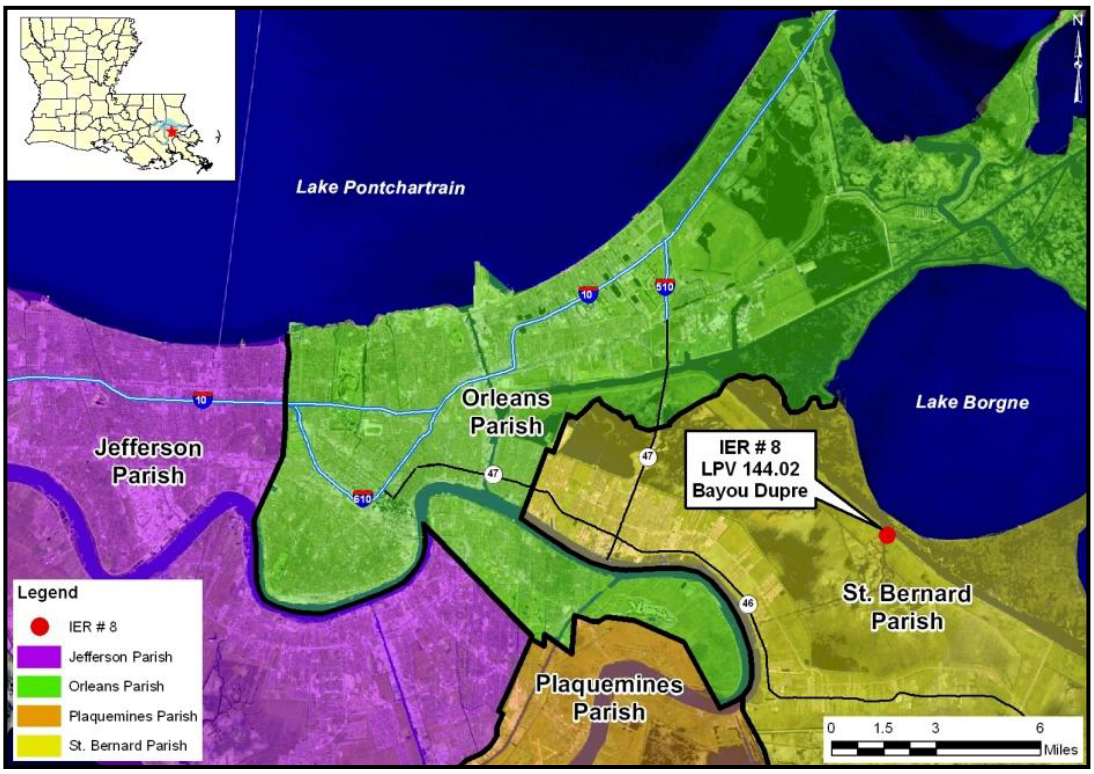
DRAFT INDIVIDUAL ENVIRONMENTAL REPORT

LAKE PONTCHARTRAIN AND VICINITY, BAYOU DUPRE CONTROL STRUCTURE

ST. BERNARD PARISH, LOUISIANA

IER # 8



US Army Corps of Engineers®

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1.0 INTRODUCTION

The United States (U.S.) Army Corps of Engineers (USACE), Mississippi Valley Division, New Orleans District (CEMVN), has prepared this Individual Environmental Report (IER) # 8 to evaluate the potential impacts associated with the proposed improvement or replacement of a flood control structure on Bayou Dupre. The Hurricane and Storm Damage Risk Reduction System (HSDRRS) in the area of Lake Pontchartrain and Vicinity (LPV) has been divided into numerous reaches, with each reach identified by a project identification number. The IER # 8 control structure comprises reach LPV 144.02, located where Bayou Dupre crosses the Chalmette Loop portion of the HSDRRS in St. Bernard Parish, Louisiana (see figure 1).

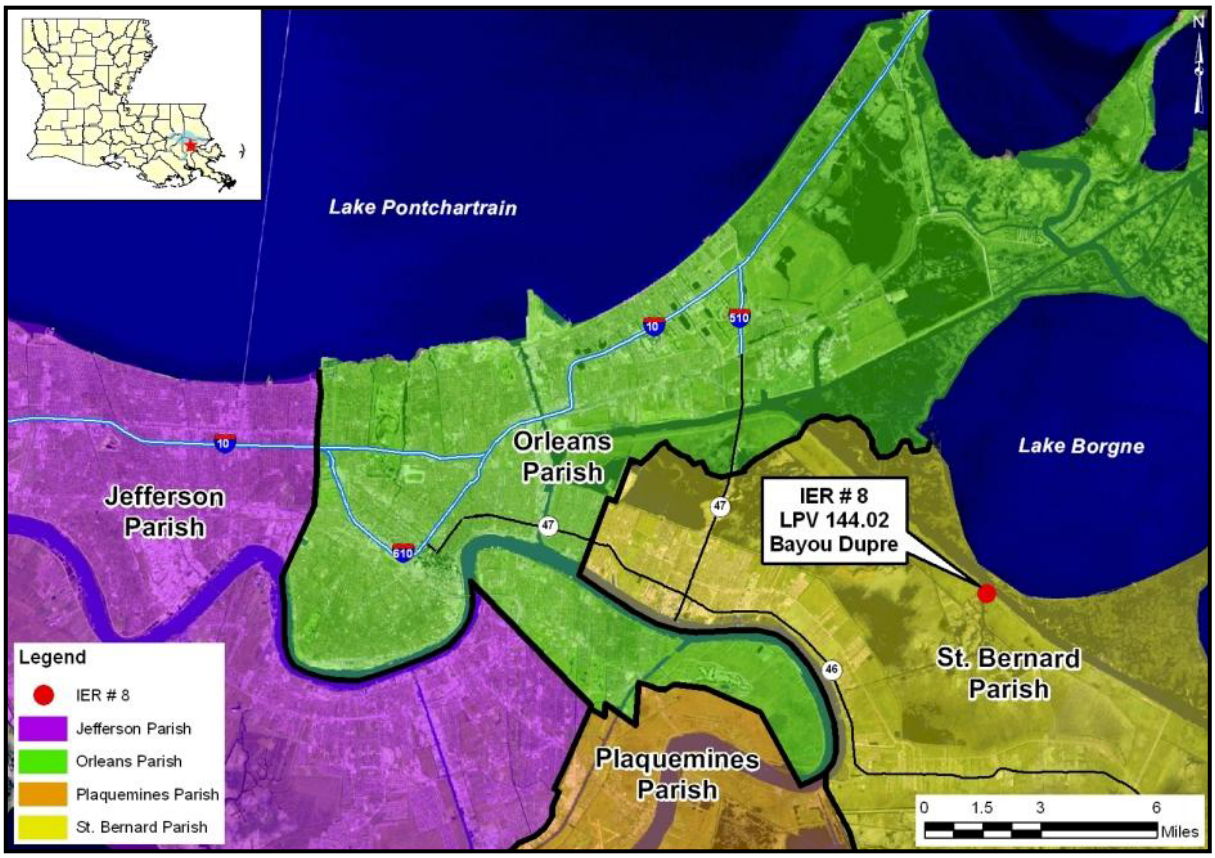

Figure 1. Bayou Dupre Control Structure – Project Vicinity Map

The project area is located on the south bank of the Mississippi River Gulf Outlet (MRGO)[1], in the northwest portion of St. Bernard Parish. Dominant physiographic features in the vicinity include the drained and developed area between the Mississippi River and the Forty Arpent Canal, Mississippi River Gulf Outlet, Lake Borgne, and extensive marshes. The communities of Chalmette, Meraux, Violet, and others make up the area along the Mississippi River to be protected by the project (figure 1).

[1] The MRGO Federal navigation channel between Mile 60 at the southern bank of the GIWW to the Gulf of Mexico at Mile - 9.4 is deauthorized.

IER # 8 has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and the regulations for implementing NEPA from the Council on Environmental Quality (CEQ) (40 Code of Federal Regulations [CFR] 1500-1508), as reflected in the USACE Engineering Regulation (ER) 200-2-2 (USACE 1988). The execution of an IER, in lieu of a traditional Environmental Assessment (EA) or Environmental Impact Statement (EIS), is provided for in ER 200-2-2, Environmental Quality Procedures for Implementing the NEPA (33 CFR 230) and pursuant to the CEQ NEPA Implementation Regulations (40 CFR 1506.11). The Alternative Arrangements can be found at www.nolaenvironmental.gov, and are incorporated herein by reference.

The CEMVN implemented Alternative Arrangements on 13 March 2007, under the provisions of the CEQ Regulations (40 CFR 1506.11). This process was employed in order to expeditiously complete environmental analysis for any changes to the authorized system and the 100-year level of the HSDRRS, formerly known as the Hurricane Protection System, authorized and funded by Congress and the George W. Bush Administration. The proposed action is located in southeastern Louisiana and is part of the Federal effort to rebuild and complete construction of the HSDRRS in the New Orleans Metropolitan area as a result of Hurricanes Katrina and Rita.

This draft IER will be distributed for a 30-day public review and comment period. A public meeting specific to the proposed action will be held if requested by a stakeholder during the review period. Any comments received during the public meeting will be considered part of the official record. After the 30-day comment period, and public meeting if requested, the CEMVN District Commander will review all comments received during the review period and determine if they rise to the level of being substantive in nature. If comments are not considered to be substantive, the District Commander will make a decision on the proposed action. This decision will be documented in the form of an IER Decision Record. If a comment(s) is determined to be substantive in nature, an addendum to the IER will be prepared and published for an additional 30-day public review and comment period. After the expiration of the public comment period, the District Commander will make a decision on the proposed action. The decision will be documented in an IER Decision Record.

1.1 PURPOSE AND NEED FOR THE PROPOSED ACTION

It is the intent of the CEMVN to employ an integrated, comprehensive, and systems-based approach to hurricane and storm damage reduction in raising the HSDRRS to the 100-year level of risk reduction. The term “100-year level of risk reduction,” as it is used throughout this document, refers to a level of risk reduction which reduces the risk of hurricane surge and wave-driven flooding that the New Orleans Metropolitan Area has a 1 percent chance of experiencing each year. The proposed action would satisfy the CEMVN’s purpose and need to provide the 100-year level of risk reduction from flood damage due to flooding from hurricanes and other tropical storms in the St. Bernard Parish area. The elevations of the existing drainage structure and levee tie-ins of the LPV project are below the 100-year design elevation. The proposed action resulted from a defined need to reduce flood risk and storm damage to residences, businesses, and other infrastructure from hurricanes (100-year storm events) and other high water events. The completed HSDRRS would lower the risk of damage to property and infrastructure during a storm event. The safety of people in the region is the highest priority of the CEMVN.

1.2 AUTHORITY FOR THE PROPOSED ACTION

The authority for the proposed action was provided as part of a number of HSDRRS projects spanning southeastern Louisiana, including the LPV HSDRRS Project and the West Bank and Vicinity (WBV) HSDRRS Project. Congress and the George W. Bush Administration granted a series of supplemental appropriations acts following Hurricanes Katrina and Rita to repair and

upgrade the project systems damaged by the storms, which gave additional authority to the USACE to construct 100-year HSDRRS projects.

The LPV project was authorized under the Flood Control Act of 1965 (Public Law [PL] 89-298, Title II, Sec. 204) which amended and authorized a "project for hurricane protection on Lake Pontchartrain, Louisiana … substantially in accordance with the recommendations of the Chief of Engineers in House Document 231, Eighty-ninth Congress." The original statutory authorization for the LPV project was amended by the Water Resources Development Act (WRDA) of 1974 (PL 93-251, Title I, Sec. 92), 1986 (PL 99-662, Title VIII, Sec. 805), 1990 (PL 101-640, Sec. 116), 1992 (PL 102-580, Sec. 102), 1996 (PL 104-303, Sec. 325), 1999 (PL 106-53, Sec. 324), and 2000 (PL 106-541, Sec. 432); and the Energy and Water Development Appropriations Acts of 1992 (PL 102-104, Title I, Construction, General), 1993 (PL 102-377, Title I, Construction, General), and 1994 (PL 103-126, Title I, Construction, General).

The Department of Defense, Emergency Supplemental Appropriations to Address Hurricanes in the Gulf of Mexico, and Pandemic Influenza Act of 2006 (3rd Supplemental - PL 109-148, Chapter 3, Construction, and Flood Control and Coastal Emergencies) appropriated funds to accelerate the completion of the previously authorized project and to restore and repair the project at full Federal expense. The Emergency Supplemental Appropriations Act for Defense, the Global War on Terror, and Hurricane Recovery of 2006 (4th Supplemental - PL 109-234, Title II, Chapter 3, Construction, and Flood Control and Coastal Emergencies) appropriated funds and added authority to raise levee heights where necessary, reinforce and replace floodwalls, and otherwise enhance the project to provide the levels of protection necessary to achieve the certification required for participation in the National Flood Insurance Program. Additional Supplemental Appropriations include the U.S. Troop Readiness, Veterans' Care, Katrina Recovery, and Iraq Accountability Appropriations Act, 2007 (PL 110-28) Title IV, Chapter 3, Flood Control and Coastal Emergencies, Section 4302 (5th Supplemental), and the 6th Supplemental (PL 110-252), Title III, Chapter 3, Construction.

1.3 PRIOR REPORTS

A number of studies and reports on water resources development in the proposed project area have been prepared by the USACE, other Federal, state, and local agencies, research institutes, and individuals. Pertinent studies, reports, and projects are summarized below:

- On 13 March 2009, the CEMVN signed a Decision Record on IER # 4 entitled "Lake Pontchartrain and Vicinity, Orleans East Bank, New Orleans Lakefront Levee, West of Inner Harbor Navigation Canal to Eastbank of 17th Street Canal, Orleans Parish, Louisiana." The document was prepared to evaluate the potential impacts associated with improving the Orleans lakefront hurricane risk reduction features.

- On 18 February 2009, the CEMVN signed a Decision Record on IER # 12 entitled "GIWW, Harvey, and Algiers Levees and Floodwalls, Jefferson, Orleans, and Plaquemines Parishes, Louisiana." The document was prepared to evaluate potential impacts associated with the proposed construction and upgrades of levees, floodwalls, floodgates, and pumping station(s) within a portion of the WBV HSDRRS.

- On 3 February 2009, the CEMVN signed a Decision Record on IER # 25 entitled "Government Furnished Borrow Material, Orleans, Jefferson, and Plaquemines Parishes, Louisiana." The document was prepared to evaluate the potential impacts associated with actions taken by the USACE as a result of excavating borrow areas for use in construction of the HSDRRS.

- On 21 January 2009, the CEMVN signed a Decision Record on IER # 17 entitled “West Bank and Vicinity, Company Canal Floodwall, Jefferson Parish, Louisiana.” The document was prepared to evaluate the potential impacts associated with the proposed construction and maintenance of a 100-year level of risk reduction along the WBV, Company Canal Floodwall from the Bayou Segnette State Park to the New Westwego Pumping Station.

- On 21 October 2008, the CEMVN signed a Decision Record on IER # 11 Tier 2 Borgne entitled "Improved Protection on the Inner Harbor Navigation Canal, Tier 2 Borgne Orleans and St. Bernard Parishes, Louisiana." The document was prepared to evaluate the potential impacts associated with constructing a surge barrier near Lake Borgne.

- On 20 October 2008, the CEMVN signed a Decision Record on IER # 26 entitled "Pre-Approved Contractor Furnished Borrow Material # 3, Jefferson, Plaquemines, and St. John the Baptist Parishes, Louisiana, and Hancock County, Mississippi." The document was prepared to evaluate the potential impacts associated with the actions taken by commercial contractors as a result of excavating borrow areas for use in construction of the HSDRRS.

- On 26 August 2008, the CEMVN signed a Decision Record on IER # 14, entitled “Westwego to Harvey Levee, Jefferson Parish, Louisiana.” The proposed action includes enlarging earthen levees, rebuilding floodwalls, constructing fronting protection for three pump stations, replacing a floodgate with a swing gate, and raising an existing ramp to ensure a continuous line of risk reduction in the levee and floodwall system.

- On 25 July 2008, the CEMVN signed a Decision Record on IER # 3, entitled “Lake Pontchartrain and Vicinity, Lakefront Levee, Jefferson Parish, Louisiana.” The proposed action includes the rebuilding of 9.5 miles of earthen levees, upgrading of foreshore protection, replacement of two floodgates, and construction of fronting protection and construction or modification of breakwaters at four pumping stations along the lakefront in Jefferson Parish, Louisiana.

- On 18 July 2008, the CEMVN signed a Decision Record on IER # 2, entitled “Lake Pontchartrain and Vicinity, West Return Floodwall, Jefferson and St. Charles Parishes, Louisiana.” The proposed action includes replacing 3.4 miles of floodwall in Jefferson and St. Charles Parishes, Louisiana.

- On 12 June 2008, the CEMVN signed a Decision Record on IER # 15, entitled “Lake Cataouatche Levee, Jefferson and Plaquemines Parishes, Louisiana.” The proposed action includes constructing and maintaining a 100-year level of risk reduction along the project area in Jefferson Parish, Louisiana.

- On 9 June 2008, the CEMVN signed a Decision Record on IER # 1, entitled “Lake Pontchartrain and Vicinity, La Branche Wetlands Levee, St. Charles Parish, Louisiana.” The proposed action includes raising approximately 9 miles of earthen levees, replacing over 3,000 feet (ft) of floodwalls, rebuilding or modifying four drainage structures, closing one drainage structure, and modifying one railroad gate in St. Charles Parish, Louisiana.

- On 5 June 2008, a Chief’s Report on the Deep-Draft De-Authorization Study entitled “Integrated Final Report to Congress and Legislative Environmental Impact Statement for the Mississippi River Gulf Outlet Deep Draft De-Authorization Study” was transferred to Congress. This action deauthorized the channel and construction of a plug has been initiated near Bayou La Loutre.

- On 30 May 2008, the CEMVN signed a Decision Record on IER # 22 entitled “Government Furnished Borrow Material # 2, Jefferson and Plaquemines Parishes, Louisiana.” The

document was prepared to evaluate the potential impacts associated with the actions taken by the USACE while excavating borrow areas for use in construction of the HSDRRS.

- On 5 May 2008, the CEMVN signed a Decision Record on IER # 23 entitled "Pre-Approved Contractor Furnished Borrow Material # 2, St. Bernard, St. Charles, Plaquemines Parishes, Louisiana, and Hancock County, Mississippi." The document was prepared to evaluate the potential impacts associated with the actions taken by commercial contractors as a result of excavating borrow areas for use in construction of the HSDRRS.

- On 14 March 2008, the CEMVN signed a Decision Record on IER # 11 (Tier 1) entitled "Improved Protection on the Inner Harbor Navigation Canal, Orleans and St. Bernard Parishes, Louisiana." The document was prepared to evaluate potential impacts associated with building navigable and structural barriers to prevent storm surge from entering the Inner Harbor Navigation Canal (IHNC) from Lake Pontchartrain and/or the Gulf Intracoastal Waterway (GIWW)-Mississippi River Gulf Outlet (MRGO)[2]-Lake Borgne complex. This document also cites specific prior reports for MRGO projects and Coastal Wetlands Planning Protection Restoration projects. The IER # 11 project also includes two Tier 2 documents, which discuss alignment alternatives, designs of the navigable and structural barriers, and the impacts associated with exact footprints. The Tier 2 Borgne document has been completed and a Decision Record was signed on 21 October 2008. The Tier 2 Pontchartrain document is currently being completed.

- On 21 February 2008, the CEMVN signed a Decision Record on IER # 18 entitled "Government Furnished Borrow Material, Jefferson, Orleans, Plaquemines, St. Charles, and St. Bernard Parishes, Louisiana." The document was prepared to evaluate the potential impacts associated with the actions taken by the USACE as a result of excavating borrow areas for use in construction of the HSDRRS.

- On 14 February 2008, the CEMVN signed a Decision Record on IER # 19 entitled "Pre-Approved Contractor Furnished Borrow Material, Jefferson, Orleans, St. Bernard, Iberville, and Plaquemines Parishes, Louisiana, and Hancock County, Mississippi." The document was prepared to evaluate the potential impacts associated with the actions taken by commercial contractors as a result of excavating borrow areas for use in construction of the HSDRRS.

- In July 2006, the CEMVN signed a Finding of No Significant Impact (FONSI) on EA # 433 entitled, "USACE Response to Hurricanes Katrina & Rita in Louisiana." The document was prepared to evaluate the potential impacts associated with the actions taken by the USACE as a result of Hurricanes Katrina and Rita.

- On 30 October 1998, the CEMVN signed a FONSI on EA # 279 entitled "Lake Pontchartrain Lakefront, Breakwaters, Pump Stations 2 and 3." The report evaluates the impacts associated with providing fronting protection for outfall canals and pump stations. It was determined that the action would not significantly impact resources in the immediate area.

- On 2 October 1998, the CEMVN signed a FONSI on EA # 282 entitled "LPV, Jefferson Parish Lakefront Levee, Landside Runoff Control: Alternate Borrow." The report investigates the impacts of obtaining borrow material from an urban area in Jefferson Parish. No significant impacts to resources in the immediate area were expected.

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[2] The MRGO navigation project was officially de-authorized on 5 June 2008 upon submission of the USACE's de-authorization report to Congress.

- On 30 August 1990, the CEMVN signed a FONSI on EA # 163 entitled "LPV Hurricane Protection – Alternate Borrow Area for Jefferson Parish Lakefront Levee, Reach III." The report addresses the impacts associated with the use of a borrow area in Jefferson Parish for LPV construction.

- On 12 March 1990, the CEMVN signed a FONSI on EA # 102 entitled "LPV Hurricane Protection – 17th Street Canal Hurricane Protection." The report addresses the use of alternative methods of providing flood risk reduction for the 17th Street Outfall Canal in association with LPV activity. Impacts to resources were found to be minimal.

- On 21 July 1988, the CEMVN signed a FONSI on EA # 76 entitled "LPV Hurricane Protection – Orleans Avenue Outfall Canal." The report investigates the impacts of strengthening hurricane risk reduction at the Orleans Avenue Outfall Canal.

- Supplemental Information Report (SIR) # 30 entitled "LPV Hurricane Protection Project, Jefferson Lakefront Levee" was signed by the CEMVN on 7 October 1987. The report investigates impacts associated with changes in Jefferson Parish LPV levee design.

- SIR # 22 entitled "LPV Hurricane Protection – Use of the17th Street Pumping Station Material for LPHP Levee" was signed by the CEMVN on 5 August 1986. The report investigates the impacts of moving suitable borrow material from a levee at the 17th Street Canal in the construction of a stretch of levee from the IHNC to the London Avenue Canal.

- In December 1984, an SIR to complement the Supplement to the final EIS on the LPV Hurricane Protection project was filed with the U.S. Environmental Protection Agency (USEPA).

- The final EIS for the LPV Hurricane Protection Project was published in August 1974. A Statement of Findings was signed by the CEMVN on 2 December 1974. Final Supplement I to the EIS, dated July 1984, was followed by a Decision Record, signed by the CEMVN on 7 February 1985. Final Supplement II to the EIS, dated August 1994, was followed by a Decision Record signed by the CEMVN on 3 November 1994.

- A report entitled "Flood Control, Mississippi River and Tributaries," published as House Document No. 90, 70th Congress, 1st Session, submitted 18 December 1927, resulted in authorization of a project by the Flood Control Act of 1928. The project provided comprehensive flood control for the lower Mississippi Valley below Cairo, Illinois. The Flood Control Act of 1944 authorized the USACE to construct, operate, and maintain water resources development projects. The Flood Control Acts have had an important impact on water and land resources in the proposed project area.

1.4 INTEGRATION WITH OTHER INDIVIDUAL ENVIRONMENTAL REPORTS

In addition to this IER, the CEMVN is preparing a draft Comprehensive Environmental Document (CED) that will describe work completed and work remaining to be constructed. The purpose of the draft CED will be to document work completed by the CEMVN on a system-wide scale. The draft CED will describe integration of individual IERs into a systematic planning effort. Overall cumulative impacts and future operation and maintenance (O&M) requirements will also be included. Additionally, the draft CED will contain updated information for any IER that had incomplete or unavailable data at the time it was posted for public review.

The draft CED will be available for a 60-day public review period. The document will be posted on www.nolaenvironmental.gov, or can be requested by contacting the CEMVN. A notice of availability will be mailed/e-mailed to interested parties advising them of the availability of the draft CED for review. Additionally, a notice will be placed in national and local newspapers. Upon completion of the 60-day review period all comments will be compiled and appropriately addressed. Upon resolution of any comments received, a final CED will be prepared, signed by the District Commander, and made available to any stakeholders requesting a copy.

Mitigation for unavoidable impacts to the human and natural environment described in this and other IERs will be addressed in separate mitigation IERs. The CEMVN has partnered with Federal and state resource agencies to form an interagency mitigation team that is working to assess and verify these impacts, and to look for potential mitigation sites in the appropriate hydrologic basin. This effort is occurring concurrently with the IER planning process in an effort to complete mitigation work and construct mitigation projects expeditiously. As with the planning process of all other IERs, the public will have the opportunity to give input about the proposed work. These mitigation IERs will, as described in section 1 of this IER, be available for a 30-day public review and comment period.

1.5 PUBLIC CONCERNS

Throughout southern Louisiana, one of the greatest areas of public concern is reducing the risk of hurricane, storm, and flood damage for businesses and residences and providing for public safety during major storm events. Hurricane Katrina forced residents from their homes and temporarily or permanently closed businesses and, due to extensive flooding, made returning to their communities in a timely manner unsafe.

In public meetings held 12 June 2007, 27 July 2007, 17 January 2008, 17 April 2008, and 17 July 2008, members of the public expressed concerns regarding flooding and tidal surge impacts on St. Bernard Parish from the MRGO, the IHNC, Lake Borgne, and Lake Pontchartrain near Seabrook. Of particular concern was the effect that the tidal surge from lakes, surrounding canals and waterways will have on St. Bernard Parish during hurricanes. Additionally, residents expressed concern about the amount of time taken to complete the levee repairs and upgrades; the presence of moored barges in the waterways and the damage they may cause to the levees and floodwalls during tropical storms or hurricanes; and the lack of emphasis on the timely construction of coastal and wetland restoration projects in St. Bernard Parish. Members of the local community also expressed concerns regarding the perceived low priority being given to St. Bernard Parish, as well as the perception that communication was occurring only with a select group of stakeholders within the parish. Residents requested additional information on how HSDRRS projects are authorized and funded. The residents fear that St. Bernard Parish will become the “barrier island protection” for New Orleans if wetland restoration projects are not constructed in a timely manner.

1.6 DATA GAPS AND UNCERTAINTY

At the time of submission of this report, engineering evaluations had not been completed for the proposed action and alternatives. The analysis provided in this IER was based on preliminary designs and best professional judgment by technical experts. Details of the final engineering design could differ from the estimates. The description of project features does not represent a formal commitment to final design, equipment to be used, vendors for supply of materials, or methods of construction; instead, it gives an approximation of how the features could be constructed and the associated impacts.

Estimates of materials necessary to construct the project were developed from best professional judgment and preliminary design reports. The alternative features and associated numbers

developed were used to quantify the magnitude of the proposed actions and not to prescribe detailed materials, quantities, or design specifications.

Uncertainty associated with final engineering design and construction, as well as slight changes to existing conditions in the future, could affect the assessment of impacts as presented in this document. For example, access routes to the construction areas are dependent on many variables that frequently change (weather, traffic and road conditions, construction materials, fuel prices, etc.). Large quantities of construction materials would be delivered to the project area, as well as to other 100-year level of risk reduction projects in the New Orleans metropolitan area. The sources for these materials and the transportation routes for delivering them have not been fully determined. The CEMVN is currently completing a system-wide transportation analysis to better quantify these impacts.

As a result of uncertainties such as these, many of the estimates of environmental impacts described in this document utilized assumptions that would account for possible design or alignment changes, allowing the project to proceed without compromising the integrity of the assessment. Any design or alignment change that would substantially alter the assessment would be evaluated in a supplement to this IER. New data relevant to design, transportation, environmental justice (EJ), or other aspects of the project will be reviewed as they become available. These data and any resulting changes to the assessment will be incorporated into future documents, including the draft CED.

2.0 ALTERNATIVES

2.1 ALTERNATIVES DEVELOPMENT AND PRELIMINARY SCREENING CRITERIA

NEPA requires that in analyzing alternatives to a proposed action a Federal agency consider an alternative of “no action.” Likewise, Section 73 of the WRDA of 1974 (PL 93-251) requires Federal agencies to give consideration to non-structural measures to reduce or prevent flood damage. The CEMVN Project Delivery Team (PDT) considered a no action alternative and non-structural measures in this IER, which are discussed in sections 2.4 and 2.5, respectively.

In addition to these mandated alternatives, a range of reasonable alternatives was formulated through input from the CEMVN PDT, Value Engineering Team, engineering and design consultants, as well as local government, the public, and resource agencies for the reach described in this IER

Once a full range of alternatives was established, a preliminary screening was conducted to identify alternatives that would proceed through further analysis. The criteria used to make this determination included engineering effectiveness, economic efficiency, and environmental and social acceptability. Those alternatives that did not adequately meet these criteria were considered infeasible and, therefore, were eliminated from further study in this IER.

2.2 DESCRIPTION OF THE ALTERNATIVES

Although it is the CEMVN’s intent to employ an integrated, comprehensive, and systems-based approach to hurricane and storm damage reduction in raising the HSDRRS to the 100-year level of risk reduction, each reach has its own range of alternatives. This approach allows for the individual reach alternative decisions to be made in a manner cognizant of unique local circumstances. At the same time, the alternatives analysis and selection remain integrated and comprehensive, considering the reach (LPV 144.02) in relation to adjacent levee projects and

other past, current, and reasonably foreseeable future actions by the CEMVN and other entities within the project study area.

2.3 PROPOSED ACTION

The proposed action for Bayou Dupre consists of the construction of a new flood control structure consisting of a steel sector gate and floodwall tie-ins to the existing levees, which would be constructed adjacent to the existing structure on the flood side, and a pontoon bridge that would be built on the protected side. The new flood control structure would be built to an elevation of +31 ft North American Vertical Datum 1988 (NAVD88) and would replace the existing structure which currently stands at a height of +15.4 ft (NAVD88).

Sector Gate

A diagram of an example sector gate is provided in figure 2. The new gate at Bayou Dupre would have a channel width of 56 ft and a sill elevation of -12.5 ft (NAVD88), the same as the existing gate. The new gate would operate in the same manner as the existing gate, remaining open except during storms and high tides. During a storm event, the gate would be closed to provide flooding risk reduction. In the absence of storm conditions, the gate would be closed when the tide rises to an elevation of +1.2 ft (NAVD88) and would be opened when the tide ebbs (Turner 2008).

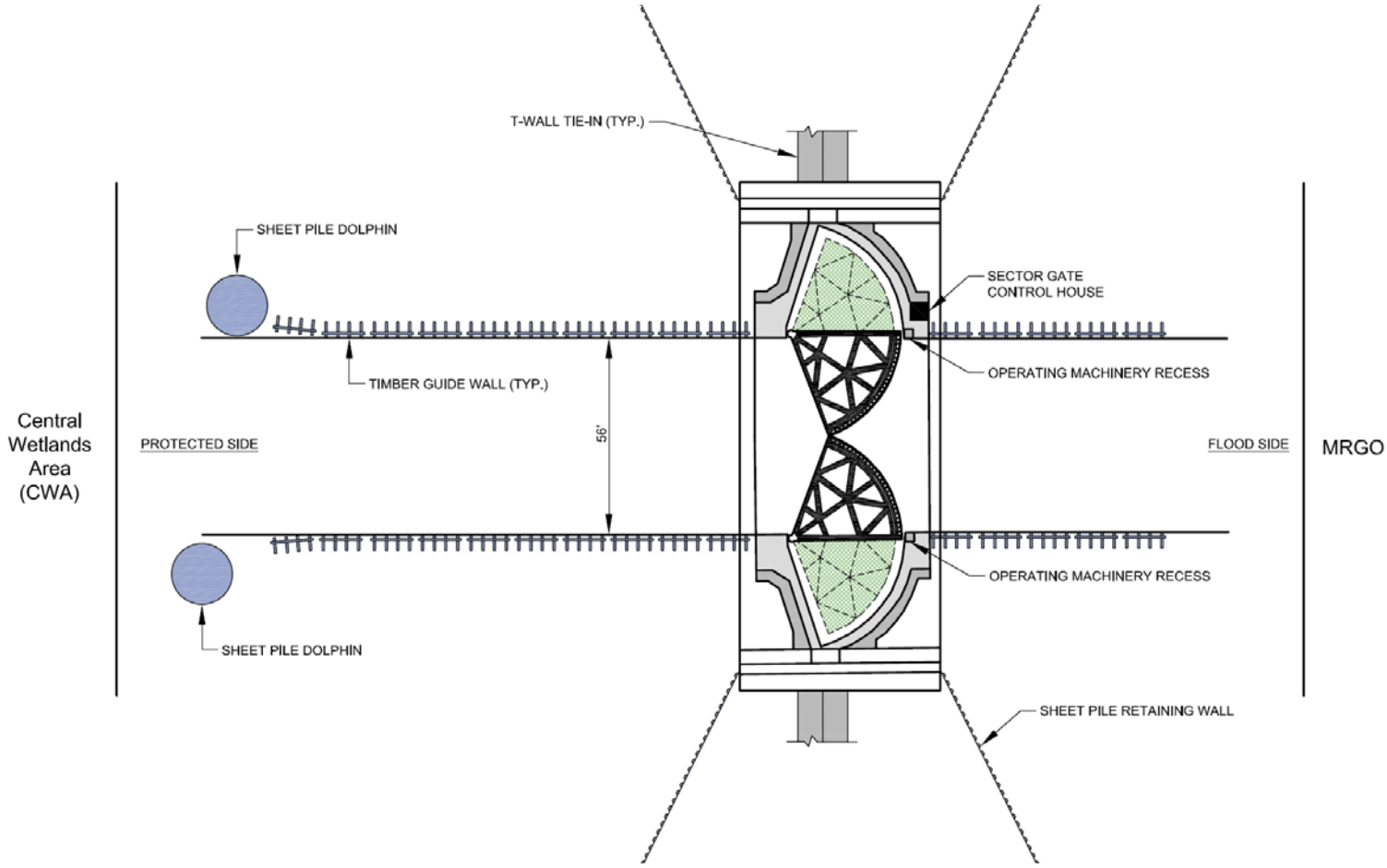

Figure 2. Example of a Sector Gate

The new gate and floodwall tie-ins at Bayou Dupre would be constructed on the flood side of the existing structure location. The centerline of the new gate would cross the bayou approximately 130 ft to the flood side of the centerline of the existing sector gate (figure 3). Segments of floodwall (T-walls) would be constructed to tie into the adjacent levee reaches (LPVs 145 and 146) on each side of the bayou (figure 4). The new structure and T-wall tie-ins would be built to a height of approximately +31 ft (NAVD88) to meet the 100-year elevation requirement for this reach. After completion of the new structure, the old structure would be de-authorized and left in the open position, unless the local sponsor chooses to maintain the old structure as an additional line of defense. In the latter case, it is assumed for the purposes of this evaluation that the new and existing structures would be operated in a coordinated manner: that is, both gates would be maintained in the open position most of the time and both would be closed during storms.

Figure 3. Schematic of the Proposed Action – Sector Gate and Pontoon Bridge

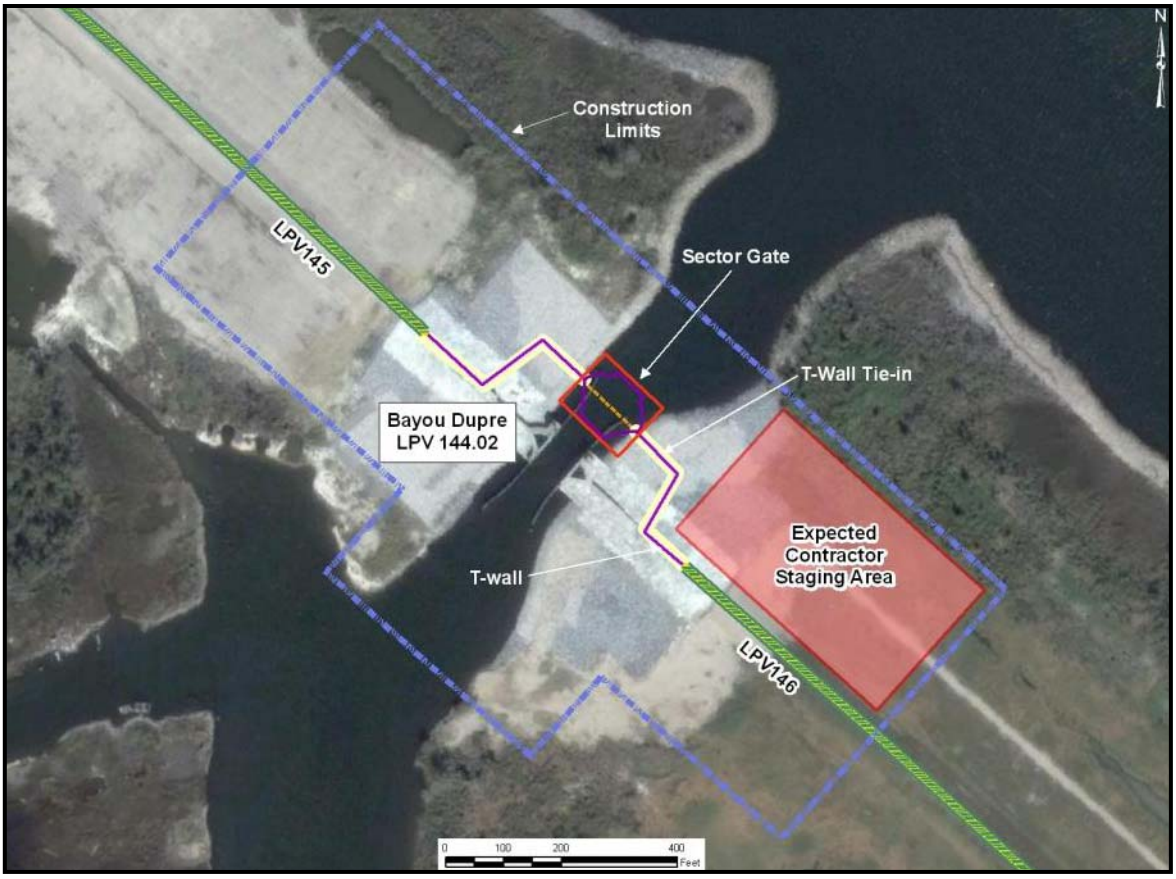

Figure 4. Proposed Action with Construction Limits and Staging Area

Construction of the proposed action could begin in the spring of 2009, and construction activities would be expected to require approximately 2 years to 3 years. During construction, a cofferdam would be installed across the bayou in the area of the proposed sector gate structure. The cofferdam would temporarily close this portion of the bayou to navigation and recreational vessels for approximately 8 months to 12 months, depending on design and construction techniques. In order to allow for the exchange of water between the bayou and the MRGO to continue during this period, four culverts would be installed around the cofferdam (figure 5). There would be two culverts on each side of the cofferdam. As shown in figure 5, where portions of two culverts are co-located one would be placed on top of the other. Each culvert would have a diameter of 4 ft, and screens with 4-inch to 5-inch mesh would be installed on the ends of the culverts to prevent substantive blockages.

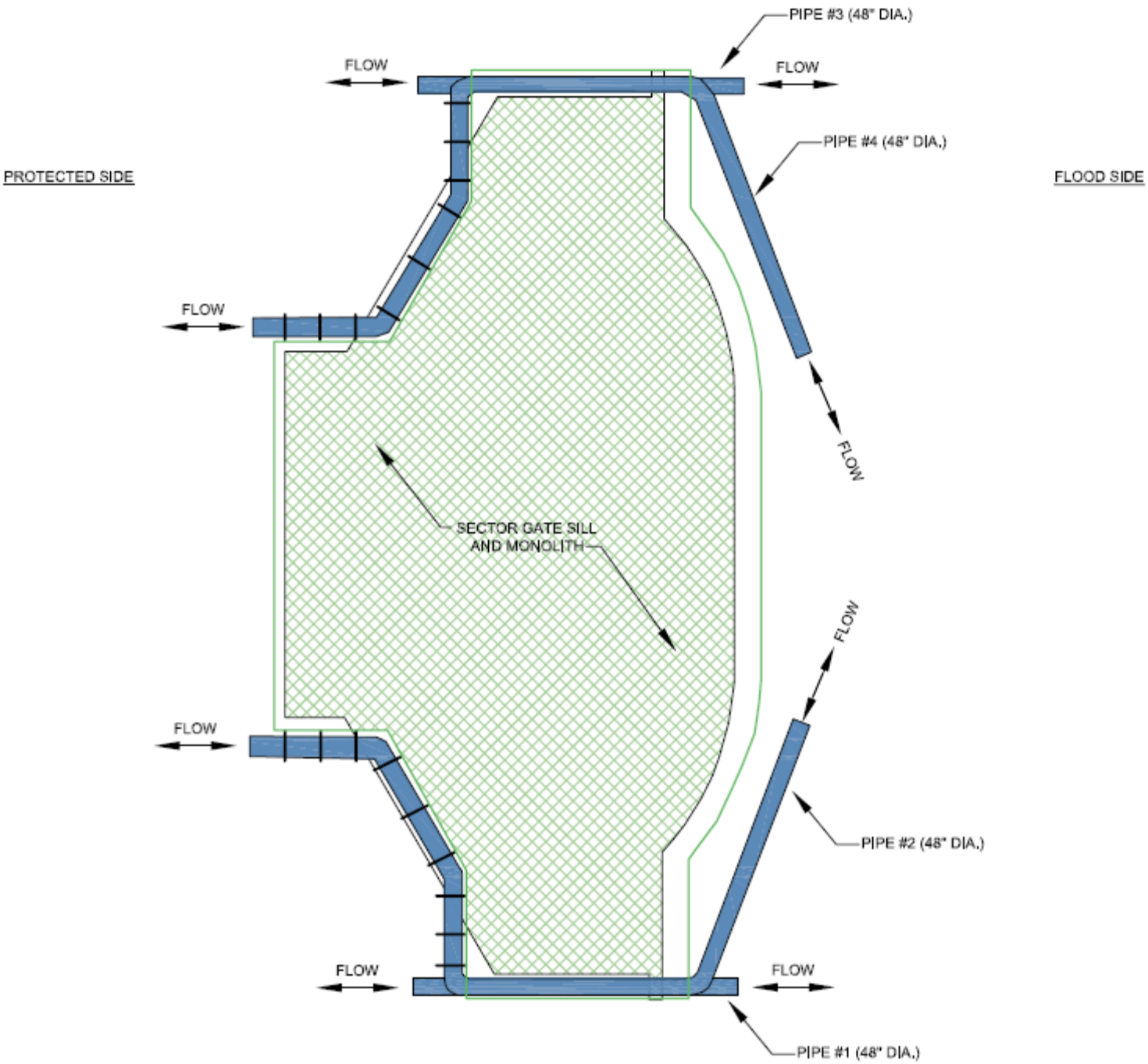

Figure 5. Example of a Cofferdam with Four 48-Inch-Diameter Culverts

Pontoon Bridge

The pontoon bridge would be constructed parallel to the new gate, approximately 140 ft on the protected side of the existing structure (see figure 3). The bridge would allow for more frequent and rigorous inspection of the levee section by vehicles between Bayou Bienvenue (discussed in IER #11 Tier 2 Borgne) and Bayou Dupre. The pontoon bridge would consist of fixed concrete slab approach spans at each end leading to the main bridge span on a pontoon barge, which would be flanked by steel tower anchor spans that move vertically up and down to provide access to the bridge. The barge would swing into place by means of electrical and mechanical

equipment, strutted ore, cables, and anchor piers (figure 6). Specific details of the operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) plan are being worked out with the local sponsor, but it is anticipated that this bridge would normally be left in the open position; this will be documented in the OMRR&R manual.

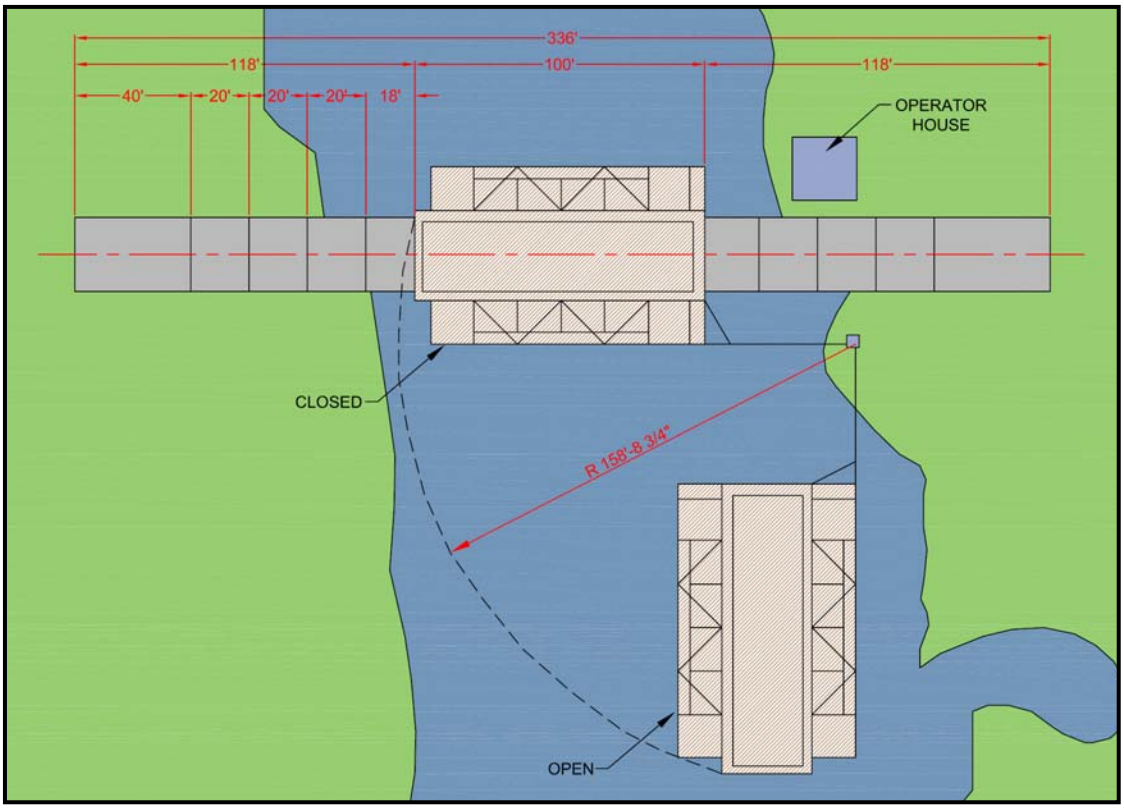

Figure 6. Example of a Pontoon Bridge in both the Open and Closed Positions

A considerable amount of construction equipment would be required to conduct the work, including but not limited to generators, barges, boats, cranes, dump trucks, flatbed trucks, bulldozers, excavators, clamshells, rollers, pile hammers, graders, tractors, front-end loaders, welding machines, and water trucks. The estimated volume of construction materials is provided in table 1. Due to limited road access to the project area, a majority of construction materials would be delivered by barge or boat. Barges could access the project area via the Violet Canal and through the MRGO prior to closure, and light loads could be brought through Lake Borgne. Some construction materials could also be transported by truck along the top of the existing levee.

Table 1.
Estimated Construction Material Quantities Required to Complete the Proposed Action

Material	Units	Quantities
Concrete form work	square feet concrete	101,649
Cofferdam	square feet	58,467
Wellpoints	linear feet	16,200
Structural concrete	cubic yards	14,880
Concrete mud slab	cubic yards	257
Sheet piling	square feet	33,350
Expansion joint	linear feet	1,367
Steel flood gates	tons	290
H-piling	linear feet	102,780
Concrete scour protection	cubic yards	117
Cofferdam compression ring	tons	900
Reinforcement bar	tons	1,097
Riprap	cubic yards	13,100
Sand fill	cubic yards	46,600
Clay fill	cubic yards	60,855
Shell fill	cubic yards	8,057
Embankment fill	cubic yards	60,000
Steel pipe rail	linear feet	1,640
Treated wood timber pile	linear feet	64,080
Timber rail	linear feet	31,600
Structural excavation	cubic yards	6,471
Channel excavation	cubic yards	46,000
Sector gate operating machinery	lump sum	1
Precast control house	each	1
Pontoon bridge – with flexi floats	each	1

Staging areas may be established for the project and approximately 3 acres in the project vicinity on the flood side (figure 4) have been identified for this purpose. The proposed staging area occurs primarily on adjacent land formed from construction of the MRGO levee; however, a small portion occurs on the riprapped area surrounding the existing control structure.

The habitat between the MRGO and the protected-side of the levees consists mainly of grasses with ruderal herbs, scattered shrubs, and small trees. Vegetation on the levees is mowed periodically. Riparian forested wetland habitat that occurs along the bayou shorelines on the protected side of the levee would not be disturbed by the staging areas.

Armoring of Levees and Floodwalls

As an additional feature, armoring would be incorporated to protect against erosion and scour on the protected and flood sides of the levees and floodwalls (T-walls) in the critical areas where short segments of floodwall transition between the levees and the control structure. The proposed method of armoring could be one of the following: articulated concrete blocks (ACB) covered with soil and grass; turf reinforcement mattress (TRM); ACB/TRM; TRM/grass; or

good grass cover. The armoring would be incorporated into the existing levee or floodwall footprint and no additional environmental impacts would be anticipated.

2.4 ALTERNATIVES TO THE PROPOSED ACTION

Two alternatives were considered in detail for LPV 144.02: No action and channel realignment to the northwest of the existing channel.

No Action Alternative

The no action alternative would be to raise the existing flood control structure (sector gate and adjacent floodwalls) at Bayou Dupre to the previously authorized elevation of +17.5 ft (NAVD88), which would require an increase of approximately 2 ft, 1 inch in height. The no action alternative also includes the incorporation of new (post-Hurricane Katrina) engineering standards and design criteria. The structure would operate as it normally does; that is, during storms or when tides rise to an elevation of +1.2 ft (NAVD88), the structure at Bayou Dupre would be closed. Routine maintenance of the structure would continue.

Alternative 1 – Channel Realignment to the Northwest of the Existing Channel

Alternative 1 consists of channel realignment by excavating a new channel approximately 330 ft to the northwest of the existing channel. This would be near the original Bayou Dupre channel that was filled when the current channel was built. A new sector gate would be constructed on the new channel in line with the existing levee and gate. Short segments of floodwall (T-walls) would be constructed to tie into adjacent levee reaches LPVs 145 and LPV 146 on each side of the bayou. There could be a pontoon bridge on the protected side of the new structure (figure 7). The new channel (parallel to the existing channel) would connect the MRGO to a remnant of the original Bayou Dupre channel, which extends approximately 230 ft north from the current channel on the protected side of the control structure (figure 7). The new channel would have a central depth of -12.5 ft (NAVD88) across and a width of 56 ft, with sloping sides that would result in a total width at the water surface of approximately 120 ft. The new steel sector gate (figure 2) would be operated and maintained in the same manner as described for the proposed action. During the construction period, the existing channel and control structure would remain open. Approximately 36,500 cubic yards of excavated material from the new channel would be temporarily stored between the alignment of the new channel and the existing channel until construction is completed. After construction of the new channel and control structure are completed, the excavated material would be used to fill in the existing channel. The new sector gate and T-wall tie-ins would be built to a height of approximately +31 ft (NAVD88) to meet the 100-year elevation requirement for this reach.

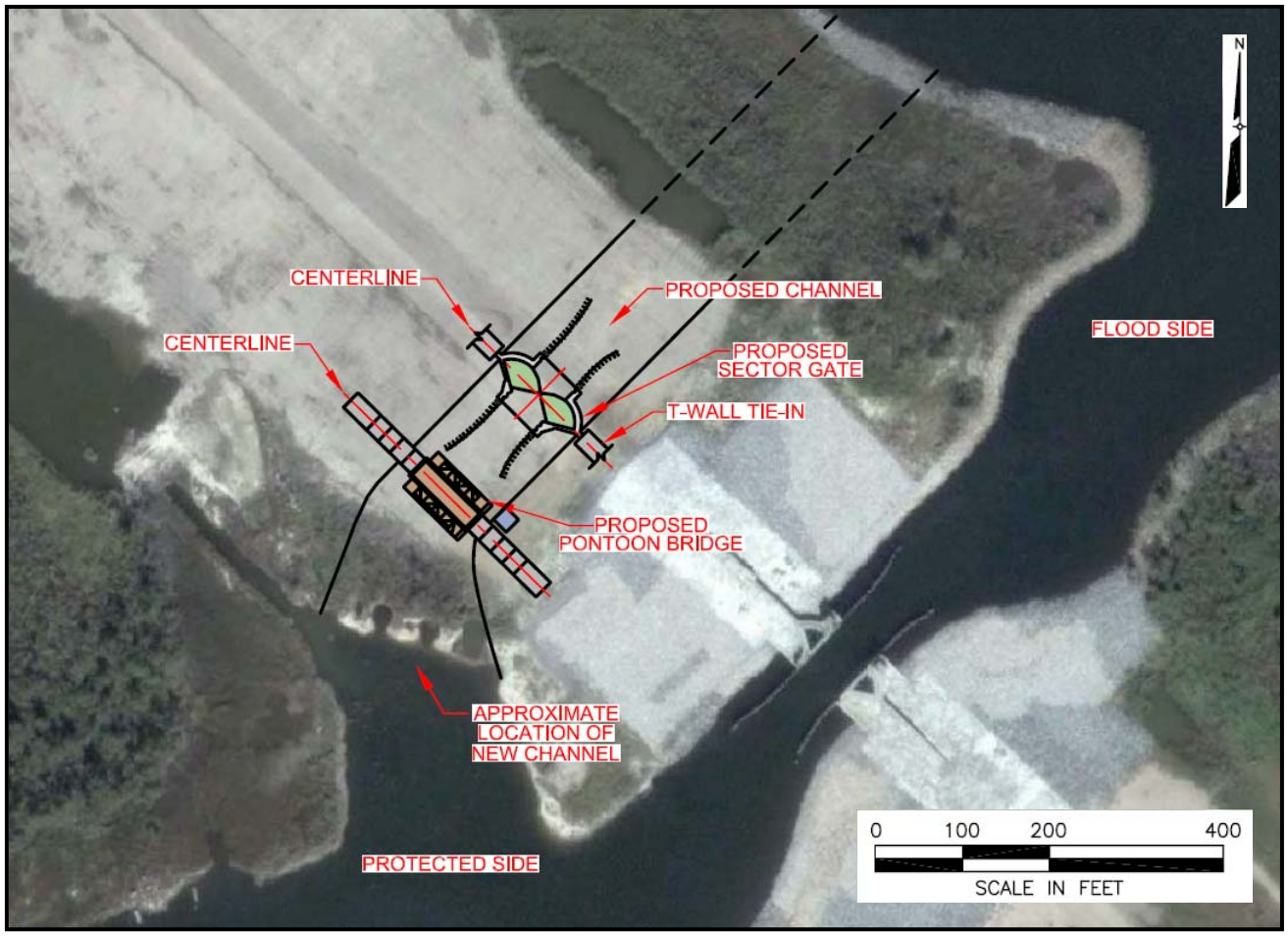

Figure 7. Alternative 1 – Channel Realignment (Northwest of Existing Channel)

2.5 ALTERNATIVES ELIMINATED FROM FURTHER CONSIDERATION

The following alternatives were eliminated from further consideration because they did not adequately meet the screening criteria.

Bayou Bienvenue Structure

In the early planning stages of this project, it was proposed that, in addition to the Bayou Dupre structure, the Bayou Bienvenue structure would need to be raised to the 100-year level of risk reduction. A suite of alternatives were considered, including modification, permanent closure, construction of a new structure on the protected side, demolition of the existing structure and construction of a new structure at the same location, and channel realignment for Bayou Bienvenue. However, the proposed alignment of the IER # 11 Tier 2 Borgne project ties in south of the existing Bayou Bienvenue structure along LPV 145. As a result, these alternatives were eliminated because the IER # 11 Tier 2 Borgne project will provide for the 100-year level of risk reduction for Bayou Bienvenue.

Modification of Existing Structure

Modification of the existing Bayou Dupre structure to raise it to the 100-year level of risk reduction was eliminated from further consideration because it was not considered feasible or practical. The existing structure would require extensive overhaul to be updated to the desired flood risk reduction levels, and these modifications would not be possible based on the inadequate support of the existing foundation.

Permanent Closure of the Existing Structure

Permanent closure by de-authorizing the existing structure and leaving it in place in the closed position or building a barrier across the bayou was eliminated from further consideration. Although this alternative is technically feasible, its disadvantages include not providing the desired flood risk reduction; creating far-reaching effects on the hydrology, wetlands, and ecosystems of the area; and impacting the recreational value associated with a Louisiana Natural and Scenic River. These impacts were considered environmentally unacceptable.

Construction of a New Structure on the Protected Side of the Existing Structure

Construction of a new sector gate approximately 130 ft to 300 ft on the protected side of the existing structure and T-wall tie-ins to the adjacent levee reaches was eliminated from further consideration because of the presence of a large scour hole in the channel at the proposed structure location. This hole, discovered during design surveys, would be an obstacle to engineering design and construction. The scour hole would need to be filled and part of the structure built within the filled hole. Stability of the fill would remain a concern, considering that the cause of the scouring would not have been addressed. Therefore, this alternative was not carried through due to increased risks and costs and its potentially lower reliability.

Demolition of the Existing Structure and Construction of a New Structure at the Same Location

Demolition of the existing sector gate and construction of a new control structure at the same location was eliminated from further consideration because the piles associated with the existing control structure would impede construction of a new structure at that same location. Once the existing structure is demolished, the piles would remain in place below the ground surface. Removal of the piles would greatly disturb the subsurface materials, creating a constructability issue relative to subsurface stability. Therefore, the alignment of the new sector gate would have to be offset from the old alignment so that new piles could be driven into the ground for support. Such an offset would not be substantially different than alternative 1 described earlier; therefore, this alternative was eliminated from further consideration.

Channel Realignment on the Southern side of the Existing Channel

Realignment of the Bayou Dupre channel southeast of the existing channel was eliminated from further consideration. Land cover and vegetation type is similar on both the northwest and southeast sides of the bayou; however, the original location of Bayou Dupre was along the northwest alignment of alternative 1. Therefore, construction of the new channel and structure in the previous channel location northwest of the existing channel would be expected to result in fewer environmental impacts, and was considered to be preferable to construction in a previously undisturbed location southeast of the existing channel.

Non-Structural Alternatives

Section 73 of the WRDA requires consideration of non-structural alternatives in flood damage reduction studies. ER 1105-2-100 provides planning guidance on applicable non-structural measures, which states that non-structural measures can be considered independently or in combination with structural measures (USACE 2000). Non-structural measures reduce flood damages without significantly altering the nature or extent of flooding. Damage reduction from non-structural measures is accomplished by changing the use of the floodplains, or by accommodating existing uses to the flood hazard. Examples are flood proofing, relocation of structures, flood warning and preparedness systems (including associated emergency measures), and regulation of floodplain uses. St. Bernard Parish already has a flood warning system and evacuation plan in place and regulation of floodplain use is addressed by the National Flood Insurance Program; therefore, only flood proofing and relocation were considered as non-structural measures. The flood proofing non-structural measures evaluated in this analysis are to raise in place the existing structure and the acquisition and relocation of the structure, which is defined as a buyout or permanent physical relocation.

Raise in Place

The following discussion of non-structural alternatives focuses on St. Bernard Parish, as the majority of residences and businesses protected by the IER # 8 project are located with that parish. It should be noted, however, that a small portion of Orleans Parish would be protected by these projects; in particular, the Lower 9th Ward is located within the Chalmette Loop sub-basin and would be afforded risk reduction by this project.

Flood proofing would require elevating all residential and commercial properties subject to flooding in the study area above the expected levels of flooding. This alternative would also have to consider elevating roadways, public buildings, and some forms of public infrastructure that would need to continue operations during and after a storm event. Some facilities such as roadways, railroads, and runways might remain at grade when repair from storm damage would be less costly than the construction, operation, and maintenance of them on elevated structures. The average cost of elevating residential structures in the study area has been estimated at approximately $95 per square foot (sq ft; USACE 2007a). This includes the cost of administration, design, inspection, costing, project management, and all other associated costs of elevating the structures as well as the costs of the occupants of the residential structures being relocated to temporary housing during the time period that the structures are being elevated. Approximately 20,000 homes in St. Bernard Parish were damaged by flooding from Hurricane Katrina (U.S. Department of Housing and Urban Development 2006). Although Hurricane Katrina was greater than a 100-year storm and not all of this flooding was a product of breaching or overtopping of the HSDRRS, this figure is reasonably representative of the magnitude of homes within this parish that are vulnerable to storm surge-induced flooding. The $95 per sq ft average cost results in a cost of approximately $152,000 to raise a 1,600-sq ft residence above the expected level of flooding. Using these assumptions, the costs to elevate all of the residences in the study area damaged from flooding by Hurricane Katrina would be approximately $3 billion in St. Bernard Parish.

Other costs associated with flood proofing would include elevating non-residential buildings, roads, railroads, and other infrastructure. No information is available on the cost of elevating commercial, industrial, and public buildings because these buildings are so different from one another that information would have to be developed for each individual building. However, it can reasonably be assumed that it would equal the costs associated with elevating the residential structures, bringing the total estimated costs for elevating buildings to approximately $6 billion.

Elevating the roadways would be equivalent to converting all roadways and railroads to bridges. The costs for repairing all roads and railroads would be much more reasonable, and these costs were estimated based on highway design assumptions and current unit prices. A non-structural alternative that left roads and railroads at existing elevations would mean they would have to be repaired after each storm event. Costs for repairing two-lane asphalt roads with shoulders were estimated at $400,000 per mile. Of the estimated 363 miles of two-lane roads that occur in St. Bernard Parish, roughly 100 percent were flooded during Hurricane Katrina. Therefore, repair costs would be $145.2 million in the parish for each storm event that exceeded the level of flood risk reduction. Repair costs were estimated at $800,000 per mile for four-lane divided roadways. There are approximately 42 miles of four-lane roadways in St. Bernard Parish. The cost of repairs to the four-lane roadways would be $33.6 million in the parish for each storm event that compromised hurricane risk reduction. Repair costs to railroads were calculated for the 24 miles of railroad in St. Bernard Parish. Railroad repair costs were estimated at $100 per linear foot. This resulted in railroad repair costs of $12.7 million in the parish.

No information is available on the costs for elevating other infrastructure such as electrical distribution and transmission grids, gas distribution lines, drainage, sewerage and water distribution facilities, communication networks, public transit, and waterborne navigation facilities. The total estimated costs as outlined above for elevating all flood-damaged buildings, roads, and railroads in the study area could likely approach, if not exceed, $6.2 billion, which greatly exceeds the funds allocated to achieve the purpose and need of the Chalmette Loop 100-year HSDRRS. However, because these costs are based on the number of homes flooded as a result of Hurricane Katrina, this cost overestimates the cost to raise those homes susceptible to flooding from the 100-year storm. Nonetheless, even if the cost of this non-structural alternative were reduced by 50 percent to account for the differences between pre-Katrina and post-Katrina population estimates and the difference between flooding potential from a Katrina-like event and a 100-year event, this cost would still greatly exceed funds allocated for the 100-year HSDRRS in the Chalmette Loop. Therefore, this alternative was eliminated from further consideration.

Real Estate Acquisition and Relocation Assistance

Public acquisition of properties in areas subject to flooding can also reduce the damages from storms and hurricanes. Acquisition of these properties as part of a Federal project and for projects where there is Federal financial assistance in any part of project costs would be subject to the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, 42 United States Code (USC) Section 4601, et seq., as amended (the Relocation Assistance Act or Uniform Act). Accordingly, the displacement of individuals, families, businesses, farms, and non-profit organizations would have to be organized and a system established to minimize the adverse impacts on displaced persons.

There are several options that could be offered for the acquisition and relocation alternative: sale of the site and home or commercial structure to the local sponsor for demolition, sale of the site to the local sponsor and relocation of the structure to a comparable site outside the area of flooding, or relocation of the displaced persons to a comparable home or business outside the area of flooding.

The most recent average sale price of a single-family home in St. Bernard Parish was $75,000 (Brookings Institution 2007). Multiplying this price by the 20,000 homes damaged from flooding in St. Bernard Parish, the total cost for acquisition of residential properties would be approximately $1.5 billion. This does not include the cost of Uniform Relocation Assistance benefits which are required for displaced residents. Relocation of these structures is another option. Assuming an average value of $25,000 in St. Bernard Parish (Louisianaatoz.com 2007) plus an average cost of $30,000 to move and re-site a 1,600-sq ft structure, the cost of relocation as a nonstructural alternative for residential properties damaged only by flooding would be $1.1

billion. Under this alternative, the affected property owners would relinquish title to their existing lot in exchange for ownership of the property to which they were relocated.

The above costs are not inclusive of the real estate transaction costs. In addition, the Uniform Act states that displaced persons may be eligible for residential and/or business relocation assistance benefits, which may include reimbursement of expenses for moving themselves and their personal or business-related property, limited expenses in searching for a replacement business or farm, and reasonable and necessary expenses for reestablishment of a displaced farm, nonprofit organization, or small business at its new location.

As in the "Raise in Place" non-structural alternative, these numbers are based on flooding as a result of Katrina and therefore could be an overestimate. Nonetheless, they are a reasonable means to represent the magnitude of the homes vulnerable to flooding from storm surge events. The acquisition and relocation alternative is a complex, costly, and time-consuming process. Acquired properties would have to remain in the public domain or, at best, be developed with features that could withstand flooding, the cost of which could be an undesired impact to the local sponsor. Moreover, there could be indirect impacts of this alternative to the local economy, such as a reduced tax base from the reduced population.

The estimated costs for real estate acquisition and relocation assistance for all flood-prone infrastructure in the study area would exceed the costs of structural alternatives. Therefore, this non-structural alternative was eliminated from further consideration.

2.6 SUMMARY TABLE

Table 2 provides a summary of the preliminary alternatives screening results.

Table 2.
Preliminary Alternatives Screening Results

Alternative	LPV 144.02
No Action	☑
Non-Structural	X
Permanent Closure	X
Existing Alignment	
▪ Replacement (structures)	X
▪ Modification of Existing Structure	X
New Structure with Protected-Side Shift	
▪ Replacement (structures)	X
New Structure with Flood-Side Shift	
▪ Replacement (structures)	☑
New Structure with Channel Realignment	
▪ Replacement (structures)	☑

X = eliminated from further study
☑ = considered in detail

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 ENVIRONMENTAL SETTING

General

The St. Bernard IER # 8 project area is located within the Lower Mississippi Delta Alluvial Plain. The project area runs along an existing levee located west and parallel to the MRGO in St. Bernard Parish, Louisiana. The flood control structure proposed for amendment as part of the IER # 8 project is located where the MRGO intersects with Bayou Dupre (figure 8).

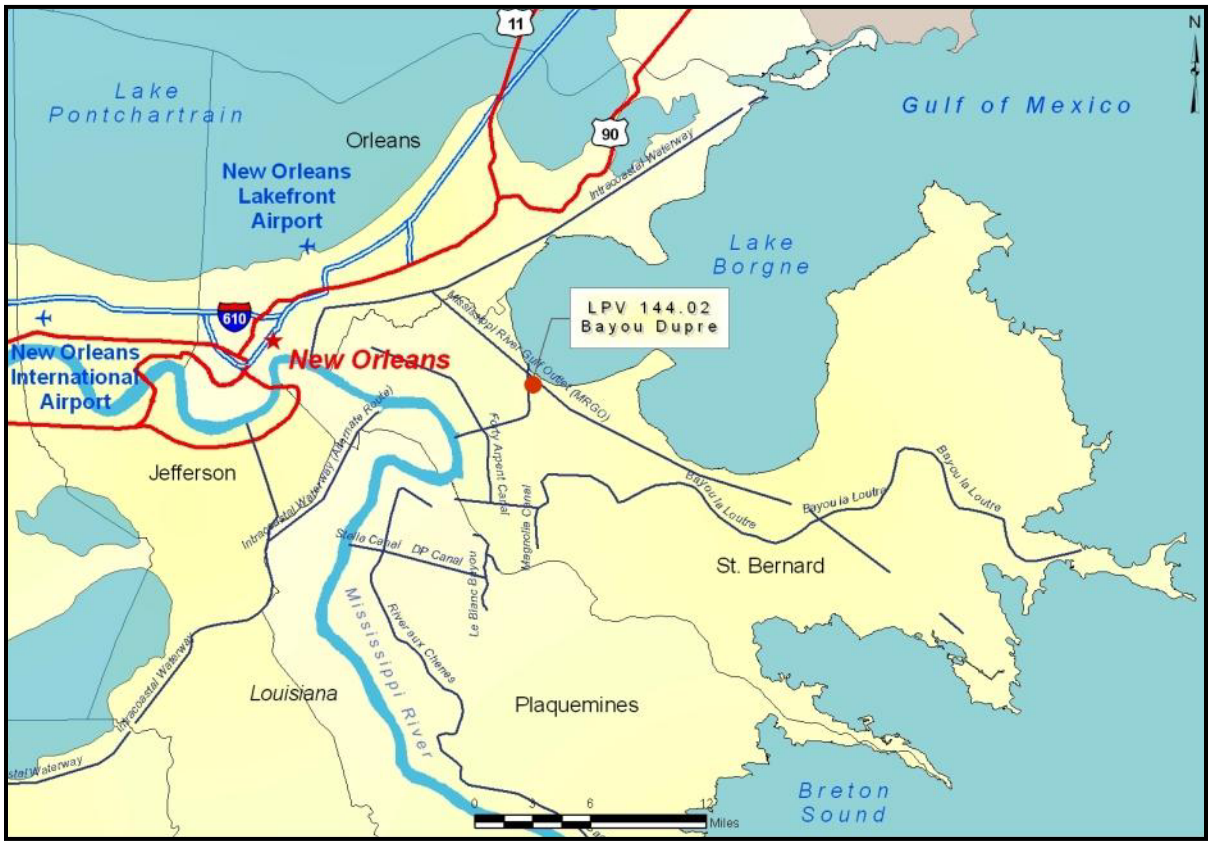

Figure 8. Vicinity Map for the IER # 8 Project Area

Climate

St. Bernard Parish is located within a subtropical latitude. The climate is influenced by the many water surfaces of the nearby wetlands, rivers, lakes, streams, and the Gulf of Mexico. Throughout the year, these water bodies aid in decreasing the range of extremes of both temperature and relative humidity. Summers are long and hot with high average humidity, average daily temperatures of 82 degrees Fahrenheit (°F), and an average daily maximum of 91°F. Winters are influenced by cold, dry, polar air masses moving southward from Canada,

with an average daily temperature of 54°F and an average daily minimum of 44°F. Annual precipitation averages 54 inches (USACE 1974; NOAA 1987).

Geology and Soils

The project area is located within the St. Bernard Delta Complex, a major deltaic lobe of the Lower Mississippi Delta Alluvial Plain that is associated with the delta-building cycle of the Mississippi River. It is located just west of Lake Borgne, along the levee running parallel and west of the MRGO at the juncture where the channel intersects with Bayou Dupre. Dominant physiographic features are the natural and man-made levees running parallel to and west of the MRGO and the prominent hydrological features of the GIWW to the north, the MRGO and then Lake Borgne to the east, the Central Wetlands Area (CWA) and the Mississippi River to the west (figure 9). The approximate extent of the CWA is shaded as yellow in figure 9 and the actual project location is labeled as LPV 144.02 (Bayou Dupre structure).

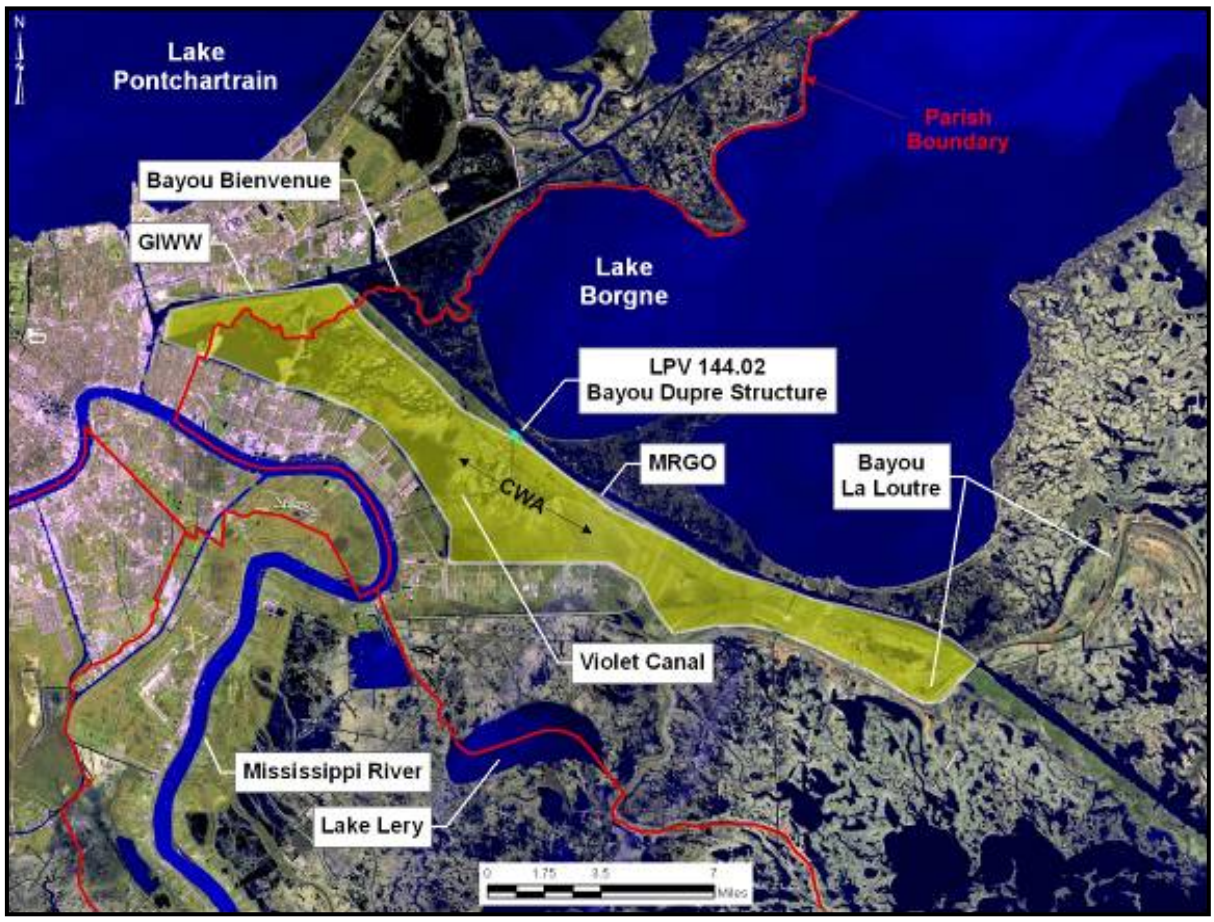

Figure 9. Hydrological Features near the Project Area

The natural surface environment of marsh and swamp has been altered by filling and drainage related to construction of the MRGO. The surface and shallow subsurface at the study sites are composed of fill, natural levee, swamp/marsh, and interdistributary, prodelta, bay-sound, and Pleistocene deposits. Fill deposits are predominantly clay and silty clay and vary in thickness. Fill deposits overlie natural levee and swamp/marsh deposits which are approximately 10 ft

thick. Natural levee deposits are associated with Bayou Dupre. Natural levee deposits are generally composed of medium to stiff clays and silty clays. Natural levee deposits grade laterally into swamp/marsh deposits, which are composed of very soft to medium organic clay, clay, silty clay, and silt, with peat and wood. Interdistributary deposits underlie swamp/marsh deposits and are characterized by soft to medium clays with some silt and sand layers, and shells. Interdistributary deposits are approximately 40 ft thick. Prodelta deposits underlie interdistributary deposits at the Bayou Dupre site. Prodelta deposits are composed of medium clays with minor amounts of silt. Bay-sound deposits are located beneath interdistributary and prodelta deposits. Bay-sound deposits are mainly soft to medium clays and silty clays with some silt, silty sand, and shells. These deposits are approximately 5 ft thick. Pleistocene deposits composed of oxidized, stiff to very stiff clays and silty clays with silty sand and sand underlie bay-sound deposits. The top of the Pleistocene deposits is approximately -75 ft at Bayou Dupre. Groundwater is at or near the surface adjacent to the levee (USDA 1989).

The predominant soil types within the project area are of the Aquents series. These soils are dredged, level, and poorly drained. They are stratified and clayey to mucky throughout. Clovelly muck soils are present near the Bayou Dupre area. These soils are poorly drained, slowly permeable, organic, clayey soils (NRCS 2007).

Long-term relative subsidence rates are estimated at 0.5 ft per century. Eustatic sea level is predicted to rise an additional 1.3 ft over the next century (IPCC 2001). Therefore, the natural, long-term, relative subsidence rate at the project site is estimated to be 1.8 ft per century.

Hydrology

The proposed project area occurs within the Lake Pontchartrain Basin, a watershed of 4,700 square miles (mi^2) in southeast Louisiana and southwest Mississippi. The basin is within the coastal zone delineation and, therefore, is regulated under the Louisiana State and Local Coastal Resources Management Act of 1978. The natural hydrology of the project area has been significantly altered by the MRGO, levees of the HSDRRS, and several man-made canals created for oil exploration, flood control, and wetland restoration. The proposed project would be located on Bayou Dupre on the western side of the MRGO.

Major surface water features in the region around the project area (see figure 9) include:

- CWA (including Violet Marsh and Bayou Bienvenue Marsh),
- Bayou Bienvenue,
- Bayou Dupre,
- GIWW,
- MRGO, and
- Lake Borgne.

All of these surface water features are Waters of the United States (WoUS; as defined by 33 CFR 328) and Navigable Waters of the United States (NWUS; as defined by 33 CFR 329). This project is subject to the USACE regulatory authority under Section 404 of the Clean Water Act (33 USC 1344) and Section 10 of the Rivers and Harbors Act (33 USC 401). Other environmental laws and regulations also apply and are discussed in section 8.

The proposed project would be located on Bayou Dupre on the western side of the MRGO. The location of this project is approximately 0.5 miles north of the confluence of Bayou Dupre and the closest designated Scenic River or stream, Bashman Bayou (figure 10). A 2-mile long segment of Bayou Dupre from the Violet Canal (Lake Borgne Canal) to Terre Beau Bayou is also designated a scenic river. At its closest point to the proposed action, this segment (the confluence of Bayou Dupre and Terre Beau Bayou) is approximately 1.2 miles south of the

project location. Natural and Scenic Stream designation provides state-legislated protection that would require a permit review before the scenic portion of the stream could be altered in any manner. The designated scenic rivers in the vicinity of the proposed project area are shown on figure 10.

Figure 10. Designated Scenic Rivers near Bayou Dupre

Hurricane Katrina and On-going Construction Activities

On 29 August 2005, Hurricane Katrina made landfall near Buras on the Louisiana Gulf Coast, east of New Orleans. St. Bernard Parish was one of the most severely impacted parishes in Louisiana. The majority of St. Bernard Parish was inundated with water up to a depth of 14 ft. One month later, Hurricane Rita inflicted an additional storm surge on the area, re-flooding areas prior to making landfall near the Texas-Louisiana border. The damage to St. Bernard Parish's residences was widespread. In addition, barrier islands, natural ridges, and land bridges in the coastal wetlands were severely damaged by Hurricane Katrina, resulting in the loss of approximately 19 mi^2 of coastal wetlands within the Pontchartrain Basin, which includes St. Bernard Parish (U.S. Geological Survey [USGS] 2006).

Additionally, numerous flood control facilities were damaged throughout St. Bernard Parish as a result of Hurricanes Katrina and Rita. As part of the USACE HSDRRS program, over 30 contracts for construction work to repair, construct, and raise levees and flood control structures to authorized design elevations in the parish have been prepared. Six of these contracts have been

awarded. Work that has been completed since Hurricane Katrina in the project area includes repair of scour damage to levee and structural repairs to adjacent floodwalls along the GIWW, repairs and modifications to the Bayou Bienvenue control structure, repairs to levee damage between the Bayou Bienvenue and Bayou Dupre control structures, repairs of a levee reach along the MRGO east of the Bayou Dupre control structure, minor scour repair to the backside of levee between the MRGO and Caernarvon, and repair of the Creedmore structure.

3.2 SIGNIFICANT RESOURCES

This section contains a list of the significant resources located in the vicinity of the proposed action, and describes in detail those resources that would be impacted, directly or indirectly, by the alternatives. Direct impacts are those that are caused by the action taken and occur at the same time and place (40 CFR 1508.8(a)). Indirect impacts are those that are caused by the action and are later in time or further removed in distance, but are still reasonably foreseeable (40 CFR 1508.8(b)). Cumulative impacts are discussed in section 4.

In addition, cumulative impacts of the proposed action and alternatives are also described in this section. A cumulative impact is defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR 1508.7)." Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time.

The resources described in this section are those recognized as significant by laws, executive orders, regulations, and other standards of National, state, or regional agencies and organizations; technical or scientific agencies, groups, or individuals; and the general public. Further detail on the significance of each of these resources can be found by contacting the CEMVN, or on www.nolaenvironmental.gov, which offers information on the ecological and human value of these resources, as well as the laws and regulations governing each resource. Search for "Significant Resources Background Material" in the website's digital library for additional information. Table 3 shows those significant resources found within the project area, and notes whether they would be impacted by the proposed action.

Table 3.
Significant Resources in Project Study Area

Significant Resource	Impacted	Not Impacted
Wetlands	X	
Bayou Dupre/Drainageways	X	
Fisheries	X	
Essential Fish Habitat (EFH)	X	
Wildlife	X	
Threatened and Endangered Species		X
Non-wet Uplands		X
Cultural Resources		X
Recreation Resources	X	
Aesthetics	X	
Air Quality	X	
Noise	X	
Transportation	X	
Socioeconomic Resources	X	
Land Use, Population, Employment	X	
Environmental Justice		X

3.2.1 Wetlands

Existing Conditions

The CWA encompasses approximately 42,559 acres bounded to the north by the GIWW, to the east by agricultural land and levee along the MRGO, to the south by Bayou La Loutre, and to the west by the developed areas adjacent to the Mississippi River (figure 9; Penland et al. 2002). The wetland communities of the CWA (including Violet Marsh and Bayou Bienvenue Marsh) primarily are brackish marsh consisting of emergent, herbaceous vegetation with areas of shallow open water and numerous tidal creeks, bayous, and man-made canals. The wetlands adjacent to the MRGO levee and within the CWA are WoUS and NWUS, and any dredge and fill activities in these areas would require compliance with Section 404 of the Clean Water Act.

The area immediately surrounding the project area has been heavily impacted by restoration efforts following Hurricane Katrina. Pockets of freshwater wetland communities exist in the areas of fill along the MRGO. The wetter areas support emergent wetland vegetation such as cattail (*Typha* spp.) and common reed (*Phragmites* spp.), and shrubby vegetation around the margins may include Chinese tallow (*Triadica sebifera*), buttonbush (*Cephalanthus occidentalis*), eastern baccharis (*Baccharis halimifolia*), dwarf palmetto (*Sabal minor*), wax myrtle (*Myrica cerifera*), marsh elder (*Iva frutescens*), and red maple (*Acer rubrum*).

The typical salinities of the CWA marshes average around 8 parts per thousand (ppt). Marshes of about 5 ppt to 10 ppt salinity are categorized as brackish (Roy 2007). Brackish marsh in the area typically is dominated by marshhay cordgrass (S*partina patens),* with other species such as saltgrass *(Distichlis spicata)*, big cordgrass *(Spartina cynosuroides)*, smooth cordgrass (*Spartina alterniflora),* black rush (*Juncus roemerianus),* bulrush (*Schoenoplectus* spp.*)*, dwarf spikerush (*Eleocharis parvula)*, widgeongrass (*Ruppia maritima)*, seashore paspalum (*Paspalum*

vaginatum), and coastal water hyssop (*Bacopa monnieri)* potentially present (Lester et al. 2005). In 1994, salinities measured in the marsh areas around the Violet Canal and Bayou Dupre ranged from 3.3 ppt to 10.0 ppt. In 2005 soon after Hurricane Katrina, the salinities in the same areas ranged from 11.4 ppt to 14.4 ppt (Lin and Kleiss 2006), which is closer to the salinities of a saline marsh (average about 16 ppt [Louisiana Natural Heritage Program [LaNHP 2004], range 10 ppt to 21 ppt [Roy 2007]). Saline marsh typically is dominated by *Spartina alterniflora* or *Distichlis spicata.*

Although some of the changes in the wetlands of the area now referred to as the CWA have resulted from natural causes such as subsidence and storm surge, many have been accelerated or caused by human activities. Before the historical construction of levees along the Mississippi River in the eighteenth and nineteenth centuries, natural overbank flooding of the river contributed fresh water and sediment to the area, and the salinity of the wetlands was fresh to intermediate. As recently as 1949, the vegetation community along the western and southern portions of the area was cypress (*Taxodium distichum*) swamp, which transitioned from this freshwater community to intermediate marsh in the northern and eastern portions of the CWA. Logging of the cypress swamp and dredging of canals for the petroleum industry and navigation substantially altered the hydrology and biota of the wetlands (Irish 1980).

The most significant changes in the wetlands occurred after construction of the Mississippi River levee and the MRGO in the early 1960s, which resulted in a substantial increase in salinities in the CWA and major changes in the vegetation of the area. By 1978, saltwater intrusion had resulted in the conversion of most of the CWA to brackish marsh. There were major increases in species common in brackish and saline marshes, such as *Spartina alterniflora* and *Spartina patens*, and major decreases in or elimination of species common in fresh and intermediate marshes. A vegetation study in 1980 identified two main communities in the CWA. A community dominated by *Spartina patens*, an intermediate-to-brackish marsh species, occurs in the western and southern areas that formerly were cypress swamp; a community dominated by *Spartina alterniflora*, a brackish-to-saline marsh species, occurs over most of the remainder of the CWA, with patches of *Spartina patens* present in slightly elevated areas throughout and both of these *Spartina* species present in areas of transition between brackish and saline marsh (Irish 1980). The storm surge associated with Hurricane Katrina destroyed a portion of the levee structure between the CWA and MRGO and may have contributed to further increases in salinity within many previously intermediate and brackish areas of marsh.

The U.S. Geological Survey (USGS) estimated that approximately 20 mi^2 of wetlands were lost within the Pontchartrain Basin as a result of Hurricane Katrina (USGS 2006). The processes of saltwater intrusion, sediment deprivation, subsidence, and erosion of wetlands, as well as the effects of river levee construction and the oil and gas industry, have caused major impacts to large areas of wetlands in Louisiana (LaCoast 1993). Projects designed to slow and/or reverse the loss of wetlands throughout Louisiana are ongoing or have been authorized.

One such project in the CWA is the Violet Freshwater Siphon Diversion. The Violet Siphon, which is owned and operated by the Lake Borgne Basin Levee District, diverts Mississippi River water into the Violet Canal and the CWA. It was constructed in 1979 to counteract the negative effects of saltwater intrusion into the marshes east of Violet and restore the area to its former state through diversion of freshwater, sediment, and nutrients from the river. Specific goals included decreasing mean salinities, increasing the ratio of marsh to open water, and promoting the growth of emergent and submergent vegetation. The area benefited is about 2,000 acres of marsh east of the Forty Arpent Canal. The Violet Siphon has a peak flow of about 300 cubic feet per second (cfs) when the Mississippi River stage is high (LaDNR 1993). Continued operation and maintenance of the Violet Siphon has been authorized and is included in the "Fiscal Year 2010 Annual Plan for Integrated Ecosystem Restoration and Hurricane Protection in Coastal Louisiana" (CPRA 2009). The siphon was operational for 7 months of a 13-month study of

salinities in the wetlands in the area of Bayou Dupre and the Violet Canal in 1993 to 1994 (Lin and Kleiss 2006). The results showed a gradual increase in salinity in the marsh moving east from the siphon (3.3 ppt) along the canal and Bayou Dupre, with the highest salinity (10 ppt) at the mouth of the bayou at the MRGO. The siphon was found to notably reduce mean salinities only near the canal and within about half the distance from the siphon to the MRGO (Lin and Kleiss 2006).

Discussion of Impacts

Future Conditions with No Action

Direct and Indirect Impacts

Under the no action alternative, the existing flood control structure (sector gate and adjacent floodwalls) would be raised to the previously authorized elevation (an increase in height of approximately 2 ft 1 inch), incorporating new engineering standards and design criteria. Direct and indirect effects of the raised structure on wetlands would not differ from those under current conditions. Under the no action alternative, the gate would continue to operate as it currently does, closing during storms and to limit tidal elevations on the protected side of the structure to less than about +1.2 ft (NAVD88). This limits the tidal range in the CWA, potentially reducing sediment deposition and erosion in the marshes and waterways.

Cumulative Impacts

Under the no action alternative, the wetlands in the project vicinity would remain relatively stable, with some improvement in habitat quality possible as a result of the cumulative effects of the closure of the MRGO at Bayou La Loutre and approved and ongoing wetland restoration projects in the CWA. The CWA habitat is becoming less brackish as a result of other USACE projects that would continue under the no action alternative. The closure of the MRGO at La Loutre will reduce the flow of higher salinity water from Breton Sound up the MRGO and into the CWA. In addition, the CWA and associated Scenic Rivers and other waterways receive freshwater inputs from several sources, such as the existing Violet Canal diversion and the existing stormwater pumping stations operated and maintained by the Lake Borgne Basin Levee District. These pumping stations discharge freshwater into the CWA during the frequent rainfall events the area experiences. Future projects in the area, such as a project to increase the flow of Mississippi River water through the Violet Diversion, would increase freshwater inputs to the CWA, contributing to further reduction in the salinity of the brackish habitats of the CWA and associated waterways.

Hydrological modeling to assess cumulative effects of USACE projects on waters of the region has been performed for the IER #11 Tier 2 Borgne project, an alignment located west of Lake Borgne. The Tier 2 Borgne project would construct a closure structure across the MRGO just south of Bayou Bienvenue, gates across Bayou Bienvenue and the GIWW, and a barrier across the marsh between these structures. A three-dimensional, open-channel flow and sediment transport model (TABS-MDS) was used to evaluate the effects of these projects on salinities in the region, including the CWA. An assumption used in the modeling was that the CWA would remain at a uniform elevation of 0.0 ft (NAVD88). An opening into the CWA through Bayou Dupre was not incorporated into the mesh of the model, which was equivalent to an assumption that the structure remains closed. The model results based on these assumptions indicated salinities in the CWA of approximately 18 ppt to 20 ppt under “existing conditions” in September 2006. When those “existing conditions” were compared to future conditions in which the MRGO is closed at Bayou La Loutre, the model showed a reduction in salinity within the CWA of approximately -4 ppt. This is the modeled effect in the CWA from just the closure of

the MRGO at Bayou La Loutre and assuming no opening at Bayou Dupre. Additional modeling to account for the future effects of completing the structures of the Tier 2 Borgne alignment resulted in a prediction of an additional salinity reduction in the CWA of approximately -1.5 ppt to -2 ppt. Thus, construction of the MRGO closure at Bayou La Loutre is causing a transition to less brackish conditions in the CWA, and the Tier 2 Borgne project will have an additional effect that will cumulatively result in CWA salinities being reduced by approximately 6 ppt, resulting in salinities of approximately 12 ppt to 14 ppt.

Thus, the modeling indicates that the cumulative effects of other USACE projects affecting the IER #8 project area under the no action scenario would likely reduce salinities in the CWA by about one-third. The marshes would remain brackish to saline, so their vegetation composition likely would remain principally as described above under existing conditions. However, species better adapted to brackish conditions than to saline conditions, especially *Spartina patens*, may gradually expand their distribution, while the areas where *Spartina alterniflora* dominates may be gradually reduced. In this way, the reductions in salinity in the CWA could promote an incremental transition of the wetlands back toward their natural, less saline, condition. Such a transition is the goal of the Violet Freshwater Siphon Diversion project, discussed above. When river levels are high enough and the siphon is operating, its effect on salinity levels in the CWA is localized, and it does not substantially reduce salinities across the larger CWA.

The above conclusions regarding limited cumulative effects on salinity in the CWA also are consistent with the results of hydrodynamic modeling performed for the area of the Tier 2 Borgne project, including the Golden Triangle Marsh area and associated waterways (MRGO, GIWW, IHNC, Bayou Bienvenue, and Lake Borgne) in conjunction with the Seabrook Fish Larval Transport Study (Tate *et al*. 2009). The Adaptive Hydraulics (ADH) model was used to simulate hydraulic effects from various combinations of proposed flood control structures in the region. The model was validated with 2008 field data for water surface elevation, discharge, and velocity. Hydrodynamic simulations were run for the baseline condition without any additional structures (MRGO open and no Tier 2 Borgne barrier) and for three combinations of planned structures. Simulations were run for two 4-week periods: August 15 to September 15, 2007 and March 1 to March 31, 2008. Compared to the more erratic conditions in the spring analysis period, the August-September period exhibited lower wind speeds and a diurnal tide signal more typical of that expected in the Gulf of Mexico (Tate *et al*. 2009). Accordingly, the tide signal for baseline conditions in August-September, shown in figure 4-5 and figure 6-32 of Tate *et al*. (2009), was examined for this IER # 8 assessment to obtain an indication of the approximate tidal range (difference in water surface elevation between high and low tide) that may typically occur in the project vicinity. The tidal ranges in the August-September study period ranged from approximately 2.3 feet to 0.5 feet, and a typical range on most days in that period is estimated at approximately 1.6 feet (19 inches).

The ADH modeling results indicate that, with the MRGO closed at Bayou La Loutre and the Tier 2 Borgne barrier completed, the tidal range on the protected side of the barrier where Bayou Bienvenue connects to the CWA may be reduced from a range of approximately 19 inches under baseline conditions (MRGO open and no Tier 2 Borgne barrier) to a range of about 8 inches (figure 6-32 of Tate *et al*. 2009). Thus, the structures likely will reduce the tidal range in this area by about one-half. These estimates are based on the prevailing tidal ranges for the modeled 12-day period in September 2007, which was considered to represent typical conditions. The model did not include the CWA, but tidal ranges there are expected to be very similar or smaller. In addition, during the construction period for the new sector gate on Bayou Bienvenue within the Tier 2 Borgne alignment, flow would be reduced up to 90 percent by a cofferdam for approximately 2 years. This would likely result in a further reduction of several inches in tidal range within the CWA because all water exchanged through Bayou Bienvenue at the MRGO would have to pass through the gate under construction on the GIWW within the Tier 2 Borgne alignment. It should be noted that the tidal range within the CWA already is limited by operation

of the existing sector gates on Bayou Bienvenue and Bayou Dupre, which are closed when necessary to prevent tides within the CWA from exceeding an amplitude of +1.2 ft (NAVD88).

The modeling assumed for simplicity that the Bayou Dupre gate remained closed. When the gate is open, additional brackish water from the MRGO and Lake Borgne could enter the CWA through Bayou Dupre. The model indicates that water in the MRGO at Bayou Dupre would be similar in salinity to that entering through Bayou Bienvenue and included in the modeling, so the net effect on CWA salinities under normal conditions with the gate open is likely to be similar to that described above. In addition, the tidal exchange through the new Bayou Dupre structure would be expected to moderate the reduction in tidal range at the north end of the CWA during the period that the Bayou Bienvenue cofferdam is in place. The higher tidal amplitude at Bayou Dupre relative to Bayou Bienvenue should cause increased flow northward in the CWA on an incoming tide. Based on a study of water circulation in the CWA (Irish 1980), this flow would occur primarily through the canal that parallels the MRGO on the west side of the depositional area. The net reduction in tidal range within the CWA over the long term would affect the duration of inundation in some areas of the marsh. For example, under average conditions, higher areas that currently are inundated only at high tide would be inundated for shorter intervals or not at all, while low areas that currently are exposed only at low tide would remain inundated. Given the very flat topography of the CWA, such areas are expected to be a minor component. Brackish and intermediate marsh vegetation is adapted to highly variable periods of inundation, but if certain species in particular areas cannot adapt to the altered tidal regime, other, better-adapted species likely will spread into these areas.

Cumulative impacts on the hydrology of the CWA also could occur during substantial rainfall events as a result of seven pumping stations, operated by the Lake Borgne Basin Levee District, discharging stormwater into the CWA in addition to the rain that falls on and accumulates in the wetland. A conservative scenario based on a 10-year rainfall event can be used to assess the hydrologic impacts in the CWA under extreme conditions. For the New Orleans area, the 10-year rain event (an event with a 10 percent chance of being exceeded in any given year) is 9.5 inches in 24 hours. The volume of water added to the CWA from 9.5 inches of rainfall would be more than 500 million cubic feet, which would raise the water surface elevation by an estimated 9.5 inches (NAVD 88). This 9.5 inches of water is equal to the baseline tidal amplitude (one-half the tidal range of 19 inches), as described above. Therefore, it can be assumed that the increased water volume in the CWA from a 10-year rain event would flow out of the system within a couple of tidal cycles (in this area, the length of a normal tidal cycle is approximately 24 hours). The water discharged into the CWA by the pumping stations would add to this rainfall volume. The maximum pumping capacity of all seven pumping stations combined totals just over 6,000 cubic feet per second. Making a very conservative assumption that all of the pumps are operated for 5 hours at full capacity would yield an estimated total discharge from pumping into the CWA of 108 million cubic feet of water. This volume is only about 1/5 (22 percent) of the rainfall volume that would fall on the CWA, which would not substantially increase the time required for the excess water to drain from the CWA. Thus, even in a 10-year rain event, the increased volume of water added to the CWA from all sources is expected to flow out of the CWA within a couple of tidal cycles, and the effects of lesser rainfall events would be proportionately smaller. Therefore, under the no action alternative, the cumulative impact on water elevations in the CWA in conjunction with pumping activities during extreme rainfall conditions would be limited and under more normal rainfall conditions would be minimal.

In summary, available data indicate that under the no action alternative other projects and activities affecting hydrology in the vicinity of the Bayou Dupre gate would have minimal cumulative impacts on salinities, tidal ranges, and water surface elevations within the CWA.

Future Conditions with Proposed Action

Direct Impacts

Implementation of the proposed action for Bayou Dupre would essentially have no direct impact on wetlands during the construction period (estimated to last up to 3 years). Most of the construction impact would occur on existing upland and levee along the MRGO, while there would be limited to no impact in wetlands adjacent to Bayou Dupre.

Indirect Impacts

Construction in the bayou channel could cause indirect impacts of increased turbidity and sedimentation within the nearby wetlands. Construction of the proposed action may have indirect impacts on wetland habitat in the immediate project area by re-suspending sediment and disturbing wetland vegetation that has had only a short time to recover from prior storms and construction activities. However, construction-related runoff into the wetlands would be managed through implementation of best management practices (BMPs) and a stormwater pollution prevention plan (SWPPP), which would minimize the potential indirect adverse impacts from this alternative on wetlands. The installation of the four 48-inch-diameter culverts around the Bayou Dupre cofferdam would allow some flow and exchange of nutrients and biota between the CWA and the MRGO and Lake Borgne during the period when the bayou would be closed by a cofferdam.

As discussed above for the no action alternative, hydrological modeling based on the assumption that Bayou Dupre is completely closed indicates that brackish water would enter the CWA from the MRGO and Lake Borgne through Bayou Bienvenue, and freshwater inputs to the CWA from even extreme rainfall events would be able to flow out via these waterways and would not elevate the water surface substantially or for longer than a couple of tidal cycles. These conditions approximate those during the construction period of up to 12 months, when flow through Bayou Dupre would be reduced up to 90 percent. During this period, flow through Bayou Bienvenue across the Tier 2 Borgne alignment also would be reduced up to 90 percent by the construction of a new sector gate there. This would likely result in a further reduction in tidal range within the CWA for 12 months because most of the water exchanged would have to pass through the existing Bayou Bienvenue gate at the MRGO as well as the gate under construction on the GIWW within the Tier 2 Borgne alignment. Although tidal exchange with the CWA would be reduced during this period through both the southern and northern outlets, greater exchange would occur through the existing Bayou Bienvenue gate opening in the north.

A study of water circulation patterns in the CWA (Irish 1980) found that during an incoming tide, water flows into the CWA through Bayou Dupre and Bayou Bienvenue and spreads out mainly to the west and south from these inlets. The canal parallel to the MRGO on the west side of the deposition area acts as a major route through which water from Bienvenue flows southeast before flowing west into the marsh and water from Dupre flows northwest and southeast before flowing west and south into the marsh. Water flows out of the canal as sheet flow across the marsh and within other canals and natural creeks and bayous. During an outgoing tide, these patterns are reversed. The ability of water to flow between the northern and southern areas of the CWA via canals and other waterways, as well as through Bayou Dupre on a very reduced level via the culverts, likely would limit the duration and magnitude of any accumulation of water in the southern area.

During periods when rainfall and pump discharge result in the temporary accumulation of freshwater within the CWA, salinities in the wetlands would be reduced. Subsequently, salinities would be expected to gradually increase due to tidal exchange and the influx of more saline

water from the MRGO. Despite such salinity variations in the past, the vegetation of the marsh has remained dominated by species adapted to primarily brackish, as well as intermediate, salinities. During the period of construction of the proposed action, substantial rainfall events would have a greater potential to result in the accumulation of freshwater and longer periods of reduced salinities. However, such effects still would be relatively short-term and infrequent, salinities likely would remain intermediate to brackish at a minimum, and the health and composition of the vegetation community of the marsh would be unlikely to be altered.

Under normal conditions after construction, when the new gate on Bayou Dupre (as well the new gate on Bayou Bienvenue) would be open most of the time, net indirect effects on CWA salinities and water surface elevations are expected to be minimal. When the gate is open, additional brackish water from the MRGO and Lake Borgne could enter the CWA through Bayou Dupre. The ADH model indicates that water in the MRGO at Bayou Dupre would be similar in salinity to that entering through Bayou Bienvenue and included in the modeling, so the net indirect effect on CWA salinities under normal conditions with the gate open is likely to be similar to that described above under no action. That is, CWA salinities would be reduced by approximately 6 ppt due to other projects in the area, resulting in salinities of approximately 12 ppt to 14 ppt in the CWA. In addition, the tidal exchange through Bayou Dupre would be expected to moderate the reduction in tidal range at the north end of the CWA during the period that the Bayou Bienvenue cofferdam is in place. The higher tidal amplitude at Bayou Dupre relative to Bayou Bienvenue should cause increased flow northward in the CWA on an incoming tide. Based on a study of water circulation in the CWA (Irish 1980), this flow would be expected to occur primarily through the canal that parallels the MRGO on the west side of the depositional area.

Under the proposed action, indirect impacts on wetlands would be mainly localized and short-term, with effects potentially lasting up to several months after project completion. The marshes would remain brackish, so their vegetation composition likely would remain principally as described above under existing conditions. However, species better adapted to brackish conditions than to saline conditions, especially *Spartina patens*, may gradually expand their distribution, while the areas where *Spartina alterniflora* dominates may be gradually reduced. In this way, reductions in salinity in the CWA could promote an incremental transition of the wetlands back toward their natural, less saline, condition.

Cumulative Impacts

The habitat adjacent to the project area previously has been disturbed by construction of the existing structure, adjacent levee, and MRGO, and also by Hurricane Katrina. Reconstruction of tie-ins to the existing structure began after Hurricane Katrina and was finished in 2006. The adjacent levees may be modified or rebuilt (as evaluated in IER #10) concurrently with the alternative selected for Bayou Dupre. Impacts to the hydrology of the project area would occur as a result of closure of the MRGO at Bayou La Loutre and from the actions proposed to provide hurricane and storm damage risk reduction along the IHNC (IER #11 Tier 2 Borgne). The MRGO and Lake Borgne allow for tidal exchange, through which more saline waters from the lake and Gulf of Mexico enter the CWA through Bayou Dupre and Bayou Bienvenue. However, construction of the closure structure at Bayou La Loutre in conjunction with the deauthorization of the MRGO will eliminate or minimize the flow of higher salinity water from the Gulf of Mexico up the MRGO to Bayou Dupre. Similarly, the barrier to be constructed across the MRGO slightly south of Bayou Bienvenue, the barrier across the marsh, and the gates across Bayou Bienvenue and the GIWW west of Lake Borgne (Tier 2 Borgne project) would restrict the flow of higher salinity water from the MRGO and Lake Borgne into the CWA via Bayou Bienvenue (see discussion above of cumulative impacts on wetlands from salinity effects under the no action alternative).

Under construction conditions in which Bayou Bienvenue could be essentially closed by a cofferdam in the Tier 2 Borgne alignment at the same time that Bayou Dupre is closed, the tidal range behind the barrier (protected side) likely would be further reduced from an estimated range of about 8 inches (estimated as described above for cumulative impacts to wetlands under the no action alternative). This reduced tidal range was obtained from the tidal signal predicted by the model for the condition in which the gate on Bayou Bienvenue is open and Bayou Dupre is closed (figure 6-32 of Tate *et al*. 2009). Long-term cumulative impacts on salinities and tidal ranges in the CWA from these projects would be essentially the same as described above for the no action alternative, though the tidal range likely would be temporarily reduced further by several inches during the period when Bayou Bienvenue is closed.

Thus, the cumulative effects of other USACE projects affecting the IER #8 project area under the proposed action would likely reduce salinities in the CWA by about one-third. The marshes would remain brackish to saline, so their vegetation composition likely would remain principally as described above under existing conditions. However, species better adapted to brackish conditions than to saline conditions, especially *Spartina patens*, may gradually expand their distribution, while the areas where *Spartina alterniflora* dominates may be gradually reduced. In this way, the reductions in salinity in the CWA could promote an incremental transition of the wetlands back toward their natural, less saline, condition. Such a transition is the goal of the Violet Freshwater Siphon Diversion, discussed above. The net reduction in tidal range within the CWA over the long term would affect the duration of inundation in some areas of the marsh. For example, under average conditions, higher areas that currently are inundated only at high tide would be inundated for shorter intervals or not at all, while low areas that currently are exposed only at low tide would remain inundated. Given the very flat topography of the CWA, such areas are expected to be a minor component. Brackish and intermediate marsh vegetation is adapted to highly variable periods of inundation, but if certain species in particular areas cannot adapt to the altered tidal regime, other, better-adapted species likely will spread into these areas.

In addition to the cumulative impacts on tidal exchange and salinity in the CWA under normal conditions discussed above, there is the potential for temporary cumulative impacts on CWA hydrology during shorter-term conditions that would occur during storm events and during the construction period, when flow through Bayou Dupre would be reduced 80 percent to 90 percent by the cofferdam. As discussed in detail for the no action alternative, rainfall and pumping of stormwater can elevate water levels in the CWA. However, even during extreme (10-year) rain events, increases in water elevations in the wetland would be limited (less than 10 inches) and temporary (less than two days). With the Bayou Dupre cofferdam in place, this water would have to drain out of the CWA mostly through Bayou Bienvenue, as well as through the culverts around the Bayou Dupre cofferdam, which would slow the rate of drainage. However, given that the limited increase in water elevations even for a 10-year rain event is similar to the tidal range, there is little likelihood that the wetlands would be adversely impacted by water accumulated temporarily in the CWA. During periods when rainfall and pump discharge result in the accumulation of freshwater within the CWA, salinities in the wetlands would be reduced. Subsequently, salinities would gradually increase due to tidal exchange and the influx of more saline water from the MRGO. Such effects have occurred previously, and the vegetation of the marsh has remained dominated by species adapted to primarily brackish as well as intermediate salinities. During the period of construction of the proposed action when Bayou Dupre would be essentially closed, substantial rainfall events would have a greater potential to result in the accumulation of freshwater and longer periods of reduced salinities. However, such effects still would be relatively short-term and infrequent, salinities likely would remain intermediate to brackish at a minimum, and the health and composition of the vegetation community of the marsh would be unlikely to be altered.

Another project that could have cumulative impacts on the wetlands of the CWA is the proposed freshwater diversion through the Violet Canal. This project could have beneficial cumulative

effects on the wetlands in the vicinity of the project area by reducing salinity to levels more similar to those that occurred in the area prior to construction of the MRGO, increasing sedimentation, and promoting more diverse and extensive wetland vegetation. Projects that could contribute to cumulative impacts are discussed in more detail in section 4.

Future Conditions with Alternative 1 – Channel Realignment to the Northwest of the Existing Channel

Direct Impacts

This alternative would have greater direct impacts on wetlands than the proposed action because wetlands within the project area immediately north of the existing Bayou Dupre channel would be lost as a result of channel realignment. The footprint of the new channel would cover approximately 0.3 acres of wetlands near the existing channel, including about 0.1 acre of freshwater marsh and 0.2 acre of brackish marsh along the shoreline of Bayou Dupre at the south end of the proposed channel. An additional 0.4 acre of nearby marsh also could be impacted if needed to improve navigability of the opening of the proposed channel into the bayou. During the approximately 3-year construction period, minor additional areas of adjacent freshwater wetland within the MRGO depositional area also could be impacted by activities associated with excavation of the new channel, including stockpiling and movement of the excavated soils. The quality of these wetland areas has been affected by past development (the Bayou Dupre channel was previously realigned during construction of the existing control structure) and Hurricane Katrina. Following construction, the adjacent wetlands would be expected to stabilize after sediment has settled and vegetation has had time to re-colonize the affected area.

Indirect Impacts

During the construction period for this alternative, the existing channel and control structure would remain open, minimizing indirect adverse impacts on wetlands. Potential indirect impacts would consist mainly of effects from increased turbidity on adjacent wetland habitat during the construction period. However, construction-related runoff into the wetlands would be managed through implementation of BMPs and an SWPPP, which would limit or prevent potential indirect adverse impacts from this alternative on wetlands.

Unlike the proposed action, this alternative would not require the construction of a cofferdam and blockage of the bayou channel for an 8-month to 12-month period. The existing gate structure could remain in operation during construction of the adjacent new structure and channel. Thus, indirect impacts on wetlands associated with a cofferdam closure as discussed above for the proposed action would not occur under this alternative.

Cumulative Impacts

Potential cumulative impacts on wetlands from this alternative would be essentially the same as described above for the no action alternative because the existing channel and control structure would remain open during construction, and after construction, the new gate would be operated as under existing conditions. Projects that could contribute to cumulative impacts are discussed in more detail in section 4.

3.2.2 Bayou Dupre and Other Waterways

The proposed project area is located on Bayou Dupre where it crosses the MRGO levee (IER #10) and connects with the MRGO. This location on the west bank of the MRGO is adjacent to the original channel of Bayou Dupre, and across from an open water passage through the marsh on the east side of the MRGO that connects the MRGO and Lake Borgne. These waters are

WoUS and NWUS and would require compliance with Section 404 of the Clean Water Act for any dredge and fill activities.

Water quality in Bayou Dupre has been impacted by urban populations and industry to the west. Bayou Dupre is listed as only partially supporting its use for primary and secondary recreational contact, and its uses as an outstanding natural resource and for fish and wildlife propagation are listed as "threatened" (Louisiana Department of Environmental Quality [LaDEQ] 2007). The substrate of the bayou within the project area has been disturbed by Hurricane Katrina and construction of the existing structure and does not support aquatic vegetation.

A Natural and Scenic River designation provides state-legislated protection of certain free-flowing Louisiana waterways (rivers, streams, bayous, and segments thereof). A permit review is required for any activity on or near a designated Scenic River that may have a detrimental impact on its ecological integrity, scenic beauty, or wilderness qualities, and a permit is required for those activities that have the potential to cause direct and significant degradation to a Scenic River or its tributaries (LaDWF 2005a). A 2-mile segment of Bayou Dupre, from the Violet Canal (Lake Borgne Canal) to Terre Beau Bayou, is designated as a Scenic River. At its closest point to the proposed action (the confluence of Bayou Dupre and Terre Beau Bayou), this segment is approximately 1.2 miles south of the project location. The project location on Bayou Dupre also is approximately 0.5 mile north of the confluence of Bayou Dupre and the closest designated Scenic River, Bashman Bayou. The designated Scenic River segments in the vicinity of the proposed project are shown on figure 10. The proposed action was reviewed by LaDWF, and the department determined that, due to the project's distance from the designated Scenic River segments and the measures included in the project to minimize far-reaching impacts to hydrology/salinity, no Scenic River Permit would be required for this activity (LaDWF 2009).

Discussion of Impacts

Future Conditions with No Action

Direct and Indirect Impacts

Under this alternative, the existing flood control structure (sector gate and adjacent floodwalls) would be increased in height to the previously authorized elevation (an increase of approximately 2 ft), incorporating new engineering standards and design criteria. The structure would remain the same width and would be operated as it is now (the sector gate closes when tides reach an elevation of +1.2 ft [NAVD 88]), so the effects of the direct and indirect impacts of the higher structure on the bayou would not differ from those under current conditions.

Cumulative Impacts

Under the no action alternative, Bayou Dupre would remain relatively stable, with possibly some improvement in habitat quality as a result of the closure of the MRGO at Bayou La Loutre and approved and ongoing wetland restoration projects in the CWA. The waters of the bayou and other waterways in the area are becoming less saline as a result of other USACE projects that would continue under the no action alternative. The closure of the MRGO at Bayou La Loutre will reduce the flow of higher salinity water from Breton Sound up the MRGO and into the area. Similarly, the barrier to be constructed across the MRGO slightly south of Bayou Bienvenue, the barrier across the marsh, and the gates across Bayou Bienvenue and the GIWW west of Lake Borgne (the Tier 2 Borgne project) would restrict the flow of higher salinity water from the MRGO and Lake Borgne into the CWA via Bayou Bienvenue (see discussion in section 3.2.1 of cumulative impacts on wetlands from salinity effects under the no action alternative). Cumulative impacts on Bayou Dupre and other CWA waterways from these projects would be essentially the same as described above for wetlands under the no action alternative. Thus, the

available data indicate that under the proposed action, other projects and activities affecting hydrology in the vicinity of the Bayou Dupre gate would have cumulative impacts that would reduce salinities, reduce tidal ranges, and alter water surface elevations within the waterways of the CWA.

In addition, the CWA and associated Scenic Rivers and other waterways receive freshwater inputs from several sources, such as the existing Violet Freshwater Siphon Diversion and the existing stormwater pumping stations operated and maintained by the Lake Borgne Basin Levee District. These pumping stations discharge freshwater into the CWA during the frequent rainfall events the area experiences. The Violet Siphon is an ongoing project that diverts Mississippi River water into the Violet Canal and the CWA, increasing inputs of fresh water, sediment, and nutrients and contributing to further reductions in the salinity of the currently brackish waterways of the CWA. Specific goals of the project included decreasing mean salinities, increasing the ratio of marsh to open water, and promoting the growth of emergent and submergent vegetation. The area benefited is about 2,000 acres of marsh along the Violet Canal east of the Forty Arpent Canal and mainly west of the pipeline canal. This area is limited due to the limited flow from the siphon (peak flow of about 300 cfs when the river stage is high) and the presence of dredged material levees along each side of the canal, which prevent flows of fresh water out into the marshes (Lin and Kleiss 2006).

Future Conditions with Proposed Action

Direct Impacts

Implementation of the proposed action for Bayou Dupre could temporarily impact stream habitat during the construction period (estimated to be up to 3 years). Approximately 2 acres of the bayou channel could be disrupted during construction, and the finished control structure would occupy approximately 0.3 acre of channel substrate. The proposed pontoon bridge structure would not disturb any aquatic substrate as it would be connected to the shoreline and floating. Open-water aquatic habitat in the bayou that may be temporarily disturbed or permanently lost due to the proposed action represents a negligible amount of the total similar habitat within the region (e.g., the Lake Pontchartrain estuary is approximately 630 mi^2).

A cofferdam would temporarily block Bayou Dupre during construction of the gate structure. The cofferdam would be in place for about 8 months to 12 months of the proposed 3-year construction period. For the rest of the construction period, flows through the channel would remain essentially as they are under current conditions, with the gate remaining open except under storm conditions or high tides above +1.2 ft (NAVD88). During the period when the cofferdam is in place, a hydrological connection across the barrier would be limited to four 48-inch-diameter culverts (see figure 5, section 2.3)

Thus, during construction of the new sector gate, a limited connection would be maintained between the CWA waterways and the waters of the Gulf of Mexico via Bayou Bienvenue, the MRGO, the GIWW, and Lake Borgne. The openings of the culverts would be covered by 4-inch to 5-inch screen mesh to prevent blockage of the culverts by debris. The mesh potentially would allow plankton, invertebrates, and small fish to cross the barrier but would block larger organisms. With the cofferdam and the four 48-inch culverts in place for an 8-month to12-month period, flow around the cofferdam has been estimated to be reduced to approximately 10 percent to 20 percent of the existing flow through Bayou Dupre at the project location. Thus, during this period when the cofferdam is in place, there would be a direct impact on the exchange of water and organisms between the MRGO and the CWA side of the structure – a reduction in flow of 80 percent to 90 percent. This would likely result in a further reduction in tidal range within the CWA for 12 months because most of the water exchanged would have to

pass through the existing Bayou Bienvenue gate at the MRGO as well as the gate under construction on the GIWW within the Tier 2 Borgne alignment. Although tidal exchange with the CWA would be reduced during this period through both the southern and northern outlets, greater exchange would occur through the existing Bayou Bienvenue gate opening in the north. Based on a previous study of water circulation patterns in the CWA (Irish 1980), it appears likely that on an incoming tide, water would flow south principally along the canal parallel to the MRGO deposition area, and from that canal would flow west and south as sheet flow across the marsh and within other canals and natural waterways. On an outgoing tide this pattern would reverse. The ability of water to flow between the northern and southern areas of the CWA via canals and other waterways, as well as through Bayou Dupre on a very reduced level via the culverts, likely would limit the duration and magnitude of any accumulation of water in the southern area.

The ecological effects of this direct reduction in exchange through the culverts is expected to be substantial but temporary. Effects on vegetation are discussed above under wetlands, and effects on fish and other aquatic fauna are discussed below under fisheries. There would continue to be an exchange of organisms through Bayou Bienvenue at the north end of the CWA. Waterways within the CWA likely would allow movement of organisms between the area of Bayou Bienvenue and waters in the central area of the CWA. Because of the alternative routes through which water and organisms could enter and leave the CWA during the temporary closure, adverse direct impacts on Bayou Dupre and other waterways in the CWA during the 8-month to 12-month period that the cofferdam is in place are likely to be limited. However, there would be direct impacts such as: the blockage of larger fish from passing through the culvert screens, the resulting inability of fish to enter or leave the CWA unless they swim north to Bayou Bienvenue, and reductions of up to 90 percent in the movement of suspended plankton and sediment through the mouth of Bayou Dupre during this period.

Indirect Impacts

Construction in the bayou channel could cause short-term adverse impacts of increased turbidity and sedimentation, with effects lasting up to several months after project completion. However, construction-related runoff into the bayou channel would be managed through BMPs and implementation of an SWPPP, which would minimize the potential indirect adverse impacts from sedimentation. As discussed for wetlands under the no action alternative, hydrological modeling indicates that the waterways of the CWA will become less brackish as a result of other projects in the vicinity that will reduce the flow of higher salinity water into the CWA and increase the relative contribution from freshwater inputs. The closure of Bayou Dupre for 8 months to 12 months by the cofferdam likely would indirectly contribute to this reduction in the salinity of the bayou and other CWA waterways by reducing flow between the bayou and MRGO by 80 percent to 90 percent. The transition to less brackish conditions in the CWA that will occur over the next several years is expected to result in salinities of approximately 12 ppt to 14 ppt. The temporary changes in flow during the closure of Bayou Dupre may reduce salinities more quickly during this portion of the construction period, but the waterways are expected to remain brackish, and the limited potential changes in salinity would not be expected to substantially affect estuarine organisms, which are adapted to a range of brackish salinities.

As discussed above for wetlands under the no action alternative, hydrological modeling based on the assumption that Bayou Dupre is completely closed indicates that brackish water would enter the CWA from the MRGO and Lake Borgne through Bayou Bienvenue, and freshwater inputs to the CWA from even extreme rainfall events would be able to flow out via these waterways and would not elevate the water surface substantially or for longer than a couple of tidal cycles. Under normal conditions after construction, when the gate would be open most of the time, net indirect effects on CWA salinities and water surface elevations are expected to be minimal. When the gate is open, additional brackish water from the MRGO and Lake Borgne could enter

the CWA through Bayou Dupre. In addition, the tidal exchange through Bayou Dupre would be expected to moderate the reduction in tidal range at the north end of the CWA during the period that the Bayou Bienvenue cofferdam is in place. The higher tidal amplitude at Bayou Dupre relative to Bayou Bienvenue should cause increased flow northward in the CWA on an incoming tide. Based on a study of water circulation in the CWA (Irish 1980), this flow would be expected to occur primarily through the canal that parallels the MRGO on the west side of the depositional area.

During periods when rainfall and pump discharge result in the temporary accumulation of freshwater within the CWA, salinities in the waterways would be reduced. Subsequently, salinities would be likely to gradually increase due to tidal exchange and the influx of more saline water from the MRGO. During the period of construction of the proposed action when the cofferdam is in place, major rainfall events would have a greater potential to result in the accumulation of freshwater and longer periods of reduced salinities. However, such effects still would be relatively short-term and infrequent, salinities likely would remain intermediate to brackish at a minimum, and the health and composition of the aquatic community within Bayou Dupre and other waterways in the CWA would be unlikely to be altered.

Under the proposed action, indirect impacts on waterways of the CWA would be mainly short-term, with effects potentially lasting up to several months after project completion. The waters of the CWA would remain brackish, so the composition of their aquatic communities would be unlikely to change substantially. However, species better adapted to brackish conditions than to saline conditions may gradually increase in numbers. Thus, reductions in salinity in the CWA could promote an incremental transition of the aquatic communities of the CWA waterways back toward their natural, less saline, condition.

Cumulative Impacts

The aquatic habitat of Bayou Dupre has previously been disturbed by construction of the existing structure, adjacent levee, and MRGO, as well as by Hurricane Katrina. Reconstruction of tie-ins to the existing structure and addition of updated armoring (riprap) began after Hurricane Katrina and was finished in 2006. The adjacent levees may be modified or re-built (as evaluated in IER #10) concurrently with the alternative selected for Bayou Dupre. Construction of the proposed action would increase the impacts to the aquatic habitat by re-suspending sediment that has only had a short time to recover from the prior events. However, these impacts would only occur during the construction period. The long term impact of a loss of up to 0.3 acre of open water habitat would be minimal based on the amount of similar available habitat that exists in the nearby canals and drainageways. Cumulative impacts on the hydrology and salinity of the waterways in the project area would be essentially the same as described for the no action alternative.

Under construction conditions in which Bayou Bienvenue could be essentially closed by a cofferdam in the Tier 2 Borgne alignment at the same time that Bayou Dupre is closed, the tidal range behind the barrier (protected side) likely would be further reduced from the range of about 11 inches predicated by the model for the condition in which the gate on Bayou Bienvenue is open and Bayou Dupre is closed. Cumulative impacts on salinities and tidal ranges in the waterways of the CWA from these projects would be essentially the same as described above for wetlands under the no action alternative, though the tidal range likely would be temporarily reduced further during the period when Bayou Bienvenue is closed.

In addition to the cumulative impacts on tidal exchange and salinity in the CWA under normal conditions discussed above, there is the potential for cumulative impacts on CWA hydrology during shorter-term conditions that would occur during storm events and during the construction

period, when flow through Bayou Dupre would be reduced 80 percent to 90 percent by the cofferdam. As discussed in detail for wetlands under the no action alternative, rainfall and pumping of stormwater can elevate water levels in the CWA. However, even during extreme (10-year) rain events, increases in water elevations in the wetland would be limited (less than 10 inches) and temporary (a couple of tidal cycles). With the Bayou Dupre cofferdam in place, this water would have to drain out of the CWA mostly through Bayou Bienvenue, as well as through the culverts around the Bayou Dupre cofferdam, which would slow the rate of drainage. However, given that the limited increase in water elevations even for a 10-year rain event is similar to the tidal range, there is little likelihood that the wetlands would be adversely impacted by water accumulated temporarily in the CWA under the proposed action. Projects that could contribute to cumulative impacts are discussed in more detail in section 4.

Future Conditions with Alternative 1 – Channel Realignment to the Northwest of the Existing Channel

Direct Impacts

Up to 4.8 acres of open water habitat in the existing Bayou Dupre channel would be permanently filled upon completion of construction of the new channel and gate under this alternative. This loss of aquatic habitat would be partially offset by the creation of up to 2.5 acres of open water habitat for the new channel. The proposed pontoon bridge would not affect the substrate because the bridge would be connected to the shoreline and would be free-floating. The new channel alignment associated with this alternative likely would require additional O&M dredging due to the associated change in hydraulic conditions caused by the off-set orientation of the new channel. The amount of aquatic habitat that may be temporarily disturbed or permanently lost under this alternative represents a negligible amount of the total similar habitat within Louisiana (e.g., the Lake Pontchartrain estuary is approximately 630 mi^2).

Unlike the proposed action, this alternative would not require the construction of a cofferdam and blockage of the bayou channel for an 8-month to 12-month period. The existing gate structure could remain in operation during construction of the adjacent new structure and channel. Thus, direct impacts associated with a cofferdam closure as discussed above for the proposed action would not occur under this alternative.

Indirect Impacts

Construction near the existing bayou channel could cause indirect adverse impacts from increased turbidity and sedimentation in the bayou. However, construction-related runoff into the bayou channel would be managed through implementation of BMPs and an SWPPP, which would minimize the potential indirect adverse impacts from this alternative. These impacts would occur only during the construction period (approximately 3 years), after which the existing sector gate would be demolished and the current channel through the MRGO depositional area would be permanently filled.

Cumulative Impacts

Potential cumulative impacts on waterways under this alternative would be essentially the same as described for the no action alternative, because the existing channel and control structure would remain open during construction, and after construction, the new gate would be operated as under existing conditions. Projects that could contribute to cumulative impacts are discussed in more detail in section 4.

3.2.3 Fisheries

Existing Conditions

Brackish marsh is of very high value to estuarine larval forms of marine organisms and provides habitat for some recreationally and/or commercially important species such as gulf menhaden (*Brevoortia patronus*), common rangia clam (*Rangia cuneata*), bay anchovy (*Anchoa mitchilli)*, hardhead catfish (*Arius felis*), silversides (*Menidia* sp.), brown shrimp (*Farfantepenaeus aztecus*), white shrimp (*Litopenaeus setiferus*), blue crab (*Callinectes sapidus*), and red drum (*Sciaenops ocellatus)* (Penland et al. 2002). Other species in the area may include seatrouts (*Cynoscion* spp.), Atlantic croaker (*Micropogonias undulatus*), and black drum (*Pogonias cromis*) (LaDEQ et al. 2007). The population status for these resources was reported in the Coast 2050 Report (Louisiana Coastal Wetlands Conservation and Restoration Task Force [RTF] and Wetlands Conservation and Restoration Authority [WCRA] 1998) as being steady, with the future trend predicted to also remain steady.

The estuarine waters of the project area occur within the Mississippi Deltaic Plain Region, which is among the most productive natural oystering grounds in North America (Wagner 1982). The eastern oyster (*Crassostrea virginica*) is the primary commercial species (Wagner 1982). This species proliferates in salinities ranging from 5 ppt to 15 ppt, and water that is too fresh or saline will not support the oyster's biologic functions and could promote disease and predation (USACE et al. 2004). The population status and trends for oysters within the CWA were indicated as declining in the Coast 2050 Report (RTF and WCRA 1998) and were also significantly damaged by Hurricanes Katrina and Rita. No information was found for oyster reefs or recorded leases in the project area, but significant oyster beds do occur on the southwest side of Lake Borgne, northeast of the project area (Gulf of Mexico Fishery Management Council [GMFMC] 2006).

Recreational and commercial fisheries are considered a vital part of Louisiana's economy. According to a national survey by the USFWS, Louisiana's recreational fishing industry was worth $605 million dollars in 1993 (Weber et al. 1995). In 2006, two of the United States' top commercial fishing ports were in Louisiana (NOAA 2006), and over 33 percent of commercial fish harvested in the lower 48 states came from the Louisiana coastal zone (CRCL 2000). The total weights and approximate values of all the fisheries species landed in the State of Louisiana in 2005, 2006, and 2007 are shown in table 4, including finfish, shrimp, and benthic fauna, such as crabs, clams, and oysters.

Table 4.
Annual Landing Statistics for all Fisheries Species Combined for the State of Louisiana from 2005 to 2007

Year	Metric Tons	Pounds	Value ($)
2005	385,231	849,280,372	251,678,265
2006	416,708	918,674,923	278,291,550
2007	453,036	998,763,106	288,952,420
Grand Totals	1,254,975	2,766,718,401	818,922,235

Source: NOAA 2007

The five most encountered fish species during recreational fishing in Louisiana are red drum, black drum, speckled trout (*Cynoscion nebulosus*), Atlantic croaker, and sand seatrout (*Cynoscion arenarius*) (Patillo et al. 1997). Selected commercially and recreationally important fishes with available data for their associated 2006 values are listed in table 5.

Table 5.
Dollar Value of Representative Game and Commercial Fisheries Species Occurring In or Near the IER # 8 Project Area

Common Name	Scientific Name	Value in 2006 Dollars ($)
Marine Species		
Brown shrimp	*Farfantepenaeus aztecus*	37,781,737
White shrimp	*Litopenaeus setiferus*	106,499,545
Pink shrimp	*Farfantepenaeus duorarum*	18,015
Atlantic croaker	*Micropogonias undulates*	30,770
Black drum	*Pogonias cromis*	1,365,989
Seatrout	*Cynoscion* sp.	16,022
Sheepshead	*Archosargus probatocephalus*	194,652
Southern flounder	*Paralichthys lethostigma*	112,258
Striped mullet	*Mugil cephalus*	4,287
Gulf menhaden	*Brevoortia patronus*	33,547,127
American oyster	*Crassostrea virginica*	35,851,947
Blue crab	*Callinectes sapidus*	32,677,480
Freshwater Species		
Alligator gar	*Atractosteus spatula*	418,752
Catfish	*Ictalurus* sp.	1,548,917
Flathead catfish	*Pylodictis olivaris*	160,014
Gizzard shad	*Dorosoma cepedianum*	641,674
Buffalo	*Ictiobus* sp.	784,369

Source: Gulf States Marine Fisheries Commission (GSMFC) 2008

These species fill a variety of ecological niches and support commercial and recreational harvests either directly or by providing prey for harvested species. Movement between fresher and more saline waters is essential to the life history of many of these species. Some marine species have increased in abundance following Hurricanes Katrina and Rita, possibly as a result of a reduction in fishing effort. For example, the fall 2005 trawl surveys found no indication of reductions in offshore fish or shrimp populations or saltwater fish kills. In fact, trawl catches of certain species averaged 30 percent greater than average pre-Katrina catches (USACE 2006b).

Discussion of Impacts

Future Conditions with No Action

Direct, Indirect, and Cumulative Impacts

Under this alternative, the existing flood control structure would be raised to the previously authorized elevation (an increase in height of approximately 2 ft), incorporating new engineering standards and design criteria. Effects of the raised structure on the bayou would not differ from those under current conditions. Under the no action alternative, fisheries resources would remain relatively stable with possibly some improvement from the closure of the MRGO at Bayou La Loutre and approved and ongoing wetland restoration projects. The CWA would continue to be a highly managed and altered system of wetlands and waterways in which hydrology, salinity,

water surface elevation, and other characteristics are affected by the sector gate on Bayou Dupre and many other structures.

The cumulative impacts of these other projects on hydrology and salinity are discussed in more detail for wetlands in section 3.2.1. As described in that section, modeling indicates that the cumulative effects of other USACE projects affecting the IER #8 project area under the no action scenario would likely reduce salinities in the CWA by about one-third. This would maintain brackish conditions in the wetlands of the CWA while reducing saltwater intrusion. Brackish, lower salinity marshes are vital for the juvenile life stage of most important commercial and sport finfish and shellfish (USACE 1985). The fisheries species inhabiting the area are adapted to the variable salinities of estuarine habitats and would not be expected to be adversely impacted by the lower salinities predicted. Instead, the lower salinities are likely to provide more optimal conditions for the growth and development of the majority of species. Also discussed in section 3.2.1, tidal ranges would be reduced by roughly one-half within the CWA over the long term, from typical baseline ranges of approximately 19 inches to estimated ranges around 8 inches as a result of the cumulative effects from multiple projects in the region. This would affect the duration of inundation in some areas of the marsh. For example, under average conditions, higher areas that currently are inundated only at high tide would be inundated for shorter intervals or not at all, reducing the habitat area available to fish and invertebrates for foraging during high tide. However, some low areas that currently are exposed only at low tide would remain inundated, allowing longer access to these areas by fish. Given the very flat topography of the CWA, such areas are expected to be a minor component of the available habitat.

Future Conditions with Proposed Action

Direct Impacts

Implementation of the proposed action for Bayou Dupre would temporarily impact fish habitat during the construction period (up to 3 years). Up to 2 acres of aquatic habitat in the bayou channel could be disrupted during the construction period and a much smaller portion (approximately 0.3 acre) of the channel would be permanently occupied by the control structure. Direct impacts to fishery resources from this very localized disruption and/or the removal of estuarine habitat within the footprint of the closure structure would be negligible. The amount and quality of fish habitat within the bayou that may be temporarily disturbed or permanently lost due to the construction of this structure would represent a negligible amount of the total similar habitat within the bayou. The proposed pontoon bridge structure would displace a negligible area of aquatic habitat because the bridge would be connected to the shoreline and would be free-floating.

Sediment suspended during construction of this project could clog fish gills, lower growth rates, and affect egg and larval development (USEPA 2003). Most of the mobile species would avoid the areas impacted by construction. Impacts to less-mobile benthic species would be short-term, up to 3 years, with effects lasting up to several months after completion. Once the proposed action is complete, the adjacent wetlands and drainageways would stabilize, allowing sediment to settle, benthos to repopulate, and other aquatic species to return.

During the construction of the proposed action, a cofferdam would be in place across Bayou Dupre for approximately 8 months to 12 months. The cofferdam would have culverts to allow for a substantially limited exchange of water around this barrier during the period the cofferdam is in place. The cross-sectional area of the culverts would be only 10 percent to 20 percent of the area of the open gate. Small organisms that rely on passive transport and migrate up and down the water column during the course of the day may be prevented from being transported through the culverts, depending on their location in the water column in relation to the depth of the

culverts. Additionally, the openings of the culverts would be covered by screens with 4-inch to 5-inch mesh, which would prevent the movement of larger fish through the culverts. To minimize this effect and facilitate fish passage, the use of vertical slats instead of mesh is being considered and will be utilized so long as the primary purpose of prevention of blockage by debris is maintained. Although the culverts would allow for some water exchange, the temporary closure of Bayou Dupre by the cofferdam and the screening of the bypass culverts would alter active and passive movement of organisms through the project area and would temporarily block access for larger fish and other organisms to habitats within the CWA. This potentially could decrease the growth and survival rates of some individual organisms, thereby having temporary, localized effects on fish populations in the vicinity during the period when passage would be restricted by the cofferdam. In addition, a portion of those organisms that successfully recruit to the CWA through the culverts could be entrapped as they mature in size and are unable to emigrate past the mesh or slats covering the culverts. As a result, the fish community on the protected side of the structure would be temporarily affected by changes in the distribution of species and the size and age structure of populations in this area. Also, conditions during the period the cofferdam is in place could cause temporary adverse changes in fish behavior and survival (e.g., susceptibility to temperature extremes from limited ability to escape to thermal refugia), increasing predation and decreasing growth rates because of the extra energy required to access quality habitat, search for prey, and avoid predators.

Calculations performed for a similar structure on Bayou Bienvenue indicated that, with the cofferdam and the four 48-inch round culverts in place during construction, flow through the bayou channel could be reduced to approximately 10 percent to 20 percent of the existing discharge. Maximum velocities through the culvert would be between 4 feet per second (fps) and 6 fps. The USEPA, in establishing requirements for cooling water intake structures under Section 316(b) of the Clean Water Act, determined that a variety of fish species and life stages could endure a through-screen velocity of 1.0 fps and avoid impingement. To be protective of a wider range of fish species and life stages and to ensure protection when screens become partly occluded by debris, which increases velocity through the portions of the screen that remain open, USEPA applied a safety factor of two in deriving a maximum through-screen intake velocity of 0.5 fps for intake structures. Thus, at the estimated maximum velocities through the culverts of 4 fps to 6 fps, fish too large to pass through the screen openings likely would be impinged on the screens if they swim near or try to enter the mouth of a culvert. At lower flow velocities through the culverts, such as would occur at slack water between incoming and outgoing tides, the potential for impingement would be reduced. The screened openings at both ends of all four culverts would have a total area of 100 square feet. The number of fish that may experience impingement-related injury or mortality on the screens during periods when velocities exceed 1.0 fps is unknown. Given the relatively small screen area, the ability of smaller fish to pass through the screens, the occurrence of periods in the daily tidal cycle when velocities would be much lower than maximum and may not cause impingement, and the limited period (to 12 months) when the culverts would be in place during construction, it is unlikely that impingement-related effects would substantially impact fish populations in the area.

The existing Bayou Dupre sector gate is operated such that the gate is closed during storms and when tides rise to an elevation of +1.2 ft (NAVD88). This operating regime would continue during the construction of the new Bayou Dupre sector gate, so all flow between the CWA and MRGO would be temporarily blocked during those tidal events when the existing gate is closed. Bayou Dupre and the network of canals and bayous within the CWA are hydrologically connected to the waters of Lake Borgne and the Mississippi Sound through Bayou Bienvenue at the northern end of the CWA (figure 7). Waters from the Lake Borgne basin can flow into the CWA through Bayou Bienvenue. From Bayou Bienvenue, water can flow southeast into the CWA and toward Bayou Bienvenue by way of the New Canal, a canal on the protected side of the LPV Hurricane Protection Levee that runs parallel to the MRGO. In addition, the Violet Freshwater Siphon diverts water from the Mississippi River into the Violet Canal, from which it

flows into the CWA and Bayou Dupre. As discussed above for wetlands under the no action alternative, hydrological modeling based on the assumption that Bayou Dupre is completely closed indicates that brackish water would enter the CWA from the MRGO and Lake Borgne through Bayou Bienvenue, and freshwater inputs to the CWA from even extreme rainfall events would be able to flow out via these waterways and would not elevate the water surface substantially or for longer than a couple of tidal cycles. Thus, indirect impacts on the fish populations of Bayou Dupre and the CWA due to indirect effects on hydrology resulting from temporary closure of the bayou during construction would likely be short-term and within the range of natural variation.

Construction activities, such as pile driving, may cause some organisms to avoid the habitat near the project area and cause behavioral changes and sub-lethal impairments to the hearing of some fishes (Hastings and Popper 2005). The occurrence of fish mortality from construction noise is not well understood; however; some literature has documented fish mortality after pile driving activities at various distances (Caltrans 2001; Caltrans 2004). Although some individual aquatic organisms may be taken during construction activities for the proposed action, the number of organisms affected would not be expected to impact populations of fishes because most species would be expected to move away from the area to similar nearby habitat.

During the subsequent long-term period of operation after construction, the flood gate could adversely impact fish through entrapment. However, the flood gate would only be closed to prevent infrequent flooding associated with major high tide and storm events; thus, limiting the potential for fish entrapment. Because the new structure would have the same width and depth as the old, velocities through the gate opening would be the same as under existing conditions, and fish would be able to pass through to enter and leave the CWA as they currently do.

Indirect Impacts

This alternative would have temporary indirect impacts from the closing of Bayou Dupre during construction for a period of approximately 8 months to 12 months. During this period, a reduction in access to over 40,000 acres of marsh edge and inner marsh habitat in the CWA would occur from closure of the bayou. A reduction in access to these habitats would result in indirect impacts to fisheries through reduction in species populations and individual growth rates related to the increased energy required to hide from predators or search for prey items, the increased risk of predation, and the decreased availability of prey occurring in the project area during construction.

Construction in the bayou channel and adjacent wetlands could cause downstream increases in turbidity and sedimentation that could impact fish survival and growth. However, construction-related runoff into the wetlands would be managed through BMPs and a SWPPP would be implemented, which would minimize the potential indirect adverse impacts from this alternative on fishery resources. Those impacts would be short-term, up to 3 years in duration, with effects lasting up to several months after construction completion. Hearing impairments caused by loud construction activities, such as pile driving, have been shown to reduce some fish species' ability to locate prey, increase risk of predation, and possibly reduce reproductive success (Hastings and Popper 2005). However, activities generating loud underwater noise would be very localized and temporary, and fish could readily avoid proximity to the source.

Cumulative Impacts

The proposed action in conjunction with all of the features associated with the IER 11 Tier 2 Borgne alignment would have substantial adverse cumulative impacts to marine fisheries access to the CWA, in particular during overlapping construction periods of the Bayou Dupre and Bayou Bienvenue gate structures. The IHNC barrier, the GIWW floodgate, the MRGO plugs

south of Bayou Bienvenue and at Bayou La Loutre along with temporary cofferdams in Bayou Dupre and Bayou Bienvenue would substantially impact recruitment into and use by marine fisheries of the CWA. Both Bayou Dupre and Bayou Bienvenue would be restricted 80% to 90% in cross-sectional area for potentially overlapping periods of 8 months to 12 months. The proposed action would be unlikely to have adverse impacts on fishery resources past the overall construction period of 3 years; therefore, it is unlikely to contribute to cumulative impacts on fishery resources beyond this time. The fisheries resources of the project area were recently disrupted during Hurricanes Katrina, Rita, Gustav, and Ike and for HSDRRS-related construction projects.

Construction and restoration projects are currently in progress or planned within the scheduled construction time frame of the proposed action. These projects may affect water characteristics such as pH, dissolved oxygen, salinity, tidal exchange, and hydrology near and in the project area, which could result in cumulative impacts to fisheries. For example, the project area would be affected by the closure of the MRGO at Bayou La Loutre and from the action to provide hurricane and storm risk reduction on the IHNC (IER #11 Tier 2 Borgne). The MRGO and Lake Borgne allow for tidal exchange, through which water from the Gulf of Mexico enters into the CWA. However, the de-authorization of the MRGO and construction of the closure at Bayou La Loutre will eliminate or minimize tidal exchange from the MRGO, reducing the movement of more saline water northward into the project area from the Gulf (Breton Sound). The cumulative impacts of these other USACE projects on hydrology and salinity in the CWA are discussed in more detail for wetlands under the no action alternative (section 3.2.1). As described in that section, modeling indicates that cumulative effects on the IER #8 project area would likely reduce salinities in the CWA by about one-third, resulting in salinities of around 12 ppt to 14 ppt and maintaining brackish conditions in the fish habitats of CWA marshes and waterways.

Populations of fish and invertebrates that utilize the habitats of the CWA could be affected either positively or negatively by changes in salinity and other water quality and hydrology characteristics, depending on their sensitivities to the affected parameters. However, the majority of estuarine species are adapted to a relatively wide range of salinity and other conditions such as occur in brackish to intermediate marshes. Marshes of brackish salinities (around 5 ppt to 10 ppt) are vital for the juvenile life stage of most important commercial and sport finfish and shellfish (USACE 1985). Accordingly, the predicted reductions in salinity of the CWA and other marshes in the area due to the cumulative effects of water-related projects in the region would not adversely impact fishery species. Projects that could contribute to cumulative impacts are discussed in more detail in section 4.

Future Conditions with Alternative 1 – Channel Realignment to the Northwest of the Existing Channel

Direct Impacts

The direct impacts on fisheries from this alternative could be incrementally greater than under the proposed action because of the short-term loss of a very small area of wetland habitat associated with channel realignment. The footprint of the new channel would directly impact approximately 0.2 acre of brackish marsh habitat along the shoreline of the existing Bayou Dupre channel. Although the creation of a new channel would result in the immediate loss of a very small area of marsh along the shoreline of Bayou Dupre, a similar area of shoreline marsh may develop along the new shoreline created when the current channel is filled.

This alternative would have less impacts on fisheries resources during the construction period than the proposed action because movements of fish and other organisms through the bayou between the CWA and MRGO would not be restricted for up to a year by a cofferdam. The

existing channel and gate would remain open, except for normal operational closures for storms and high tides, until the new gate is operational.

Construction of the new channel and filling of the existing Bayou Dupre channel for this alternative could result in incidental mortality of some individual organisms from dredging and burial during placement of material in the current channel. Most fisheries species are highly mobile and would avoid these activities and relocate until construction activities are complete. Thus, their populations would not be expected to be measurably impacted by this alternative. As discussed for the proposed action, activities such as pile driving may cause some organisms to avoid the habitat near the project area and cause behavioral changes and sub-lethal impairments to the hearing of some fishes (Hastings and Popper 2005), and some fish mortality could occur.

Construction of this alternative would result in the movement of the current bayou channel and effective re-creation of the existing habitats, which would result in no substantial direct impacts to fisheries resources. During the subsequent long-term period of operation, the direct impacts of this alternative would be essentially the same as described for the proposed action.

Indirect Impacts

Indirect impacts on fisheries during construction of this alternative could result from changes in water chemistry, turbidity, dissolved oxygen, and salinity in the immediate project area. Most organisms would relocate from areas with unfavorable conditions to nearby adjacent and similar habitat until construction activities are complete.

Construction in the bayou channel and adjacent wetlands could cause downstream increases in turbidity and sedimentation that could impact fish survival and growth. However, construction-related runoff into the wetlands would be managed through implementation of BMPs and an SWPPP, which would minimize the potential indirect adverse impacts from this alternative on fishery resources. The potential for such minimal impacts also would be limited to the short-term period of construction. Hearing impairments caused by loud construction activities, such as pile driving, have been shown to reduce some fish species' ability to locate prey, increase the risk of predation, and possibly reduce reproductive success (Hastings and Popper 2005). The potential for such effects would be very limited in area and duration because project activities under this alternative would occur mainly on land.

Cumulative Impacts

Cumulative impacts on fisheries from other projects in conjunction with this alternative would be the same as described for the no action alternative.

3.2.4 Essential Fish Habitat

Existing Conditions

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) (50 CFR 600) states that EFH is "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity" (16 USC 1802). The 1996 amendments to the MSA set forth a mandate for the National Oceanic and Atmospheric Administration (NOAA) Fisheries, Regional Fishery Management Councils (FMCs), and other Federal agencies to identify and protect EFH of economically important marine and estuarine fisheries. A provision of the MSA requires that FMCs identify and protect EFH for every species managed by a Fishery Management Plan ([FMP] 16 USC 1853).

The proposed project is located in an area identified as EFH for postlarval, juvenile, and subadult life stages of red drum, brown shrimp, and white shrimp. The primary categories of EFH that may be affected by project implementation include estuarine emergent wetlands, mud substrates, and water column. Brown and white shrimp in the post larvae, juvenile and sub-adult life stages, as well as white shrimp adults, inhabit marsh edge, SAV, marsh ponds, and inner marsh. Brown shrimp sub-adults live in estuarine mud bottoms and marsh edge. Red drum in the post-larvae/juvenile life stage inhabit SAV, estuarine mud bottoms, and the interface between marsh and open water. Therefore, the most likely species to occur in the project location are brown shrimp in the sub-adult life stage and red drum in the post-larvae/juvenile life stage. Table 6 identifies these managed species, life stages, and particular EFH subcategories for which EFH has been designated in the project area.

Table 6.
EFH requirements for species and life stages managed by the Gulf of Mexico Fishery Management Council in the project area of Ecoregion 3, Pensacola Bay, FL to Mississippi River Delta (South Pass)

Species	Life Stage	System*	EFH
Brown shrimp	larvae	M	planktonic, sand/shell/soft bottom, SAV, emergent marsh, oyster reef
	juvenile	E	SAV, sand/shell/soft bottom, SAV, emergent marsh, oyster reef
	adults	M	sand/shell/soft substrate
White shrimp	larvae	M	planktonic
	juvenile	E	SAV, soft bottom, emergent marsh
Red drum	larvae/postlarvae	E	all estuaries, planktonic, SAV, sand/shell/soft bottom, emergent marsh
	juvenile	E/M	all estuaries, SAV, sand/shell/ soft/hard bottom, emergent marsh
	adult	E/M	all estuaries, SAV, sand/shell/ soft/hard bottom, emergent marsh

* E=estuarine, M=marine

In addition to being designated as EFH for red drum, brown shrimp, and white shrimp, wetlands and water bottoms in the project area provide nursery and foraging habitats that support a variety of economically important marine fishery species such as Atlantic croaker, southern flounder, black drum, gulf menhaden, blue crab, spotted seatrout, sand seatrout, and striped mullet. Some of these species serve as prey for other fish species managed under the MSA by the GMFMC (e.g., mackerels, snappers, and groupers) and highly migratory species managed by NMFS (e.g., billfishes and sharks). Wetlands in the project area also produce nutrients and detritus, important components of the aquatic food web, which contribute to the productivity of the CWA and the Lake Borgne estuary.

The IER #8 flood control structure is at the mouth of Bayou Dupre, where the bayou opens to the MRGO. This control structure is within EFH because it is part of the estuarine system of the Gulf of Mexico. Estuarine EFH includes all waters and substrates within estuarine boundaries, including the subtidal vegetation (seagrasses and algae) and adjacent tidal vegetation (marshes).

The primary categories of EFH occurring in the project vicinity include mud bottoms, marsh edge, inner marsh, and oyster reef (in Lake Borgne). However, the actual location of the proposed action and alternative may have some mud bottom but very little to no marsh edge and no inner marsh, oyster reef, or submerged aquatic vegetation (SAV).

Discussion of Impacts

Impacts to EFH and managed fish species would be similar to those for fisheries resources for the same alternatives. However, the consultation requirements in the MSA direct Federal agencies to consult with the National Marine Fisheries Service (NMFS) when any of their activities may have an *adverse effect* on EFH and defines *adverse effec*t as "any impact that reduces quality and/or quantity of EFH... [and] may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, reduction in species' fecundity), site-specific or habitat wide impacts, including individual, cumulative, or synergistic consequences of actions."

Future Conditions with No Action

Direct Impacts

Under the no action alternative, the existing flood control structure would be raised to the previously authorized elevation (an increase of approximately 2 ft), incorporating new engineering standards and design criteria. Existing conditions would be maintained, and there would be essentially no direct effects from this activity on EFH.

Indirect Impacts

Under the no action alternative, the existing flood control structure would be raised to the previously authorized elevation (an increase of approximately 2 ft), incorporating new engineering standards and design criteria. Existing conditions would be maintained, and there would be essentially no indirect effects from this activity on EFH.

Cumulative Impacts

Under the no action alternative, EFH would remain relatively stable with possibly some improvement from the cumulative effects of other projects in the region, including the approved closure of the MRGO at Bayou La Loutre and approved and ongoing wetland restoration projects in the vicinity. The CWA would continue to be a highly managed and altered system of wetlands and drainageways in which hydrology, salinity, and other characteristics are affected by the sector gate on Bayou Dupre and many other structures. The cumulative impacts of these other projects on hydrology and salinity are discussed in more detail under the no action alternative for wetlands (section 3.2.1). As described in that section, modeling indicates that the cumulative effects of other USACE projects affecting the IER #8 project area under the no action alternative would likely reduce salinities in the CWA by about one-third. This would maintain brackish conditions in the EFH of the CWA. The fisheries species inhabiting the area, as well as their prey and other food sources, are adapted to the variable salinities of estuarine habitats and would not be expected to be adversely impacted by the lower salinities predicted.

Future Conditions with Proposed Action

Direct Impacts

Implementation of the proposed action for Bayou Dupre would temporarily adversely impact EFH during the construction period, particularly the approximate 8-month to 12-month period during which a cofferdam would restrict flow and the movement of fish between the CWA and

MRGO. Up to 2 (surface area) acres of estuarine mud bottoms and brackish waters in the bayou channel could be disrupted during the construction period, and a much smaller portion (approximately 0.3 acre) of the channel (estuarine mud bottom and water column) would be permanently occupied by the control structure. The amount of EFH that may be temporarily disturbed or permanently lost with this action represents a very small amount of the total similar habitat within the Lake Pontchartrain Basin (approximately 226 mi^2 of brackish wetland habitat). The proposed pontoon bridge structure would not replace any EFH because the bridge would be connected to the shoreline and would be free-floating. The shade created by the bridges could potentially prevent SAV from growing. SAV is an EFH habitat type, but none is currently present in the project area. SAV requires clear, relatively calm, and shallow water to grow successfully. Other direct impacts of the proposed action on EFH for the managed species identified above would be largely the same as described under the proposed action for fisheries. The three species most likely to utilize EFH in project area and CWA are discussed below.

The red drum is a fish that as an adult occurs throughout the Gulf of Mexico, from offshore to very shallow estuarine waters, and can tolerate salinities ranging from freshwater to highly saline. Spawning occurs in deeper waters near the mouths of bays and inlets, the eggs hatch mainly in the Gulf, and larvae are transported into estuaries where the fish mature before returning to the Gulf. Estuarine wetlands, such as the CWA, are especially important to red drum in their larval, juvenile, and subadult stages, as well as to their prey (GMFMC 2004). Given these life history characteristics, the proposed action would be unlikely to adversely affect red drum EFH after removal of the temporary cofferdam. However, during the 8-month to 12-month period that the cofferdam would be in place, adult red drum could be prevented from passing through the bayou between the CWA and MRGO. Large adults would be unable to pass through the screens covering the openings of the bypass culverts, and adult fish would have to enter or leave the CWA through Bayou Bienvenue. During this period, transport of larvae into the CWA by the tides also would be reduced by the 80 percent to 90 percent reduction in flow,, despite the ability of larvae to be carried through the culverts past the temporary cofferdam, as well as through Bayou Bienvenue. This period in which Bayou Dupre is closed by a cofferdam likely would coincide with the period in which Bayou Bienvenue would be closed by a similar cofferdam with bypass culverts within the Tier 2 Borgne alignment. As a result, larvae or adults that enter or exit the CWA through the existing Bayou Bienvenue gate on the MRGO would have to pass through the navigation gate being constructed on the GIWW in moving to or from Lake Borgne and the Mississippi Sound. Because these effects would be temporary and would not extend beyond 12 months in duration, they are not expected to substantially impact red drum EFH or populations.

The brown shrimp is an important species that utilizes brackish marshes of the CWA as nursery habitat during its postlarval and juvenile life stages. Following these stages, subadult brown shrimp leave estuaries and emigrate to nearshore and offshore habitats. Spawning occurs offshore, and the pelagic larvae remain there until they metamorphose to postlarvae, then they migrate inshore to estuaries. The postlarvae migrate to estuaries through passes on flood tides at night, mainly from February to April, with a minor migration peak in the fall (Gulf of Mexico Fishery Management Council [GMFMC] 2004). Although brown shrimp can tolerate wide ranges of salinity and temperature, adverse conditions can reduce growth and survival of postlarvae and juveniles in the estuary. Thus, commercial production of brown shrimp in a Louisiana study was found to be low when postlarvae recruited early to areas of low salinity (less than 8 ppt) and temperature (less than 20 degrees Celsius [68 degrees Fahrenheit]), but was higher when they recruited at later dates to areas with salinities greater than 15 ppt and temperatures greater than 20 degrees C (Larson et al. 1989). Another study found that brown shrimp production in Louisiana was correlated with the acreage of marsh with water above 10 ppt salinity (GMFMC 2004). The expected salinities in the CWA (12 ppt to 14 ppt) would be above the lower salinities associated in these studies with reduced productivity and would be well within the range to which brown shrimp, and their food sources, are adapted. Postlarvae

and juveniles have been found to exhibit good growth at salinities down to 2 ppt, so any localized reductions in salinity within the CWA to less than 10 ppt, such as due to rainfall and reduced tidal influx, should not adversely affect brown shrimp populations. Larval and juvenile brown shrimp would be able to pass through the culverts around the cofferdam during the period the bayou is closed for construction, though the numbers of postlarvae that would be carried in by the tides and the numbers of subadults that would be able to emigrate out to offshore habitats would be restricted. These life stages also would be able to enter and leave the CWA via Bayou Bienvenue, with constraints on their movements as described above for the red drum. Because these direct effects would be temporary and would not extend beyond 12 months in duration, they are not expected to substantially impact brown shrimp EFH or populations.

The white shrimp also utilizes the brackish marshes of the CWA as nursery habitat during its postlarval and juvenile life stages. Following these stages, subadult white shrimp leave estuaries on ebb tides during full moons and emigrate to nearshore habitats in late August and September. Adult white shrimp inhabit nearshore waters of the Gulf and spawn in depths between 9 and 34 meters from spring to fall. The pelagic larvae remain there until they metamorphose to postlarvae, then they migrate inshore to estuarine nursery areas. White shrimp postlarvae enter estuaries through passes from May to November, with migration peaks in June and September (GMFMC 2004). Given the similarities between their life histories and habitats, direct impacts of the proposed action on white shrimp EFH are expected to be essentially the same as for brown shrimp.

Indirect Impacts

The proposed action would indirectly impact EFH through the effects described above for the wetlands and waterways that comprise EFH in the project area, particularly the CWA. The proposed action would have temporary indirect impacts from the closing of Bayou Dupre during construction for a period of approximately 8 months to 12 months. During this period, a reduction in access to over 40,000 acres of marsh edge and inner marsh habitat in the CWA would occur from closure of the bayou. As discussed above under the no action alternative, access to marshes of the CWA would be further restricted during this period by a cofferdam on Bayou Bienvenue in the Tier 2 Borgne alignment. A reduction in access to these marsh habitats could result in indirect impacts to EFH species during construction through reduced recruitment of larvae into the CWA, decreased availability of prey and other food sources in the marshes, and resulting reductions in species populations.

Construction in the bayou channel and adjacent wetlands could cause downstream increases in turbidity and sedimentation that could impact fish survival and growth. However, construction-related runoff into the wetlands would be managed through BMPs and a SWPPP would be implemented, which would minimize the potential indirect adverse impacts from this alternative on EFH. Those impacts would be short-term, up to 3 years in duration, with effects lasting up to several months after construction is completed. Hearing impairments caused by loud construction activities, such as pile driving, have been shown to affect some fish species by reducing their ability to locate prey, increasing their risk of predation, and possibly reducing their reproductive success (Hastings and Popper 2005). However, activities generating loud underwater noise would be very localized and temporary, and species utilizing EFH in the vicinity could readily avoid proximity to the source.

Cumulative Impacts

Cumulative impacts on EFH from the proposed action in conjunction with other projects in the region would be similar to those described above for fisheries. Construction and restoration projects are currently in progress or planned within the scheduled construction time frame of the proposed action. These projects may affect water characteristics such as pH, dissolved oxygen,

salinity, tidal exchange, and hydrology near and in the project area, which could result in cumulative impacts to EFH. For example, the project area would be affected by the closure of the MRGO at Bayou La Loutre and from the action to provide hurricane and storm risk reduction on the IHNC (IER #11 Tier 2 Borgne). The MRGO and Lake Borgne allow for tidal exchange, through which water from the Gulf of Mexico enters into the CWA. However, the de-authorization of the MRGO and construction of the closure at Bayou La Loutre reduce tidal exchange from the MRGO and the movement of more saline water northward into the project area from the Gulf of Mexico (Breton Sound). The cumulative impacts of these other USACE projects on hydrology and salinity in the CWA are discussed in more detail for wetlands under the no action alternative (section 3.2.1). As described in that section, modeling indicates that cumulative effects on the IER #8 project area would likely reduce salinities in the CWA by about one-third, resulting in salinities of around 12 ppt to 14 ppt and maintaining brackish conditions in the estuarine EFH of the CWA.

Under construction conditions in which Bayou Bienvenue could be essentially closed by a cofferdam in the Tier 2 Borgne alignment at the same time that Bayou Dupre is closed, the tidal range behind the barrier (protected side) likely would be further reduced from the range of about 10 inches predicated by the model for the condition in which the gate on Bayou Bienvenue is open and Bayou Dupre is closed. Cumulative impacts on tidal ranges in the CWA from the other projects in the area would slightly reduce the tidal range in the CWA, and it likely would be temporarily reduced further during the period when Bayou Bienvenue is closed. The cumulative effect on water elevations in the CWA in conjunction with pumping activities during extreme rainfall conditions would be limited and under more normal rainfall conditions would be minimal.

Populations of EFH species that utilize the habitats of the CWA could be affected either positively or negatively by changes in salinity and other water quality and hydrology characteristics, depending on their sensitivities to the affected parameters. The expected salinities in the CWA (12 ppt to 14 ppt) would not be expected to reduce productivity of the EFH species in the CWA as they are well within the range of salinities to which these species are adapted. The reductions in salinities associated with the cumulative effects of these projects are likely to improve EFH by increasing the extent, species diversity, and stability of brackish and intermediate marshes, returning area marshes to conditions more similar to those that existed historically. Also, the limited changes in tidal range and stormwater accumulation in the CWA as a result of cumulative effects from other projects and activities would not be expected to adversely impact EFH. Passage for brown shrimp, white shrimp, and red drum up and down the MRGO would be blocked by the total closure structure under construction at Bayou La Loutre. However, there are numerous alternate routes from Breton and Chandeleur Sounds to Lake Borgne and the northern portion of the MRGO, such as through Bayou La Loutre and other waterways. This would allow for continued movement of larvae and other life stages through the estuaries to Bayou Dupre via routes such as those that existed before the MRGO was constructed (USACE 2007b).

Accordingly, it is unlikely that EFH species would be adversely affected by the cumulative impacts of the water-related projects in the region. Effects resulting in decreased salinities in area marshes are likely to have beneficial effects on EFH. Projects that could contribute to cumulative impacts are discussed in more detail in section 4. In summary, the proposed action would have limited, short-term, direct impacts on some life stages of the three EFH species that commonly utilize the CWA due to blockage of Bayou Dupre during construction. Long-term impacts from the proposed action on these EFH species are expected to be minimal and would not warrant mitigation.

Future Conditions with Alternative 1 – Channel Realignment to the Northwest of the Existing Channel

Direct Impacts

Direct impacts of alternative 1 on EFH would be essentially the same as described above for fisheries under alternative 1. The creation of a new channel would result in the immediate loss of a very small area of brackish marsh along the shoreline of Bayou Dupre (approximately 0.2 acre). However, this area is negligible in comparison to the extensive areas of similar habitat in the vicinity, and a similar area of marsh may develop along the new shoreline created when the current channel is filled.

Unlike the proposed action, this alternative would not require the construction of a cofferdam and blockage of the bayou channel for an 8-month to 12-month period. The existing gate structure could remain in operation during construction of the adjacent new structure and channel. Thus, direct impacts associated with a cofferdam closure would not occur under this alternative.

During the subsequent long-term period of operation after construction, the flood gate could adversely impact EFH species if they are temporarily entrapped in the CWA. However, the flood gate would be closed only as it is under current conditions, to prevent infrequent flooding associated with major high tide and storm events. Thus, the potential for fish entrapment would be limited. Because the new structure would have the same width and depth as the old, velocities through the gate opening would be the same as under existing conditions, and EFH species would be able to pass through to enter and leave the CWA as they currently do.

Indirect Impacts

Indirect impacts of alternative 1 on EFH would be essentially the same as described above for fisheries under the proposed action.

Cumulative Impacts

Cumulative impacts on EFH from alternative 1 in conjunction with other projects in the region would be essentially the same as described above for the no action alternative. Thus, under alternative 1, EFH would remain relatively stable with possibly some improvement from the closure of the MRGO at Bayou La Loutre and approved and ongoing wetland restoration projects in the region. The CWA would continue to be a highly managed and altered system of wetlands and waterways in which hydrology, salinity, water surface elevation, and other characteristics are affected by the sector gate on Bayou Dupre and many other structures.

The cumulative impacts of regional projects on hydrology and salinity are discussed in more detail for wetlands in section 3.2.1. As described in that section, modeling indicates that the cumulative effects of other USACE projects affecting the IER #8 project area under the no action scenario would likely reduce salinities in the CWA by about one-third. This would maintain brackish conditions in the wetlands of the CWA while reducing saltwater intrusion. Brackish marshes are EFH for the juvenile life stage of red drum, brown shrimp, and white shrimp. Reductions in saltwater intrusion and improvements in the condition and extent of brackish marsh are likely to provide more optimal conditions for the growth and development of these species. Also as discussed in section 3.2.1, tidal ranges would be reduced by roughly one-half within the CWA over the long term, from typical baseline ranges of approximately 19 inches to estimated ranges potentially around 8 inches as a result of the cumulative effects from multiple projects in the region. This would affect the duration of inundation in some areas of the marsh. For example, under average conditions, higher areas that currently are inundated only at high tide

would be inundated for shorter intervals or not at all, reducing the habitat area available to fish and shrimp for foraging during high tide. However, some low areas that currently are exposed only at low tide would remain inundated, allowing longer access to these areas as habitat. Given the very flat topography of the CWA, such areas are expected to be a minor component of the available EFH.

3.2.5 Wildlife

Existing Conditions

The diversity and abundance of wildlife inhabiting the project area are dependent on the quality and extent of suitable habitat present. The areas potentially affected by the proposed IER # 8 project are within or immediately adjacent to the current locations of the control structure at Bayou Dupre. Construction-related activities under the proposed action would be located adjacent to the current structure along the existing bayou channel and under the alternative would be located immediately to the northwest and parallel to the current channel, along the path of the historical bayou channel. The terrestrial wildlife habitat potentially affected would be in these areas near the bayou from the flood-side to the protected-side of the existing levee.

Potential wildlife habitat in the project corridor along the bayou occurs principally on existing MRGO levee and riprap. The vegetation communities in these areas between the MRGO and the boundary of the levee right-of-way (ROW) on the protected-side of the levee consist mainly of grasses with scattered shrubs and small trees. The grassy areas along the levee ROW are mowed periodically, maintaining limited diversity in the vegetation community and resulting in limited cover or other habitat components supportive of wildlife.

On the protected side of the levee ROW, riparian forested wetland habitat occurs along the bayou shorelines. This forest community consists of a canopy of small to moderately tall deciduous trees with a dense shrub layer; it provides the greatest diversity and quality of wildlife habitat within the potential IER # 8 project areas.

Wildlife that typically inhabit terrestrial and brackish aquatic habitats such as those in the project area include a diverse assemblage of amphibians, reptiles, birds, and mammals. Representatives of these classes that may occur in the habitats of the project area can be identified based on the geographical ranges and habitat preferences of each species. An amphibian that may occur in these habitats is the Gulf coast toad (*Bufo valliceps*) (Conant and Collins 1998, Felley 1992, Wigley and Lancia 1998). Reptiles that may utilize habitats such as those of the project area include the American alligator (*Alligator mississippiensis*), Mississippi diamondback terrapin (*Malaclemys terrapin pileata*), common snapping turtle (*Chelydra serpentina*), green anole (*Anolis carolinensis*), Gulf salt marsh snake (*Nerodia clarkii clarkii*), marsh brown snake (*Storeria dekayi limnetes*), and rough green snake (*Opheodrys aestivus*) (Conant and Collins 1998, Felley 1992, Wigley and Lancia 1998).
Mammals that may occur in the habitats of the project area include the nutria (*Myocastor coypus*), muskrat (*Ondatra zibethicus*), swamp rabbit (*Sylvilagus aquaticus*), marsh rice rat (*Oryzomys palustris*), cotton mouse (*Peromyscus gossypinus*), golden mouse (*Ochrotomys nuttalli*), least shrew (*Cryptotis parva*), raccoon (*Procyon lotor*), and white-tailed deer (*Odocoileus virginianus*) (Whitaker 1998, Wigley and Lancia 1998).

Birds that may utilize the habitats of the project area include both non-migratory residents of the region and migratory species that are present only part of the year. Non-migratory species that may use these habitats include the anhinga (*Anhinga anhinga*), double-crested cormorant (*Phalacrocorax auritus*), great blue heron (*Ardea herodias*), great egret (*Ardea alba*), tricolored heron (*Egretta tricolor*), snowy egret (*Egretta thula*), black-crowned night heron (*Nycticorax nycticorax*), green heron (*Butorides virescens*), white ibis (*Eudocimus albus*), barred owl (*Strix*

varia), bald eagle (*Haliaeetus leucocephalus*), downy woodpecker (*Picoides pubescens*), common crow (*Corvus brachyrhynchos*), red-winged blackbird (*Agelaius phoeniceus*), and northern cardinal (*Cardinalis cardinalis*). Migrant birds that may occur in the area only during the spring/summer breeding season include the acadian flycatcher (*Empidonax virescens*) and barn swallow (*Hirundo rustica*). Migrant birds that may occur in the area mainly during winter include the red-breasted nuthatch (*Sitta canadensis*), gray catbird (*Dumetella carolinensis*), hermit thrush (*Catharus guttatus*), rusty blackbird (*Euphagus carolinus*), swamp sparrow (*Melospiza georgiana*), and song sparrow (*Melospiza melodia*), as well as the mallard (*Anas platyrhynchos*), blue-winged teal (*Anas discors*), and other waterfowl (Dunn and Alderfer 2006, Wigley and Lancia 1998).

Although the bald eagle was recently delisted as a Federally threatened species (August 2007), it continues to be protected under the Bald and Golden Eagle Protection Act, as well as the Migratory Bird Treaty Act. Habitats suitable for use by the bald eagle are present in St. Bernard Parish, and occurrences of the bald eagle have been recorded in the parish. According to U.S. Fish and Wildlife Service (USFWS) records, bald eagle nests have been documented near the IER # 10 project area (USFWS 2009). Because the forested wetlands in this area of the parish provide nesting habitat for bald eagles, there also is a possibility of undocumented nests in the project area. However, habitats in the immediate IER # 8 project area do not have characteristics that would be particularly attractive to bald eagles for nesting, such as large bald cypress or other tall trees.

Discussion of Impacts

Future Conditions with No Action

Direct, Indirect, and Cumulative Impacts

Without implementation of the proposed action, the existing flood control structure would be raised to the previously authorized elevation (an increase in height of approximately 2 ft), incorporating new engineering standards and design criteria. Effects of the raised structure on wildlife would not differ from those under existing conditions, as described previously; thus, there would be essentially no adverse impacts on wildlife.

Future Conditions with Proposed Action

Direct Impacts

Construction under the proposed action of a new gate structure along the bayou channel approximately 130 ft to the flood side of the existing structure centerline would not result in the loss of quality wildlife habitat because the footprint of the new structure on each bank of the bayou would remain within areas that are currently covered by riprap (figures 3 and 4). The approaches to the proposed pontoon bridge structure also would occupy a small area that is currently covered by rock. The operation of the sector gate and pontoon bridge would be relatively slow, noisy, and infrequent; therefore, these operations would have little to no adverse impacts on wildlife. The greatest potential for effects on wildlife associated with the implementation of the proposed action would occur during the construction period. The presence of construction-related activity, machinery, and noise would be expected to cause most wildlife to avoid the construction area as well as nearby habitats during the construction period.

Although birds are highly mobile and able to move to other habitats in the vicinity, local populations of species that nest in colonies could be adversely affected if construction activities caused abandonment of nesting sites. The reproductive capacity of local or regional populations of one or more species may depend on a given nesting colony, so disturbance of a colony could

adversely affect these populations. The area of LPV 144.02 at Bayou Dupre is not known to be utilized for colonial nesting by wading birds such as herons, egrets, and ibises or water birds such as the anhinga and double-crested cormorant. Although these birds nest in trees and potentially could nest in the forested wetland habitats on the protected side of the levee, nesting colonies have not been recorded in this area. In order to minimize the potential for construction under the proposed action to disturb colonial-nesting wading birds should they become established in the area, procedures recommended by the USFWS would be followed (USFWS 2009). Prior to construction, the project area would be inspected by the USFWS or other qualified personnel for the presence of nesting colonies during the nesting season (typically February through September in this region, depending on the species). Construction-related activities that would occur within 1,000 ft of a colony would be restricted to the non-nesting period. The 1,000-ft buffer would be maintained during the nesting season (USFWS 2009).

Although bald eagles may nest in mature trees near marshes and open water habitat, eagle nests have not been recorded in the vicinity of the Bayou Dupre structure, and the USFWS has concurred with the CEMVN determination that the proposed action would not be likely to adversely affect the bald eagle (USFWS 2009).

Indirect Impacts

Potential indirect impacts on wildlife from the proposed action mainly would involve displacement of wildlife populations from the project area. Movement of the limited numbers of wildlife that currently inhabit this small area into surrounding, unimpacted habitats would not be expected to result in exceedances of the carrying capacity of the extensive, adjacent habitats.

Cumulative Impacts

Potential cumulative impacts on wildlife from the proposed action mainly would involve the combined effects on wildlife from habitat loss and displacement of wildlife populations from the multiple LPV flood control projects in the New Orleans area. These projects are discussed in detail in section 4. The habitat that would be affected in the vicinity of Bayou Dupre is not a high-quality or unique habitat but is similar to extensive areas of dredged material that have been vegetated with grasses and other herbs in the New Orleans region. The potentially impacted habitat area at Bayou Dupre is extremely small in the context of similar habitat in the region. If the area impacted by the construction of the proposed project were added to the areas of similar habitats potentially impacted by other LPV projects, the loss of this type of wildlife habitat would be very small compared to the available habitat remaining. Movement of the limited numbers of wildlife that currently inhabit these areas into surrounding, unimpacted habitats would not be expected to result in exceedances of the carrying capacity of the extensive, adjacent habitats. Habitat restoration, creation, and stabilization projects proposed or constructed in nearby areas are discussed in section 4.2.

Future Conditions with Alternative 1 – Channel Realignment to the Northwest of the Existing Channel

Direct Impacts

The direct adverse effects on wildlife from this alternative would be greater than those described for the proposed action. A new channel would be excavated approximately 330 ft northwest of the existing channel, approximately aligned with the original Bayou Dupre channel that was filled when the current channel was built. As a result, there would be a loss of wildlife habitat within the construction corridor. The affected habitat would consist principally of grasses and other herbaceous vegetation growing on the fill within the construction corridor between the levee and the MRGO. Within this corridor, there could be impacts to birds, mammals, reptiles,

and amphibians from construction of the new channel and flood control structure. The project footprint would affect a very small area of marginal, mainly grassy habitat that has become established on the dredged material along the MRGO between the armored shoreline and the levee. In addition, the small area potentially affected by the project is adjacent to a large area of similar habitat along the MRGO to the northwest and southeast. Wildlife currently using the habitat in the project corridor could move to adjacent habitats at the start of construction. After construction of the new channel and structure, filling of the existing channel, and revegetation of the filled channel, a habitat area comparable to that lost to construction would be restored, and displaced wildlife could return.

This alternative could potentially result in construction activity within the 1,000-ft buffer around a wading bird or water bird nesting colony should such a colony occur in the adjacent forested habitats on the protected-side of the levee ROW. The procedures discussed previously under the proposed action would be employed to prevent disturbance of colonial nesting sites.

Indirect Impacts

The indirect adverse effects on wildlife from this alternative would be similar to those described for the proposed action. Thus, wildlife would be unlikely to be adversely affected by indirect effects from this alternative, and any such effects would occur during construction and would be temporary.

Cumulative Impacts

The cumulative adverse impacts on wildlife from this alternative would be similar to those described for the proposed action. Thus, wildlife would be unlikely to be adversely affected by cumulative effects from this alternative.

3.2.6 Threatened and Endangered Species

Existing Conditions

In accordance with the consultation provisions of the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 USC 1531 et seq.), the CEMVN submitted a letter to the USFWS on 7 November 2007 and re-coordinated on 29 December 2008, requesting review of the proposed project to modify flood control structures in Orleans, Jefferson, and St. Bernard Parishes (IERs # 5 through # 11), including IER # 8 (LPV 144.02). In response and in accordance with the provisions of the ESA, the Bald and Golden Eagle Protection Act (54 Stat. 250, as amended; 16 USC 668a-d), the Migratory Bird Treaty Act of 1918 (40 Stat. 755, as amended; 16 USC 703 et seq.), and the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 USC 661 et seq.), the USFWS responded in a letter on 2 February 2009 (USFWS 2009) identifying listed species that potentially could be adversely affected by the IER # 5 through # 11 projects. Occurrences of rare, threatened, and endangered species are tracked by the LaNHP and reported by parish (Louisiana Department of Wildlife and Fisheries [LaDWF] and LaNHP 2007). Of the six wildlife species that are Federally listed as endangered or threatened in Louisiana and have been reported as occurring in St. Bernard Parish, the USFWS identified only one that could potentially be impacted by the IER # 8 project: the endangered West Indian manatee (*Trichechus manatus*) (USFWS 2009, USFWS 2007a, LaDWF and LaNHP 2007). USFWS (2009) concurred with the determination that the manatee would not be adversely affected by the IER # 8 project if protective measures, as described in the following impacts discussion, are followed during construction.

One of the listed species potentially occurring in the area, the threatened Gulf sturgeon (*Acipenser oxyrinchus desotoi*), was not evaluated by the USFWS for its potential to be

impacted. As noted in the USFWS letter (USFWS 2009), the responsibility for protection of the Gulf sturgeon in estuarine habitats is shared by the USFWS with the NMFS, and the responsible agency is dependent on the Federal agency requesting consultation. For the USACE and all but four other federal agencies, consultation regarding the Gulf sturgeon is handled by the NMFS (USFWS 2009). In addition, three other Federally listed species that are the responsibility of NMFS could potentially occur in the project area: the endangered Kemp's ridley sea turtle (*Lepidochelys kempii*), the threatened loggerhead sea turtle (*Caretta caretta*), and the threatened green sea turtle (*Chelonia mydas*). The manatee, Gulf sturgeon, and Kemp's ridley, loggerhead, and green sea turtles are discussed below.

West Indian Manatee

The West Indian manatee is Federally and state-listed as endangered and also is protected under the Marine Mammal Protection Act of 1972, under which it is considered depleted (USFWS 2001). It occurs in both freshwater and saltwater habitats within tropical and subtropical regions and includes two subspecies, the Florida manatee (*T. manatus latirostris*) and the Antillean manatee (*T. manatus manatus*). The primary human-related threats to the manatee include watercraft-related strikes (impacts and/or propeller strikes), crushing and/or entrapment in water control structures (flood gates, navigation locks), and entanglement in fishing gear (discarded fishing line, crab traps) (USFWS 2007b).

The Florida manatee can occur throughout the coastal regions of the southeastern U. S. and may disperse greater distances during warmer months; it has been sighted as far north as Massachusetts and as far west as Texas. However, the manatee is a subtropical species with little tolerance for cold, and it returns to and remains in the vicinity of warm-water sites in peninsular Florida during the winter (USFWS 2007b; USFWS 2007c). Thus, the manatee is not a year-round resident in Louisiana, but it may migrate there during warmer months. Manatees prefer access to natural springs or man-made warm water and waters with dense beds of submerged aquatic or floating vegetation. Manatees prefer to forage in shallow grass beds that are adjacent to deeper channels. They seek out quiet areas in canals, creeks, lagoons, or rivers, using deeper channels as migratory routes (USFWS 1999).

There have been 110 reported sightings of manatees in Louisiana since 1975 (LaDWF 2005b). Sightings in Louisiana have been uncommon and sporadic, and have included occurrences in Lake Pontchartrain and in the vicinity of the MRGO and Bayous Bienvenue and Dupre (Abadie et al. 2000). Although manatees can enter the project area from the MRGO and can occur in the CWA, preferred food sources (submerged or floating aquatic vegetation) are not abundant in the project area. Given the lack of habitat availability, it is unlikely that manatees would frequently occur in the project area.

Gulf Sturgeon

The Gulf sturgeon is Federally listed as threatened throughout its range and is state-listed as threatened in Louisiana. It supported an important commercial fishing industry during the late 19th and early 20th centuries. A minor commercial fishery was reported to exist for Gulf sturgeon in Lake Pontchartrain and its tributaries during the late 1960s (USFWS and NMFS 2003). Throughout most of the 20th century, Gulf sturgeon suffered population declines due to over fishing, habitat loss, water quality deterioration, and barriers to historic migration routes and spawning areas (dams). In 1991, the Gulf sturgeon was listed as a threatened species under the Endangered Species Act (16 United States Code [USC] 1531 et seq.). The present range of the species extends from Lake Pontchartrain and the Pearl River system in Louisiana and Mississippi east to the Suwannee River in Florida (USFWS and NMFS 2003).

The Gulf sturgeon is an anadromous fish that migrates from saltwater into large coastal rivers to spawn and spend the warm months. Subadults and adults typically spend the three to four coolest months in estuaries or Gulf of Mexico waters before migrating into rivers as temperatures increase. This migration typically occurs from mid-March through June. Most adults would spend eight to nine months each year in rivers before returning to the estuary or the Gulf of Mexico by mid-November to early December. Thus, the Gulf sturgeon spends the majority of its life in freshwater (USFWS and GSMFC 1995), yet subadult and adult Gulf sturgeon do not feed significantly in freshwater; instead, they rely almost entirely on the estuarine and marine areas for feeding. Young-of-the-year and juveniles feed mostly in the riverine environment (USFWS and NMFS 2003).

Critical habitat identifies specific areas that are essential to the conservation of a listed species. Various activities in or adjacent to each of the critical habitat units may affect certain physical and biological features necessary to the preservation of the species and, therefore, may require special management considerations or protection. Fourteen geographic areas (units) among the Gulf of Mexico rivers and tributaries have been designated as critical habitat for this species. Offshore critical habitat for the Gulf sturgeon extends from Lake Borgne and the Rigolets along the Gulf Coast to the Suwannee Sound, Florida. Of the 14 units designated by USFWS and the NMFS among Gulf of Mexico rivers and tributaries, Units 1 to 7 are river systems and Units 8 to 14 are estuarine and marine systems (USFWS and NMFS 2003). The project area is adjacent to portions of Unit 8, which encompasses Lake Pontchartrain east of the Lake Pontchartrain Causeway, all of Little Lake, the Rigolets, Lake Catherine, Lake Borgne, and the Mississippi Sound. Critical habitat follows the shorelines of each water body. Estuaries and bays located adjacent to riverine units were designated as critical habitat to protect unobstructed passages for sturgeon between feeding and spawning areas (USACE 2006a). Sturgeon migrations to rivers that enter Lake Pontchartrain follow routes through Lake Borgne and the Rigolets. Studies conducted by the LaDWF have shown the presence of Gulf sturgeon in Lake Pontchartrain, the Rigolets, and Lake Borgne during the winter and during periods of migration to and from marine environments. Thus, critical habitat was designated for the Gulf sturgeon in each of these areas (USACE 2006a).

In Lake Borgne from the 1950s through the 1980s, many Gulf sturgeon were reported as taken incidentally in shrimp trawls between August and October. At least 22 additional records of Gulf sturgeon in Lake Borgne exist. These occurrences were located around the perimeter of the lake, including Bayou Bienvenue and the Violet Canal, which connects to Bayou Dupre. Both the USFWS and the NMFS have included all of Lake Borgne as critical habitat (USFWS and NMFS 2003). The only recent sighting of Gulf sturgeon within the MRGO occurred during a sonic tracking study completed by the USACE Engineer Research and Development Center 19 January 2005. The Engineer Research and Development Center tracked a Gulf sturgeon moving from within the MRGO above Bayou La Loutre toward the marshes adjacent to the MRGO. Gulf sturgeon have also been collected in Breton Sound and from bayous connected to the MRGO. This suggests that, due to the proximity of the MRGO to the Breton Islands, sturgeon may use this channel as a passageway from Lake Borgne to the islands (USACE 2006a). However, the MRGO has not been designated as critical habitat (USFWS and NMFS 2003). It should be noted that with de-authorization of the MRGO and construction of a closure structure at Bayou La Loutre, this connection to the Gulf of Mexico will no longer exist.

The IER # 8 flood control structure is at the mouth of Bayou Dupre, where the bayou opens to the MRGO. This control structure is adjacent to designated critical habitat for the Gulf sturgeon in Lake Borgne. Accordingly, Gulf sturgeon may pass through this structure when present in the area, principally during the three to four coolest, winter months and periods of migration to and from marine environments in Lake Borgne and the Mississippi Sound. Gulf sturgeon would not be expected to occur in the project area during the eight to nine warmer months of the year. Therefore, the Gulf sturgeon would not be expected to utilize the IER # 8 project area as a

significant component of its habitat. Although individuals may pass through this control structure in winter if they forage in the CWA, their presence in the project area would be transitory and incidental.

Kemp's Ridley, Loggerhead, and Green Sea Turtles

Sea turtles are air-breathing reptiles with large flippers and streamlined bodies. They inhabit tropical and subtropical marine and estuarine waters around the world. Of the seven species in the world, six occur in waters of the U.S., and all are listed as threatened or endangered. The three species identified by NMFS as potentially occurring in the region of the project area are similar in appearance, though they differ in maximum size and coloration. The Kemp's ridley is the smallest sea turtle; adults average about 100 pounds with a carapace length of 24 to 28 inches and a shell color that varies from gray in young individuals to olive green in adults. The loggerhead is the next largest of these three species; adults average about 250 pounds with a carapace length of 36 inches and a reddish brown shell color. The green is the largest of the three; adults average 300 pounds to 350 pounds with a length of more than 3 ft and brown coloration (its name comes from its greenish colored fat) (NMFS 2008).

The Kemp's ridley has a carnivorous diet that consists mainly of crabs and may also include fish, jellyfish, and mollusks. The loggerhead has an omnivorous diet that includes fish, jellyfish, mollusks, crustaceans, and aquatic plants. The green has a herbivorous diet of aquatic plants, mainly seagrasses and algae, which is unique among sea turtles. All three species are known to forage as juveniles and adults in nearshore waters, including estuaries, in Louisiana and may be more likely to occur there in months when the waters are warmer. The Kemp's ridley and loggerhead turtles are most likely to find suitable foraging habitat for invertebrates and fish in the open waters in the vicinity of Lake Borgne. The green turtle is less likely to occur there due to the scarcity of the seagrasses on which they feed. All three species nest on sandy beaches, which are not present in the project area, and the Kemp's ridley does not nest in Louisiana. The life stages that may occur in the project area are likely to be older juveniles to adults (NMFS 2008).

Discussion of Impacts

Future Conditions with No Action

Direct, Indirect, and Cumulative Impacts

Without implementation of the proposed action, no direct, indirect, or cumulative impacts to endangered or threatened species would occur. Under this alternative, the existing flood control structure would be raised to the previously authorized elevation (an increase in height of approximately 2 ft), incorporating new engineering standards and design criteria. Effects on endangered or threatened species would not differ from those under existing conditions, as described previously. Also, with closure of the MRGO at Bayou La Loutre, this direct connection with the Gulf of Mexico will be eliminated, potentially decreasing the presence of endangered or endangered species in the project area. Thus, effects from the no action alternative on endangered or threatened species would be unlikely to adversely affect these species.

Future Conditions with Proposed Action

Direct Impacts

Construction under the proposed action would not result in the loss of habitat for endangered or threatened species. As discussed previously, the manatee was the only Federally listed

endangered or threatened species identified by USFWS as having a potential to be adversely affected by the IER # 8 project. In addition, there is the possibility that the Gulf sturgeon or Kemp's ridley, loggerhead, and green sea turtles, under NMFS jurisdiction, also could occur in or pass through the area sporadically.

The greatest potential for direct effects on the manatee associated with the implementation of the proposed action would occur during the construction period (estimated to last up to approximately 3 years). The presence of construction-related activity, machinery, and noise likely would cause the manatee to avoid the project area during construction. When flow is restricted during the construction period, the potential for this species to move from the MRGO into Bayou Dupre would be restricted. Closure of the bayou during construction also could cause changes in hydrology, salinity, and water quality that may affect plant food sources for the manatee in the vicinity of the bayou. However, given the extensive foraging habitat in the region, any such changes in the project area during the construction period would be unlikely to adversely affect this species.

In order to minimize the potential for construction activities under the proposed action to impact the manatee, standard manatee protection measures would be followed. These procedures have been recommended by the USFWS (USFWS 2009) and adopted by the USACE (2005) for use in situations where in-water construction activities potentially could occur where manatees may be present. These procedures include the following:

> All contract personnel associated with the project would be informed of the potential presence of manatees and the need to avoid collisions with manatees. All construction personnel would be responsible for observing water-related activities for the presence of manatees. Temporary signs would be posted prior to and during all construction or dredging activities to remind personnel to be observant for manatees during active construction/dredging operations or within vessel movement zones (i.e., the work area), and at least one sign would be placed where it is visible to the vessel operator. Siltation barriers, if used, would be made of material in which manatees could not become entangled and would be properly secured and monitored. If a manatee is sighted within 100 yards of the active work zone, special operating conditions would be implemented, including: moving equipment would not operate within 50 ft of a manatee; all vessels would operate at no wake/idle speeds within 100 yards of the work area; and siltation barriers, if used, would be re-secured and monitored. Once the manatee has left the 100-yard buffer zone around the work area of its own accord, special operating conditions would no longer be necessary, but careful observations would be resumed. Any manatee sighting would be immediately reported to the U.S. Fish and Wildlife Service (337/291-3100) and the LaDWF, LaNHP (225/765-2821). These procedures have been recommended by the USFWS (2009) and adopted by the USACE (2005) for use in situations where in-water construction activities potentially could occur when manatees may be present.

Assuming the above procedures for preventing disturbance or injury to manatees are employed, the potential for direct impacts during the period of construction of the proposed action at Bayou Dupre would be minimal and unlikely to adversely affect this species.

Following construction, manatees would be able to swim through the Bayou Dupre gate with little hindrance when the gate is open, which it would be most of the time. Although the gate could pose a limited risk of injury during the long-term period of operation, future risks due to this project would be no greater than those from current operation of the existing gate. Entrapment in water-control structures and navigational locks is the second largest human-related cause of manatee deaths (USFWS 2001). The sector gate on Bayou Dupre would be closed only infrequently (typically a few times per month) as needed to prevent flooding

associated with major storms and high tides, or for maintenance. The low likelihood of a manatee being present in the project area because it does not provide suitable/preferred manatee habitat, combined with the low likelihood of a gate being closed when a manatee is present, would minimize the potential for a manatee to be trapped or injured by the operation of a gate. In addition, the relatively slow movement of the gate would likely give a manatee time to move out of the gate opening.

Collisions with boats and barges are a primary human-related threat to manatees and pose a limited risk to this species in Bayou Dupre under existing conditions. The presence of the current gate structure on Bayou Dupre constricts the channel through which both boats and wildlife pass. Under the proposed action, this constriction would continue along with the potential for injuries to manatees should they swim through the gate at the same time a boat is passing through. Given the relative rarity of manatees in the project area, the likelihood of this occurrence is expected to be very low. In addition, the slow speeds of boats required as they pass through the gate would increase the response time available to these animals to avoid a collision and, if an impact occurs, the degree of injury generally will be lower if the boat is operating at slower speeds (USFWS 2007b). Thus, the potential short-term or long-term direct effects on the manatee resulting from the proposed action would be unlikely to adversely affect this species.

The greatest potential for direct effects associated with the implementation of the proposed action on the Gulf sturgeon and Kemp's ridley, green, and loggerhead sea turtles would occur during the construction period. The presence of construction-related activity, machinery, and noise likely would cause the Gulf sturgeon and sea turtles to avoid the project area during construction. When flow is restricted during the construction period, the potential for these species to move from the MRGO into Bayou Dupre would be restricted. Closure of the bayou during construction also could affect the movement of prey organisms in and out of the bayou and its associated tidal creeks and marshes, as well as causing changes in hydrology, salinity, and water quality that may affect food sources in the vicinity of the bayou. However, given the minimal habitat provided for these species in the project area and the extensive foraging habitat in the region, any such changes in the project area during the construction period would not adversely affect these species.

A no effect determination for the Gulf sturgeon and Kemp's ridley, green, and loggerhead sea turtles has been made for the proposed action at IER 8. Factors evaluated for this determination include the following: the area impacted by this project is not designated critical habitat; the channel bottom where the proposed sector gate would be constructed consists of rock and riprap, so it doesn't contain an abundance of prey items (sturgeon prefer sandy bottom substrate, not rock and concrete); no dredging would occur as part of this project – instead, a cofferdam would be installed, the gate would be constructed in the dry, and BMPs and an SWPPP would be implemented to minimize impacts to water quality in the project area; and the new sector gate would be built directly adjacent to an existing sector gate that operates infrequently (a few times per month) for high tide and storm events. Sturgeon and sea turtles could potentially be present in the area, but likely would avoid the area during construction due to noise, lack of prey items, and the currently operating sector gate. During the long-term operation of the new gate, sturgeon and sea turtles could avoid injury during closures of the slow-moving gate and would be able to swim through the gate with little hindrance when the gate is open.

In order to further minimize the potential for construction activities under the proposed action to cause impacts to sea turtles, construction conditions recommended by NMFS would be followed. These conditions include the following:

> All personnel associated with the project would be instructed of the potential presence of sea turtles and the need to avoid collisions with sea turtles. All construction personnel

would be responsible for observing water-related activities for the presence of these species. All construction personnel would be advised that there are civil and criminal penalties for harming, harassing, or killing sea turtles, which are protected under the Endangered Species Act of 1973. Siltation barriers would be made of materials in which sea turtles cannot become entangled, be properly secured, and be regularly monitored to avoid protected species entrapment. Barriers would not block sea turtle entry to or exit from designated critical habitat without prior agreement from the NMFS' Protected Resources Division, St. Petersburg, Florida. All vessels associated with the construction project would operate at "no wake/idle" speeds at all times while in the construction area and while in water depths where the draft of the vessel provides less than a 4-foot clearance from the bottom. All vessels would preferentially follow deep-water routes (e.g. marked channels) whenever possible. If a sea turtle is seen within 100 yards of the active daily construction/dredging operation or vessel movement, all appropriate precautions would be implemented to ensure its protection. These precautions would include the cessation of operation of any moving equipment closer than 50 ft of a sea turtle. Operation of any mechanical construction equipment would cease immediately if a sea turtle is seen within a 50 ft radius of the equipment. Activities would not resume until the protected species has departed the project area of its own volition. Any collision with and/or injury to a sea turtle would be reported immediately to the NMFS' Protected Resources Division (727-824-5312) and the local authorized sea turtle stranding/rescue organization.

Employment of the above procedures for preventing disturbance or injury to sea turtles would ensure that there would be no effect on these species during the period of construction of the proposed action at Bayou Dupre.

In summary, there is the possibility that five Federally-listed species (the manatee, Gulf sturgeon, and Kemp's ridley, loggerhead, and green sea turtles) could occur in the project area. The manatee could transit the area sporadically during the summer, the Gulf sturgeon may be in the area during several months mainly in winter, and sea turtles may enter the area occasionally, mainly during warmer months. The potential for individuals of any of these species to be impacted by the proposed action would be minimal. Procedures for preventing disturbance to these species would be employed during construction, further minimizing the potential for individuals to be affected by the proposed action. Therefore, direct impacts from the proposed action would have no effect on the Gulf sturgeon, or Kemp's ridley, loggerhead, or green sea turtles and would be unlikely to adversely affect the manatee. USFWS concurred with the CEMVN determination of not likely to affect the manatee (USFWS 2009).

Indirect Impacts

Indirect impacts on endangered or threatened species are effects that could occur later in time than direct impacts but still are reasonably certain to occur (NMFS 2006). Given that future operation of the new control structure on Bayou Dupre would be the same as described above for initial operation of the structure, indirect impacts on endangered or threatened species from the proposed action would be essentially the same as the direct impacts. Construction-related runoff into the wetlands and waterways would be managed through BMPs, and an SWPPP would be implemented, which would minimize the potential indirect adverse impacts from this alternative on endangered or threatened species. Also, no dredging would occur as part of this project. Instead, a cofferdam would be installed and the proposed structure would be constructed in the dry area within the cofferdam, minimizing the impacts on water quality. Thus, indirect impacts would have no effect on sea turtles and would be unlikely to adversely affect the manatee.

Cumulative Impacts

Cumulative impacts on endangered and threatened species from the proposed action could occur mainly as a result of the combined effects of this project and the other LPV flood control projects in the New Orleans area on habitat available to the manatee, Gulf sturgeon, and Kemp's ridley, loggerhead, and green sea turtles. The habitats that would be affected in the vicinity of Bayou Dupre are not high-quality, unique, or critical habitats for these species. The potentially impacted habitat areas at Bayou Dupre are extremely small in the context of similar habitats in the region. Any loss of habitat associated with the proposed action would occur mainly during the construction period and would be temporary. If the areas impacted by the construction of these proposed projects were added to the areas of similar habitats potentially impacted by other LPV projects, the loss of this type of aquatic habitat would be negligible compared to the available habitat remaining. In addition, closure of the MRGO at Bayou La Loutre would cut off a direct connection with the Gulf of Mexico that likely has facilitated the movement of species, particularly sea turtles, northward to the project area. Consequently, this closure may reduce the numbers of individuals of threatened or endangered species that migrate through the project area, further reducing the potential for impacts. Thus, cumulative impacts on endangered or threatened species from other actions in conjunction with the proposed action at Bayou Dupre would not adversely affect sea turtles and would be unlikely to adversely affect the manatee.

Future Conditions with Alternative 1 – Channel Realignment to the Northwest of the Existing Channel

Direct Impacts

The direct effects on endangered or threatened species from this alternative would be similar to those described above for the proposed action over the long term because the design and operation of the new flood control structure would be essentially the same as for the proposed action. During the construction period, the potential for impacts on the manatee, Gulf sturgeon, or Kemp's ridley, loggerhead, and green sea turtles would be similar to that under the no action alternative because the existing channel and gate would be left open and would continue to operate as they do currently during construction of the new channel and gate, Although this would allow individuals to pass through the bayou to the protected side of the levee system as they can now, it also would allow them to approach the construction zone from both sides. Assuming the procedures discussed previously under the proposed action would be employed to prevent injury to manatees and sea turtles during in-water construction activities, this alternative would not be likely to adversely affect the manatee and would have no effect on the Gulf sturgeon or Kemp's ridley, loggerhead, or green sea turtles.

Indirect Impacts

Indirect impacts from this alternative on endangered or threatened species would be essentially the same as described for the proposed action. Thus, indirect impacts from this alternative would not be likely to adversely affect the manatee and would have no effect on the Gulf sturgeon or Kemp's ridley, loggerhead, or green sea turtles.

Cumulative Impacts

Cumulative impacts from this alternative on endangered or threatened species would be essentially the same as described for the proposed action. Thus, cumulative impacts would be unlikely to adversely affect the manatee and would have no effect on the Gulf sturgeon or Kemp's ridley, loggerhead, or green sea turtles.

3.2.7 Non-wet Uplands

Existing Conditions

Other than the MRGO man-made earthen levees, there are no significant non-wet uplands in the project area. These areas do not represent significant, native uplands. Therefore, non-wet uplands are not evaluated further as a potentially impacted resource.

3.2.8 Cultural Resources

Existing Conditions

Records on file at the Louisiana Division of Archaeology and the CEMVN indicate previously recorded archaeological and historic properties are located within the general vicinity of the IER # 8 project area (LPV 144.02 - Bayou Dupre control structure). Site forms, previous archaeological investigations, and historic district surveys describe these known properties. Prehistoric middens, hunting and gathering camps, habitation and village sites, and mound sites tend to be located on active and abandoned distributary channel levee complexes, major beach ridges and other stable portions of the delta, and are likely adjacent to marsh and lake environments, including Lake Borgne and Lake Pontchartrain. Due to recent geologic development of the Mississippi delta and the age of the deposits within the project area, the earliest known archaeological sites in the region date to the Poverty Point period (1700 to 500 B.C.). Similarly, historic period sites and structures, such as forts, plantations, farmsteads, bridges, and industrial facilities, are primarily located on relatively high natural levee areas adjacent to waterways. Historic period watercraft are recorded in bayou and river channels and lakes in the region. The following reports provide specific historical information on the IER # 8 project areas (Coastal Environments, Inc. 1983, Jones and Franks 1993, Lackowicz and Titelbaum 2007, Warren 2004, Wiseman et al. 1979).

Three of these cultural resources investigations are particularly relevant to the project areas. In the first study, researchers conducted a pedestrian and boat survey of the MRGO canal and examined the shoreline area in the vicinity of Bayou Dupre (Wiseman et al. 1979). The study did not locate any cultural materials or features in the Bayou Dupre control structure area. In the second study, an investigation of potential MRGO dredged material disposal areas was conducted along both sides of Shell Beach in the vicinity of the Bayou Dupre control structure (Jones and Franks 1993). The field crew examined known sites along Shell Beach and also identified a new prehistoric site to the east. The third study effectively repeated much of the work conducted by Jones and Franks (1993), although it supplemented the terrestrial survey with underwater remote sensing data collection (Warren 2004). This investigation also examined the northerly Bayou Dupre opening at Lake Borgne and adjacent Shell Beach.

The CEMVN contracted R. Christopher Goodwin & Associates to conduct a Phase 1A cultural resources records review and field reconnaissance of the IER # 8 project area (Lackowicz and Titelbaum 2007). Approximately 92 acres were investigated at the Bayou Dupre control structure. Researchers utilized background research, cultural resources investigations review, soil and topographic analyses, and reconnaissance level field data to locate known historic properties and to identify high potential areas for cultural resources. No archaeological sites, historic structures or features, or high probability areas for cultural resources were identified. No further cultural resources investigations were recommended.

The CEMVN held meetings with Louisiana State Historic Preservation Office (LaSHPO) staff and Tribal governments to discuss the emergency alternative arrangements approved for NEPA project review and the development of a Programmatic Agreement (PA) to tailor the Section 106 consultation process under the alternative arrangements. The CEMVN formally initiated Section

106 consultation for the LPV Hurricane Protection Project (100-year), which includes IER # 8, in a letter dated 9 April 2007 and emphasized that standard Section 106 consultation procedures would be implemented during PA development. A public meeting was held on 18 July 2007 to discuss the working draft PA.

In letters to the State Historic Preservation Officer and Indian tribes dated 15 October 2007, the CEMVN provided project documentation, evaluated cultural resources potential in the project area, and found that the proposed action would have no impact on cultural resources. The LaSHPO concurred with the CEMVN's "no historic properties affected" finding in a letter dated 19 November 2007. The Mississippi Band of Choctaw Indians concurred with the effect determination in an email dated 29 November 2007. No other Indian Tribes responded to the request for comments.

Section 106 consultation for the proposed project action is concluded. However, if any unrecorded cultural resources are determined to exist within the proposed project boundaries, then no work will proceed in the area containing these cultural resources until a CEMVN archaeologist has been notified and final coordination with the LaSHPO and Indian tribes has been completed. The following discussion of impacts is based on the preliminary information summarized previously.

Discussion of Impacts

Future Conditions with No Action

Direct Impacts

Under the no action alternative, the existing flood control structure (sector gate and adjacent floodwalls) would be raised to the previously authorized elevation, incorporating new engineering standards and design criteria, and the structure would operate as it normally does. The project area has been subjected to severe ground disturbing activities associated with previous levee, floodwall, and control structure construction, and borrow excavations. The likelihood for intact and undisturbed cultural resources in the existing project right of way is extremely minimal. Implementation of this action would have no direct impact on cultural resources.

Indirect and Cumulative Impacts

The no action alternative would be expected to have no indirect or cumulative impacts on cultural resources in the general project vicinity. All known or unknown cultural resources would continue to be exposed to conditions as they currently exist.

Future Conditions with Proposed Action

Direct Impacts

Based on the review of state records, previous cultural resources studies, and the results of recent Phase 1A cultural resources investigations in the project area, implementation of the proposed action would have no impact on cultural resources. The entire project area has been subjected to severe ground disturbing activities associated with previous levee, floodwall, and control structure construction, borrow excavations, and landscaping. The likelihood for intact and undisturbed cultural resources in the project area is extremely minimal. Implementation of this action would have no direct impact on cultural resources.

Indirect Impacts

Implementation of the proposed action would provide an added level of flood risk reduction to known and unknown archaeological sites located on the protected side of the control structures by reducing erosion during flood events. Erosion of ground deposits during flood events could result in severe damage and destruction of archaeological sites.

Cumulative Impacts

Implementation of the proposed action would have beneficial cumulative impacts on historic properties in the New Orleans metropolitan area. This proposed action is part of the ongoing Federal effort to reduce the threat to property posed by flooding. The combined effects from construction of the multiple projects underway and planned for the HSDRRS would reduce flood risk and storm damage to significant archaeological sites, individual historic properties, engineering structures and nineteen historic districts.

Future Conditions with Alternative 1 – Channel Realignment to the Northwest of the Existing Channel

Direct, Indirect, and Cumulative Impacts

The direct, indirect, and cumulative impacts on cultural resources would be similar to those described previously for the proposed action. Excavation of a new channel northwest of the existing channel could have a potentially greater effect on cultural resources; however, the likelihood for intact and undisturbed cultural resources in the project area is extremely minimal.

3.2.9 Recreational Resources

Existing Conditions

The project area includes Bayou Dupre which is a popular fishing area and also is used by fisherman as a route to other fishing spots on either side of the MRGO or to the MRGO itself. Fishing camps are situated along Bayou Dupre near the project area.

Other recreational activities that are popular in the area include motor boating for pleasure, crabbing, shrimping, hunting, and passive recreational activities, such as observation of wildlife and nature study. Recreational fishing opportunities exist in the project area because of the abundance of fish that are attracted to the highly productive ecosystem in terms of providing a food source and nursery habitat.

The Louisiana Scenic Rivers Act of 1976 (amended 1988, No. 947, Section 1) was adopted to preserve certain rivers with outstanding natural, cultural, or recreational features in a free-flowing condition. The act classifies designated rivers as wild, scenic, or recreational, although most of these streams are used for recreational purposes. The natural and scenic rivers located within the Chalmette Loop sub-basin near the proposed project area are:

- Lake Borgne/Violet Canal
- Bayou Dupre
- Bashman Bayou
- Terre Beau Bayou
- Pirogue Bayou.

These Scenic Rivers are discussed in section 3.2.2 and shown in figure 10.

Discussion of Impacts

Future Conditions with No Action

Direct, Indirect, and Cumulative Impacts

Under this alternative, the existing flood control structure would be raised to the previously authorized elevation (an increase in height of approximately 2 ft), incorporating new engineering standards and design criteria. Effects of the raised structure on recreation would not differ from those under the current conditions.

Recreation camps along Bayou Dupre could continue to be impacted by a storm surge overtopping the existing gate. Many of the camps along this bayou were heavily damaged by Hurricane Katrina. Also, storm surges could damage boat launches and other recreational facilities within St. Bernard Parish and the CWA. If construction to raise the existing structure to the previously authorized elevation were to occur during the time that Bayou Bienvenue would be closed for construction (as described for the proposed action in IER # 11), boat access could be reduced in the area. This would result in a cumulative impact on recreational boating and fishing.

Future Conditions with Proposed Action

Direct Impacts

Construction activities such as pile driving may cause some organisms to avoid the habitat near the project area, which could affect recreational fishing. During the construction of the proposed action, a cofferdam would be installed across Bayou Dupre for approximately 8 months to 12 months. The cofferdam would have culverts to allow for a limited exchange around this barrier during the period the cofferdam would be in place. Although the culverts would allow for some water exchange, the closure of Bayou Dupre during construction could alter active and passive movement of organisms in the project area and could temporarily block access for some organisms to the wetland habitats along the bayou. This could potentially decrease the growth and survival rates of some individual aquatic organisms, thereby having limited, temporary localized effects on populations of fisheries species in the vicinity during the up to 1-year period when passage would be restricted by the cofferdam. These effects on fish populations would cause a temporary impact on recreational fishing during the 3-year construction period.

Direct impacts to fishery resources could occur from disruption and/or removal of estuarine substrate (water bottoms) and estuarine open water within the footprint of the closure structure. Approximately 4 acres of potential estuarine fish habitat within the construction area could be temporarily disturbed and approximately 2 acres permanently lost under the proposed action. However, this area is negligible compared to the more than 703 mi^2 of estuarine or brackish habitat estimated to exist within southeastern Louisiana (figure 11; LSU CADGIS Research Laboratory 2003).

Additionally, access to fishing and hunting areas in the project area would be temporarily affected during construction of the gate structure. Recreational traffic (boaters, fishermen, hunters, etc.) would not be able to travel between the MRGO and Bayou Dupre because the channel would be closed for up to 2 years of the 3-year construction effort. However, the Back Dike Canal/New Canal, which parallels the MRGO within the CWA, is a navigable waterway. Recreational boaters on Bayou Dupre could use this canal to enter and leave the CWA through the existing Bayou Bienvenue gate, which would remain open under the proposed action for IER # 11.

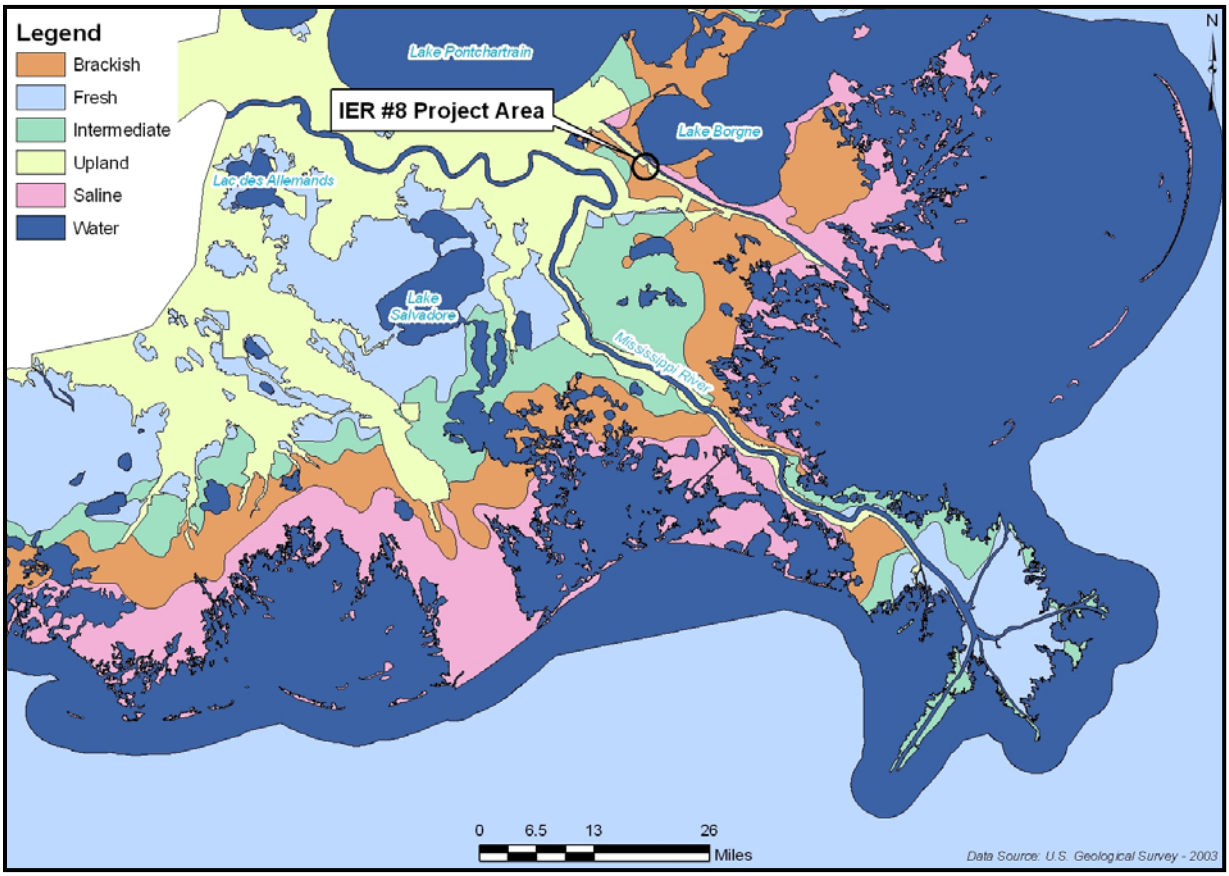

Figure 11. Salinity Zones of Southeastern Louisiana (2003)

Indirect Impacts

Construction in the bayou channel and adjacent wetlands would cause downstream increases in turbidity and sedimentation that would impact fish survival and growth. Impacts on fisheries most likely would be temporary. Indirect impacts would be caused by the displacement of organisms from localized areas due to elevated turbidity levels, decreased dissolved oxygen, and increased biochemical oxygen demand associated with construction excavation/dredging activities. These impacts would be reduced because construction-related runoff would be managed through implementation of BMPs and a SWPPP. Recreational fishing could be impacted. However, those impacts would be short-term, with effects lasting up to several months after construction completion.

Cumulative Impacts

Recreational use of the project area and adjacent areas was previously disrupted by construction of the MRGO, HSDRRS, the existing structures, and Hurricane Katrina. Construction of the proposed action could increase the impacts to the aquatic and wetland habitat in this area by re-suspending sediment that has only had a short time to recover from the prior events. As previously discussed, suspended sediments can clog fish gills, lower growth rates, and affect egg and larval development and when re-deposited, can smother the existing benthos. Recreational fishing in this area could be temporarily impacted. However, use of BMPs would limit those impacts.

Navigation of recreational fishing boats would be affected and access limited during construction of the MRGO IHNC barrier and construction of gates at Bayous Dupre and Bienvenue. Construction of the MRGO closure structure at Bayou La Loutre will also redirect fisherman to alternative routes to gain access to points east and south to the Gulf of Mexico. However, these projects are unlikely to have adverse impacts to fishery resources past the construction period of 3 years, and are unlikely to contribute to cumulative impacts to recreational fishing beyond this time.

Cumulative impacts on recreational boating and fishing in the project area would be greatest when both Bayou Bienvenue (east of the MRGO) and Bayou Dupre are closed for construction at the same time, which would be expected to occur for up to 2 years. As mentioned previously, the Back Dike Canal/New Canal, which parallels the MRGO within the CWA, would provide access from Bayou Dupre through the Bayou Bienvenue gate.

Additionally, the protection provided from the HSDRRS would provide risk reduction for storm surges that could damage boat launches and recreational facilities and property within St. Bernard Parish and the CWA.

Future Conditions with Alternative 1 – Channel Realignment to the Northwest of the Existing Channel

Direct, Indirect, and Cumulative Impacts

The direct, indirect, and cumulative effects on recreation from this alternative would be similar to those described previously for the proposed action. However, the impacted area would be larger (a new channel would be excavated) with greater downstream increases in turbidity and sedimentation that could impact fish survival and growth, and the construction time could be longer (due to the time required for excavation). The impact on recreational fishing would be less than for the proposed action because the existing channel and control structure would remain open during the construction period.

3.2.10 Aesthetic (Visual) Resources

Existing Conditions

The project area is remote and visually inaccessible to most observers except those traveling via watercraft along the MRGO and Bayou Dupre. The Louisiana Natural and Scenic River System was proposed in the late 1960s and enacted in the 1970s with the passage of the Louisiana Scenic Rivers Act. Several streams in the project area have been designated as part of the system based on their scenic and other qualities. The location of the project area is approximately 0.5 mile north of the confluence of Bayou Dupre and the closest designated Scenic River, Bashman Bayou (figure 10). A 2-mile long segment of Bayou Dupre, from the Lake Borgne Canal to Terre Beau Bayou, also is designated as a Scenic River. At its closest point (the confluence of Bayou Dupre and Terre Beau Bayou), this segment is approximately 1.2 miles south of the project location. The designated segment of Bayou Dupre and the other Scenic Rivers are largely undeveloped and provide open vistas of solid and broken marshes interspersed with natural levees and ridges that support woody vegetation. The relatively unobstructed panoramas contribute to the wilderness quality and high scenic value of the rivers.

Discussion of Impacts

Future Conditions with No Action

Direct, Indirect, and Cumulative Impacts

Under this alternative, the existing flood control structure would be raised to the previously authorized elevation (an increase in height of approximately 2 ft), incorporating new engineering standards and design criteria. Effects on visual resources would not differ substantially from those under the current conditions.

Future Conditions with Proposed Action

Direct and Indirect Impacts

The Louisiana Scenic Rivers Act established a regulatory program and empowered the Secretary of the LaDWF to administer the Natural and Scenic Rivers System through regulations and permits. Impoundments, channelization, clearing and snagging, and channel realignment are prohibited by the Act; therefore, flood control projects on Scenic Rivers, with a few exceptions, are not permissible. After consultation with the LaDWF, the department determined that, due to the project's distance from the designated Scenic River segments and the measures included in the project to minimize far-reaching impacts to hydrology/salinity, no Scenic River Permit would be required for the proposed action (LaDWF 2009).

Additionally, the majority of the footprint of disturbance necessary to construct the proposed action falls within an area where similar risk reduction measures, navigation-related channel improvements, and other civil works projects, including roads, currently exist. The proposed project area is remote, and flood risk reduction measures are visually inaccessible to most observers. Considering the distances between the project area and the designated Scenic Rivers and the fact that the proposed construction would be on the flood side of the MRGO levee and the existing Bayou Dupre sector gate, the views from the designated scenic rivers and streams would not be impacted. The current Bayou Dupre structure has a height of +15.4 ft (NAVD88), while the proposed action would result in a height of +31 ft (NAVD88), which will tie in to levees of similar height. As a result, these structures would be about 15 ft taller than their current height and visible from a greater distance along the bayou. However, the direct and indirect effects on the visual character of the proposed project area and vicinity would be minimal.

Cumulative Impacts

Cumulatively, the visual impacts caused by flood risk reduction measures regionally and nationwide may be considered substantial. Flood prone natural landscapes protected by unnatural visual conditions similar to the proposed project may be increasingly converted to developable land. Land development may be considered visually distressing depending on the complexity of natural and cultural elements lost.

Future Conditions with Alternative 1 – Channel Realignment to the Northwest of the Existing Channel

Direct, Indirect, and Cumulative Impacts

The impacts to visual resources under the alternative action would be the similar to those described under the proposed action. Given that this alternative would occur farther from the designated scenic rivers in the vicinity (it would be constructed approximately 330 ft northwest

of the existing channel and flood control structure), it would be expected to have less impact on the visual character of the scenic rivers.

3.2.11 Air Quality

Existing Conditions

The USEPA, under the requirements of the Clean Air Act of 1963 (CAA), has established National Ambient Air Quality Standards (NAAQS) for seven contaminants, referred to as criteria pollutants (40 CFR 50). These are carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (less than 10 microns in diameter [PM_{10}] and particulate matter less than 2.5 microns in diameter [$PM_{2.5}$]), lead (Pb), and sulfur dioxide (SO_2). The NAAQS standards include primary and secondary standards. The primary standards were established at levels sufficient to protect public health with an adequate margin of safety. The secondary standards were established to protect the public welfare from the adverse effects associated with pollutants in the ambient air. The primary and secondary standards are presented in table 7.

Table 7.
National Ambient Air Quality Standards

Pollutant and Averaging Time	Primary Standard		Secondary Standard	
	μg/m³	parts per million (ppm)	μg/m³	ppm
Carbon Monoxide				
8-hour concentration	10,000[1]	9[1]	-	
1-hour concentration	40,000[1]	35[1]	-	
Nitrogen Dioxide				
Annual Arithmetic Mean	100	0.053	Same as primary	
Ozone				
8-hour concentration	147	0.075[2]	Same as primary	
Particulate Matter				
$PM_{2.5}$:				
Annual Arithmetic Mean	15[3]	-	Same as primary	
24-hour Maximum	35[4]	-		
PM_{10}:				
24-hour concentration	150[1]	-		
Lead				
Quarterly Arithmetic Mean	1.5	-	Same as primary	
Sulfur Dioxide				
Annual Arithmetic Mean	80	0.03	-	-
24-hour concentration	365[1]	0.14[1]	-	-
3-hour concentration	-	-	1300[1]	0.50[1]

Notes:
[1] Not to be exceeded more than once per year.
[2] 3-year average of the fourth highest daily maximum 8-hour concentration must not exceed 0.075 ppm, effective as of 27 May 2008.
[3] Based on 3-year average of annual averages.
[4] Based on 3-year average of annual 98th percentile values.
Source: 40 CFR 50.

National Ambient Air Quality Standard Attainment Status

Areas that meet the NAAQS for a criteria pollutant are designated as being "in attainment" and areas where a criteria pollutant level exceeds the NAAQS are designated as being "in non-attainment." The proposed action would occur in St. Bernard Parish, Louisiana, an area that is currently designated as in attainment for all criteria pollutants. Therefore, further requirements required by the CAA, general conformity rule (Section 176(c)) would not apply for the proposed Federal action.

Discussion of Impacts

Future Conditions with No Action

Direct, Indirect, and Cumulative Impacts

Under the no action alternative, the existing flood control structure would be raised to the previously authorized elevation (an increase in height of approximately 2 ft), incorporating new engineering standards and design criteria. Given the limited extent of construction activities, there would be no direct, indirect or cumulative impacts to air quality within the project area under the no action alternative.

Future Conditions with Proposed Action

Direct Impacts

Following implementation of the proposed action, increases in air emissions in the project area would be expected during the construction period. These minor, temporary emissions could include 1) exhaust emissions from operations of various types of non-road construction equipment such as loaders, excavators, cranes, etc. and 2) fugitive dust due to earth disturbance. These emissions would be from mobile sources for which emissions performance standards are applicable to source manufacturers, and they are not regulated under the CAA air permit regulations. Therefore, it is not necessary to quantify these emissions given the lack of ambient emissions thresholds that could be used to make the determination of air quality impact significance from these mobile sources.

The principal air quality concern associated with the proposed activities would be emission of fugitive dust near construction areas. The private autos used to access the work area would also contribute to air pollution in the project surrounding areas when traveling along local roads. However, site-specific construction effects are temporary and dust emissions would be controlled using standard best management practices.

Indirect Impacts

There would be no adverse indirect impacts to air quality within the project area under the proposed action.

Cumulative Impacts

The principal air quality concern associated with the proposed activities would be emission of pollutants from construction equipment and emission of fugitive dust near construction areas. Private autos used to access the work area would also contribute to air pollution in the project surrounding areas when traveling along local roads. Projects ongoing concurrently with the proposed action would contribute to this pollution, including emissions associated with transport of materials. The concurrent timing of many of these projects in conjunction with the relative

large scale of much of the construction work would represent a cumulative impact to air quality within the region. These impacts would be limited to the construction periods for these projects.

Future Conditions with Alternative 1 – Channel Realignment to the Northwest of the Existing Channel

Direct, Indirect, and Cumulative Impacts

The direct, indirect, and cumulative impacts to air quality for the alternative action would be the same as those described under the proposed action.

3.2.12 Noise

Existing Conditions

Noise is generally described as unwanted sound, which can be based either on objective effects (hearing loss, damage to structures, etc.) or subjective judgments (such as community annoyance). Sound is usually represented on a logarithmic scale with a unit called the decibel (dB). Sound on the dB scale is referred to as sound level. The threshold of human hearing is approximately 0 dB, and the threshold of discomfort or pain is around 120 dB.

Noise levels are computed over a 24-hour period and adjusted for nighttime annoyances to produce the day-night average sound level (DNL). DNL is the community noise metric recommended by the USEPA and has been adopted by most Federal agencies (USEPA 1974). A DNL of 65 weighted decibels (dBA) is the level most commonly used for noise planning purposes and represents a compromise between community impact and the need for activities like construction. Areas exposed to a DNL above 65 dBA are generally not considered suitable for residential use. A DNL of 55 dBA was identified by the USEPA as a level below which there is no adverse impact (USEPA 1974). Noise levels occurring at night generally produce a greater annoyance than do the same levels occurring during the day. It is generally agreed that people perceive intrusive noise at night as being 10 dBA louder than the same level of noise during the day. This perception is largely because background environmental sound levels at night in most areas are also about 10 dBA lower than those during the day.

Areas surrounding the IER # 8 project area are primarily undeveloped wetlands with minimal noise generated by recreational users. Higher levels of noise are generated by commercial waterborne traffic along the MRGO and Bayou Dupre. No major roadways, railways, or runways are present in the vicinity of IER # 8 that would contribute to ambient noise levels in the area.

Discussion of Impacts

Future Conditions with No Action

Direct, Indirect, and Cumulative Impacts

Under the no action alternative, the existing flood control structure would be raised to the previously authorized elevation (an increase in height of approximately 2 ft), incorporating new engineering standards and design criteria. Noise receptors near the project area would experience limited additional noise associated with construction activities such as pile driving and vehicles. Therefore, there would be temporary adverse impacts to noise under the no action alternative.

Future Conditions with Proposed Action

Direct Impacts

Table 7 describes noise emission levels for construction equipment expected to be used during the proposed construction activities. As can be seen from this table, the anticipated noise levels at 50 ft range from 76 dBA to 101 dBA based on data from the Federal Highway Administration [FHWA] (2006).

Table 8.
Weighted (dBA) Sound Levels of Construction Equipment and Modeled Attenuation at Various Distances[1]

Noise Source	50 ft	100 ft	200 ft	500 ft	1,000 ft
Backhoe	78	72	68	58	52
Crane	81	75	69	61	55
Dump Truck	76	70	64	56	50
Excavator	81	75	69	61	55
Front end loader	79	73	67	59	53
Concrete mixer/pump truck	79	73	67	59	53
Auger drill rig	84	78	72	64	58
Dozer	82	76	70	62	56
Pile driver	101	95	89	81	75

1. The dBA at 50 ft is a measured noise emission. The 100- to 1,000-ft results are modeled estimates.
Source: FHWA 2006. "Highway Construction Noise Handbook."

One construction activity, pile driving, would be expected to create temporary noise impacts above 65 dBA to sensitive receptors within 1,000 ft of the project corridor. Assuming the worst case scenario of 101 dBA, as would be the case during pile driving at the sector gate, all areas within 1,000 ft of the pile driving area would experience noise levels exceeding 65 dBA. A few of the recreation camps along Bayou Dupre (labeled "fishing village community" in figure 12) are within 1,000 ft of the project area. Construction noise levels would attenuate to 75 dBA at a distance of 350 ft from construction activities.

The construction activities could occur 24 hours a day, 7 days a week. These activities would be expected to create temporary noise impacts above 65 dBA to the limited number of sensitive receptors within 1,000 ft of the Bayou Dupre project site. The opportunities for noise mitigation would be limited because much of the construction activity would occur at the sector gate location. However, the project site is at a remote location and sensitive receptors potentially present near the Bayou Dupre site (at the recreation camps along Bayou Dupre) are intermittent visitors to the area rather than permanent residents. Following construction, noise levels would return to existing conditions.

Indirect Impacts

Indirect impacts from noise would be those related to avoidance of the area by wildlife and fishermen, and emotional and mental stress that could result from the noise levels in the area during construction. Most of these impacts, with the exception of the emotional and mental stress, are discussed in other sections of this document corresponding to the resource being

impacted by the construction related noise levels. Emotional and mental stresses from increased noise levels are difficult to assess and are out of the scope of this document. However, it is reasonable to assume that the emotional and mental stress created by noise levels would be compensated by the relief from the hurricane risk reduction provided by the project.

Cumulative Impacts

Noise resulting from ongoing and planned construction activities in the IER # 8 project area as a result of HSDRRS projects and rebuilding and restoration following Hurricanes Katrina and Rita would not likely cause levels in the project area to surpass the maximum levels of noise described previously under the direct impacts. However, concurrent projects would likely extend the amount of time people are exposed to the increased noise levels resulting from construction activities and movement of materials. The overall cumulative impacts would be temporary, with noise levels returning to existing conditions once construction is completed.

Future Conditions with Alternative 1 – Channel Realignment to the Northwest of the Existing Channel

Direct, Indirect, and Cumulative Impacts

The direct, indirect, and cumulative impacts on noise levels for the alternative action would be similar to those described for the proposed action.

3.2.13 Transportation

Existing Conditions

The Bayou Dupre flood control structure is located at the intersection of Bayou Dupre and the MRGO. The project site is surrounded by water and wetlands. There are no land-based residential or commercial land uses in the immediate vicinity of the flood control structure. There is a small community of fishing village residences (recreation camps) near the Bayou Dupre structure and water-based commercial development along the Violet Canal, near LA Highway 39, approximately 4 miles west of the structure. The commercial development in the area supports fishing activities occurring within the study area.

There are no public roads located near the project site. The project site and surrounding area are served by unpaved access roads, shipping channels, and canals. The closest highway corridor that serves the Bayou Dupre flood control structure is LA Highway 39, which runs parallel to the Mississippi River located approximately 4.4 miles west; and LA Highway 46, located 4.3 miles south (see figure 12). Population centers along these highway corridors near the project site, including Chalmette, Meraux, Violet, and Poydras, are located along the Mississippi River.

Although the project site is in the New Orleans metropolitan area, it is relatively remote given that it is separated from the local highway network by a large expanse of undeveloped wetlands (the CWA) to the west and the MRGO waterway to the east.

Waterborne traffic in the area, including commercial and recreational fishing boats, passes through the Bayou Dupre flood control structure. The structure provides access between the CWA and the MRGO. Vessels can continue on to Lake Borgne, Lake Pontchartrain, and the Gulf of Mexico to harvest fish, shrimp, and oysters. The effects of hurricane damage, subsidence, erosion, and other environmental conditions along the MRGO have led to its de-authorization and closure. The MRGO Federal navigation channel from the southern bank of the GIWW to the Gulf of Mexico is officially de-authorized and construction of the closure structure across the MRGO just south of Bayou La Loutre has begun.

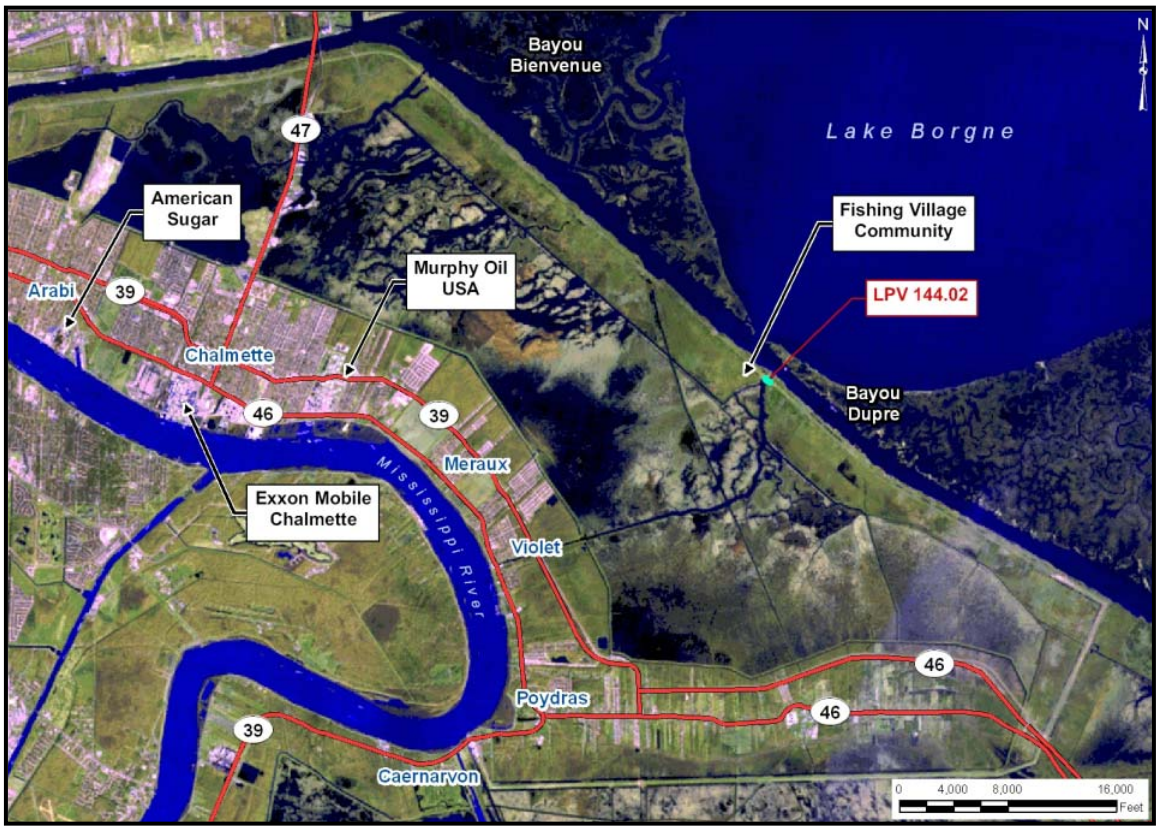

Figure 12. Roadways, Facilities, and Communities in the Project Area

Discussion of Impacts

Future Conditions with No Action

Direct, Indirect, and Cumulative Impacts

Under the no action alternative, the existing flood control structure would be raised to the previously authorized elevation (an increase in height of approximately 2 ft), incorporating new engineering standards and design criteria. Waterways, as well as local roads to a lesser extent, would experience a minor increase in traffic associated with construction activities. Therefore, under the no action alternative, there would be temporary impacts to transportation within the project area.

Future Conditions with Proposed Action

Direct Impacts

Most of the traffic associated with the proposed action is expected to be waterborne. Due to the limited road access to the project site, the majority of the construction materials would be delivered by barge or boat. Barges could access the project area via the Violet Canal and through the MRGO from the north prior to closure, and light loads could be brought through Lake Borgne. The unpaved roads along the levee system could be used to a limited extent for access by construction workers or for some deliveries of equipment and materials. The use of Lake Borgne, which is a relative shallow waterbody, for access to the project area would require use of shallow-draft vessels, which would result in more waterborne traffic (a greater number of

trips to and from the construction site). Any potential impact on local waterborne transportation would be short-term given that construction activities are expected to occur over a period of up to 3 years, with barge and boat traffic being distributed throughout that time frame. However, the channel would be closed during part of the construction period, thus hindering movement of waterborne traffic in the construction area and potentially increasing the use of land-based transportation facilities during that time. This could result in a short-term impact on operation of local highways as a result of project-related traffic.

Indirect Impacts

The additional truck traffic resulting from the proposed action could contribute to additional wear-and-tear of pavement on roads within the project's vicinity. Unpaved roads along the levee system, if they need to be used to transport workers or materials, would be similarly impacted.

Cumulative Impacts

Cumulative impacts on transportation from the proposed action could occur mainly as a result of the combined effects of this project and the other LPV flood control projects in the vicinity; in particular, the portions of the HSDRRS addressed in IERs # 10 and # 11. Large quantities of material and equipment would be transported via boats and barges for these proposed projects. This could have an impact on the shipping industry due to traffic delays on the waterways, in particular the GIWW. Delays could also result from increased usage of locks and the GIWW barge gate. In addition, on-going construction related to other HSDRRS projects in the project vicinity could also contribute to an increase in truck traffic and could, therefore, increase the wear-and-tear on roads and add to area congestion. The cumulative impacts, except for road wear-and-tear, would be temporary, occurring during the construction period.

Future Conditions with Alternative 1 - Channel Realignment to the Northwest of the Existing Channel

Direct, Indirect, and Cumulative Impacts

The impacts to transportation under the alternative action would be essentially the same as those described under the proposed action.

3.3 SOCIOECONOMIC RESOURCES

3.3.1 Land Use, Population, and Employment

Existing Conditions

The project area is located in an undeveloped area along a man-made levee running west of and parallel to the MRGO. The MRGO waterway crosses St. Bernard Parish in a southeast/ northwest direction connecting with the GIWW approximately 6 miles northwest of the Bayou Dupre flood control structure. There are limited paved areas likely used predominantly for maintenance vehicle parking in the vicinity of the Bayou Dupre flood control structure. Aside from these paved areas, the surrounding area is comprised of undeveloped wetlands, marsh, and bayous. Lake Borgne is located immediately north and east of the Bayou Dupre flood control structure.

The primary urbanized areas of St. Bernard Parish are located along the East Bank of the Mississippi River within the current levee systems. Developed communities in the upper portion of the parish include (from north to south) Arabi, Chalmette, Meraux, Violet, and Poydras, as shown in figure 12. The area of St. Bernard Parish surrounding the project area is rural in nature,

with the existing communities centered along the bayous and marshes. LA Highway 46 (St. Bernard Highway) and LA Highway 39 (Judge Perez Drive) are the main arteries through St. Bernard, running roughly parallel with the Mississippi River from the parish boundary with the City of New Orleans on the north and continuing to the lower portion of the parish. LA Highway 47 (Paris Road) runs across St. Bernard Parish from the Mississippi River ferry landing north across the GIWW into eastern New Orleans.

The majority of retail and commercial development in St. Bernard Parish has historically occurred along LA Highway 39, LA Highway 46, and LA Highway 47. Industrial development is predominately located between the Mississippi River and LA Highway 46 (see figure 12). Major refining operations such as the American Sugar refinery in Arabi and the Exxon Mobil Chalmette refinery are located in the St. Bernard Port area and the Murphy Oil USA refinery is located farther downstream in Meraux (St. Bernard Parish Net 2007).

The developed land closest to the project area is a small community comprised of fishing village residences along the banks of Bayou Dupre approximately 1,000 ft west of the Bayou Dupre flood control structure (see figure 12). Personal coordination with the Lake Borgne Levee District indicated that pre-Katrina there were 12 camps to 15 camps (secondary sporting/recreational lodging) in the vicinity of the Bayou Dupre gate structure. It is highly unlikely that these were primary residences, for while electrical hookup was available, water and sewer was not available other than cistern or primitive privy. The most recent post-Katrina information has 3 of those camps in the process of rebuilding, indicating that the others have most likely been abandoned, at least for the time being.

In addition to St. Bernard Parish, the area protected by the Chalmette Loop HSDRRS includes part of Orleans Parish, consisting of the Lower Ninth Ward and adjacent undeveloped wetlands. The Lower Ninth Ward, located in the easternmost downriver part of the City of New Orleans, is bordered by the Mississippi River to the south, the IHNC to the west, the St. Bernard Parish to the east, and the Florida Avenue Canal to the north. It is an urbanized, largely residential neighborhood. LA Highways 39 and 46 cross the Lower Ninth Ward roughly parallel with the Mississippi River. As in St. Bernard Parish, most retail and commercial development serving this neighborhood is located along these two major roads. Industrial development has historically been concentrated along the IHNC (Greater New Orleans Community Data Center [GNOCDC] 2002).

Since the majority of the potentially impacted land and population are located within St. Bernard Parish and the Lower Ninth Ward neighborhood of Orleans Parish, this assessment focuses on population and employment for these two areas. Available information for the Lower Ninth Ward is for the most part limited to 2000 Census data. Comparable information for subsequent years is available on the parish level, but not on the neighborhood or census tract level.

St. Bernard Parish encompassed 465 mi^2 of land plus 1329 mi^2 of water in the year 2000 (U.S. Census Bureau [USCB] 2007a). With a population of 67,229 reported in the 2000 Census, the parish had a population density of 145 persons per mi^2, compared to 103 persons per mi^2 for the state of Louisiana (USCB 2007b). The Lower Ninth Ward encompasses approximately 2.5 mi^2. With a population of 19,515 reported in the 2000 Census (USCB 2007b), the neighborhood's population density was 7,806 persons per mi^2. A total of 65,929 residents in St. Bernard Parish (based on the 2000 Census) were protected by the LPV Hurricane Protection Project, as authorized (USACE 2006b). The 2000 Census indicated no population or housing within block group 5 of census tract 302.04 in St. Bernard Parish, where the Bayou Dupre project site is located, and no population or housing was reported for the block groups of census tract 17.33 in Orleans Parish near the MRGO.

The estimated population of St. Bernard Parish had declined slightly to 65,364 in July 2005 (prior to Hurricane Katrina). Following Hurricane Katrina, the population experienced a drastic decline to an estimated 15,514 in July 2006, which represents a 77 percent decrease from 2000 (USCB 2006 and 2007b). Also, approximately 19 mi^2 of coastal wetlands were lost due to Hurricanes Katrina and Rita, reducing the land area of the parish (Louisiana Speaks 2007). The population of the Lower Ninth Ward declined severely in the aftermath of Hurricane Katrina. However, neighborhood level population estimates are not available for 2005 or for 2006.

The most current indicators of the effects of Hurricane Katrina on the population of St. Bernard Parish include residential postal deliveries and students enrolled in school. The proportion of parish households actively receiving mail in June 2007 was 36.5 percent of pre-Katrina levels (GNOCDC 2007). The number of students enrolled in public schools reached 42 percent of pre-Katrina levels in the spring semester of 2007, up from 19 percent 1 year earlier (Brookings Institution 2007). Comparable information is not available for the Lower Ninth Ward.

According to the 2000 Census, 88.3 percent of the population of St. Bernard Parish was white, 7.6 percent was African American, and the remaining 4.1 percent was primarily Asian and persons identified as two or more races. The median household income was $35,939 and approximately 13.1 percent of individuals residing in St. Bernard Parish were identified as living below the Federal poverty level (USCB 2007c*)*. In 2004, median household income had risen to $36,566 while persons below the poverty level increased to 15.1 percent, compared to $35,216 and 19.2 percent for Louisiana (USCB 2007b). As shown by the 2000 Census, 96 percent of the population of the Ninth Ward was African American, 3 percent was white, and 1 percent was another race or two or more races (USCB 2007d). The median household income in the seven Census tracts that make up the Lower Ninth Ward ranged from $18,737 to $22,399 and approximately 34 percent of individuals were identified as living below the Federal poverty level (USCB 2007e).

St. Bernard Parish is included in the New Orleans-Metairie-Kenner, Louisiana, Metropolitan Statistical Area. Between 2000 and 2004, employment in St. Bernard Parish grew from 16,029 to 17,386, representing an increase of 8 percent. In 2004, health care/social assistance and retail trade represented the largest sectors of employment followed by educational services, manufacturing, accommodation/food services, and construction. In 2005, employment declined by 19.6 percent to 13,985. The distribution of employment across sectors remained the same except for educational services, which declined to the point that data were not published to avoid disclosing data for individual employers (Louisiana Department of Labor [LaDOL] 2002, 2005, 2006). In 2006, the annual average unemployment rate in St. Bernard Parish was 3.1 percent, which is lower than the annual average unemployment rate of 4.0 percent for Louisiana (LaDOL 2007). Comparable employment information is not available for the Lower Ninth Ward.

Discussion of Impacts

Future Conditions with No Action

Direct Impacts

Under this alternative, the existing flood control structure would be raised to the previously authorized elevation (an increase in height of approximately 2 ft), incorporating new engineering standards and design criteria. The structure would continue to operate as it normally does. The level of risk reduction under the no action alternative would be less than the level provided by the proposed action. Under the no action alternative, this portion of the Chalmette Loop HSDRRS would not be brought to the 100-year level of risk reduction and Federal Emergency Management Agency (FEMA) certification of that level of risk reduction could not be obtained for the protected area in St. Bernard Parish and Orleans Parish (Lower Ninth Ward). This could

have adverse impacts on the social and economic situation in the parishes and the potential for residents and businesses to return and rebuild. Any adverse impacts to the nearby camps resulting from construction activities would be minor and transitory, the majority of that being a temporary inconvenience for access and local noise.

Indirect Impacts

The no action alternative would be anticipated to have an adverse impact on the number of businesses and industries, land use patterns, and employment in the Chalmette Loop HSDRRS protected area. Without implementation of the proposed action, the flood risk reduction necessary for recovery and economic prosperity in the area would not be provided.

Cumulative Impacts

The no action alternative would contribute to adverse cumulative impacts on socioeconomic resources in the New Orleans metropolitan area. Without improvement of the Bayou Dupre control structure, there would be a gap in the New Orleans HSDRRS for 100-year level of risk reduction that would leave St. Bernard Parish and the Lower Ninth Ward of New Orleans more vulnerable to flooding and the associated damage to buildings and infrastructure, disruption of economic activity, and displacement of residents.

Future Conditions with Proposed Action

Direct Impacts

Land use would not be directly impacted by the construction activities associated with the proposed action because the proposed sector gate and floodwall tie-ins would be constructed on vacant land in an undeveloped area of St. Bernard Parish. However, the proposed action would provide 100-year level of flood risk reduction for the area within the Chalmette Loop HSDRRS. This would allow for FEMA certification of that level of risk reduction, and would have a beneficial impact on social and economic resources in St. Bernard Parish and the Lower Ninth Ward.

There would be short-term beneficial economic impacts from construction activities associated with the proposed action, including purchase of materials, equipment, and services and a temporary increase in employment and income. This increase could be local or regional, depending on where the goods, services, and workers are obtained. Any adverse impacts to the nearby camps resulting from construction activities would be minor and transitory, the majority of that being a temporary inconvenience for access and local noise.

Indirect Impacts

Following completion of the proposed action, land use patterns in St. Bernard Parish and the Lower Ninth Ward would not be expected to change because that portion of the protected area that is not already developed is predominantly wetlands not suitable for development. Although the proposed action would not be expected to stimulate growth in urban development in the protected area, population and long-term employment and income levels in St. Bernard Parish and the Lower Ninth Ward could be positively affected because the proposed action would allow for FEMA certification of 100-year level of risk reduction within the protected area. This could encourage rebuilding in the area and have a beneficial impact on socioeconomic resources.

Cumulative Impacts

The proposed action would have beneficial cumulative impacts on socioeconomic resources in the New Orleans metropolitan area. It is part of the ongoing Federal effort to reduce the threat to life, health and property posed by flooding. The combined effects from construction of the multiple projects underway and planned to rebuild the HSDRRS in the area would reduce flood risk and storm damage to residences, businesses, and other infrastructure from storm-induced and tidally-driven storm events and, thereby, encourage recovery.

Future Conditions with Alternative 1 – Channel Realignment to the Northwest of the Existing Channel

Direct, Indirect, and Cumulative Impacts

The direct, indirect and cumulative effects on land use, population, and employment from this alternative would be essentially the same as those described previously for the proposed action.

3.4 ENVIRONMENTAL JUSTICE

The USEPA defines Environmental Justice (EJ) as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of Federal, state, local, and tribal programs and policies." Meaningful involvement means that people have an opportunity to participate in decisions about activities that may affect their environment and/or health; the public's contribution can influence the regulatory agency's decision; their concerns will be considered in the decision making process; and the decision makers seek out and facilitate the involvement of those potentially affected. The goal of this "fair treatment" is not to shift risks among populations, but to identify potential disproportionately high or adverse effects and identify alternatives that may mitigate these impacts.

This EJ analysis was developed following the requirements of:

- Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" (11 February 1994); and
- "Department of Defense Strategy on Environmental Justice" (24 March 1995).

The EJ analysis identifies and addresses, as appropriate, potential disproportionate adverse human health and/or environmental effects of the proposed action and alternatives on minority and/or low-income populations. The methodology to accomplish this includes identifying low-income and minority populations within the study area. Census block group statistics from the 2000 US Census (the latest and most detailed census) and Environmental Systems Research Institute, Inc. (ESRI) estimates were utilized for data analysis. In addition, community meetings targeted at minority and low-income populations have and will continue to take place throughout the planning process.

Detailed discussion of demographic and income data, along with pertinent maps, tables and photographs, are available by request and will be included in the CED.

Existing Conditions

According to the 2007 ESRI figures, the most populated area in the vicinity of the IER # 8 project area within St. Bernard Parish, Block Group 301.011, is a minority and low-income block group. According to the 2000 Census, the populated area in the vicinity of the project area within St. Bernard Parish included 26.0 percent minority population. In 2007, the minority population was greater than 50 percent. The percentage of the population in the area living below the poverty line in 2007 was 34.8 percent compared to 26.6 percent in 2000, and to 23.8 percent parish-wide and 19.6 percent in Louisiana in 2007. However, based on the available descriptions of the project work site location, the area within a 1-mile radius of the project's footprint is uninhabited and is not a minority or low-income community.

Discussion of Impacts

The reaches of this flood control structure project include uninhabited land only. However, it is noted that both 2000 Census data and 2007 ESRI estimates show presence of minority and low-income populations within the IER # 8 project area, which includes St. Bernard Parish and the Lower Ninth Ward neighborhood of Orleans Parish.

Future Conditions with No Action

Direct, Indirect, and Cumulative Impacts

Under the no action alternative, impacts could be presented in the form of increased storm-related flooding in low-lying areas, which could lead to damage to buildings and infrastructure as well as disruption of local economic activity and displacement of residents. However, impacts of the 100-year storm would be borne by all communities of St. Bernard Parish and Lower Ninth Ward equally and there would be no disproportionate adverse impact on minority and low-income populations.

Future Conditions with Proposed Action

Direct and Indirect Impacts

Due to the absence of human habitation in the vicinity of the project area, no requirement of takings of property, limited changes to the waterways and environment utilized for subsistence fishing, and no anticipated release of hazardous, toxic, and radioactive waste (HTRW) materials, this proposed action would not have a disproportionate adverse impact on any minority or low income populations in the project area. This portion of the Chalmette Loop HSDRRS would be brought to the 100-year level of risk reduction, thereby reducing the risk of damage to low income or minority areas.

Cumulative Impacts

The combined effects from construction of the multiple projects underway and planned to rebuild the HSDRRS in the area would reduce flood risk and storm damage to residences, businesses, and other infrastructure from storm-induced and tidally-driven storm events. The proposed action would have a positive cumulative impact to protect all individuals living in the project area. Therefore, there would be no disproportionate cumulative adverse impact on minority or low-income populations.

Future Conditions with Alternative 1 – Channel Realignment to the Northwest of the Existing Channel

Direct, Indirect, and Cumulative Impacts

The direct, indirect and cumulative effects on minority and/or low-income populations from this alternative would be essentially the same as those described previously for the proposed action.

3.5 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE

Under ER 1165-2-132 the reasonable identification and evaluation of HTRW contamination within a proposed area of construction is required. ER 1165-2-132 identifies the CEMVN HTRW 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., Resource Conservation and Recovery Act [RCRA] regulated), pollutants, and other contaminants, which are not regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), would be treated as project costs if the requirement is the result of a validly promulgated Federal, state, or local regulation.

An American Society for Testing and Materials (ASTM) E 1527-05 Phase I Environmental Site Assessment was completed for the project area in order to identify the potential presence of HTRW. The Phase I Environmental Site Assessment identified no recognized environmental conditions (RECs) for the project area. In the event of a discovery of HTRW materials during construction, work that could affect the contaminated materials would be stopped and appropriate notification and coordination would be completed. Investigations would be conducted to characterize the nature and extent of the contamination and establish appropriate resolution.

A copy of the Phase I Environmental Site Assessment for the IER # 8 project area will be maintained on file at the CEMVN office in New Orleans and is incorporated herein by reference. Copies of the report are available on request from the CEMVN, or the report can be accessed at www.nolaenvironmental.gov.

Phase I Environmental Assessment-ADDENDUM-3-24-2009

A September 2007 report, *Phase I Environmental Site Assessment Chalmette Loop Levees and Bayou Bienvenue and Bayou Dupre Control Structures*, presented no RECs within the vicinity of Bayou Dupre as stated in IER # 8. On 20 March and 23 March 2009, the Engineering Division's Environmental Team conducted a HTRW site investigation of the Bayou Dupre control structure and adjacent levee, LPV 146. Site reconnaissance found no existing RECs or areas of environmental concern as reported by the addendum submitted to USACE New Orleans District Hurricane Protection Office on 24 March 2009.

4.0 CUMULATIVE IMPACTS

NEPA requires a Federal agency to consider not only the direct and indirect impacts of a proposed action, but also the cumulative impacts of the action. Direct, indirect, and cumulative impacts of the proposed action are evaluated specifically for each IER, but will also be addressed within the draft CED that is being prepared by the CEMVN. A cumulative impact is defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR 1508.7)." Cumulative

impacts can result from individually minor but collectively significant actions taking place over a period of time. Cumulative impacts were addressed for each alternative and resource in the preceding sections.

4.1 METHODOLOGY

To successfully assess cumulative impacts, a broad range of activities and patterns of environmental changes that are occurring in the vicinity of the project were considered. The following guidelines were used to assess the cumulative impacts for this document:

- The temporal and geographic proximity of the IER # 8 project to other projects;
- The probability of IER # 8 project actions affecting the same environmental resource as another project, especially resources that are susceptible to development pressures;
- The likelihood that the IER # 8 project or other relevant project would lead to a wide range of effects or additional associated projects;
- Whether the effects of other projects are similar to those of the IER # 8 project;
- The likelihood that the project would occur; and
- The probability of the projects and related impacts being imminent.

4.2 DESCRIPTIONS OF PROJECTS CONSIDERED

Rebuilding efforts as a result of Hurricane Katrina are occurring throughout southeast Louisiana and along the Mississippi and Alabama Gulf Coast. The Insurance Information Institute (III) has estimated that the total insured losses from Hurricane Katrina were $40.6 billion in six states, and in Louisiana the insured losses are estimated at $25.3 billion (III 2007); much of those insured losses would be a component of the regional rebuilding effort. Although the full extent of construction in Orleans and St. Bernard Parishes and throughout the Gulf Coast over the next 5 years to 10 years is unknown, a large-scale rebuilding effort is underway.

The Water Resources Development Act of 2007 (WRDA 07) became law in November 2007. This bill authorized several additional projects and studies in the greater New Orleans area that could contribute to cumulative impacts. WRDA 07 included authorization of the LPV and WBV HSDRRS projects to raise risk reduction levels to 100-year levels, as well as coastal restoration projects, Morganza-to-the-Gulf hurricane risk reduction, hurricane risk reduction in Jean Lafitte and lower Jefferson Parish, a study of coastal area damage that could be attributable to the USACE, the MRGO deep-draft de-authorization, an EIS for the IHNC lock, and the formation of a Coastal Louisiana Ecosystem Protection and Restoration Task Force (Alpert 2007). The majority of these projects or studies still require specific appropriations. The WRDA does not guarantee financing of these projects, but does allow Congress to allocate money for them in future spending bills (Alpert 2007). These additional projects could contribute to resource impacts, either adversely or with long-term positive impacts.

As indicated previously, in addition to this IER, the CEMVN is preparing a draft CED that will describe the work completed and the work remaining to be constructed. The purpose of the draft CED will be to document the work completed by the USACE on a system-wide scale. The draft CED will describe the integration of individual IERs into a systematic planning effort. Overall cumulative impacts, a finalized mitigation plan, and future O&M requirements will also be included. The following discussion describes an overview of other actions, projects, and occurrences that may contribute to the cumulative impacts previously discussed.

Federal hurricane damage risk reduction for the greater New Orleans area is referred to as the HSDRRS and is divided into three USACE authorized projects: 1) LPV; 2) WBV; and 3) New Orleans to Venice (NOV). The NOV and WBV projects have no or limited discussion in this IER because their alignments are not located within the project region and, with the exception of some positive cumulative impacts to socioeconomics, these projects would not greatly increase cumulative impacts. The various projects that make up the LPV projects include the construction of 125 miles of levees, concrete floodwalls and other structures. Many of these projects are broken out by area and referred to by their IER document number. Figure 13 shows LPV and WBV IER projects. A summary of the projects that fall within the New Orleans Metropolitan area is provided below:

- **IER # 1, LPV, La Branche Wetlands Levee St. Charles Parish, Louisiana** – evaluates the potential impacts associated with raising approximately 9 miles of earthen levees; replacing over 3,000 ft of floodwalls; rebuilding, modifying or closing five drainage structures; and modifying one railroad gate along the existing levee system on the north side of U.S. 61 (Airline Highway) between the Bonnet Carré Spillway and the northwest end of the Louis Armstrong New Orleans International Airport near the St. Charles/Jefferson Parish line.

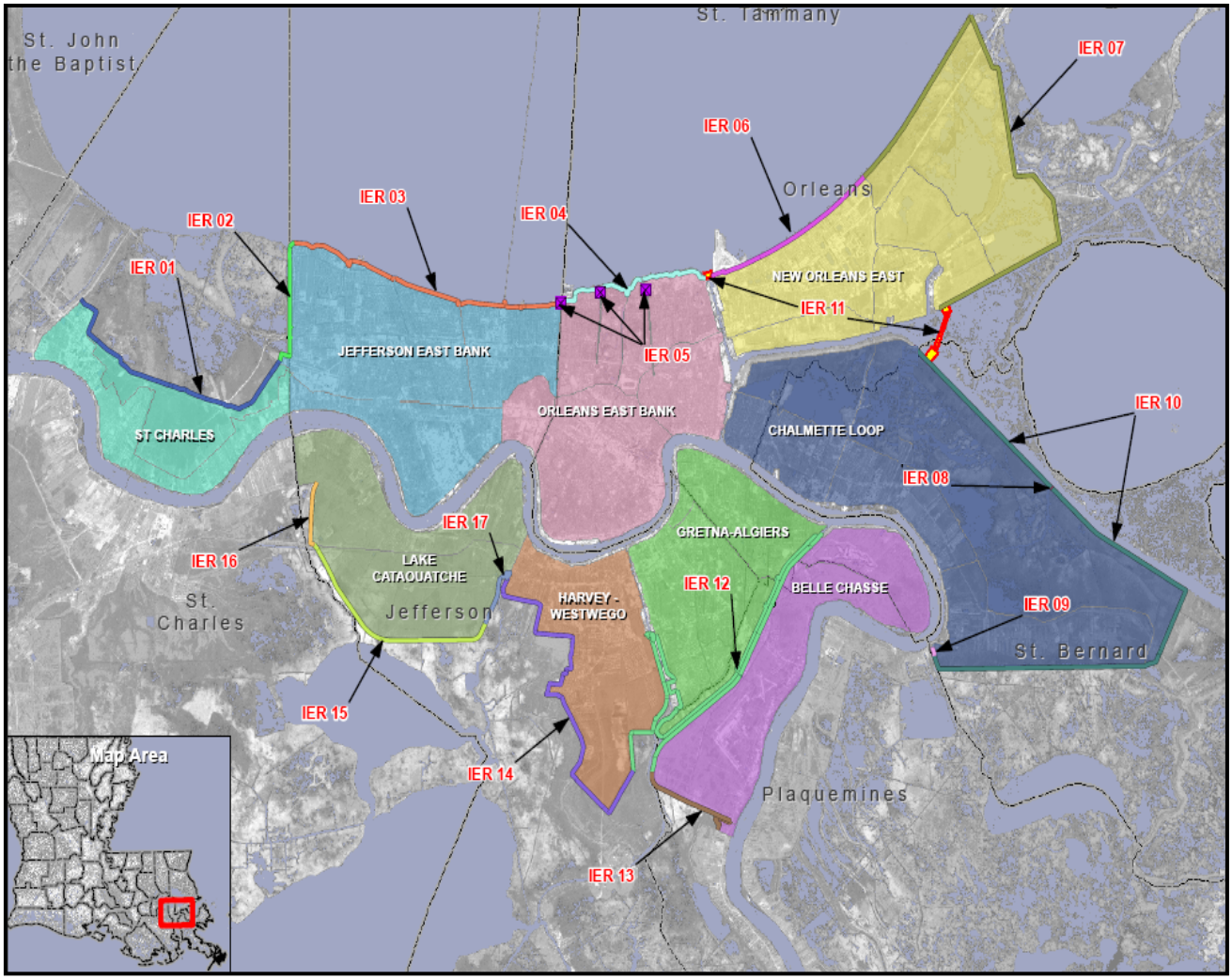

Figure 13. HSDRRS Lake Pontchartrain and Vicinity and West Bank and Vicinity IER Projects

- **IER # 2, LPV, West Return Floodwall Jefferson and St. Charles Parishes, Louisiana** – evaluates the potential impacts associated with the proposed replacement of 17,900 ft (3.4 miles) of floodwalls along the line between Jefferson Parish and St. Charles Parish in the northeastern portion of the Mississippi River deltaic plain. The project area is adjacent to the Parish Line Canal from the north side of the Louis Armstrong New Orleans International Airport to the south shore of Lake Pontchartrain.

- **IER # 3, LPV, Jefferson East Bank, Jefferson Parish, Louisiana** – evaluates the potential impacts associated with the proposed rebuilding of 9.5 miles of earthen levees, upgrading of the foreshore protection, the replacement of two floodgates, and the construction of fronting protection and construction or modification of breakwaters at four pumping stations just east of the St. Charles Parish and Jefferson Parish line to the western side of the 17th Street Canal.

- **IER # 4, LPV, Orleans East Bank, New Orleans Lakefront Levee, West of IHNC to East bank of 17th Street Canal Orleans Parish, Orleans Parish, Louisiana** – investigates improvement of the levee, floodwall, and Bayou St. John Sector Gate extending from the 17th Street Canal to the IHNC.

- **IER # 5, LPV, New Orleans East, New Orleans Lakefront Levee to Citrus Lakefront Levee, New Orleans Airport Floodwall to Paris Road, Orleans Parish, Louisiana** – investigates a range of alternatives to protect Orleans and Jefferson Parish from storm surge induced flooding through the 17th Street, Orleans Avenue, and London Avenue Outfall Canals, while not impeding the ability of the area's internal drainage system to remove storm water. The alternatives under evaluation include improvement of floodwalls along these canals to the 100-year level of risk reduction or providing a closure structures and pump stations at or near Lake Pontchartrain. Some possible locations being considered for these pump stations could include construction in Lake Pontchartrain.

- **IER # 6, LPV, New Orleans East, New Orleans Lakefront Levee to Citrus Lakefront Levee, New Orleans Airport Floodwall to Paris Road, Orleans Parish, Louisiana** – investigates improvement of approximately 6 miles of levees, floodwalls, and floodgates that extend from the IHNC and the New Orleans Lakefront Airport east to Paris Road – locally known as the Citrus Lakefront. Foreshore protection enhancements along this reach could include the dredging of access channels in Lake Pontchartrain.

- **IER # 7, LPV, New Orleans East, New Orleans East Lakefront Levee to New Orleans East Back Levee, Paris Road to East Bank of Michoud Canal, Orleans Parish, Louisiana** – investigates improvement of approximately 19.3 miles of levee and three floodgates stretching from the New Orleans East Lakefront Levee to New Orleans East Back Levee – CSX Railroad to Michoud Canal. This portion of the LPV HSDRRS encompasses a large portion of the Bayou Sauvage National Wildlife Refuge (NWR). The northern portion of this reach could include foreshore protection enhancements requiring dredged access channels in Lake Pontchartrain.

- **IER # 9, LPV, Caernarvon Floodwall, St. Bernard Parish, Louisiana** – evaluates a range of alignments as part of improvements to the Caernarvon floodwall. Depending on the chosen alignment there could be major impacts to infrastructure, residences, and wetlands.

- **IER # 10, LPV, Chalmette Loop Levee, St. Bernard Parish, Louisiana** – evaluates alternatives for improving the Chalmette Loop HSDRRS.

- **IER # 11 Tier 2 Borgne, LPV, IHNC, Orleans Parish, Louisiana** – evaluates the potential impacts associated with constructing surge barriers on Lake Borgne. This is the Tier 2 review for alternatives to protect against storm surge from the IHNC originating from Lake Borgne. This project was initially evaluated in IER # 11 Tier 1 (USACE 2008). Currently, this project is under construction; dredging and piles tests are being completed and approximately 1.2 million cubic yards of dredged material has been beneficially used for marsh nourishment within 205 acres of open water ponds near the project area.

- **IER # 11 Tier 2 Lake Pontchartrain, LPV, IHNC, Orleans Parish, Louisiana** – evaluates a new structure proposed within the Pontchartrain 2 location range which extends from the Seabrook Bridge to 2,500 ft south of the bridge on the IHNC. This is the Tier 2 review for alternatives to protect against storm surge from the IHNC originating from Lake Pontchartrain. This project was initially evaluated in IER # 11 Tier 1 (USACE 2008).

- **IER # 12, GIWW WCC, Harvey, and Algiers Levees and Floodwalls, Jefferson, Orleans, and Plaquemines Parishes, Louisiana** – includes a sector gate across the GIWW and levee tie-ins to the adjacent Hero Canal levee to the east and the V-line levee to the west. Approximately 3 miles of levee and floodwall would be constructed, along with a closure complex across the GIWW, a pump station, fronting protection, and a bypass channel. Levees would generally be raised to 14 feet, requiring 3.1 million cubic yards of earthen material and 310,000 tons of stone.

- **IER # 13, WBV, Hero Canal Levee and Eastern Terminus, Plaquemines Parish, Louisiana –** evaluates 22,000 linear feet of levee improvements and the construction of 1,500 linear feet of floodwalls.

- **IER # 14, WBV, Harvey-Westwego Levee, Jefferson Parish, Louisiana –** evaluates 12 miles of levee, construction of 7,013 linear feet of floodwalls, and modifications to three pump stations.

- **IER # 15, WBV, Lake Cataouatche Levee, Jefferson Parish, Louisiana –** evaluates 8 miles of levee and fronting protection modifications for one pump station.

- **IER # 16, WBV, Western Terminus Levee, Jefferson Parish, Louisiana –** evaluates construction of a new levee section to complete the western terminus of the West Bank Hurricane Protection Project.

- **IER # 17, WBV Company Canal Floodwall, Jefferson Parish, Louisiana –** evaluates 442 linear feet of floodwalls and fronting protection modifications to two pump stations.

- **IER # 18 - Government Furnished Borrow Material, Jefferson, Orleans, Plaquemines, St. Charles, and St. Bernard Parishes, Louisiana and IER # 19 - Contractor Furnished Borrow Material, Jefferson, Orleans, St. Bernard, Iberville, and Plaquemines Parishes, Louisiana, and Hancock County, Mississippi** – The purpose of these two IERs is to identify borrow areas that contain suitable material that can be excavated to supply clay material to Federal HSDRRS levee and floodwall projects. A Decision Record was signed for IER # 18 on 21 February 2008 and for IER # 19 on 14 February 2008.

- **IER # 20, LPV Hurricane Protection Project – Mitigation: Manchac Wildlife Management Area Shoreline Protection Modification, St. John the Baptist Parish, Louisiana** – This mitigation IER will be completed when unavoidable impacts are identified within the study area from the resulting actions of the aforementioned IERs # 1 to # 11.

- **IER # 21, WPV Hurricane Protection Project – Mitigation –** This mitigation IER will be completed when unavoidable impacts are identified within the study area from the resulting actions of the aforementioned IERs # 12 to # 17.

- **IER # 22, Government Furnished Borrow Material # 2, Jefferson and Plaquemines Parishes, Louisiana –** evaluates the potential impacts associated with the actions taken by the USACE while excavating borrow areas for use in construction of the HSDRRS.

- **IER # 23, Pre-Approved Contractor Furnished Borrow Material # 2, St. Bernard, St. Charles, Plaquemines Parishes, Louisiana, and Hancock County, Mississippi –** evaluates the potential impacts associated with the actions taken by commercial contractors as a result of excavating borrow areas for use in construction of the HSDRRS.

- **IER # 24, Stockpile Sites for Borrow Material, Orleans and St. Bernard Parishes, Louisiana –** evaluates the potential impacts associated with the actions taken by commercial contractors as a result of stockpiling borrow material for use in construction of the HSDRRS.

- **IER # 25, Government Furnished Borrow Material, Orleans, Jefferson, and St. Bernard Parishes, Louisiana –** evaluates the potential impacts associated with the actions taken by the USACE while excavating borrow areas for use in construction of the HSDRRS.

- **IER # 26, Pre-Approved Contractor Furnished Borrow Material, Jefferson, Plaquemines, and St. John Parishes, Louisiana, and Hancock County, Mississippi –** evaluates the potential impacts associated with the actions taken by commercial contractors as a result of excavating borrow areas for use in construction of the HSDRRS.

A discussion of habitat restoration, stabilization, and creation projects that would contribute to cumulative impacts to resources in the IER # 8 study area are discussed in the following section.

Table 9 provides a summary of the cumulative impacts to be mitigated for the HSDRRS projects completed (draft or final) to date. In addition to the impacts shown in table 9, approximately 170.5 acres of impacts to forested habitats, requiring mitigation would occur as part of projects for the raising of the Mississippi River Levee.

Table 9.
HSDRRS Impacts and Compensatory Mitigation to be Completed*

IER #	Parish		Non-wet BLH (acres)	Non-wet BLH AAHUs	Marsh (acres)	Marsh AAHUs	Swamp (acres)	Swamp AAHUs	Wetland BLH (acres)	Wetland BLH AAHUs	EFH (acres)
1	St. Charles	Protected Side	-	-	-	-	**137.05**	**73.99**	-	-	-
		Flood Side	-	-	-	-	**143.57**	**110.97**	**11.33**	**8.09**	
2	Jefferson / St. Charles	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	**33.40**	**9.00**	-	-	
3	Jefferson	Protected Side	-	-	-	-	-	-	-	-	**26.00**
		Flood Side	-	-	-	-	-	-	-	-	
4	Orleans	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	
5	Jefferson / Orleans	Protected Side	-	-	-	-	-	-	-	-	**3.20**
		Flood Side	-	-	-	-	-	-	-	-	
6	Orleans	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	
8	St. Bernard	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	
10	St. Bernard	Protected Side	-	-	**106.55**	**57.31**	-	-	**38.32**	**16.44**	-
		Flood Side	-	-	**323.04**	**209.94**	-	-	**35.31**	**14.22**	
11 Borgne	Orleans / St. Bernard	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	**186.00**	**24.33**	-	-	**15.00**	**2.59**	
12	Jefferson / Plaquemines	Protected Side	-	-	-	-	-	-	**251.70**	**177.30**	-
		Flood Side	-	-	-	-	**74.90**	**38.50**	**2.30**	**1.90**	
13	Plaquemines	Protected Side	-	-	-	-	**1.00**	**0.66**	**40.00**	**24.01**	-
		Flood Side	-	-	**20.00**	-	-	-	**4.00**	**2.23**	
14	Jefferson	Protected Side	-	-	-	-	-	-	**45.00**	**30.00**	-
		Flood Side	-	-	-	-	**29.75**	**17.02**	**45.50**	**18.58**	
15	Jefferson	Protected Side	-	-	-	-	-	-	**23.50**	**6.13**	-
		Flood Side	-	-	-	-	-	-	**3.60**	**1.35**	
16	Jefferson	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	**62.00**	**29.85**	-	-	**24.10**	**11.30**	
17	Jefferson	Protected Side	-	-	-	-	-	-	**5.50**	**2.69**	-
		Flood Side	-	-	-	-	**19.00**	**17.09**	-	-	
Borrow 18	St. Bernard / Orleans / Jefferson / Plaquemines / St. Charles	Protected Side	**300.03**	**112.38**	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	
Borrow 19	Hancock County, MS / Iberville / New Orleans / Plaquemines / St. Bernard / Jefferson	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	
Borrow 22	Jefferson / Plaquemines	Protected Side	**244.69**	**118.54**	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	
Borrow 23	Hancock County, MS / Plaquemines / St. Bernard / St. Charles	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	
Borrow 25	Jefferson / Orleans / Plaquemines	Protected Side	**969.00**	**284.00**	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	
Borrow 26	Jefferson / Plaquemines / St. John the Baptist / Hancock County, MS	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	
Totals		Protected Side	**1513.99**	**514.92**	**106.55**	**57.31**	**138.05**	**74.65**	**404.02**	**256.57**	-
		Flood Side	-	-	**591.04**	**264.12**	**300.62**	**192.58**	**141.14**	**60.26**	**29.20**
		Both	**1513.99**	**514.92**	**697.59**	**321.43**	**438.67**	**267.23**	**545.16**	**316.87**	**29.20**

- = Not applicable to the IER or number impacted is 0.
AAHU = average annual habitat unit, BLH = bottomland hardwood, CFBM = contractor-furnished borrow material, GFBM = government-furnished borrow material, AAHU = average annual habitat unit
** Last updated 4 May 2009*

4.2.1 Habitat Restoration, Creation, and Stabilization Projects

4.2.1.1 Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) Program Projects

The CEMVN and other Federal and state agencies participate in coastal restoration projects through the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA). These are specific prioritized restoration projects implemented coast-wide by the USACE in cooperation with Louisiana Department of Natural Resources (LaDNR), Coastal Restoration Division and other Federal agencies. Within the Lake Pontchartrain Basin, there are 14 projects proposed or constructed under CWPPRA that are designed to restore, enhance, or build marsh habitat and prevent erosion of marsh habitat. The projects involve numerous protection and restoration methods, including rock armored shoreline protection breakwaters, dredged material marsh construction, marsh terracing and planting, fresh water and sediment diversion projects, and modification or management of existing structures. Figure 14 indicates the locations of and table 10 lists and provides additional detail for CWPPRA projects near the IER # 8 project area.

Three Federally sponsored shoreline restoration projects on Lake Borgne and the MRGO (project numbers PO 30 to 32) are a few of the larger CWPPRA projects within the IER # 8 project area. The Lake Borgne and MRGO shoreline restoration projects would maintain the integrity of existing marsh that would also help preserve the existing shorelines in this area. Two projects are currently under construction, and an EIS is being developed for the remainder of the proposed work. One of the projects under construction provides a breakwater along the southern Lake Borgne shoreline from Doullut's Canal to Jahnke's Ditch. The second project under construction involves foreshore protection along the north bank of the MRGO between river miles 39.9 and 44.4. Future projects could involve wetland creation through the placement of material dredged from the water bottoms of Lake Borgne and the construction of retention dikes, where needed, to contain the hydraulically dredged material and facilitate stacking to an elevation supportive of wetland vegetation while minimizing adverse impacts to water quality.

4.2.1.2 Mississippi River Gulf Outlet Deep-Draft Deauthorization

The WRDA 07 provided for the de-authorization of the MRGO upon the submission of the USACE Chief's Report, Legislative EIS, and signed Decision Record to Congress. On 5 June 2008, the Assistant Secretary of the Army for Civil Works forwarded said Report, Legislative EIS and Decision Record to Congress. The Report recommended de-authorization of the MRGO and construction of a closure structure across the MRGO just south of Bayou La Loutre. Therefore, the MRGO Federal navigation channel between Mile 60 at the southern bank of the GIWW to the Gulf of Mexico at Mile -9.4 is de-authorized.

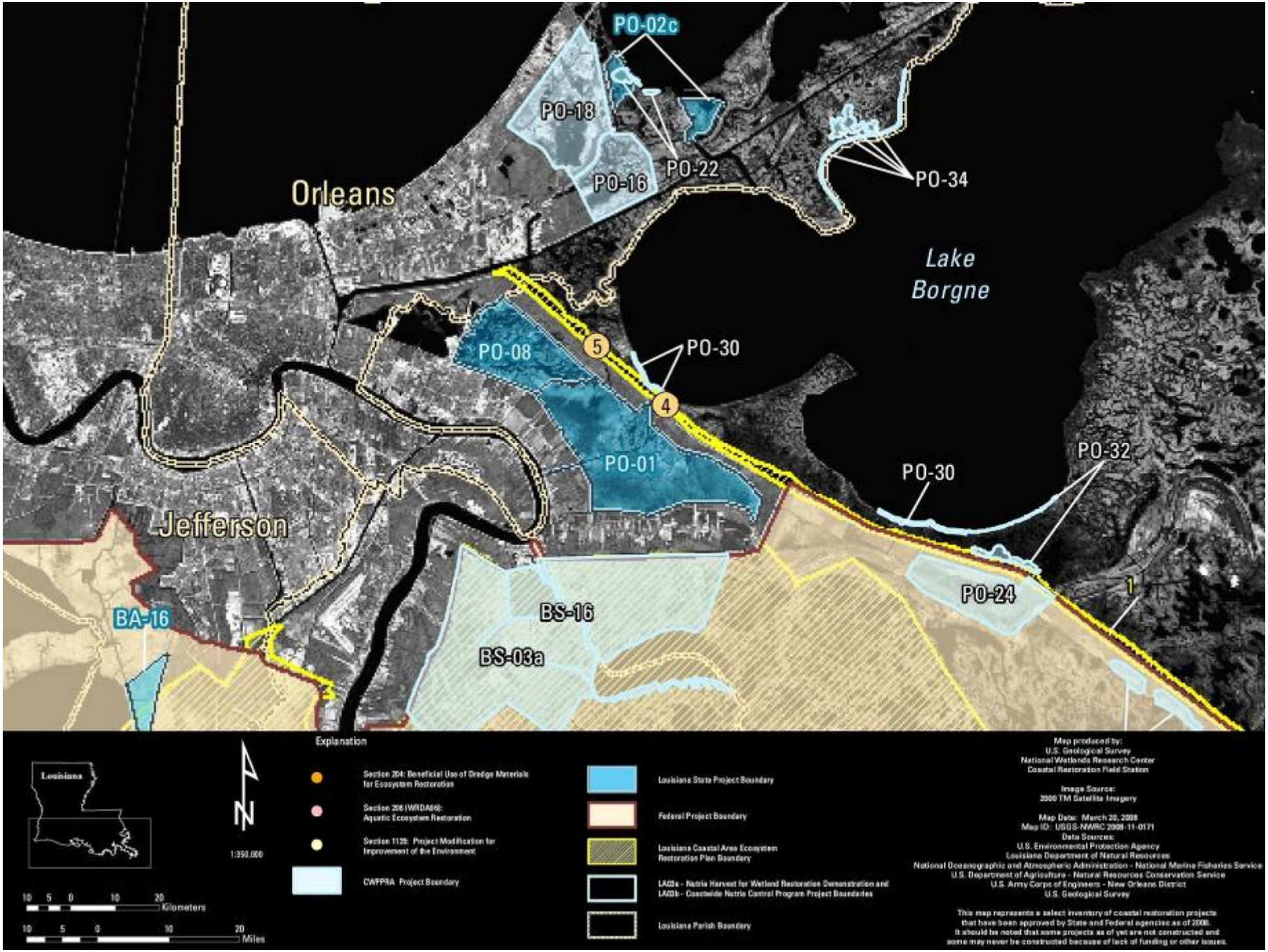

Figure 14. CWPPRA Restoration, Stabilization, and Creation Projects Near the IER # 8 Project Area

Table 10.
Selected CWPPRA Projects Near the IER # 8 Project Area

State Number	PPL	Agency	Project Name	Project Area	AAHU	Acres Created/ Restored	Acres Protected	Total Net Acres	Construction Date	Status
BA-16	n/a	n/a	Bayou Segnette Shoreline Protection	n/a	n/a	n/a	n/a	n/a	n/a	Completed 1994
BS-03a	2	NRCS	Caernarvon Diversion Outfall Management	15,556	504	802	0	802	6/1/2001	Complete
BS-16	17	USFWS	Caernarvon Outfall Management/Lake Lery SR	16,260	302	268	384	652	n/a	n/a
PO-01	**n/a**	**n/a**	**Violet Siphon Freshwater Diversion**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**Completed 1992**
PO-02c	n/a	n/a	Bayou Chevee Shoreline Protection	n/a	n/a	n/a	n/a	n/a	n/a	Completed 1994
PO-08	**n/a**	**n/a**	**Central Wetlands Pump Outfall – Freshwater Diversion**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**Completed 1992**
PO-16	1	USFWS	Bayou Sauvage National Wildlife Refuge Hydrologic Restoration, Phase I	3,800	520	1,050	500	1,550	6/1/1995	Completed May 1996
PO-18	2	USFWS	Bayou Sauvage National Wildlife Refuge Hydrologic Restoration, Phase II	5,475	584	7850	530	1,280	4/15/1996	Completed May 1997
PO-19	3	USACE	Mississippi River Gulf Outlet (MRGO) Disposal Area Marsh Protection	855	435	0	755	755	1/25/1999	Completed Jan. 1999
PO-22	5	USACE	Bayou Chevee Shoreline Protection	212	42	0	75	75	8/25/2001	Construction
PO-24	8	NMFS	Hopedale Hydrologic Restoration	3,805	269	0	134	134	1/10/2004	Construction
PO-30	**10**	**EPA**	**Lake Borgne Shoreline Protection**	**192**	**61**	**0**	**165**	**165**	**8/1/2007**	**Construction**
PO-32	12	USACE	Lake Borgne and MRGO Shoreline Protection	465	70	17	249	266	n/a	Engineering and Design
PO-34	16	USACE	Alligator Bend Marsh Restoration and Shoreline Protection	584	166	285	45	330	n/a	n/a
Summary Acres for all approved projects (including those not shown):				**1,488,841**		**51,829**	**69,890**	**121,719**		

Notes:

= Projects within 5 miles of the IER # 8 Project Area

n/a = information not available

Agency/Sponsor: EPA = Environmental Protection Agency; NMFS = National Marine Fisheries Service; NRCS = Natural Resources Conservation Service; NWRC = National Wetlands Research Center; USFWS = U.S. Fish and Wildlife Service; USACE = U.S. Army Corps of Engineers; PCWRP = Parish Coastal Wetlands Restoration Program.

PPL – Priority Project List

Project Area – the benefitted area as determined by the Environmental Work Group for purposes of conducting Wetland Value Assessments.

AAHU – Average Annual Habitat Units as determined by the Environmental Work Group.

Habitat Units represent a numerical combination of habitat quality (Habitat Suitability Index) and habitat quantity (acres) within a given area at a given point in time. Average Annual Habitat Units represent the average number of Habitat Units within any given area.

Acres Created/Restored – The acres of emergent marsh created or restored as a result of project implementation.

Acres Protected – The acres of emergent marsh protected from loss as a result of project implementation.

Total Net Acres – The net gain in emergent marsh as a result of project implementation as determined by the Environmental Work Group. This table includes acres of emergent marsh protected, created, and restored as a result of project implementation.

The de-authorization and plug to be constructed in the MRGO and the impacts of such an action were disclosed in a final Legislative EIS (January 2008). Additionally, impacts associated with the action proposed for the IER # 11 Tier 2 Borgne project, which is located between the IER # 8 project area and the Gulf Intracoastal Waterway (GIWW), were described in the final IER # 11 Tier 2 Borgne document (July 2008). The MRGO closure structure at La Loutre, which is currently under construction, is expected to be primarily responsible for the impacts associated with salinity change and any resultant species shift or alteration of habitats within the study area. The cumulative impact of a second closure on the MRGO as part of the storm surge barrier proposed in IER # 11 Tier 2 Borgne would be comparatively small. Shifts and changes in habitats occur naturally as part of the deltaic processes where land is built and then erodes as the river shifts it course over thousands of years. Over time, species adapt and change with these shifting habitats.

4.2.1.3 Coastal Impact Assistance Program

The Energy Policy Act of 2005 (PL 109-58) was signed into law by President Bush on 8 August 2005. Section 384 of the Act establishes the Coastal Impact Assistance Program (CIAP) which authorizes funds to be distributed to Outer Continental Shelf oil and gas producing states to mitigate the impacts of Outer Continental Shelf oil and gas activities. Pursuant to the Act, a producing state or coastal political subdivision can use all amounts received for projects and activities for the conservation, protection, or restoration of coastal areas, including wetlands and for mitigation of damage to fish, wildlife, or natural resources. Amounts awarded under the provisions of the Act can also be used to develop a comprehensive conservation management plan.

The state worked with the coastal parishes to prepare a draft Louisiana Coastal Impact Assistance Plan that identifies restoration, conservation, and infrastructure projects to be supported by the State of Louisiana and each coastal parish for the 4 years of CIAP funding. This plan included projects for the enhanced management of Mississippi River water and sediment, protection and restoration of critical land bridges, barrier shoreline restoration and protection, interior shoreline protection, marsh creation with dredged material and a coastal forest conservation initiative. Table 11 provides information on CIAP projects near the IER # 8 project area.

Table 11.
Selected CIAP Projects within 5 miles of the IER # 8 Project Area

Project Name	Project Area (acres)
Orleans Land Bridge Shoreline Protection and Marsh Creation	220
Violet Freshwater Diversion	49

4.2.1.4 State Coastal Planning and Restoration

The State of Louisiana has initiated a series of programs to offset the catastrophic loss of coastal wetlands. The Louisiana State and Local Coastal Resources Management Act was passed in 1978 to regulate the developmental activities that affect wetland loss. The resulting Louisiana Coastal Resources Program became a Federally approved coastal zone management program in 1980. The Louisiana Legislature passed Act 6 in 1989 (R.S.49:213-214), and a subsequent constitutional amendment which created the Coastal Restoration Division within the LaDNR, as well as the Wetlands Conservation and Restoration Authority (Wetlands Authority).

In the First Extraordinary Session, 2005 of the Louisiana Legislature, which ended on 22 November 2005, Senate Bill No. 71 (Act No. 8), which provided for the new 16-member panel, called the Coastal Protection and Restoration Authority, which is a broader version of the previous board that was named the Wetlands Conservation and Restoration Authority. In addition, Senate Bill No. 71 also provided for the establishment of the Coastal Protection and Restoration Fund, previously named the Wetlands Conservation and Restoration Fund. The Fund is used for coastal wetlands conservation, coastal restoration, hurricane and storm damage risk reduction, and infrastructure impacted by coastal wetland losses.

The Louisiana Coastal Protection and Restoration project, a project between the CEMVN and the Coastal Protection and Restoration Authority (Non-Federal sponsor), was established to identify risk reduction measures that can be integrated to form a system that will provide enhanced protection of coastal communities and infrastructure, as well as for restoration of coastal ecosystems. The project addresses the full range of flood control, coastal restoration, and hurricane and storm damage risk reduction measures available, including those needed to provide comprehensive Category 5-Hurricane risk reduction. The project study was performed and a technical document has been produced with recommendations related to enhanced hurricane protection and restoration of coastal ecosystems. The technical document is undergoing internal USACE review.

The LaDNR Office of Coastal Restoration and Management is responsible for the maintenance and protection of the state's coastal wetlands. The Coastal Restoration and Engineering Divisions are responsible for the construction of projects aimed at creating, protecting and restoring the state's wetlands. These divisions are divided further and provide ongoing management and restoration of resources in the Louisiana coastal zone. The LaDNR is involved in several major programs that are working to save Louisiana's coastal wetlands. These programs include the CWPPRA, Coast 2050, the Louisiana Coastal Area (LCA) Ecosystem Restoration Plan, and the Coastal Impact Assistance Plan of 2005. Other programs include state restoration projects, Parish Coastal Wetlands Restoration Program, Vegetation Plantings, Section 204/1135, and WRDA.

The LCA Ecosystem Restoration Study (2004) was a comprehensive report that identified the most critical human and natural ecological needs of the coastal area. The study presented and evaluated conceptual alternatives for meeting the most critical needs, identified the kinds of restoration features that could be implemented in the near-term (within 5 years to 10 years) that address the most critical needs, and proposed to address these needs through features that would provide the highest return in net benefits per dollar of cost. The study also established priorities among the identified near-term restoration features; described a process by which the identified priority near-term restoration features could be developed, approved, and implemented; identified the key scientific uncertainties and engineering challenges facing the effort to protect and restore the ecosystem; and proposed a strategy for resolving them. The study also identified, assessed and recommended feasibility studies that should be undertaken within the next 5 years to 10 years to fully explore other potentially promising large-scale and long-term restoration concepts. The study concluded by presenting a strategy for addressing the long-term needs of coastal Louisiana restoration beyond the near-term focus of the LCA Plan. The 2007 WRDA authorized approximately $1.9 billion for the USACE to carry out the LCA restoration program. The CEMVN has signed an agreement with the State of Louisiana to begin studies on the first six LCA projects, with study completion by December 2010.

4.2.1.5 Violet Freshwater Diversion Project

One of the larger restoration projects that could influence the IER # 8 project area is the recently authorized Violet Diversion. Authorized under the provisions of the 2007 WRDA, the Violet

Diversion would divert freshwater from the Mississippi River east across the wetland areas from the Mississippi River to Lake Borgne. The purpose of this diversion is to reduce the salinity in the western Mississippi Sound by diverting freshwater from the Mississippi River to the Biloxi Marshes and Lake Borgne. This diversion project could increase fine sediment transport and deposition into the marshes located between the Mississippi River and the MRGO.

4.2.2 Other Projects

Local sponsors are initiating or considering initiating other actions related to the proposed actions. The East Jefferson Levee District is placing more than 1,000 three-ton highway traffic barriers along the Lake Pontchartrain shoreline to help slow the rate of erosion in East Jefferson Parish. The Southeast Louisiana Flood Protection Authority-East is planning on constructing a new breakwater along portions of the IER # 3 project area. Over 100,000 tons of rock will be used, primarily along Reach 1 (the Recurve I-wall in Northwest Kenner to the Duncan Pumping Station) and Reach 4 (Suburban Canal to Bonnabel Canal), with another 8,000 tons of rock used along the remaining reaches in the IER # 3 project area. The Greater New Orleans Expressway Commission is also considering additional Causeway improvements associated with the USACE HSDRRS project at the Causeway. These improvements could include roadway modification to maintain the new ramp height of 16.5 ft from the HSDRRS levee out onto the Causeway itself as well as additional roadway modifications. Although these projects could contribute to adverse impacts for some of the resources, several of them would have long-term positive impacts, including improved hurricane, storm, and flood damage risk reduction.

4.3 SUMMARY OF CUMULATIVE IMPACTS

The magnitude and significance of cumulative impacts were evaluated by comparing the existing environment with the expected impacts of the proposed action when combined with the impacts of other proximate actions. Projects that occur within the greater New Orleans area, within the Lake Pontchartrain Basin, and within the designated coastal zone for Louisiana were considered collectively (as appropriate) for the evaluation of cumulative impacts.

All of the HSDRRS projects are currently in the construction, planning and design stages, and impacts from these component projects will be addressed in separate IERs. Construction of levees, gates, floodwalls, and onshore breakwaters throughout the region could cause direct and indirect wetland (including open water) and upland habitat loss. Construction damage as part of the 100-year hurricane and storm damage risk reduction projects to quality wetland habitats would be fully mitigated through formal mitigation planning. The closing of the MRGO with a plug at Bayou La Loutre would reduce the intrusion of higher salinity waters into the CWA, which has been impacted by an increase in salinity.

The primary hydrologic impact of the HSDRRS projects would reduce storm surge inundation impacts for low-lying areas on the protected side of the HSDRRS. Depending on design and maintenance shoreline stabilization measures could alter existing shoreline habitat and block access to interior wetlands. Impacts to EFH could occur as a result of construction activities and access dredging but should return to pre-construction levels once those activities have ceased. Marsh areas with greater heterogeneity and interspersion and lower salinity levels could be a by-product of implementing wetland creation and shoreline protection projects within the Lake Pontchartrain Basin and Breton Sound Basin and closure of the MRGO. These changes would provide long-term benefit to most wildlife, fishery, and aquatic resources within the IER # 8 project area. However, a habitat shift would be associated with the lower salinity which would impact some existing resources such as the fish and plant species in the project area that are dependent on a higher salinity environment.

The proposed actions are not anticipated to have any impacts on the presence of HTRW in the study area. The cumulative effect of these projects could provide long-term and sustainable beneficial impacts to the communities within the study area by reducing the risk of damage within flood-prone areas and by generating economic growth. Economic growth could attract displaced residents and new workers, and encourage repopulation within the New Orleans metropolitan area.

Cumulative adverse impacts to human populations within the study area are not expected to be permanent; however, there would be temporary adverse impacts from the increased traffic, detours, road closures, and noise associated with construction activities that could occur 24 hours a day, 7 days a week for several years. It is expected that the temporary cumulative impacts to social and community facilities would result in permanent benefits because the threat to flood-prone areas would be reduced by the increased flood risk reduction provided by area projects. Construction of these projects could cause temporary and localized decreases in air quality that would mainly result from the emissions of construction equipment during dredging and construction. However, these changes in air quality should return to pre-construction conditions shortly after construction completion and these changes in air quality would not be expected to change the area's attainment status.

The proposed action would have cumulative beneficial impacts to socioeconomic resources in the New Orleans Metropolitan area. It is part of the ongoing Federal effort to reduce the threat to life, health, and property posed by flooding. The LPV project would be improved to provide additional hurricane, storm, and flood damage risk reduction, reducing the threat of inundation of infrastructure due to severe tropical storm events. The combined effects from construction of the multiple projects underway and rebuilding the HSDRRS in the area would reduce flood risk and storm damage to residences, businesses, and other infrastructure from storm-induced and tidally-driven flood events and, thereby, would encourage recovery. Providing 100-year level of risk reduction within all reaches of the LPV allows for FEMA certification of that level of risk reduction. Improved hurricane, storm, and flood damage risk reduction would benefit all residents, regardless of income or race, increase confidence, reduce insurance rates, and allow for development and redevelopment of existing urban areas.

The proposed action would unlikely have adverse impacts to fishery resources past the construction period of 3 years; therefore, it is unlikely to contribute to cumulative impacts to fishery resources beyond this time. The fisheries resources of the project area were recently disrupted during Hurricanes Katrina, Rita, Gustav, and Ike, and for HSDRRS-related construction projects. Construction and restoration projects are currently in progress or planned within the scheduled construction time frame of the proposed action. These projects may affect water characteristics such as pH, dissolved oxygen, salinity, tidal exchange, and hydrology near and in the project area, which could result in cumulative impacts to fisheries. For example, the project area would be affected by the closure of the MRGO at Bayou La Loutre and from the action to provide hurricane and storm risk reduction on the IHNC (IER # 11). The MRGO and Lake Borgne allow for tidal exchange, through which water from the Gulf of Mexico enters into the CWA. However, the de-authorization of the MRGO and construction of the closure at Bayou La Loutre will eliminate or minimize tidal exchange from the MRGO, reducing the movement of more saline water northward into the project area from the Gulf (Breton Sound). Changes in salinity and other water characteristics could affect the species that predominate in the area and their populations either positively or negatively, depending on their sensitivities to the affected parameters. However, estuarine species typically are adaptable to a relatively wide range of salinity and other conditions, and it is unlikely that they would be adversely affected by the cumulative impacts of the water-related projects in the region.

The aquatic habitat of Bayou Dupre has previously been disturbed by construction of the existing structure, adjacent levee, and MRGO, and by Hurricane Katrina. Reconstruction of tie-ins to the

existing structure and addition of updated armoring (riprap) began after Hurricane Katrina and finished in 2006. The adjacent levees may be modified or re-built (as evaluated in IER # 10) concurrently with the alternative selected for Bayou Dupre. Impacts to the hydrology of the project area would occur as a result of closure of the MRGO at Bayou La Loutre and from the action proposed to provide hurricane and storm risk reduction on the IHNC (IER # 11). The MRGO and Lake Borgne allow for tidal exchange, through which water from the Gulf of Mexico enters into the CWA. However, the de-authorization of the MRGO and construction of the closure at Bayou La Loutre will eliminate or minimize tidal exchange from the MRGO. Construction of the proposed action would increase the impacts to the aquatic habitat by re-suspending sediment that has only had a short time to recover from the prior events. However, these impacts would only occur during the construction period. The long term impact of a loss of up to 0.3 acre of open water habitat would be minimal based on the amount of similar available habitat that exists in the nearby canals and drainageways. Also, the proposed freshwater diversion through the Violet Canal could provide beneficial cumulative effects to the project area.

The purpose of the proposed project is to provide hurricane and storm damage risk reduction that would protect the lives, properties, businesses. It was authorized and funded in response to the devastation and flooding that occurred as a result of Hurricanes Katrina and Rita. Any impacts to wetlands as result of the footprint of this project will be mitigated as part of a large scale mitigation project to produce a beneficial cumulative impact.

In conclusion, although there are many ongoing and planned projects that would similarly impact resources in the Lake Pontchartrain Basin portion of Louisiana, most of the resulting impacts would be temporary. Those adverse impacts that would not be temporary in nature would be directly mitigated or would be indirectly mitigated by other projects in the region that would provide positive long-term impacts to the same resource (e.g., wetlands or EFH). Cumulative impacts to social and economic resources would not only be beneficial, but are considered essential.

5.0 SELECTION RATIONALE

The USACE has established the Alternative Evaluation Process (AEP), a logical, systematic process for recommending a proposed action alternative. The AEP is being utilized throughout the HSDRRS to promote a consistent method of selecting a proposed action, across the system. The proposed action selected for IER # 8 would replace the current sector gate and T-wall tie-ins with a new sector gate approximately 130 ft to the flood side of the existing gate and a pontoon bridge would be added approximately 150 ft to the protected side of the existing gate structure. The proposed action was selected to balance the necessity for better reduction of risk to life and property from hurricane and storm related flooding with engineering costs, feasibility, and practicality as well as with the objectives of preservation and sustainability of the natural environment. Most of the adverse resource impacts expected would be short-term, and only occur during construction. Some permanent impacts to surface water and water bottoms could occur from permanent placement of the proposed features. These resource impacts were considered along with AEP factors or practicality criteria that included risk and reliability, constructability, real estate requirements, OMRR&R, environment impacts, schedule, and cost.

Risk and Reliability: Various USACE studies were undertaken as part of the overall IER # 8 project, and numerous alternatives were investigated as means to provide reduced risk to the project area. The no action alternative would not provide the desired level of risk reduction; therefore, its reliability would be very low with very high associated risks. Alternative 1 and the proposed action would provide similar risk and reliability in terms of storm load exposure,

overtopping frequency and volume, and foundation quality. However, the proposed action offers a level of redundancy during construction that alternative 1 does not. During construction of the proposed action, the presence of the existing structure along the same alignment (e.g., within the bayou, 130 ft behind the new structure), provides protection while the new structure is being built. Under alternative 1, the new structure would be built adjacent to the existing gate meaning that during construction, the cofferdam would be the primary source of protection on the new channel.

In addition, under alternative 1 it would be necessary to demolish the existing gate structure, fill the existing channel, and construct a section of T-wall on top of the filled channel that would tie into the adjacent levee system. The new t-wall would need to provide the same level of risk reduction as the adjacent levee segments. Also, the new t-wall section could potentially have to be offset from the existing levee alignment due to the presence of piles associated with the existing structure; those piles could interfere with construction of the t-wall foundation. An offset t-wall would require more transition points in order to connect into the existing levee system, which would increase risk and lower reliability. In contrast, the proposed action would not require any modification of the existing structure.

Environmental: The no action alternative would have the lowest level of impact on the environmental resources of the three alternatives evaluated in this IER. However, it would not provide the 100-year level of risk reduction. The environmental impacts from the proposed action would generally be short-term, associated with construction activities. Approximately 0.3 acres of aquatic habitat would be permanently lost due to the proposed structure. Alternative 1 would result in a greater level of impact than the proposed action. Approximately 2 acres of wetlands near the existing Bayou Dupre channel and 2 acres of aquatic habitat in the bayou channel would be lost, with associated impacts on fisheries and wildlife resources.

Navigation was also considered under the environmental impacts criterion. During construction of the proposed action, a cofferdam would be installed, disabling passage through the existing channel to the MRGO for all boats. Boat traffic needing to access the MRGO would need to use an alternate route, such as the New Canal (Back Dike Canal), a navigable channel that could be used during the construction period for boaters to exit the CWA through Bayou Bienvenue. The proposed action would have slightly greater impacts to navigation than alternative 1.

Constructability: Although alternative 1 would require construction of a new channel and filling of the existing channel, the construction of alternative 1 would be easier than the proposed action because there would be less congestion on the site than with the proposed action.

Operations, Maintenance, Repair, Replacement and Rehabilitation: Although this project is 100 percent Federally-funded, OMRR&R remains the responsibility of the non-Federal sponsor. For this criterion, several issues are considered including: the difficulty associated with operating and maintaining the structure, the chance of some element crucial to OMRR&R being overlooked, or the local sponsor not performing required OMRR&R duties. The proposed alternative balances the short-term design requirements with the long-term ability of the local sponsor to maintain and operate the HSDRRS and of the system to provide adequate risk reduction. The proposed action is very similar to the existing system; therefore the OMRR&R requirements would also be similar to the existing system. OMRR&R under alternative 1 may be more difficult due to the hydrology associated with the curved shape of the new channel. More maintenance dredging would be required under alternative 1 to ensure that the structure in the new channel operates as needed. In addition, there would be substantial flow through the new structure/new channel under alternative 1 that could result in new scour occurring, creating additional OMRR&R requirements.

Real Estate Requirements: Real estate requirements must be considered given the impact they can have on the speed by which hurricane and storm risk reduction can be provided to the project area. The number of properties to be acquired can influence the real estate acquisition schedule. The proposed action was selected, in part, because no new ROW would be required. The real estate acquisition of new ROW for alternative 1 could take an additional year or more.

Schedule and Cost: Schedule and cost are important considerations for any project. Excessive project duration or expenses would limit available funding, create budget shortfalls, and prolong or prevent project completion. The schedule and cost of each alternative was estimated and balanced with the ability of each alternative to provide adequate risk reduction as well as minimizing environmental and social impacts. The proposed action would maximize risk reduction and minimize time and cost through the construction of the alternative within the current channel while avoiding the need to fill the scour hole within the project area. The proposed action would minimize the need for mitigation of environmental impacts. Under alternative 1, the construction of a new channel and the need to fill-in the existing channel would add both time and cost to the project, when compared to the proposed action.

Selection Rationale Summary: Considering the criteria of risk and reliability, constructability, O&M, real estate requirements and cost, the proposed action was selected because it would minimize uncertainty and risk to acceptable levels in a reasonable period of time. The proposed action would minimize impacts to resources and would be possible within the time constraints and technology available. Finally, the proposed action is compatible and works in concert with other projects that have been completed, are in progress, or will be implemented to improve the risk reduction provided by the HSDRRS.

6.0 COORDINATION AND CONSULTATION

6.1 PUBLIC INVOLVEMENT

Extensive public involvement has been sought in preparing this IER. The project analyzed in this IER was publicly disclosed and described in the Federal Register on 13 March 2007 and on the website www.nolaenvironmental.gov. Scoping for this project was initiated on 12 March 2007 through placing advertisements and public notices in USA Today and The New Orleans Times-Picayune. Nine public scoping meetings were held throughout the New Orleans Metropolitan area to explain the scope and process of the Alternative Arrangements for implementing NEPA between 27 March and 12 April 2007, after which a 30-day scoping period was open for public comment submission. Additionally, the CEMVN is hosting monthly public meetings to keep the stakeholders advised of project status. The public is able to provide verbal comments during the meetings and written comments after each meeting in person, by mail, and via www.nolaenvironmental.gov.

In public meetings held 12 June 2007, 27 July 2007, 24 October 2007, 1 November 2007, 17 January 2008, 17 April 2008, and 17 July 2008, several public concerns were raised regarding flooding and tidal surge impacts on St. Bernard Parish from the MRGO, the IHNC, Lake Borgne, and Lake Pontchartrain near Seabrook. These concerns are discussed in section 1.5.

The draft IER will be distributed for a 30-day public review and comment period. A public meeting specific to the proposed action will be held if requested by a stakeholder during the review period. Any comments received during this public meeting will be considered part of the official record. After the 30-day comment period, and public meeting if requested, the CEMVN District Commander will review all comments received during the review period and make a determination if they rise to the level of being substantive in nature. If comments are not

considered to be substantive, the District Commander will make a decision on the proposed action. This decision will be documented in an IER Decision Record. If a comment(s) is determined to be substantive in nature, an Addendum to the IER will be prepared and published for an additional 30-day public review and comment period. After the expiration of the public comment period the District Commander will make a decision on the proposed action. The decision will be documented in an IER Decision Record.

6.2 AGENCY COORDINATION

Preparation of this IER has been coordinated with appropriate Congressional, Federal, state, and local interests, as well as environmental groups and other interested parties. An interagency environmental team was established for this project in which Federal and state agency staff played an integral part in the project planning and alternative analysis phases of the project (members of this team are listed in appendix C). This interagency environmental team was integrated with the CEMVN PDT to assist in the planning of this project and to complete a mitigation determination of the potential direct and indirect impacts of the proposed action. Monthly meetings with resource agencies were also held concerning this and other IER projects. The following agencies, as well as other interested parties, are receiving copies of this draft IER:

U.S. Department of the Interior, Fish and Wildlife Service
U.S. Department of the Interior, National Park Service
U.S. Environmental Protection Agency, Region VI
U.S. Department of Commerce, NOAA National Marine Fisheries Service
U.S. Natural Resources Conservation Service
Governor's Executive Assistant for Coastal Activities
Louisiana Department of Wildlife and Fisheries
Louisiana Department of Natural Resources, Coastal Management Division
Louisiana Department of Natural Resources, Coastal Restoration Division
Louisiana Department of Environmental Quality
Louisiana State Historic Preservation Officer

Water quality certification for the proposed project was received from LaDEQ on 8 February 2009 (appendix D).

The USFWS and NMFS reviewed the proposed action to see if it would affect any threatened or endangered species, or their critical habitat. The USFWS concurred with the CEMVN in a letter dated 2 February 2009, that the proposed action would not be likely to adversely affect the threatened or endangered species under their jurisdiction, the manatee (appendix D). CEMVN determined, as documented in this IER, that the proposed action would have no effect on the threatened or endangered species under NMFS jurisdiction (Gulf sturgeon and sea turtles). Consequently, written concurrence from NMFS was not required.

The LaDNR reviewed the proposed action for consistency with the Louisiana Coastal Resources Program (LCRP). The proposed actions were found to be consistent with the LCRP, as per a letter dated 17 April 2008 (appendix D). A modification to the consistency determination was requested by the CEMVN for the proposed action based on changes to IER # 8, including the removal of the action proposed for Bayou Bienvenue and modification of the proposed action at Bayou Dupre. LaDNR concurred that the modification proposed is consistent with the LCRP in a letter dated 26 January 2009 (appendix D).

Section 106 of the National Historic Preservation Act, as amended, requires consultation with the LaSHPO and Native American tribes. Eleven Federally-recognized tribes that have an interest in the region were given the opportunity to review the proposed action. The LaSHPO concurred with the CEMVN “no historic properties affected” finding in a letter dated 19 November 2007,

and the Mississippi Band of Choctaw Indians concurred with the effect determination in an email dated 29 November 2007. No other Native American tribes responded to the requests for comment.

Coordination with the USFWS on the Alternative Arrangements process was initiated by letter on 13 March 2007, and concluded on 6 August 2007. The USFWS provided a programmatic Fish and Wildlife Coordination Act Report (CAR) on 26 November 2007. A draft CAR for IER # 8 was provided by the USFWS on 4 March 2008 (appendix D). The draft CAR concluded that the USFWS does not object to the construction of the proposed project provided that fish and wildlife conservation recommendations are implemented concurrently with project implementation. In addition, as discussed previously in section 3.2.6, measures recommended by the USFWS in their letter dated 2 February 2009 for protection of the manatee would be followed during construction of the proposed action.

The USFWS' programmatic recommendations applicable to this project will be incorporated into project design studies to the extent practicable, consistent with engineering and public safety requirements. The USFWS' programmatic recommendations, and the CEMVN's response to them, are listed below:

> Recommendation 1: To the greatest extent possible, situate flood protection so that destruction of wetlands and non-wet bottomland hardwoods are avoided or minimized.
>
> CEMVN Response 1: The project will minimize new impacts to wetlands.
>
> Recommendation 2: Minimize enclosure of wetlands with new levee alignments. When enclosing wetlands is unavoidable, acquire non-development easements on those wetlands, or maintain hydrologic connections with adjacent, un-enclosed wetlands to minimize secondary impacts from development and hydrologic alteration.
>
> CEMVN Response 2: The proposed action does not enclose any additional wetlands and its alignment remains along the existing alignment.
>
> Recommendation 3: Avoid adverse impacts to bald eagle nesting locations and wading bird colonies through careful design project features and timing of construction.
>
> CEMVN Response 3: Concur. These issues are addressed in section 3.2.6 of the IER.
>
> Recommendation 4: Forest clearing associated with project features should be conducted during the fall or winter to minimize impacts to nesting migratory birds, when practicable.
>
> CEMVN Response 4: No forest clearing will occur with implementation of the proposed action.
>
> Recommendation 5: The project's first Project Cooperation Agreement (or similar document) should include language that includes the responsibility of the local-cost sharer to provide operational, monitoring, and maintenance funds for mitigation features.
>
> CEMVN Response 5: USACE Project Partnering Agreements (PPA) do not contain language mandating the availability of funds for specific project features, but require the non-Federal Sponsor to provide certification of sufficient funding for the entire project. Further, mitigation components are considered a feature of the entire project. The non-Federal Sponsor is responsible for O&M, Repair, Replacement, and Rehabilitation (OMRR&R) of all project features in accordance with the OMRR&R manual that the USACE provides upon completion of the project.

Recommendation 6: Further detailed planning of project features (e.g., Design Documentation Report, Engineering Documentation Report, Plans and Specifications, or other similar documents) should be coordinated with the USFWS, NMFS, LaDWF, USEPA, and LaDNR. The USFWS shall be provided an opportunity to review and submit recommendations on all the work addressed in those reports.

CEMVN Response 6: Concur.

Recommendation 7: The CEMVN should avoid impacts to public lands, if feasible. If not feasible, the CEMVN should establish and continue coordination with agencies managing public lands that may be impacted by a project feature until construction of that feature is complete and prior to any subsequent maintenance. Points of contacts for the agencies overseeing public lands potentially impacted by project features are: Kenneth Litzenberger, Project Leader for the USFWS' Southeast National Wildlife Refuges, and Jack Bohannan (985) 822-2000, Refuge Manager for the Bayou Sauvage NWR, Office of State Parks contact Mr. John Lavin at 1-888-677-1400, National Park Service (NPS) contact Superintendent David Luchsinger, (504) 589-3882, extension 137 (david_luchsinger@nps.gov), or Chief of Resource Management David Muth (504) 589-3882, extension 128 (david_muth@nps.gov) and for the 404(c) area contact the previously mentioned NPS personnel and Ms. Barbara Keeler (214) 665-6698 with the USEPA.

CEMVN Response 7: Concur.

Recommendation 8: If applicable, a General Plan should be developed by the CEMVN, the USFWS, and the managing natural resource agency in accordance with Section 3(b) of the Fish and Wildlife Coordination Act for mitigation lands.

CEMVN Response 8: Concur.

Recommendation 9: If mitigation lands are purchased for inclusion within a NWR, those lands must meet certain requirements; a summary of some of those requirements is provided in Appendix A (to the draft CAR.) Other land-managing natural resource agencies may have similar requirements that must be met prior to accepting mitigation lands; therefore, if they are proposed as a manager of a mitigation site, they should be contacted early in the planning phase regarding such requirements.

CEMVN Response 9: Concur.

Recommendation 10: If a proposed project feature is changed significantly or is not implemented within one year of the date of the Endangered Species Act consultation letter, the USFWS recommended that the Corps reinitiate coordination to ensure that the proposed project would not adversely affect any Federally-listed threatened or endangered species or their habitat.

CEMVN Response 10: Concur.

Recommendation 11: In general, larger and more numerous openings in a protection levee better maintain estuarine-dependent fishery migration. Therefore, as many openings as practicable, in number, size, and diversity of locations should be incorporated into project levees.

CEMVN Response 11: This recommendation will be considered in the design of the project to the greatest extent practicable. However, the project addresses construction of a new

flood control structure consisting of a steel sector gate and floodwall tie-ins to the existing levees, and not the construction of new levees.

Recommendation 12: Flood protection water control structures in any watercourse should maintain pre-project cross-sections in width and depth to the maximum extent practicable, especially structures located in tidal passes.

CEMVN Response 12: Acknowledged. The proposed action maintains the current dimensions of the existing gate.

Recommendation 13: Flood protection water control structures should remain completely open except during storm events. Management of those structures should be developed in coordination with the USFWS, NMFS, LaDWF, and LaDNR.

CEMVN Response 13: Acknowledged. The new gate would operate in the same manner as the existing gate, remaining open except during storms and high tides. During a storm event, the gate would be closed to provide flood risk reduction. In the absence of storm conditions, the gate would be closed when the tide rises to an elevation of +1.2 ft (NAVD88) and would be opened when the tide ebbs.

Recommendation 14: Any flood protection water control structure sited in canals, bayous, or a navigation channel which does not maintain the pre-project cross-section should be designed and operated with multiple openings within the structure. This should include openings near both sides of the channel as well as an opening in the center of the channel that extends to the bottom.

CEMVN Response 14: This recommendation will be considered in the design of the project to the greatest extent practicable.

Recommendation 15: The number and siting of openings in flood protection levees should be optimized to minimize the migratory distance from the opening to enclosed wetland habitats.

CEMVN Response 15: Not applicable.

Recommendation 16: Flood protection structures within a waterway should include shoreline baffles and/or ramps (e.g., rock rubble, articulated concrete mat) that slope up to the structure invert to enhance organism passage. Various ramp designs should be considered.

CEMVN Response 16: The structure will be at channel level, with no raised sill, and it will not change existing conditions.

Recommendation 17: To the maximum extent practicable, structures should be designed and/or selected and installed such that average flow velocities during peak flood or ebb tides do not exceed 2.6 ft per second. However, this may not necessarily be applicable to tidal passes or other similar major exchange points.

CEMVN Response 17: The design of the project will use the same dimensions as the current structure.

Recommendation 18: To the maximum extent practicable, culverts (round or box) should be designed, selected, and installed such that the invert elevation is equal to the existing

water depth. The size of the culverts selected should maintain sufficient flow to prevent siltation.

CEMVN Response 18: Four 48-inch culverts with screens are being designed as part of the temporary coffer dam to allow for some flow exchange during the sector gate construction.

Recommendation 19: Culverts should be installed in construction access roads unless otherwise recommended by the natural resource agencies. At a minimum, there should be one 24-inch culvert placed every 500 ft and one at natural stream crossings. If the depth of water crossings allow, larger-sized culverts should be used. Culvert spacing should be optimized on a case-by-case basis. A culvert may be necessary if the road is less than 500 ft long and an area would hydrologically be isolated without that culvert.

CEMVN Response 19: Concur.

Recommendation 20: Water control structures should be designed to allow rapid opening in the absence of an offsite power source after a storm passes and water levels return to normal.

CEMVN Response 20: Concur.

Recommendation 21: Levee alignments and water control structure alternatives should be selected to avoid the need for fishery organisms to pass through multiple structures (i.e., structures behind structures) to access an area.

CEMVN Response 21: Acknowledged.

Recommendation 22: Operational plans for water control structures should be developed to maximize the cross-sectional area open for as long as possible. Operations to maximize freshwater retention or redirect freshwater flows could be considered if hydraulic modeling demonstrates that is possible and such actions are recommended by the natural resource agencies.

CEMVN Response 22: The design of the project will replace the existing structure with one of the same size and dimensions.

Recommendation 23: The CEMVN shall fully compensate for any unavoidable losses of wetland habitat or non-wet bottomland hardwoods caused by project features.

CEMVN Response 23: Concur.

Recommendation 24: Acquisition, habitat development, maintenance and management of mitigation lands should be allocated as first-cost expenses of the project, and the local project-sponsor should be responsible for operational costs. If the local project-sponsor is unable to fulfill the financial mitigation requirements for operation, then the CEMVN shall provide the necessary funding to ensure mitigation obligations are met on behalf of the public interest.

CEMVN Response 24: Construction of the project features are not cost shared between the Government and the non-Federal sponsor. However, costs for operation, maintenance, repair, replacement, and rehabilitation will be the responsibility of the non-Federal sponsor.

Recommendation 25: Any proposed change in mitigation features or plans should be coordinated in advance with the USFWS, NMFS, LaDWF, USEPA, and LaDNR.

CEMVN Response 25: Mitigation for the impacts caused by this project will be coordinated through a mitigation IER. Any material changes to the mitigation plan in this IER would be coordinated in advance.

Recommendation 26: A report documenting the status of mitigation implementation and maintenance should be prepared every 3 years by the managing agency and provided to the CEMVN, USFWS, NMFS, USEPA, LaDNR, and LaDWF. That report should also describe future management activities, and identify any proposed changes to the existing management plan.

CEMVN Response 26: Concur.

The 4 March 2008 USFWS project-specific recommendations for the IER # 8 proposed action are listed below. Each recommendation is followed by the CEMVN response.

Recommendation 1: To the greatest extent possible, situate flood protection features so that destruction of wetlands are avoided or minimized.

CEMVN Response 1: The project will minimize new impacts to wetlands.

Recommendation 2: The project's first Project Cooperation Agreement (or similar document) should include language that specifies the responsibility of the local-cost sharer to provide operational, monitoring, and maintenance funds for mitigation features.

CEMVN Response 2: USACE PPA do not contain language mandating the availability of funds for specific project features, but require the non-Federal Sponsor to provide certification of sufficient funding for the entire project. Further, mitigation components are considered a feature of the entire project. The non-Federal Sponsor is responsible for OMRR&R of all project features in accordance with the OMRR&R manual that the USACE provides upon completion of the project.

Recommendation 3: Further detailed planning of project features (e.g., Design Documentation Report, Engineering Documentation Report, Plans and Specifications, or other similar documents) should be coordinated with the Service, NMFS, LaDWF, EPA and LaDNR. The Service shall be provided an opportunity to review and submit recommendations on the all work addressed in those reports.

CEMVN Response 3: Concur.

Recommendation 4: If a proposed project feature is changed significantly or is not implemented within 1 year of the date of our Endangered Species Act consultation letter, we recommend that the Corps reinitiate coordination with this office to ensure that the proposed project would not adversely affect any Federally listed threatened or endangered species or their habitat. In addition, the Corps should re-consult with the Service if the protective measures for the West Indian manatee are not incorporated into plans and specifications for work within any adjacent waterbody.

CEMVN Response 4: Concur.

Recommendation 5: The cross-section of the structures should be designed to pass flows from the proposed Violet Diversion to the unprotected-levee side.

CEMVN Response 5: At this time, the Violet Diversion is currently under study and design details, including the volume of water that would be diverted from the Mississippi

River, are not available. Therefore, it is not possible to design the Bayou Dupre structure to account for this future project.

Recommendation 6: The proposed flood protection water control structures should maintain pre-project cross section in width and depth to the maximum extent practicable.

CEMVN Response 6: Acknowledged. The proposed action maintains the current dimensions of the existing gate.

Recommendation 7: If the proposed flood protection water control structures do not maintain the pre-project cross section, those structures should be designed and operated with multiple openings within the structure. This should include openings near both sides of the channel as well as an opening in the center of the channel that extends to the bottom.

CEMVN Response 7: This recommendation will be considered in the design of the project to the greatest extent practicable.

Recommendation 8: The proposed flood protection water control structures shall remain completely open except during storm events. Management of those structures should be developed in coordination with the USFWS, NMFS, LaDWF, and LaDNR.

CEMVN Response 8: Acknowledged. The new gate would operate in the same manner as the existing gate, remaining open except during storms and high tides. During a storm event, the gate would be closed to provide flood risk reduction. In the absence of storm conditions, the gate would be closed when the tide rises to an elevation of +1.2 ft (NAVD88) and would be opened when the tide ebbs.

Recommendation 9: The proposed flood protection water control structures should be designed to allow rapid opening in the absence of an offsite power source after a storm passes and water levels return to normal.

CEMVN Response 9: Concur.

Recommendation 10: To enhance organism passage, the proposed flood protection structures should include shoreline baffles and/or ramps (e.g., rock rubble, articulated concrete mat) that slope up to the structure invert. Various ramp designs should be considered.

CEMVN Response 10: The structure will be at channel level, with no raised sill, and it will not change existing conditions.

Recommendation 11: The Corps shall fully compensate for the unavoidable losses of 0.5 acres of wetland habitat caused by project features.

CEMVN Response 11: It is unlikely that 0.5 acre of wetland would be destroyed as part of the proposed action. This estimate was originally based on estimates that included an action at Bayou Bienvenue as well as the action at Bayou Dupre. The estimate for the proposed action at Bayou Dupre is that up to 0.3 acre of estuarine open water and substrate could be permanently impacted. However, the actual permanent impacts are expected to be less than this estimate. The USACE will mitigate for the habitat lost as determined necessary by the coordinating agencies.

Recommendation 12: Acquisition, habitat development, maintenance and management of mitigation lands should be allocated as first-cost expenses of the project, and the local

project-sponsor should be responsible for operational costs. If the local project-sponsor is unable to fulfill the financial mitigation requirements for operation, then the Corps should provide the necessary funding to ensure mitigation obligations are met on behalf of the public interest.

CEMVN Response 12: Construction of the project features are not cost shared between the Government and the non-Federal sponsor. However, costs for operation, maintenance, repair, replacement, and rehabilitation will be the responsibility of the non-Federal sponsor.

7.0 MITIGATION

Quantitative analysis utilizing existing methodologies for water resource planning has identified the acreages and habitat type for the direct or indirect impacts of implementing the proposed action. The proposed action was selected because it was designed to minimize impacts to wetlands and as such no wetlands would be impacted by construction of the structure and T-wall tie-ins at the bayou. Up to 0.3 acre of EFH (estuarine mud bottom and water column) at the bayou would be permanently occupied by the control structure.

A comprehensive mitigation IER will be prepared documenting and compiling these unavoidable impacts and those for all other proposed actions within the LPV Project that are being analyzed through other IERs. Mitigation planning is being carried out for groups of IERs, rather than within each IER, so that large mitigation efforts could be taken rather than several smaller efforts, thus increasing the relative economic and ecological benefits of the mitigation effort.

The CEMVN has partnered with Federal and state resource agencies to form an interagency mitigation team that is working to assess and verify these impacts, and to look for potential mitigation sites in the appropriate hydrologic basin. This effort is occurring concurrently with the IER planning process in an effort to complete mitigation work and construct mitigation projects expeditiously. As with the planning process of all other IERs, the public will have the opportunity to give input about the proposed work. These mitigation IERs will, as described in section 1 of this IER, be available for a 30-day public review and comment period.

These forthcoming mitigation IERs would implement compensatory mitigation as early as possible. All mitigation activities would be consistent with standards and policies established in the Clean Water Act Section 404 and the appropriate USACE policies and regulations governing this activity.

8.0 COMPLIANCE WITH ENVIRONMENTAL LAWS AND REGULATIONS

Construction of the proposed action would not commence until the proposed action achieves environmental compliance with all applicable laws and regulations, as described below.

Environmental compliance for the proposed action would be achieved upon coordination of this IER with appropriate agencies, organizations, and individuals for their review and comments: the USFWS and NMFS confirmation that the proposed action would not be likely to adversely affect any endangered or threatened species or completion of ESA Section 7 consultation; the LaDNR concurrence with the determination that the proposed action is consistent, to the maximum extent practicable, with the Louisiana Coastal Resources Program; receipt of a Water Quality Certification from the state of Louisiana; public review of the Section 404(b)(1) Public Notice and signature of the Section 404(b)(1) Evaluation; coordination with the LaSHPO; receipt and

acceptance or resolution of all Fish and Wildlife Coordination Act recommendations; receipt and acceptance or resolution of all LaDEQ comments on the air quality impact analysis documented in the IER; and receipt and acceptance or resolution of all EFH recommendations.

9.0 CONCLUSIONS

9.1 INTERIM DECISION

The proposed action for the Bayou Dupre control structure consists of construction of a new structure to a height of approximately 31 ft. The new structure would be approximately 130 ft on the flood-side of the existing structure with T-walls that tie into the adjacent levee reaches. In addition, a pontoon bridge would be included to allow for a more efficient means of inspecting and maintaining the adjacent levee reaches.

The CEMVN has assessed the environmental impacts of the proposed action and has determined that the proposed action would have the following impacts:

- **Wetlands** – No loss of wetlands at Bayou Dupre; impacts would occur primarily during construction.
- **Bayou Dupre/Drainageways** – Up to 0.3 acre of aquatic habitat lost.
- **Fisheries** – Temporary impacts to fisheries during construction.
- **Essential Fish Habitat** – Temporary impacts to EFH in the vicinity of the project area during construction and up to 0.3 acre of estuarine water and substrate permanently lost by the new structure.
- **Wildlife** – Temporary impacts to wildlife within the vicinity of the project area during construction.
- **Threatened and Endangered Species** – CEMVN determination of not likely to adversely affect the manatee (USFWS jurisdiction) and no effect on the Gulf sturgeon or sea turtles (NMFS jurisdiction). USFWS concurrence on 2 February 2009. NMFS concurrence not required.
- **Cultural Resources** – CEMVN determination of no impact to a cultural resource. La SHPO and Tribal concurrence on 19 November 2007 and 29 November 2007, respectively.
- **Recreation Resources** – Temporary construction-related impacts to fish habitat would reduce recreational opportunities. Impacts to the nearby fishing camps resulting from construction activities would be minor and transitory.
- **Aesthetic (Visual) Resources** – The visual attributes of the project area would be very similar to those under existing conditions.
- **Air Quality** – Temporary impacts during construction.
- **Noise** – Temporary impacts to receptors within 1,000 ft of the project area during construction.

- **Transportation** – Waterborne transportation and worker/truck traffic resulting from the project would temporarily impact traffic on local waterways and roads within the vicinity of the project area.

- **Socioeconomic Resources** – Beneficial impacts to population, land use, and employment due to heightened flood risk reduction and construction-generated employment.

- **Environmental Justice** – CEMVN determination of no disproportionate adverse impact to any low income or minority populations.

9.2 PREPARED BY

The point of contact for this IER is Laura Lee Wilkinson USACE, CEMVN-HPO. Table 12 lists the preparers of relevant sections of this report. Ms. Wilkinson can be reached at the U.S. Army Corps of Engineers, New Orleans District; P.O. Box 60267, 7400 Leake Avenue; New Orleans, Louisiana 70118.

Table 12.
Environmental Assessment Preparation Team

EA Section	Team Member
Environmental Team Leader	Gib Owen, USACE
Environmental Manager	Laura Lee Wilkinson, USACE
Technical Coordinator	Lee Walker, Evans-Graves Engineers
Task Manager/Alternatives	Roberta Hurley, Earth Tech
Environmental Setting/Project Support	Erika Schreiber, Earth Tech
Wetlands, Fisheries, Aesthetics/Noise/Air	Leslie Howard, Earth Tech
Legal Review	Robert Northey, USACE
Wetlands, Waterways, Fisheries, EFH, Terrestrial Resources, Threatened and Endangered Species	Stephen Dillard, Earth Tech
Socioeconomics/Land Use	Susan Provenzano, AICP, Earth Tech
Transportation/Noise	John Schrohenloher, P.E., Earth Tech
Air	Fang Yang, P.E., Earth Tech
Gulf sturgeon Coordinator	Elizabeth Behrens, USACE
Environmental Justice	Jerica Richardson, USACE
Cultural Resources	Michael Swanda, USACE
Recreation	Andrew Perez, USACE
HTRW	Christopher Brown, USACE
Internal Technical Review	Tom Keevin, USACE
Technical Editor	Jennifer Darville, USACE
Technical Review	Randall Kraciun, USACE Patricia Leroux, USACE
Technical Support	Tony Collins, Earth Tech
Administrative Support	Bonnie Freeman, Earth Tech

9.3 LITERATURE CITED

16 USC 661. United States Code, Title 16, *Conservation*, Chapter 5A, "Protection and Conservation of Wildlife," Subchapter I, Game, Fur-Bearing Animals, and Fish.

16 USC 668. United States Code, Title 16, *Conservation*, Chapter 5A, "Protection and Conservation of Wildlife," Subchapter II, Protection of Bald and Golden Eagles.

16 USC 703. United States Code, Title 16, *Conservation*, Chapter 7, "Protection of Migratory Game and Insectivorous Birds," Subchapter II, Migratory Bird Treaty.

16 USC 1531. United States Code, Title 16, *Conservation*, Chapter 35, "Endangered Species."

16 USC 1802. United States Code, Title 16, *Conservation*, Chapter 38, "Fishery Conservation and Management," Section 1802, Definitions.

16 USC 1853. United States Code, Title 16, *Conservation*, Chapter 38, "Fishery Conservation and Management," Section 1853, Contents of Fishery Management Plans.

42 USC 4601. United States Code, Title 42, The Public Health and Welfare, Chapter 61, Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally Assisted Programs, Section 4601 "Definitions."

33 CFR 230. Code of Federal Regulations, Title 33 - Navigation and Navigable Waters, Chapter II - Corps of Engineers, Department of the Army, Department of Defense, Part 230 "Procedures for Implementing NEPA."

33 CFR 328. Code of Federal Regulations, Title 33, *Navigation and Navigable Waters*, Chapter II - "Corps of Engineers, Department of the Army, Department of Defense," Part 328, Definition of Waters of the United States.

33 CFR 329. Code of Federal Regulations, Title 33, *Navigation and Navigable Waters*, Chapter II - "Corps of Engineers, Department of the Army, Department of Defense," Part 329, Definition of Navigable Waters of the United States.

33 USC 401. United States Code, Title 33, *River and Harbor Act of 1899*, Section 10, "Construction of bridges, causeways, dams, or dikes, exemptions"

33 USC 1344. United States Code, Title 33, *Navigation and Navigable Waters*, Chapter 26, "Water Pollution Prevention and Control," Section 1344, Permits for Dredged or Fill Material.

40 CFR 50. Code of Federal Regulations, Title 40, *Protection of Environment*, Part 50, National Ambient Air Quality Standards.

40 CFR 1500-1508. Code of Federal Regulations, Title 40, *Protection of Environment*, Chapter V – "Council on Environmental Quality," Parts 1500-1508, National Environmental Policy Act.

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Appendix A

List of Acronyms and Definitions of Common Terms

ACB	articulated concrete blocks
ASTM	American Society for Testing and Materials
BMP	best management practices
CAA	Clean Air Act of 1963
CAR	Fish and Wildlife Coordination Act Report
CED	Comprehensive Environmental Document
CEMVN	Corps of Engineers, Mississippi Valley Division, New Orleans District
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIAP	Coastal Impact Assessment Program
CO	carbon monoxide
CWA	Central Wetlands Area
CWPPRA	Coastal Wetlands Planning, Protection, and Restoration Act
dB	decibel
dBA	A-weighted decibel
DNL	day-night average sound level
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EJ	Environmental Justice
ER	Engineering Regulation
ESA	Endangered Species Act
ESRI	Environmental Systems Research Institute, Inc.
°F	degrees Fahrenheit
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FMC	Fishery Management Council
FMP	Fishery Management Plan
FONSI	Finding of No Significant Impact
fps	feet per second
ft	feet
GIWW	Gulf Intracoastal Waterway
GMFMC	Gulf of Mexico Fishery Management Council
GNOCDC	Greater New Orleans Community Data Center
HSDRRS	Hurricane and Storm Damage Risk Reduction System
GSMFC	Gulf States Marine Fisheries Commission
HTRW	hazardous, toxic, and radioactive waste
IER	Individual Environmental Report
IHNC	Inner Harbor Navigation Canal
III	Insurance Information Institute
LCA	Louisiana Coastal Area
LCRP	Louisiana Coastal Resources Program
LaDEQ	Louisiana Department of Environmental Quality
LaDNR	Louisiana Department of Natural Resources
LaDOL	Louisiana Department of Labor
LaDWF	Louisiana Department of Wildlife and Fisheries
LaNHP	Louisiana Natural Heritage Program
LaSHPO	State Historic Preservation Office

LPV	Lake Pontchartrain and Vicinity
mi^2	square mile(s)
MRGO	Mississippi River Gulf Outlet
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NAAQS	National Ambient Air Quality Standards
NAVD88	North American Vertical Datum 1988
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NOV	New Orleans to Venice
NPS	National Park Service
NWR	National Wildlife Refuge
NWUS	Navigable Waters of the United States
O_3	ozone
O&M	operation and maintenance
OMRR&R	operation, maintenance, repair, replacement, and rehabilitation
PA	Programmatic Agreement
Pb	lead
PDT	Project Delivery Team
PL	Public Law
PM	particulate matter
PPA	Project Partnering Agreements
ppm	parts per million
ppt	parts per thousand
PWA	Plaquemines Wetland Area
RCRA	Resource Conservation and Recovery Act
REC	recognized environmental condition
ROW	right-of-way
RTF	Louisiana Coastal Wetlands Conservation and Restoration Task Force
SAV	submerged aquatic vegetation
SIR	Supplemental Information Report
SO_2	sulfur dioxide
sq ft	square foot
SWPPP	storm water pollution prevention plan
TRM	turf reinforcement mattress
U.S.	United States
USACE	U.S. Army Corps of Engineers
USC	United States Code
USCB	U.S. Census Bureau
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WBV	West Bank and Vicinity
WCRA	Wetlands Conservation and Restoration Authority
WRDA	Water Resources Development Act
WoUS	Waters of the United States

Appendix B

Public Comment and Responses Summary

Appendix C

Members of Interagency Environmental Team

Kyle Balkum	Louisiana Dept. of Wildlife and Fisheries
Catherine Breaux	U.S. Fish and Wildlife Service
Mike Carloss	Louisiana Dept. of Wildlife and Fisheries
David Castellanos	U.S. Fish and Wildlife Service
Frank Cole	Louisiana Department of Natural Resources
Greg Ducote	Louisiana Department of Natural Resources
John Ettinger	U.S. Environmental Protection Agency
David Felder	U.S. Fish and Wildlife Service
Michelle Fischer	U.S. Geologic Survey
Deborah Fuller	U.S. Fish and Wildlife Service
Mandy Green	Louisiana Department of Natural Resources
Jeffrey Harris	Louisiana Department of Natural Resources
Richard Hartman	NOAA National Marine Fisheries Service
Brian Heimann	Louisiana Dept. of Wildlife and Fisheries
Jeffrey Hill	NOAA National Marine Fisheries Service
Christina Hunnicutt	U.S. Geologic Survey
Barbara Keeler	U.S. Environmental Protection Agency
Kirk Kilgen	Louisiana Department of Natural Resources
Tim Killeen	Louisiana Department of Natural Resources
Brian Lezina	Louisiana Dept. of Wildlife and Fisheries
Brian Marks	Louisiana Dept. of Wildlife and Fisheries
Ismail Merhi	Louisiana Department of Natural Resources
David Muth	U.S. National Park Service
Clint Padgett	U.S. Geologic Survey
Jamie Phillippe	Louisiana Dept. of Environmental Quality
Molly Reif	U.S. Geologic Survey
Kevin Roy	U.S. Fish and Wildlife Service
Manuel Ruiz	Louisiana Dept. of Wildlife and Fisheries
Reneé Sanders	Louisiana Department of Natural Resources
Angela Trahan	U.S. Fish and Wildlife Service
Nancy Walters	U.S. Fish and Wildlife Service
David Walther	U.S. Fish and Wildlife Service
Patrick Williams	NOAA National Marine Fisheries Service

Appendix D

Agency Coordination Documentation

BOBBY JINDAL
GOVERNOR

HAROLD LEGGETT, PH.D.
SECRETARY

State of Louisiana

DEPARTMENT OF ENVIRONMENTAL QUALITY
ENVIRONMENTAL SERVICES

FEB 08 2009

U.S. Army Corps of Engineers- New Orleans District
P.O. Box 60267
New Orleans, LA 70160-0267

Attention: Laura Lee Wilkinson

RE: Water Quality Certification (WQC 081222-01/AI 162387/CER 20080001)
Individual Environmental Report (IER) #8 (Bayou Dupre Control Structure)
Individual Environmental Report (IER) #10 (Chalmette Loop Levee)
Orleans & St. Bernard Parishes

Dear Ms. Wilkinson:

The Department has reviewed your application to install a control structure on Bayou Dupre at the MRGO & to construct a hurricane protection levee, in the vicinity of the east bank of metropolitan New Orleans between the Inner Harbor Navigation Canal and Caernarvon, Louisiana.

The requirements for Water Quality Certification have been met in accordance with LAC 33:IX.1507.A-E. Based on the information provided in your application, we have determined that the placement of the fill material will not violate the water quality standards of Louisiana provided for under LAC 33:IX.Chapter 11. Therefore, the Department has issued a Water Quality Certification.

Sincerely,

Thomas F. Harris
Administrator
Waste Permits Division

TFH/jjp

Post Office Box 4313 • Baton Rouge, Louisiana 70821-4313 • Phone 225-219-3181 • Fax 225-219-3309
www.deq.louisiana.gov

United States Department of the Interior

FISH AND WILDLIFE SERVICE
646 Cajundome Blvd.
Suite 400
Lafayette, Louisiana 70506

January 30, 2007

RECEIVED BY
USACE CEMVN
2 FEBRUARY 2009

Colonel Michael McCormick
Hurricane Protection Office (HPO)
U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel McCormick:

Please reference the December 31, 2008, letter from Mr. Gib Owen, Acting Chief of the Environmental Planning and Compliance Branch, requesting our concurrence with determinations regarding impacts to threatened or endangered species and their critical habitat made by U.S. Army Corps of Engineers' (Corps) for work proposed in Individual Environmental Reports (IER) 5-11 in Orleans, Jefferson, and St. Bernard Parishes. Those projects would involve improvements to levees, floodwalls, floodgates, and construction of new barriers, closure structures, navigable gates and/or permanent pump stations in the New Orleans East Bank, New Orleans East and Chalmette Loop sub basins. These improvements are necessary to provide 100-year level flood protection for the New Orleans Metropolitan area. The U.S. Fish and Wildlife Service (Service) has reviewed the information provided, and offers the following comments in accordance with the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.), Bald and Golden Eagle Protection Act (BGEPA) (54 Stat. 250, as amended, 16 U.S.C. 668a-d), Migratory Bird Treaty Act (MBTA) (40 Stat. 755, as amended; 16 U.S.C. 703 et seq.), and the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

The projects included in IERs 5-11 span a large geographic area and have unique components, but the number of potentially impacted threatened or endangered species is small; therefore, the IERs will be grouped according to potentially affected species.

Federally listed as an endangered species, West Indian manatees (*Trichechus manatus*) occasionally enter Lakes Pontchartrain and Maurepas, and associated coastal waters and streams during the summer months (i.e., June through September). Manatee occurrences appear to be increasing, and they have been regularly reported in the Amite, Blind, Tchefuncte, and Tickfaw Rivers, and in canals within the adjacent coastal marshes of Louisiana. They have also been occasionally observed elsewhere along the Louisiana Gulf coast. The manatee has declined in numbers due to collisions with boats and barges, entrapment in flood control structures, poaching, habitat loss, and pollution. Cold weather and outbreaks of red tide may also adversely affect these animals.

Some or all of the proposed project features, including alternatives, of IERs 5, 6, 7, 8, and 11 (especially the dredging of access channels for IERs 6 and 7), could potentially impact the

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manatee. The Corps has incorporated the following protective measures into its construction contracts; therefore, the Service concurs with your determination that construction of the proposed project features is not likely to adversely affect the manatee.

All contract personnel associated with the project should be informed of the potential presence of manatees and the need to avoid collisions with manatees, which are protected under the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973. All construction personnel are responsible for observing water-related activities for the presence of manatee(s). Temporary signs should be posted prior to and during all construction/dredging activities to remind personnel to be observant for manatees during active construction/dredging operations or within vessel movement zones (i.e., work area), and at least one sign should be placed where it is visible to the vessel operator. Siltation barriers, if used, should be made of material in which manatees could not become entangled, and should be properly secured and monitored. If a manatee is sighted within 100 yards of the active work zone, special operating conditions should be implemented, including: no operation of moving equipment within 50 feet of a manatee; all vessels should operate at no wake/idle speeds within 100 yards of the work area; and siltation barriers, if used, should be re-secured and monitored. Once the manatee has left the 100-yard buffer zone around the work area on its own accord, special operating conditions are no longer necessary, but careful observations would be resumed. Any manatee sighting should be immediately reported to the Service's Lafayette, Louisiana Field Office (337/291-3100) and the Louisiana Department of Wildlife and Fisheries, Natural Heritage Program (225/765-2821).

The Gulf sturgeon (*Acipenser oxyrhynchus desotoi*), federally listed as a threatened species, is an anadromous fish that occurs in many rivers, streams, and estuarine waters along the northern Gulf coast between the Mississippi River and the Suwanee River, Florida. In Louisiana, Gulf sturgeon have been reported at Rigolets Pass, rivers and lakes of the Lake Pontchartrain basin, and adjacent estuarine areas. Spawning occurs in coastal rivers between late winter and early spring (i.e., March to May). Adults and sub-adults may be found in those rivers and streams until November, and in estuarine or marine waters during the remainder of the year. Sturgeon less than two years old appear to remain in riverine habitats and estuarine areas throughout the year, rather than migrate to marine waters. Habitat alterations such as those caused by water control structures that limit and prevent spawning, poor water quality, and over-fishing have negatively affected this species.

On March 19, 2003, the Service and the National Marine Fisheries Service (NMFS) published a final rule in the Federal Register (Volume 68, No. 53) designating critical habitat for the Gulf sturgeon in Louisiana, Mississippi, Alabama, and Florida. Portions of the Pearl and Bogue Chitto Rivers, Lake Pontchartrain east of the Lake Pontchartrain Causeway, all of Little Lake, The Rigolets, Lake St. Catherine, and Lake Borgne within Louisiana were included in that designation. The primary constituent elements essential for the conservation of Gulf sturgeon are those habitat components that support feeding, resting, sheltering, reproduction, migration, and physical features necessary for maintaining the natural processes that support those habitat components.

In that critical habitat designation, responsibility for consultation with specific Federal agencies was also identified for the Service and for the NMFS. For estuarine and marine waters in

Louisiana, the NMFS is responsible for consultations regarding impacts to the sturgeon and its critical habitat with all Federal agencies, except the Department of Transportation, the Environmental Protection Agency, the U.S. Coast Guard, and the Federal Emergency Management Agency, which consult with the Service. Therefore, please contact Dr. Stephania Bolden (727/824-5312) in St. Petersburg, Florida, for information concerning that species and its critical habitat. Should the proposed project directly or indirectly affect the Gulf sturgeon or its critical habitat in Louisiana, further consultation with that office will be necessary.

The project-area forested wetlands may provide nesting habitat for the bald eagle (*Haliaeetus leucocephalus*), which has officially been removed from the List of Endangered and Threatened Species as of August 8, 2007, however the bald eagle continues to be protected under the MBTA and the BGEPA. Bald eagles nest in Louisiana from October through mid-May. Eagles typically nest in mature trees (e.g., bald cypress, sycamore, willow, etc.) near fresh to intermediate marshes or open water in the southeastern parishes. Major threats to this species include habitat alteration, human disturbance, and environmental contaminants.

The Service developed the National Bald Eagle Management (NBEM) Guidelines to provide landowners, land managers, and others with information and recommendations regarding how to minimize potential project impacts to bald eagles, particularly where such impacts may constitute "disturbance," which is prohibited by the BGEPA. A copy of the NBEM Guidelines is available at:
http://www.fws.gov/migratorybirds/issues/BaldEagle/NationalBaldEagleManagementGuidelines.pdf. Those guidelines recommend: (1) maintaining a specified distance between the activity and the nest (buffer area); (2) maintaining natural areas (preferably forested) between the activity and nest trees (landscape buffers); and (3) avoiding certain activities during the breeding season. On-site personnel should be informed of the possible presence of nesting bald eagles within the project boundary, and should identify, avoid, and immediately report any such nests to this office. The construction of the proposed project features for IER 10, Reach LPV 148, may potentially impact the bald eagle. If the Corps determines that construction activities will be located at or closer than 660 feet from a nest tree, the Service recommends that the Corps conduct an on-line evaluation at: http://www.fws.gov/southeast/es/baldeagle. Following completion of the evaluation, that website will provide a determination of whether additional consultation is necessary. A copy of that determination should be provided to this office. The Division of Migratory Birds for the Southeast Region of the Service (phone: 404/679-7051, e-mail: SEmigratorybirds@fws.gov) has the lead role in conducting such consultations. Should you need further assistance interpreting the guidelines or performing an on-line project evaluation, please contact our office.

Federally listed as an endangered species, brown pelicans (*Pelecanus occidentalis*) are not currently known to nest in the project vicinity. Brown pelicans feed along the Louisiana coast in shallow estuarine waters, using sand spits and offshore sand bars as rest and roost areas. Major threats to this species include chemical pollutants, colony site erosion, disease, and human disturbance. The Service concurs that construction of the proposed project features is not likely to adversely affect the brown pelican.

IERs 6, 7, 8, 9, and 10 are located where colonial nesting waterbirds may be present. LDWF currently maintains a database of these colonies locations. That database is updated primarily by monitoring the colony sites that were previously surveyed during the 1980s. Until a new, comprehensive coast-wide survey is conducted to determine the location of newly-established nesting colonies, we recommend that a qualified biologist inspect the proposed work sites for the presence of undocumented nesting colonies during the nesting season (e.g. February through September depending on the species). If colonies exist, work should not be conducted within 1,000 feet of the colony during the nesting season

Portions of IER 6 and 7 are located within or may require access through the Service's Bayou Sauvage National Wildlife Refuge. 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 compatible. A compatibility determination is a written determination signed and dated by the Refuge Manager and Regional Refuge Chief, signifying that a proposed or existing use of a national wildlife refuge is a compatible use or is not a compatible use. A compatible use is defined as a proposed or existing wildlife-dependent recreational use or any other use of a national wildlife refuge that, based on sound professional judgment, will not materially interfere with or detract from the fulfillment of the National Wildlife Refuge System mission or the purposes of the national wildlife refuge. A compatibility determination is only required when the Service has jurisdiction over the use. For example, proposed uses that deal exclusively with air space, navigable waters or overly refuges where another Federal agency has primary jurisdiction over the area, would not be subject to compatibility.

Federal agencies proposing a project that includes features on a national wildlife refuge are encouraged to contact the Refuge Manager early in the planning process. The Refuge Manager will work with the project proponent to determine if the proposed project constitutes a "refuge use" subject to a compatibility determination. If the proposed project requires a compatibility determination, a concise description of the project (refuge use) including who, what, where, when, how, and why will be needed to prepare the compatibility determination. In order to determine the anticipated impacts of use, the project proponent may be required to provide sufficient data and information sources to document any short-term, long-term, direct, indirect or cumulative impacts on refuge resources. Compatibility determinations will include a public review and comment before issuing a final determination.

All construction or maintenance activities (e.g., surveys, land clearing, etc.) on a National Wildlife Refuge (NWR) will require the Corps to obtain a Special Use Permit from the Refuge Manager; furthermore, all activities on that NWR must be coordinated with the Refuge Manager. Therefore, we recommend that the Corps request issuance of a Special Use Permit well in advance of conducting any work on the refuge. Please contact Kenneth Litzenberger, Project Leader for the Service's Southeast National Wildlife Refuges and Jack Bohannan Refuge Manager for the Bayou Sauvage National Wildlife Refuge at (985) 822-2000, for further information on compatibility of flood control features, and for assistance in obtaining a Special Use Permit. Close coordination by both the Corps and its contractor must be maintained with the Refuge Manager to ensure that construction and maintenance activities are carried out in accordance with provisions of any Special Use Permit issued by the NWR.

Based on our review, the Service concurs with your determinations that the construction of the proposed project features in IERs 5-11 is not likely to adversely affect the brown pelican, and because of manatee protective measures included in the Corps' construction contracts, the Service also concurs that the construction of the proposed project features in IERs 5-11 is not likely to adversely affect the manatee. The Service recommends that the Corps contact NMFS regarding impacts to the Gulf sturgeon and its critical habitat and implement the above mentioned survey and protection measure to protect colonial nesting birds. The Service is also willing to assist the Corps evaluate the potential impacts to the bald eagle under the NBEM Guidelines.

We appreciate the opportunity to review the proposed 100 Year Hurricane Protection Projects for IERs 5-11. If you need further assistance or have questions regarding this letter, please contact David Walther (337/291-3122) of this office.

Sincerely,

for James F. Boggs
Field Supervisor
Louisiana Field Office

cc: NOAA, St. Petersburg, FL
Laura Lee Wilkinson, CEMVN, New Orleans, LA
LDWF, Natural Heritage, Baton Rouge, LA

BOBBY JINDAL
GOVERNOR

JAN 28 2009

SCOTT A. ANGELL
SECRETARY

State of Louisiana

DEPARTMENT OF NATURAL RESOURCES

OFFICE OF COASTAL RESTORATION AND MANAGEMENT

January 26, 2009

Elizabeth Wiggins
Chief, Environmental Planning and Compliance Branch
U. S. Army Corps of Engineers, New Orleans District
P. O. Box 60267
New Orleans, Louisiana 70160-0267

RE: **C20080057,** Coastal Zone Consistency Modification
U. S. Army Corps of Engineers, New Orleans District
Direct Federal Action
Individual Environmental Report # 8, Pontchartrain and vicinity, Bayou Bienvenue and Bayou Dupre control structures; modification to remove the former structure and separate the sector gate closure and pontoon bridge, and to realign the proposed sector gate,
Orleans & St. Bernard Parishes, Louisiana

Dear Ms. Wiggins:

The above referenced project modification has been reviewed for consistency with the approved Louisiana Coastal Resource Program (LCRP) as required by Section 307 of the Coastal Zone Management Act of 1972, as amended. The modification, as proposed in the application, is consistent with the LCRP. If you have any questions concerning this determination please contact Brian Marcks of the Consistency Section at (225) 342-7949.

Sincerely yours,

Jim Rives
Administrator

JR/JH/bgm

cc: Dave Butler, LDWF
Wynecta Fisher, Orleans Parish
Charles Repel, St. Bernard Parish
Gib Owen, COE-NOD
Dona Ours, OCPR
Ismail Mehri, OCPR
Tim Killeen, CMD FC

BOBBY JINDAL
GOVERNOR

SCOTT A. ANGELLE
SECRETARY

State of Louisiana

DEPARTMENT OF NATURAL RESOURCES

OFFICE OF COASTAL RESTORATION AND MANAGEMENT

April 17, 2008

Elizabeth Wiggins
Chief, Environmental Planning and Compliance Branch
U. S. Army Corps of Engineers, New Orleans District
P. O. Box 60267
New Orleans, Louisiana 70160-0267

RE: **C20080057,** Coastal Zone Consistency
U. S. Army Corps of Engineers, New Orleans District
Direct Federal Action
Individual Environmental Report # 8, Pontchartrain and vicinity, Bayou Bienvenue and Bayou Dupre control structures, **Orleans & St. Bernard Parishes, Louisiana**

Dear Ms. Wiggins:

The above referenced project has been reviewed for consistency with the approved Louisiana Coastal Resource Program (LCRP) as required by Section 307 of the Coastal Zone Management Act of 1972, as amended. The project, as proposed in the application, is consistent with the LCRP. If you have any questions concerning this determination please contact Brian Marcks of the Consistency Section at (225) 342-7949.

Sincerely yours,

Jim Rives
Administrator

JR/JH/bgm

cc: Venise Ortego, LDWF
Wynecta Fisher, Orleans Parish
Charles Repel, St. Bernard Parish
Gib Owen, COE-NOD
Dona Ours, CED
Renee Sanders, CRD
Tim Killeen, CMD FC

United States Department of the Interior

FISH AND WILDLIFE SERVICE
646 Cajundome Blvd.
Suite 400
Lafayette, Louisiana 70506

March 4, 2008

Colonel Jeffery Bedey
Hurricane Protection Office (HPO)
U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel Bedey:

Please reference the Individual Environmental Report (IER) 8, for the entitled Bayou Bienvenue and Bayou Dupre Control Structure Replacement Project in Orleans and St. Bernard Parishes, Louisiana. That IER addresses impacts resulting from the construction of navigable floodgates within the hurricane protection system. Those floodgates will increase hurricane protection within the Greater New Orleans area, located in southeast Louisiana. Work associated with that IER is being conducted in response to Public Law 109-234, Emergency Supplemental Appropriations Act for Defense, the Global War on Terror, and Hurricane Recovery, 2006 (Supplemental 4). That law authorized the Corps of Engineers (Corps) to upgrade two existing hurricane protection projects (i.e., Westbank and Vicinity of New Orleans and Lake Pontchartrain and Vicinity) in the Greater New Orleans area to provide protection against a 100-year hurricane event. This draft report contains an analysis of the impacts on fish and wildlife resources that would result from construction of those floodgates and provides recommendations to minimize and/or mitigate project impacts on those resources.

This draft report incorporates and supplements our November 26, 2007, Draft Programmatic Fish and Wildlife Coordination Act Report for the IERs providing general recommendations for minimizing impacts to fish and wildlife resources from IER implementation. This report, however, does not constitute the report of the Secretary of the Interior as required by Section 2(b) of the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). This report has been provided to the Louisiana Department of Wildlife and Fisheries and the National Marine Fisheries Service; their comments will be incorporated into our final report.

The study area is primarily located within the Mississippi River Deltaic Plain of the Lower Mississippi River Ecosystem. Higher elevations occur on the natural levees of the Mississippi River and its distributaries. Developed lands are primarily associated with natural levees, but extensive wetlands have been leveed and drained to accommodate residential, commercial, and agricultural development. Federal, State, and local levees have been installed for flood protection purposes, often with negative effects on adjacent wetlands. Navigation channels such as the Gulf Intracoastal Waterway and the Mississippi River – Gulf Outlet (MRGO) are also prominent landscape features, as are extensive oil and gas industry access channels and pipeline canals. Extensive wetlands and associated shallow open waters dominate the landscape outside the flood control levees. Major water bodies include the Mississippi River which is located west of the project area and Lake Borgne which is located on the eastern edge of the project area.

Habitat types in the project area and vicinity include bottomland hardwoods (wet and non-wet), scrub-shrub, marsh, open water, and developed areas. Due to urban development, the MRGO and the local and Federal levee systems, the hydrology of much of the wetland habitat has been altered. Those factors have been in operation for many years and wetland loss and subsidence is evident throughout the area. Developed habitats in the study area include residential and commercial areas, as well as roads and existing levees. Those habitats do not support significant wildlife use. The Service provided a November 26, 2007, draft programmatic FWCA Report for the IERs that described fish and wildlife resources, their habitats, and factors affecting those resources within the study area. For brevity, that discussion is incorporated by reference herein.

In our February 21, 2008, letter we provided protective measures under the Endangered Species Act (ESA) to minimize any potential adverse affect to the endangered West Indian manatees (*Trichechus manatus*). Those protective measures should be included in all contracts involving construction in any waterbody.

The Water Resources Development Act of 2007 authorized the Violet Diversion to reduce wetland loss in and surrounding the project area. That diversion, when constructed, would divert Mississippi River water into the wetlands located on the protected (inside) side of the proposed control structures. Therefore, those control structures should be designed to safely pass the volume of water authorized to be diverted. Failure to incorporate the diversion flows into the structures design may limit the diversion's ability to reduce wetland loss rates.

The proposed project sites have been located in areas (i.e., levee rights-of-way) that minimize impacts to wetlands and scrub-shrub. Approximately 0.5 acres of marsh will be impacted by the construction of the control structures. In addition to that impact, construction of the control structures sites will result in the conversion of a small but undetermined amount of open-water areas into concrete and timber piles. Because pasture (i.e., levee) and open water habitats have a reduced value to fish and wildlife resources and are not a declining or limited habitat type, impacts associated with conversion of those habitats to open-water or levees were not quantified. The wetland impact acreage was determined by the Corps regulatory program. Because of the small acreage of marsh impacted, the natural resource agencies agreed that the impacted acreage (0.5 acres) would be included in the impact assessment within IER 10 for the adjacent levees because of the greater acreage of marsh impacted by the upgrading of that levee.

Feasible alternatives to the proposed plan included the no-action plan, replacement of the structures at their existing location, and construction of new structures on the floodside of the levee. The no-action alternative was eliminated because it would not provide the authorized 100-year level of hurricane protection. Replacement of the structures in their current location would have a greater cost, and construction of new structures closer to the adjacent navigation channel would pose a greater risk to navigation. It is unlikely that either of the last two alternatives would have resulted in fewer impacts to fish and wildlife resources.

The President's Council on Environmental Quality defined the term "mitigation" in the National

Environmental Policy Act regulations to include; (a) avoiding the impact; (b) minimizing impacts; (c) rectifying the impact; (d) reducing or eliminating the impact; and (e) compensating for the impact by replacing or providing substitute resources or environments. The Service supports and adopts this definition of mitigation and considers its specific elements to represent the desirable sequence of steps in the mitigation planning process. Based on current and expected future without-project conditions, the planning goal of the Service is to develop a balanced project, i.e., one that is responsive to demonstrated hurricane protection needs while addressing the co-equal need for fish and wildlife resource conservation. Per the Service's Mitigation Policy (Federal Register, Vol. 46, pp. 7644-7663, January 23, 1981), the Service's mitigation goal for marsh is no net loss of in-kind habitat value.

SERVICE POSITION AND RECOMMENDATIONS

The Service does not object to the construction of the proposed structures provided the following fish and wildlife conservation recommendations are implemented concurrently with project implementation:

1. To the greatest extent possible, situate flood protection features so that destruction of wetlands are avoided or minimized.

2. The project's first Project Cooperation Agreement (or similar document) should include language that specifies the responsibility of the local-cost sharer to provide operational, monitoring, and maintenance funds for mitigation features.

3. Further detailed planning of project features (e.g., Design Documentation Report, Engineering Documentation Report, Plans and Specifications, or other similar documents) should be coordinated with the Service, NMFS, LDWF, Environmental Protection Agency (EPA) and Louisiana Department of Natural Resources (LDNR). The Service shall be provided an opportunity to review and submit recommendations on the all work addressed in those reports.

4. If a proposed project feature is changed significantly or is not implemented within one year of the date of our Endangered Species Act consultation letter, we recommend that the Corps reinitiate coordination with this office to ensure that the proposed project would not adversely affect any federally listed threatened or endangered species or their habitat. In addition, the Corps should re-consult with the Service if the protective measures for the West Indian manatee are not incorporated into plans and specifications for work within any adjacent waterbody.

5. The cross-section of the structures should be designed to pass flows from the proposed Violet Diversion to the unprotected-levee side.

6. The proposed flood protection water control structures should maintain pre-project cross section in width and depth to the maximum extent practicable.

7. If the proposed flood protection water control structures do not maintain the pre-project cross section, those structures should be designed and operated with multiple openings within the structure. This should include openings near both sides of the channel as well as an opening in the center of the channel that extends to the bottom.

8. The proposed flood protection water control structures should remain completely open except during storm events. Management of those structures should be developed in coordination with the Service, NMFS, LDWF, and LDNR.

9. The proposed flood protection water control structures should be designed to allow rapid opening in the absence of an offsite power source after a storm passes and water levels return to normal.

10. To enhance organism passage, the proposed flood protection structures should include shoreline baffles and/or ramps (e.g., rock rubble, articulated concrete mat) that slope up to the structure invert. Various ramp designs should be considered.

11. The Corps shall fully compensate for the unavoidable losses of 0.5 acres of wetland habitat caused by project features.

12. Acquisition, habitat development, maintenance and management of mitigation lands should be allocated as first-cost expenses of the project, and the local project-sponsor should be responsible for operational costs. If the local project-sponsor is unable to fulfill the financial mitigation requirements for operation, then the Corps should provide the necessary funding to ensure mitigation obligations are met on behalf of the public interest.

If you or your staff have any questions or comments regarding this draft report or our recommendations please have them contact David Walther (337/291-3122) of this office.

Sincerely,

James F. Boggs
Supervisor
Louisiana Field Office

cc: EPA, Dallas, TX
NMFS, Baton Rouge, LA
LA Dept. of Wildlife and Fisheries, Baton Rouge, LA
LA Dept. of Natural Resources (CMD/CRD), Baton Rouge, LA