicinity of the project area, including Lake Borgne, Bayous Bienvenue, Dupre, and Yscloskey, the MRGO, and GIWW between the lake and MRGO. Four minor oil and fuel spills were reported in the lake between 1998 and 2005 (Report Nos. 443981, 615335, 739379, and 777114). A minor oil spill was reported in Bayou Bienvenue in 2006 (Report No. 796247). A larger spill of automotive gasoline (70 gallons) was reported west of the MRGO in Bayou Dupre in 1996 (Report No. 344785).

Sediment chemistry data for Lake Borgne, provided by the EPA, Gulf Ecology Division, were also reviewed. Sediment samples were collected from thirteen sites in the lake between 1991 and 2005, including four post-Hurricane Katrina collections (see **Appendix D 404(b)(1) Evaluation**). The sediment data were reviewed for the presence of 141 contaminants of concern (COC), including metals, PAHs, pesticides, PCBs, semi-volatiles, and volatiles. The concentrations of detected contaminants were compared to a set of screening values developed by the National Oceanic and Atmospheric Administration (NOAA) to identify substances that may potentially threaten resources of concern at the marsh creation sites. Based on comparison to these screening values, little or no adverse biological effects would be expected as a result of the discharge of lake sediments into the marsh creation sites.

Hence, based on the evaluation of USCG spill reports and sediment chemistry data, the CEMVN has no reason to believe that sediments from the proposed borrow sites in Lake Borgne are unsuitable for discharge into the proposed marsh creation sites.

In August 2007, an ASTM E1527-05 Phase I Environmental Site Assessment (ESA) was completed for the project area to determine if the project site was within the vicinity of a

CERCLA National Priority List (NPL) site or RCRA response site. The project area was not identified in any of the reviewed Federal or State-listed cleanup sites as requiring further assessment or corrective action. Based on site visits to the project area and the above findings, the probability of encountering hazardous, toxic, and radioactive wastes in the project area is low (See **Section 3.20 Hazardous, Toxic, and Radioactive Wastes**). The Phase I ESA will be maintained on file at the CEMVN.

3.13 WATER QUALITY

This resource is institutionally significant because of the National Environmental Policy Act of 1969; the Clean Water Act; the Coastal Zone Management Act; and the Estuary Protection Act. This resource is technically significant because the water quality supports most physical, chemical, geological, and biological processes throughout the entire estuarine system. This resource is publicly significant because the public demands clean water and healthy wildlife and fisher species for recreational and commercial use.

3.13.1 Historic and Existing Conditions

Historic and current water quality issues for rivers and streams in coastal Louisiana include the transport of nutrients, pesticides, synthetic organic compounds, trace elements, suspended sediment, and bacteria. The Louisiana Department of Health and Hospitals coordinates with the LDEQ, the LDWF, and the Louisiana Department of Agriculture and Forestry to issue water body advisories aimed at protecting the public's health.

The LDEQ assesses four categories for water use under the Louisiana Environmental Regulatory Code (LAC Title 33, Chapter 11) that would apply to the project area. Primary Contact Recreation includes activities such as swimming, water skiing, tubing, snorkeling, skin diving, and other activities that involve prolonged body contact with water and probable ingestion. Secondary Contact Recreation includes fishing, wading, and recreational boating, and other activities that involve only incidental or accidental body contact and minimal probability of ingesting water. Fish and Wildlife Propagation includes the use of water by aquatic biota for aquatic habitat, food, resting reproduction, and cover, including indigenous fishes and invertebrates, reptiles, amphibians, and other aquatic biota consumed by humans. Oyster Propagation includes the use of water to maintain biological systems that support economically important species of oysters, clams, mussels, and other mollusks consumed by humans so that their productivity is preserved and the health of human consumers of these species is protected. In the project area, Oyster Propagation was identified as being impaired in some areas. The USEPA and LDEQ identified low dissolved oxygen levels and high fecal coliform levels as the suspected causes for impairment for Oyster Propagation, but were not able to identify the sources of these problems (LDEQ, 2005). The Louisiana Department of Health and Hospitals, Office of Public Health, Molluscan Shellfish Program (LDHH, 2009) has prohibited harvesting of oysters for human consumption from leases in the project area south of the Lake Borgne shoreline through August 2009, at which time the prohibition will be reevaluated.

Prior to construction of the MRGO, tidal flow into Lake Borgne was dominated by flow from Mississippi Sound because tidal flow from the Breton Sound area was reduced as it moved northwest across the marshes and wetlands through bayous and ponds toward Lake Borgne.

Habitats in the area were aligned along salinity gradients and reflected the varied landscape and interspersed watercourses (Chabreck and Condrey, 1979).

Material dredged during construction of the MRGO channel was deposited in a 4,000 foot-wide (1,220 m) continuous strip along the channel's southwestern side. Creation of the dredged material disposal area resulted in the disruption of water flow and partially impounded existing wetlands on the southwestern side of the spoil bank, which contributed to water quality problems and affected the quality and integrity of the emergent wetland habitat.

According to environmental assessment #152 (EA #152) and EA #247 (USACE, 1991 and 1996), tidal currents promote mixing and dispersion in the upper water column of the MRGO, but density stratification as a result of the migrating saltwater wedge in the deep channel produces oxygen deficits and other associated water quality problems at deeper levels. These waters ordinarily remain confined to the MRGO channel and only directly influence the adjacent relatively shallow areas during periods of intense mixing.

EA #152 (USACE, 1991) states that wastewater and polluted storm-water runoff from developed areas enter the MRGO from many sources. Both total and fecal coliform, indicators of bacterial pollution, have consistently exceeded the applicable criteria of 70 and 14 counts per 100 milliliters, respectively. Coliform levels observed at other locations along the channel have usually exceeded the criteria as well, indicating a widespread area of water and wetlands that are subject to bacterial pollution. Measured dissolved oxygen levels at the nearby Bayou Dupre have consistently been above the minimum state standard and Environmental Protection Agency (EPA) criteria. With rare exceptions, pH measurements also have been within the desirable range of 6.5 to 9.0. Toxic substances, including heavy metals and synthetic organics, have been measured above EPA criteria levels, but no patterns consistently exceeding the criteria for particular substances have been observed.

Examination of data collected by the LDEQ in 2007 (personal communication, LDEQ, 2007) indicated that water quality in the project area has not declined since Hurricane Katrina. While fecal coliform counts in the waterways near the MRGO channel have still been measured above the criteria of 14 counts per 100 milliliters, the average counts are lower than in pre-Katrina sampling. Other water quality parameters show similar levels in pre- and post-Katrina samples.

3.13.2 Salinity

Tate et al. (2002) report mean monthly pre- and post-MRGO salinity for the period 1951 to 1963 and 1963 to 1977 for several sites throughout the Pontchartrain Basin estuary. Two of these sites are located near the project area: the Chef Menteur Pass, located near the northern-most portion of the project area; and the Bayou La Loutre-Alluvial City, located near the southern-most portion of the project area (**Table 3.9**). Tate et al. (2002) indicate that salinity has increased on the average by 2.3 ppt at Chef Menteur Pass and 4.5 ppt at Bayou La Loutre-Alluvial City since construction of the MRGO. Salinity in the project area is typically lowest in the late spring and highest in the summer and fall. This pattern reflects seasonal variations in fresh water inflows from the major rivers and streams into the Pontchartrain Basin.

The authorized closure structure across the MRGO channel to be constructed south of Bayou La Loutre is anticipated to result in the reduction of salinities at Alluvial City by up to 6.6 ppt (USACE, 2007). Additionally, another closure structure across the MRGO near Bayou Bienvenue and two sector gates across the GIWW and Bayou Bienvenue are planned for the Greater New Orleans Hurricane and Storm Damage Risk Reduction System (**Figure 3.5**), but these structures are not expected to alter salinity patterns in the area (USACE, 2008).

Table 3.9 Mean monthly pre- and post-MRGO salinity (ppt) for the period 1951 to 1963 and 1963 to 1977 (Source: Tate et al., 2002)

Month	Chef Menteur Pass		Bayou La Loutre, Alluvial City	
	Pre	**Post**	**Pre**	**Post**
January	3.8	5.7	6.8	9.8
February	2.9	4.8	6.4	9.7
March	2.2	4.3	6.3	10.4
April	2.2	4.0	7.0	10.0
May	2.6	4.0	9.5	10.2
June	3.3	4.2	9.0	12.3
July	3.2	6.3	7.9	16.0
August	4.8	7.5	8.6	16.1
September	6.0	8.5	8.2	12.9
October	5.2	8.4	7.6	13.8
November	5.2	8.0	8.0	13.1
December	4.2	7.0	8.0	12.5
Average Salinity	**3.8**	**6.1**	**7.8**	**12.2**
Average Salinity Increases Post-MRGO		**2.3**		**4.5**

3.14 RECREATIONAL RESOURCES

This resource is institutionally significant because of the Federal Water Project Recreation Act of 1965, as amended, and the Land and Water Conservation Fund Act of 1965, as amended. Recreational resources are technically significant because of the high economic value of recreational activities and their contribution to local, state, and national economies. Recreational resources are publicly significant because of the high value that the public places on fishing, hunting, and boating, as measured by the large number of fishing and hunting licenses sold in Louisiana, and the large per-capita number of recreational boat registrations in Louisiana.

3.14.1 Historic and Existing Conditions

The diversity of natural resources provides many recreational opportunities for water-based activities such as fishing, boating, water skiing, sailing, canoeing, crabbing, crawfishing, floundering, frogging, and shrimping. Conservation areas and wildlife refuges are also an important recreational resource. Two wildlife areas exist in the area, Biloxi State Wildlife Management Area, and Bayou Sauvage National Wildlife Refuge, both of which provide hunting and fishing related opportunities (**Figure 3.6**). Portions of the proposed action (Golden Triangle Marsh Creation and Nourishment) would be constructed on the Bayou Sauvage National Wildlife Refuge.

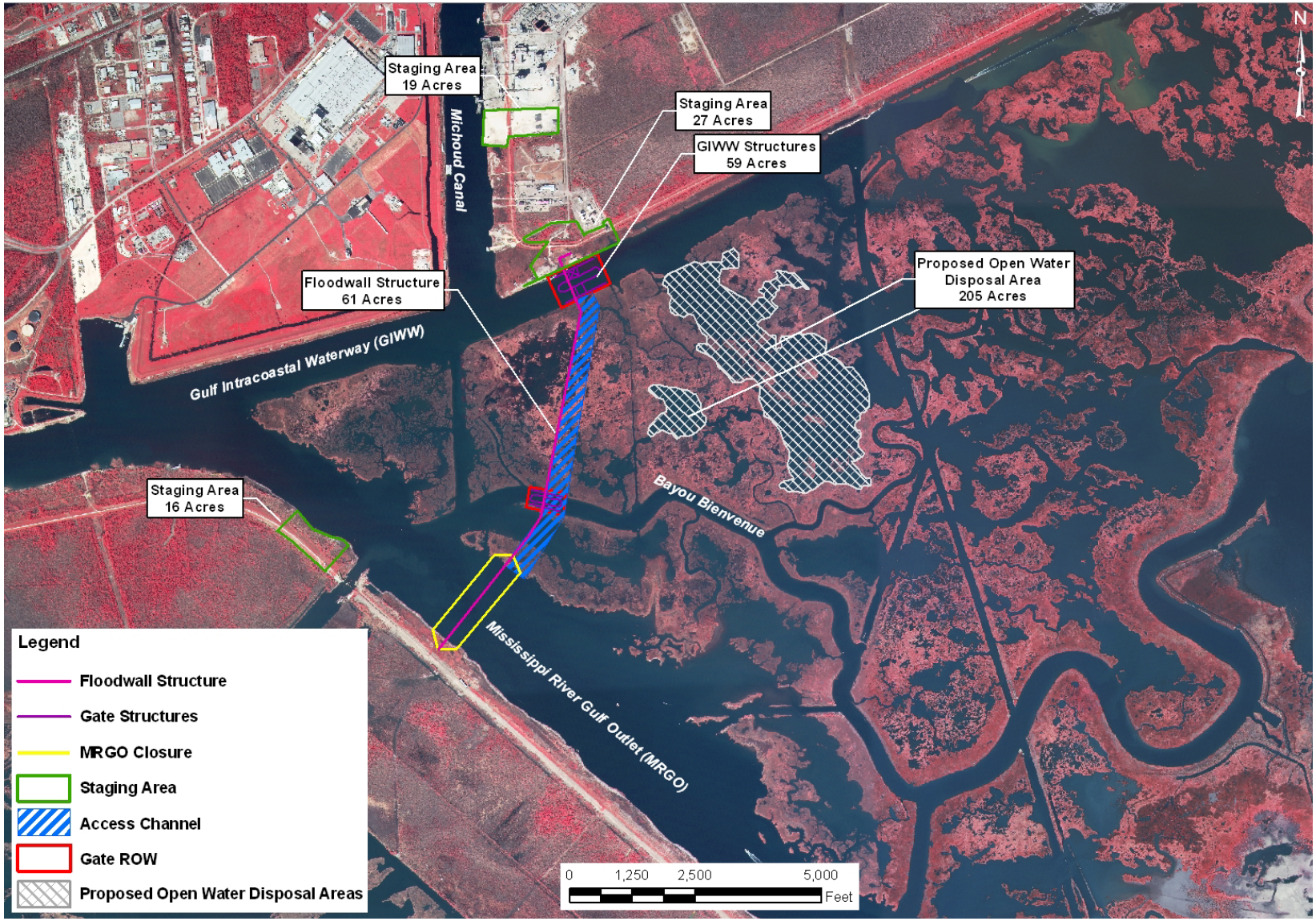

Figure 3.5 Proposed Alignment of the Greater New Orleans Hurricane and Storm Damage Risk Reduction System Structure

The recreation market area also attracts state and national attention with the availability of numerous charter fishing vessels. For the 2005-2006 season, the Sate of Louisiana issued 617,566 fishing and 391,217 salt-water fishing resident/non-resident licenses. The State of Louisiana also issued 274,531 hunting and 223,922 big game hunting resident/non-resident licenses as well as 6,436 non-resident waterfowl hunting licenses.

Boaters are provided recreational access into some of the most sought after sport fishing marshes in the state. The Louisiana Statewide Comprehensive Outdoor Recreation Plan (SCORP) inventoried over 282,000 acres (114,249 ha) of recreational facilities. Some of these facilities are tied to urban settings, however many are related directly to the marsh areas.

There is a growing investment in the recreation resources surrounding the project area as evidenced by the numerous support facilities, including bait and tackle shops, boat storage and marinas, and docking facilities. Although there are no facilities directly in the project area, the eastern lobe of Lake Borgne is often cited in fishing reports as a fishing hotspot by local anglers (e.g., see Marshall, 2007).

3.15 PUBLIC LANDS

This resource is institutionally significant because of the Federal Water Project Recreation Act of 1965, as amended; the Land and Water Conservation Fund Act of 1965, as amended; the National Wildlife Refuge System Administration Act of 1966; and the National Wildlife Refuge System Improvement Act of 1997. Public lands are technically significant because of the high economic value of recreational activities and their contribution to local, state, and national economies. Public lands are publicly significant because of the high value that the public places on conservation of natural resources, as well as access for fishing, hunting, and boating activities, as measured by the large number of fishing and hunting licenses sold in Louisiana, and the large per-capita number of recreational boat registrations in Louisiana.

3.15.1 Historic and Existing Conditions

Public lands are those areas owned by the Federal or state government, which have been made available for public access. The National Wildlife Refuge System Improvement Act of 1997 authorized that no new or expanded use of a refuge may be allowed unless it is first determined to be a compatible use and the use is not inconsistent with public safety.

The Bayou Sauvage National Wildlife Refuge (NWR) was established in 1990 within the city limits of New Orleans, Louisiana, in Orleans Parish. It encompasses 23,000 acres (9,318 ha) of fresh and brackish marsh. Whereas most of the refuge is behind hurricane protection levees, the area of the refuge in the Golden Triangle is not. A portion of this area of the Bayou Sauvage NWR is located within the Golden Triangle wetland creation feature in this study.

In addition to a large wading bird rookery, the refuge provides winter habitat for tens of thousands of waterfowl. Endangered and threatened species known to inhabit the refuge include American alligator and brown pelican. Bald eagle are also known to utilize the refuge.

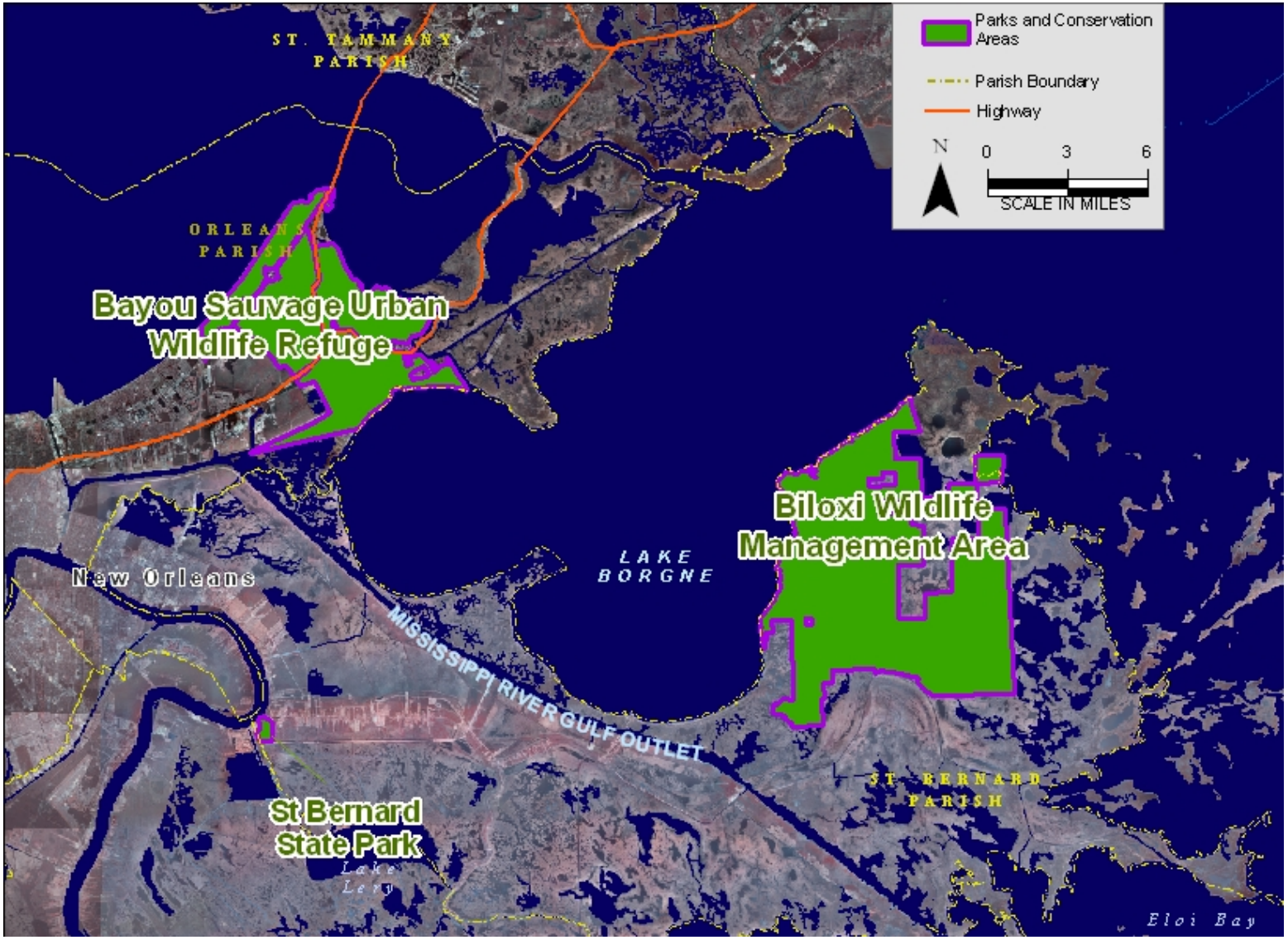

Figure 3.6 Parks and Conservation Areas near the Project Area

3.16 CULTURAL RESOURCES INCLUDING NATIONAL REGISTER LISTINGS

3.16.1 Historic and Existing Conditions

Recorded archival and historical research was conducted to develop a baseline level of knowledge for prehistoric and historic period cultural developments and to identify archaeological and historical sites previously recorded in the MRGO project area. Among the research efforts, a review of historical literature and previous archaeological investigation reports yielded information useful for developing a general chronology of cultural developments across the region. Information maintained by the Louisiana Department of Archaeology was consulted to identify previous cultural resources surveys in the area as well as to obtain site forms for previously sites.

Cultural Setting

Eight cultural units are used to characterize the prehistoric cultural sequence in southeast Louisiana. These are: Paleo-Indian (10,000 – 8,000 B.C.), Archaic (8,000 – 1,000 B.C.), Poverty Point (1,700 – 500 B.C.), Tchefuncte (500 B.C. – A.D. 100), Marksville (100 A.D. – A.D. 500), Baytown (A.D. 400 – 700), Coles Creek (A.D. 700 – 1,200) and Mississippian/Plaquemine (A.D. 1,200 – 1,700). A summary of the sites within the project area appears in **Table 3.10**.

Table 3.10 Cultural Resources Sites within the Project Area

Site No.	Type	Period of Occupation	Recommended Eligibility
16OR23	Spanish Fishing Village	Historic	Not Eligible
16SB39	Prehistoric Mounds	Marksville – Coles Creek	Eligible
16SB40	Shell Midden	Marksville – Mississippian	Not Eligible
16SB43	Shell Midden	Marksville – Plaquemine	Not Eligible
16SB84	Battery Bienvenue	Historic	Eligible
16SB148	Shell Midden	Mississippian – Historic	Not Eligible
16SB149	Shell Midden	Marksville – Historic	Not Eligible
16SB152	Shell Midden	Marksville – Coles Creek, Historic	Not Eligible
16SB154	Shell Midden	Plaquemine/Mississippian	Eligible

In addition to artifacts several sites, 16SB39, 16SB40, 16SB43 and 16SB154 contained human remains. Only at two of the sites, 16SB39 and 16SB154 were the human remains found in an undisturbed context. At 16SB40 and 16SB143 the human remains were part of disturbed wave-washed component.

3.16.2 Previous Investigations

The present chapter provides background contextual information regarding previous archeological and architectural investigations completed within the general vicinity of the proposed project area in Orleans and St. Bernard Parishes, Louisiana. This background information was compiled to ensure that any previously recorded cultural resources situated within the current study area were relocated accurately during fieldwork, as well as to provide data on the nature and distribution of previously recorded cultural resources in the immediate project vicinity. A records review was

undertaken of all previously completed archeological investigations conducted within 1.6 km (1.0 mi) of the project area, as well as for archeological sites, historic standing structures, and National Register properties situated within 1.6 km (1.0 mi) of the currently proposed project area. The review involved the following activities: a search of relevant archeological site forms, surveys, and historic map data on file with the Louisiana Division of Archaeology and the State Library; a review of the historic standing structures files housed at the Louisiana Division of Historic Preservation; and a search of the online National Register of Historic Places (NRHP) database for St. Bernard Parish, Louisiana. The results of this background investigation are summarized below.

Previously Conducted Cultural Resources Surveys

A total of five previously completed cultural resources surveys and archeological inventories were identified within 1.6 km (1 mi) of the currently proposed project area. These investigations resulted in the identification of 32 archeological sites. Only twenty of the previously recorded sites identified in these five surveys (16SB39, 16SB40, 16SB43, 16SB44, 16SB47, 16SB65, 16SB66, 16SB71, 16SB74, 16SB75, 16SB83, 16SB84, 16SB140, and 16SB148 through 16SB154), however, are within 1.6 km (1 mi) of the currently proposed study areas. A total of nine of the above sites (16OR23, 16SB39, 16SB40, 16SB43, 16SB84, 16SB148, 16SB149, 16SB152, and 16SB154) are positioned within the currently proposed project area.

Of these studies, three were conducted prior to 1993 (Wiseman et al., 1979; Coastal Environments Inc., 1983; Jones and Franks, 1993), with the other two studies completed after 2004 (Warren, 2004; Labadia et al., 2007). Four studies were completed on behalf of CEMVN, with the remaining investigation conducted for the St. Bernard Parish Police Jury in association the construction of a protective breakwater for Fort Proctor (16SB83).

3.17 AESTHETICS

3.17.1 Historic and Existing Conditions

The general project area encompasses the surrounding areas of Lake Borgne/MRGO and adjacent marshes. The project area is in the vicinity of St. Bernard Parish and Orleans Parish, Louisiana. The visual complexity surrounding its fragmented and remote marshes, bayous, wetlands, ridges and levees provides a pleasing aesthetic to the public eye. View points that provide some visual interest are based on the interplay of lines, forms, colors and textures found in water, vegetation and changes in elevation from the water's edge to dry land. Public significance is based on expressed public perceptions and professional analysis of the project area.

The impacts of Hurricane Katrina on aesthetics are varied. Although Hurricane Katrina negatively impacted the project area and the people of the region, the visual complexity of remote marshes, bayous and wetlands remain.

3.17.2 Scenic Rivers and Streams

The Louisiana Natural and Scenic River System is one of the Nation's largest, oldest, most diverse and unique state river protection initiatives (Louisiana Agricultural Center Internet web page: http://www.lsuagcenter.com/MCMS/RelatedFiles/%7B1755A5C5-C928-4561-8FAE-E711DBD51852%7D/ScenicRiversVermilion-TecheTemplate.ppt). It encompasses over

80 streams or stream segments including over 3,000 linear miles (4,827 km) of Louisiana's streams, rivers, and bayous (LDWF, 2005). The streams in the system vary from fast flowing upland streams with riffles and waterfalls to sluggish swamp bayous flanked by Spanish moss draped cypress trees to brackish water tidal creeks in the coastal marshes. A natural or scenic river is a river, stream, or bayou that is in a free-flowing condition and has not been altered by channelization or realignment (Louisiana Scenic Rivers Act [LSRA] - Acts 1988, No. 947, §1, eff. July 27, 1988). A stream can also be classified as scenic if it has been altered, but contains native vegetation and has little or no manmade structures along its bank. The Lake Borgne Canal (a.k.a. Violet Canal) is an example of such a scenic river that has been altered by dredging to improve navigation.

The LDWF is the administrator of the Scenic River System and serves to protect these streams from the effects of channelization, channel realignment, clearing and snagging projects, and reservoir construction projects. The scenic river system is designed to protect the overall ecology of the stream including the wildlife, vegetation, and hydrology. It is also designed to preserve the wilderness qualities, scenic beauty, archaeological resources, and other features of the stream or bayou. All of these streams are used for recreational activities such as boating, fishing, and canoeing. The project area is made up mostly of open water marshes, swamps and bayous. There are seven designated scenic streams or bayous located near or adjacent to the project area (**Table 3.11** and **Figure 3.7**).

Table 3.11 Scenic Streams and Rivers (LSRA)

Scenic Stream/River	Location
Bayou Dupre	The Lake Borgne Canal to Terre Beau Bayou
Lake Borgne Canal	The Forty Arpent Canal to Bayou Dupre
Bashman Bayou	Origin to Bayou Dupre
Terre Beau Bayou	Bayou Dupre to the New Canal
Pirogue Bayou	Bayou Dupre to the New Canal
Bayou Bienvenue	Bayou Viuere to Lake Borgne
Bayou Chaperon	Origin to end

There are other scenic areas that are only accessible by boat. These scenic areas can be found where high ground rises out of the marsh (and hardwood vegetation and brush associated with the crests of beach ridges, prehistoric mounds and middens, and natural levees) or where contrasting cultural elements increase the visual complexity. One example is the viewpoint into the ridges as seen from recreational boat traffic traveling along Doulluts Canal and the southern shoreline of Lake Borgne. Study interest emanates from the visual complexity surrounding the fragmented remote natural levee portion of an abandoned river distributary – a prime example of an ancient alluvial ridge undergoing gradual deterioration. A ridge, predominately vegetated by live oak, that rises out of the marsh (which is representative of the remnants of the abandoned St. Bernard Subdelta of the Mississippi River) and the occasionally white shell-laden Lake Borgne shoreline also provide pleasing vistas.

3.18 NOISE

3.18.1 Historic and Existing Conditions

Noise is institutionally significant because of the Noise Control Act of 1972 that declares the policy of the United States to promote an environment for all Americans free from noise that jeopardizes their health or welfare; and the Occupational Safety and Health Standards (29 CFR, part 1910) regarding protection against the effects of noise exposure. Noise is technically significant because noise can negatively affect the physiological or psychological well-being of an individual (Kryter, 1994) ranging from annoyance to adverse physiological responses, including permanent or temporary loss of hearing, and other types of disturbance to humans and animals, including disruption of colonial nesting birds. Noise is publicly significant because of the public's concern for the potential annoyance and adverse effects of noise on wildlife and humans.

Noise is typically associated with human activities and habitations, such as operation of commercial and recreational boats, water vessels, air boats, and other recreational vehicles; operation of machinery and motors; and human residential-related noise (air conditioner, lawn mower, etc.). However, the proposed project area is a remote and uninhabited marsh. The noise from distant urban areas surrounding the project area has little if any impacts on the area.

3.19 AIR QUALITY

3.19.1 Historic and Existing Conditions

This resource is institutionally significant because of the Clean Air Act of 1963, as amended, and the Louisiana Environmental Quality Act of 1983, as amended. Air quality is technically significant because of the status of regional ambient air quality in relation to the National Ambient Air Quality Standards (NAAQS). Air quality is publicly significant because of the desire for clean air and public health concerns expressed by many citizens.

Based upon a review of an ambient air quality five-year trend analysis (2000-2005) conducted by the Louisiana Department of Environmental Quality – Air Quality Division (LDEQ-AQD), there were no violations of state air quality standards at the monitoring stations nearest the project area (LDEQ, 2006). The LDEQ-AQD also indicated that there are no non-attainment areas or deviations from National Ambient Air Quality Standards in the general vicinity. These findings indicate that the air quality in the project area is generally good. St. Bernard and Orleans Parishes are currently classified in attainment of all NAAQS (LDEQ, 2006). This classification is the result of area-wide air quality modeling studies.

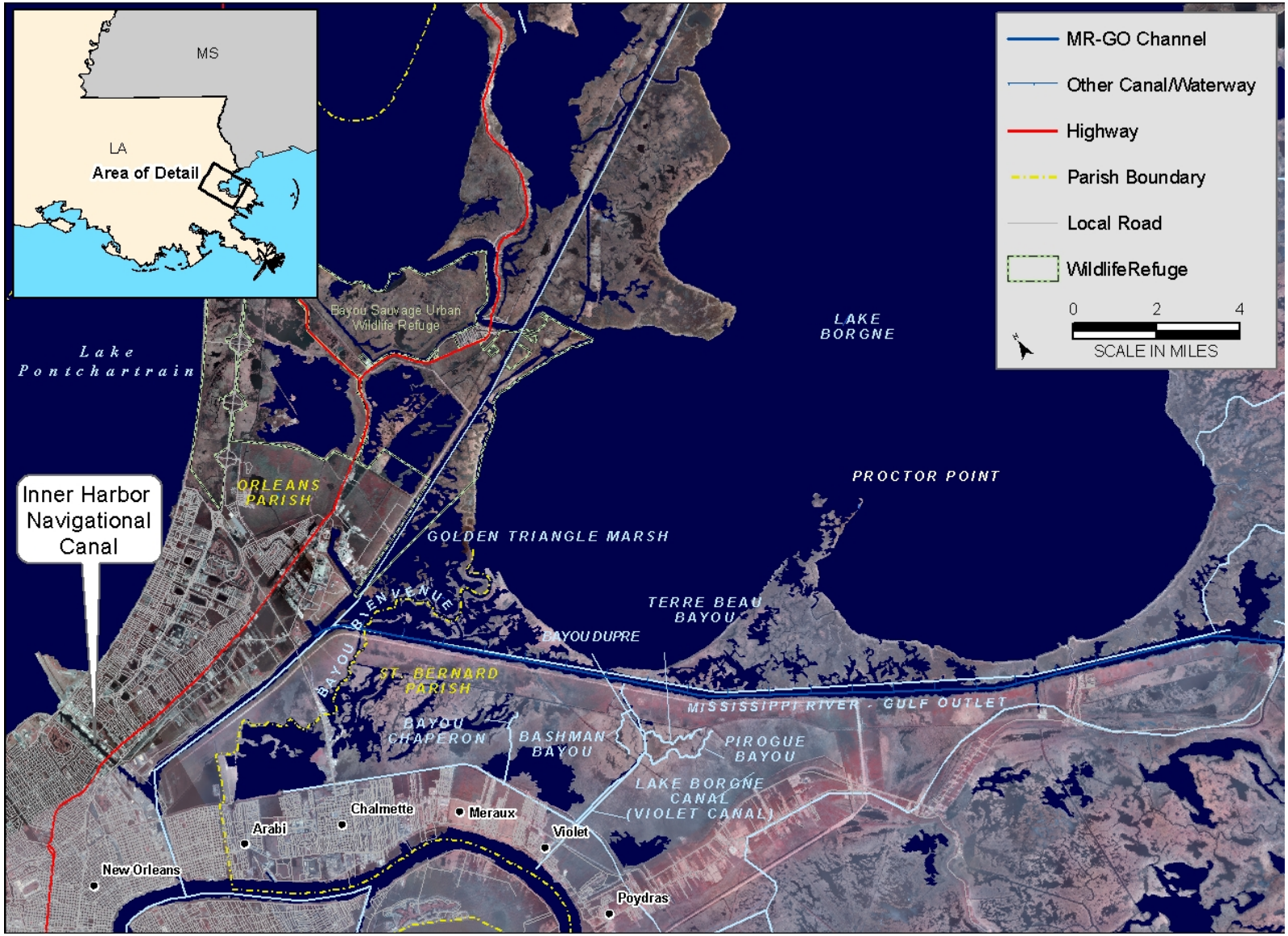

Figure 3.7 Scenic Rivers And Bayous near the Project Area

3.20 SOCIECONOMIC AND HUMAN RESOURCES

This resource is institutionally significant because of the National Environmental Policy Act of 1969; the Estuary Protection Act; the Clean Water Act; the River and Harbors Acts; the Watershed Protection and Flood Protection Act; and the Water Resources Development Acts. Of particular relevance is the degree to which the proposed action affects public health, safety, and economic well-being; and the quality of the human environment. This resource is technically significant because the social and economic welfare of the nation may be positively or adversely impacted by the proposed action. This resource is publicly significant because of the public's concern for health, welfare, and economic and social well-being from water resources projects.

3.20.1 Historic and Existing Conditions

3.20.1.1 Population

The project area is located in remote and uninhabited coastal wetlands within St. Bernard and Orleans Parishes. There are no communities or human populations in the project area. Nevertheless, there are population centers near the project area. The towns of Arabi, Meraux, Violet, and Poydras are located west of the project area in St. Bernard Parish, along with the larger city of Chalmette. To the northwest in Orleans Parish is Michoud, which falls in the Greater New Orleans area. The 2000 census data are presented in **Table 3.12** (http://www.city-data.com). The Greater New Orleans area had a population of 484,674 in 2000, but in July 2006 the estimated post-storm population was 223,388. Post-storm estimates for the minor population centers are not available, but for the purposes of this analysis, 2000 census data were used.

Table 3.12 2000 Populations at Cities and Towns Near the Project Area (http://www.city-data.com)

City, Town, or Municipality	Population	Distance From Project Area
Arabi	8,092	5.7 miles
Chalmette	32,081	4.7 miles
Meraux	8,435	3.8 miles
Violet	10,725	4.3 miles
Poydras	7,890	5.4 miles
Michoud[1]	14,963	2.5 miles
New Orleans (Greater Metro)	484,674	9.4 miles[2]

1 – Michoud is included in the Greater New Orleans Metropolitan Area
2 – to downtown New Orleans

3.20.1.2 Infrastructure

The project area is located in remote and uninhabited coastal wetlands within St. Bernard and Orleans Parishes. Other than buried oil, gas and utilities pipelines that pass through the area, there is no typical infrastructure (roads, buildings, etc.) within the project area.

3.20.1.3 Employment and Income

The project area is located in remote and uninhabited coastal wetlands within St. Bernard and Orleans Parishes. There are no communities or human populations in the project area; hence, there is no employment or income base. The area may support sources of income related to oil and gas exploration and production, and commercial and recreational fishing.

3.20.1.4 Navigation

The project area is bounded by the MRGO along the south, and the GIWW along the northwest.

3.20.1.4.1 Historic and Existing Conditions

Prior to construction of the MRGO (1958-1968), navigation in the area was along the GIWW and the Mississippi River. Following completion of construction, the size and draft of vessels using the MRGO increased to meet the competitive demand for more efficient movements of bulk commodities. However, in the late 1990s preliminary analysis of deep-draft navigation indicated that maintaining the authorized dimensions of the MRGO was not cost-effective.

In response to the widespread destructive impacts by Hurricane Katrina (2005), the Emergency Supplemental Appropriations Act for Defense, the Global War on Terror, and Hurricane Recovery, 2006 (Public Law 109-234) directed the Secretary of the Army, acting through the Chief of Engineers, to develop a comprehensive plan, at full Federal expense, to deauthorize deep-draft navigation on the Mississippi River-Gulf Outlet, Louisiana, extending from the Gulf of Mexico to the Gulf Intracoastal Waterway.

On June 5, 2008, the Assistant Secretary of the Army for Civil Works (ASA (CW)) forwarded the U. S. Army Corps of Engineers Chief's Report for the Mississippi River Gulf Outlet (MRGO) Deep-Draft De-Authorization Study to Congress. This action officially de-authorized the MRGO from the Gulf Intracoastal Waterway to the Gulf of Mexico in accordance with the Water Resources Development Act of 2007. The Chief's Report recommends construction of a closure structure, made of rock, just south of Bayou La Loutre near Hopedale, Louisiana, at full Federal expense, with the State of Louisiana providing lands, easements and rights of way for the project, as well as the State assuming the operation and maintenance responsibilities of the closure structure. The closure structure is designed to be 12 ft (3.7 m) wide at the top and 450 ft (137 m) wide at the bottom and will consist of more than 391,500 tons (386,667 metric tons) of stone. The Chief's Report addresses recommendations concerning deauthorization and physical modification of the MRGO project and, based on the requirements of Section 7013 of WRDA 2007, has been expanded to include a plan to address ecosystem restoration. The plan for ecosystem restoration is preliminarily addressed in the report and will be fully addressed in a supplement to this report, which will be provided to Congress at a later date.

3.20.1.5 Oil, Gas and Utilities Pipelines

The petroleum industry in the state accounts for almost 25 percent of the total state revenues and employs more than 116,000 people (about 6 percent of the state's total workforce). These workers earn almost twelve percent of the total wages paid in Louisiana. Indirect employment levels in support industries make this economic sector more important than is indicated by the direct employment figures. The total assessed value of interstate pipelines alone in Louisiana is over $600 million and the pipeline industry employs 4,855 persons with an annual payroll of

$250 million. Louisiana is laced with thousands of pipelines conveying oil, gas, and other liquid and gaseous materials for short and long distances.

There are eleven utility crossings managed by six companies along the MRGO and extending into the project area (**Table 3.13, Figure 3.8**). The Air Products and Chemical Company has pipelines at Miles 59.9 and 58.7. The Tenneco Company has a pipeline at Mile 57.9 and two pipelines at Mile 42.7. The Collins Pipeline Company has a pipeline at Mile 57.7. The Southern Natural Gas Company has two pipelines at Mile 54.7, one at Mile 54.6. The Chevron Pipeline Company has a pipeline at Mile 45.6. The Bellsouth Company has a telephone cable line at Mile 41.6.

Table 3.13 Utility Crossing and Owners

Mile Marker	Description	Owner
58.9	9” SUB GAS PIPELINE	AIR PRODUCTS AND CHEMICAL
58.7	12” SUB HYD PIPELINE	AIR PRODUCTS AND CHEMICAL
57.9	12” SUB GAS PIPELINE	TENNECO OIL CO.
57.7	16” SUB GAS PIPELINE	COLLINS PIPELINE CO
54.7	20” SUB GAS PIPELINE	SOUTHERN NATURAL GAS CO.
54.7	24” SUB GAS PIPELINE	SOUTHERN NATURAL GAS CO.
54.6	30” SUB GAS PIPELINE	SOUTHERN NATURAL GAS CO.
45.6	20” SUB GAS PIPELINE	CHEVRON PIPELINE CO.
42.7	36” SUB GAS PIPELINE	TENNECO OIL CO.
42.7	30” SUB GAS PIPELINE	TENNECO OIL CO.
41.6	SUB TELEPHONE CABLE	BELLSOUTH TEL.

3.20.1.6 Commercial Fisheries

Louisiana’s coastal wetlands are the richest estuaries in the country for fisheries production. Commercially and recreationally important species such as brown and white shrimp, blue crabs, eastern oysters, and menhaden are abundant, but these species populations are threatened if land loss continues. Louisiana has historically been an important contributor to the Nation’s domestic fish and shellfish production, and is one of the primary contributors to the Nation’s food supply for protein. While Louisiana has long been the Nation’s largest shrimp and menhaden producer, it has also recently become the leading producer of blue crabs and oysters.

Louisiana ports produce a catch comparable to that of the entire Atlantic seaboard, and more than triple that of the remaining gulf states (NMFS, 2001). Four Louisiana ports have ranked among the top ten in value of commercial fisheries landings throughout the U.S. since 1981 (NMFS, 2003). Louisiana’s commercial landings have been over one billion pounds per year (454 million kg) for over 20 years, with a value exceeding $400 million in 2000. White shrimp (*Litopenaeus setiferus*), brown shrimp (*Farfantepenaeus aztecus*), and gulf menhaden (*Brevoortia patronus*) account for the majority of commercial harvest by value.

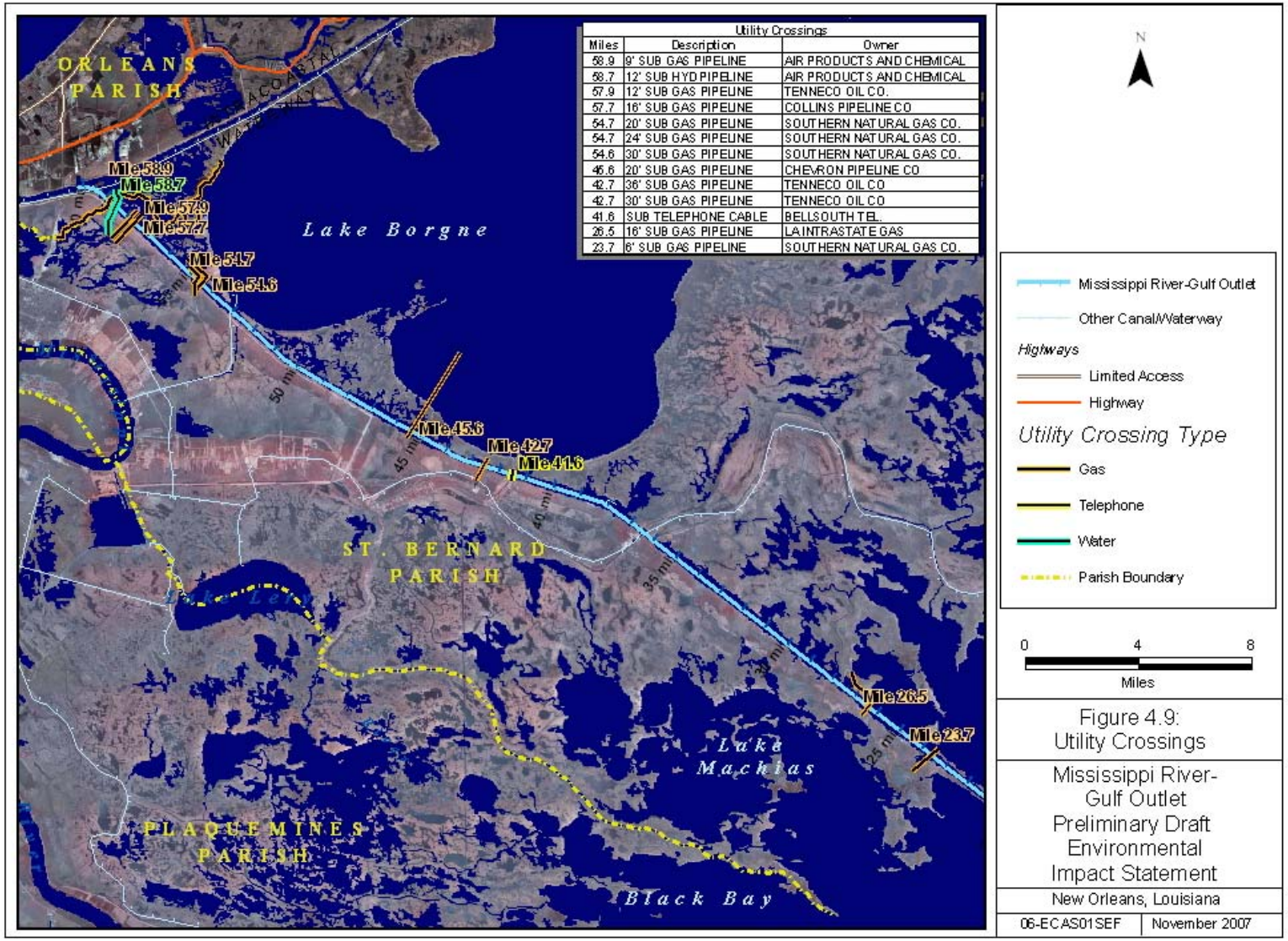

Figure 3.8 Utility Crossings in and near the Project Area

The primary fisheries in the project area are brown and white shrimp, blue crabs, and oysters. While species data aren't available for this particular area, totals for the state for 2005 are available from the NMFS (Personal communication from the NMFS, Fisheries Statistics Division, Silver Spring, MD, 2007). For the state, landings of brown and white shrimp totaled 39.1 million pounds (17.8 million kg) and 62.1 million pounds (28.2 million kg), with a value of $41.2 million and $91.9 million, respectively. Blue crab landings for the state totaled 37.9 million pounds (17.2 million kg) with a value of $26.8 million, and oyster landings totaled 12.1 million pounds (5.5 million kg) with a value of $33.3 million. In all, landings from Louisiana accounted for 39 percent of the nation's harvest of shrimp (all types), 25 percent of blue crab landings, and 35 percent of oyster landings.

From 1982 to 2005 at the Delacroix-Yscloskey, LA, combined port, an average of 12.5 million pounds (5.7 million kg) of seafood were landed, with an average value of $14.2 million (personal communication, NMFS, Fisheries Statistics Division, Silver Spring, MD, 2007). No trends were evident in the annual landings (**Table 3.14**).

Table 3.14 Annual Seafood Landings at the Delacroix-Yscloskey, LA Combined Port (personal communication, National Marine Fisheries Service, Fisheries Statistics Division, Silver Spring, MD)

Year	Millions of Pounds	Millions of Dollars	Year	Millions of Pounds	Millions of Dollars
1982	10.6	9.8	1994	25.3	37.6
1983	6.6	9.0	1995	9.3	12.8
1984	10.8	10.8	1996	10.1	10.9
1985	11	10.6	1997	13.9	15.8
1986	16.3	12.5	1998	14	15.6
1987	12.5	13.1	1999	16	17
1988	11.1	11.0	2000	15.5	20.1
1989	9.5	9.8	2001	13.4	19.9
1990	8.3	7.6	2002	15.5	20.5
1991	11	8.0	2003	12.8	16.8
1992	14	12.6	2004	12	14.4
1993	12.8	11.8	2005	7.7	12.8
			Average:	13.8	17.9

3.20.1.7 Oyster Leases

In 1892, Louisiana Act 206 established the first public oyster grounds open to all Louisiana residents. Act 206 also adjusted the closed season, increased the size of a lease to ten acres (4 ha), and authorized the office of oyster inspector to enforce the laws. Ten years later, Louisiana's first comprehensive oyster law was passed with the Act of 1902. The Louisiana Department of Conservation issued the first private oyster lease in 1903 in Plaquemines Parish (Laiche, 1993). Additionally, the state manages several oyster seed grounds, from which oysters can be collected for transfer to private leases.

Production of oysters in Louisiana has been relatively stable for the last 50 years, with harvest from public beds replacing the decreasing harvest from private leases. The Louisiana oyster industry has been experiencing many stressors over the past several decades that threaten the long-term sustainability of both the industry and the resource. Increasing coastal land loss is reducing the amount of marsh that provides shelter to oyster reefs, and saltwater intrusion is exacerbating disease and predation. In addition, the industry is faced with changing environmental conditions, fluctuating market demands, public perception issues, and increased competition. **Figure 3.9** shows oyster leases and state oyster grounds in and around the project area as of February 2007. **Table 3.15** lists active oyster leases in the project area that would be acquired (at least in part) prior to construction.

Table 3.15 Existing Oyster Leases in Project Area That Would be Acquired (at Least in Part) for this Project

Location	Lease #	Owner #	Acres	Expiration
Lake Borgne	2760300	886	547.0	01/01/15
Lake Borgne	28841057	2452	240.0	01/01/22
Lake Borgne	2816801	689	108.0	01/01/16
Lake Borgne	2817801	1258	22.0	01/01/16
Lake Borgne	2835101	3057	287.0	01/01/11
Lake Borgne	2818401	71	260.0	01/01/11
Fort Bayou	3296107	2264	11.0	01/01/22

3.20.1.8 Flood Control and Hurricane Protection Levees

The project area does not contain any flood control or hurricane protection structures. However, a portion of the Hurricane Protection System, a series of levees and floodgates designed to protect against storm surges associated with tropical systems, is located immediately adjacent to the project area to the north and west (**Figure 3.10**). Alternative plan formulation considered providing shoreline protection measures along the MRGO to protect portions of the Greater New Orleans Hurricane and Storm Damage Risk Reduction System (GNOHSDRRS). Along the southwestern shoreline of the MRGO, a portion of the GNOHSDRRS levee extends from Mile 47 to Mile 60 to protect the population centers of Chalmette, Arabi, Poydras, Meraux, and Violet. This levee system is built to a height of 20.0 ft (6.1 m) NAVD88, and has floodgates at Bayou Dupre and Bayou Bienvenue. A levee along the northern shoreline of the GIWW protects portions of eastern New Orleans and Michoud, and levees along the IHNC protect portions of eastern New Orleans and Arabi. Many of these levees were damaged during Hurricane Katrina, and have been rebuilt.

There are on-going efforts to raise the level of protection to conform to the updated requirement for a 100-year level of protection. The floodwall proposed for the GNOHSDRRS would be located in the northwest corner of the project area (**Figure 3.5**). It would consist of a floodwall constructed to an elevation of 26 ft (7.9 m) above the average water level, with a closure structure across the MRGO channel south of Bayou Bienvenue, and sector gates across Bayou Bienvenue and the GIWW that would be closed during storm surge situations (USACE, 2008).

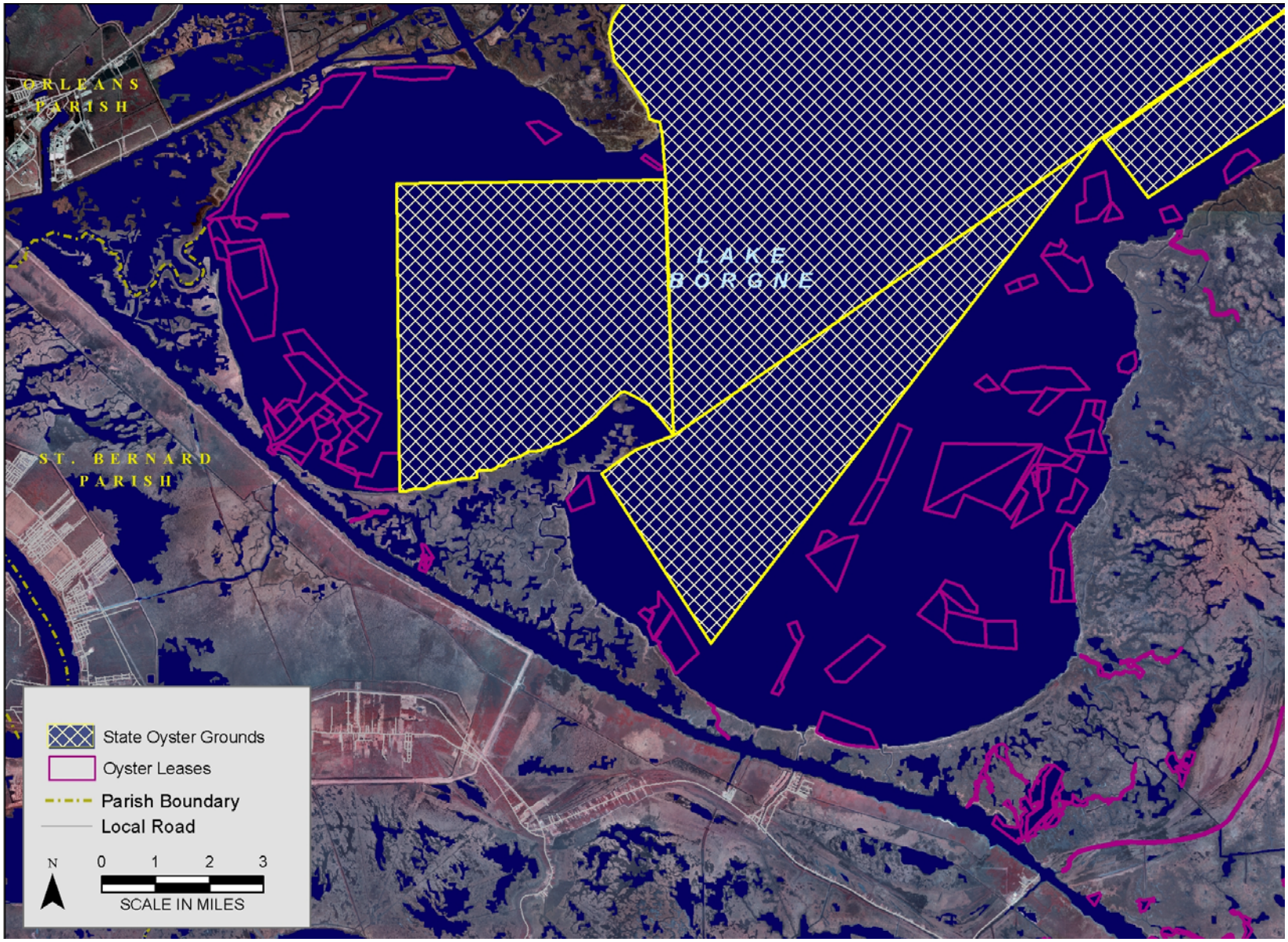

Figure 3.9 Active Oyster Leases in and near the Project Area

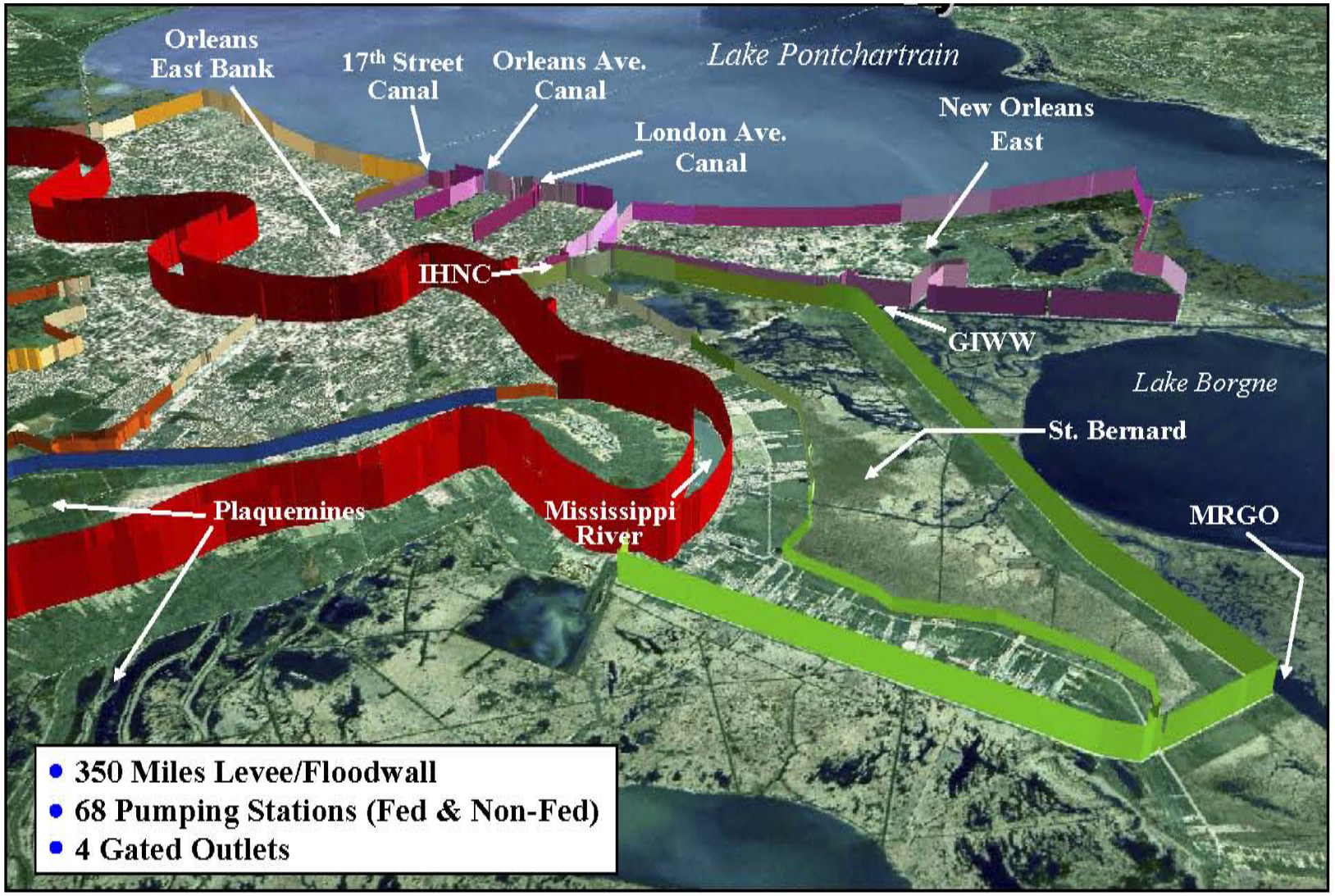

Figure 3.10 Flood Protection Features near the Project Area

3.21 HAZARDOUS, TOXIC AND RADIOACTIVE WASTES

3.21.1 Historic and Existing Conditions

The USACE is obligated under Engineer Regulation (ER) 1165-2-132 to assume responsibility for the reasonable identification and evaluation of all HTRW contamination within the vicinity of the proposed action. ER 1165-2-132 identifies the USACE policy to avoid the use of project funds for HTRW removal and remediation activities. Costs for necessary special handling or remediation of wastes (e.g., those regulated by the RCRA), pollutants and other contaminants, which are not regulated under the CERCLA, will be treated as project costs if the requirement is the result of a validly promulgated Federal, state or local regulation.

HTRW investigations facilitate early identification and consideration of HTRW problems. The Civil Works Project Plan routinely includes a phased and documented review to provide for early identification of HTRW potential at project sites. ER 1165-2-132 requires that viable options to avoid HTRW problems be determined and a procedure for resolution of HTRW concerns be established.

The discharge of dredged material into waters of the U.S. is regulated under the Clean Water Act (CWA), and the Marine Protection and Sanctuaries Act governs the transportation of dredged material to ocean waters for the purpose of disposal. The RCRA hazardous waste management regulations, promulgated pursuant to RCRA (42 U.S.C. 6905) specifically exempt dredge material from the hazardous waste definition if that material is covered by:

1) a permit issued under Section 404 of the Clean Water Act, 33 U.S.C. 1344;

2) a permit issued under Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 33 U.S.C. 1413; or

3) the administrative equivalent of such permits where the work involves an Army Corps of Engineers civil works project, 40 C.F.R. 261.4(g), 63 F.R. 65874, 65921; November 30, 1998.ER1165-2-132 states, dredged material and sediments beneath navigable waters proposed for dredging qualify as HTRW only if they are within the boundaries of a site designated by the EPA or a state for a response action (either a removal or a remedial action) under CERCLA, or if they are a part of a NPL site under CERCLA.

As reported in the Phase I ESA, during review of historic records the presence of a former World War II training facility known as the Shell Beach, Anti-Aircraft Training Center (AATC) located on the southern shoreline of the eastern half of Lake Borgne was identified. Based on review of historic documents and information obtained from personnel interviews, ammunition was shot from both large and small caliber weapons at targets that were towed above Lake Borgne.

Magnetic surveys of the shoreline protection area between Doulluts Canal and Jahncke's Ditch were conducted by USACE Baltimore District, Munitions and Explosives of Concern (MEC) dredging experts. These surveys did not identify the presence of MEC in the dredged material deposited within an existing shoreline protection project. The MEC dredging experts reported a low probability of encountering MEC in the project area. The MEC dredging experts also recommended that borrow area sediments be monitored during the project for MEC.

Even though the risk of encountering MEC in the project area was determined to be low, as a precaution, a risk assessment and response plan was prepared to identify procedures to follow should a MEC be discovered. Protocols for proper notification, handling, and disposal of

potential MEC associated with the former Shell Beach AATC have been developed for implementation if MEC is discovered during the dredging operations and placement of the dredge material.

Should at anytime during the project HTRW concerns arise, the CEMVN would take immediate actions to investigate the concerns. Should an HTRW issue be determined and the development of a response action required, CEMVN would coordinate with the appropriate Federal and state authorities to implement an approved response action.