# WEST SHORE LAKE PONTCHARTRAIN
# HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY
# INTEGRATED DRAFT FEASIBILITY REPORT
# AND
# ENVIRONMENTAL IMPACT STATEMENT

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## ENVIRONMENTAL APPENDIX

**Annex A:** Clean Water Act Section 401 Water Quality Certification
Clean Water Act Section 404(b)(1) Evaluation
**Annex B:** Louisiana Coastal Resources Program Consistency Determination
**Annex C:** Louisiana State Department of Wildlife and Fisheries Mitigation Letter
**Annex D:** National Marine Fisheries Service Scoping / Planning Aid Letter
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**Annex F:** State Historic Preservation Officer (SHPO) and Tribal Coordination Letters
**Annex G:** U.S. Fish and Wildlife Service Draft Coordination Act Report
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**Annex J:** Environmental Compliance Laws
**Annex K:** Mitigation Plan
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**Clean Water Act Section 401 Water Quality Certification**
**Clean Water Act Section 404(b)(1) Evaluation**

*****Note: these documents, associated analyses and coordination will be completed during the feasibility-level analysis phase of this study which would occur following release of the Draft Environmental Impact Statement, and would be included in the Final Environmental Impact Statement.

# WEST SHORE LAKE PONTCHARTRAIN
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### Louisiana Coastal Resources Program Consistency Determination

*****Note: this document, associated analyses and coordination will be completed during the feasibility-level analysis phase of this study which would occur following release of the Draft Environmental Impact Statement, and would be included in the Final Environmental Impact Statement.

# WEST SHORE LAKE PONTCHARTRAIN
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**Louisiana State Department of Wildlife and Fisheries Mitigation Letter**

BOBBY JINDAL
GOVERNOR

State of Louisiana

DEPARTMENT OF WILDLIFE AND FISHERIES
OFFICE OF WILDLIFE

ROBERT J. BARHAM
SECRETARY

JIMMY L. ANTHONY
ASSISTANT SECRETARY

**October 24, 2012**

Colonel Edward R. Fleming
District Commander
U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

RE: *West Shore Lake Pontchartrain Hurricane Levee Project*

Dear Colonel Fleming:

The professional staff of the Louisiana Department of Wildlife and Fisheries (LDWF) has reviewed limited information concerning the West Shore, Lake Pontchartrain, Louisiana, Hurricane and Storm Damage Risk Reduction Feasibility Study in Ascension, St. Charles, St. James, and St. John the Baptist Parishes, Louisiana. The information included three preliminary levee alignments which would provide Federal hurricane protection to the western shore of Lake Pontchartrain. Based upon our review of the limited information, LDWF provides the following comments and questions. We recommend that each comment and question be thoroughly considered and satisfactorily addressed by the U.S. Army Corps of Engineers (USACE).

**Natural and Scenic River**

The Blind River, which is a Louisiana designated Natural and Scenic River, is located within Alignment D of the proposed project. The purpose of the Natural and Scenic Rivers Act is to preserve, protect, develop, reclaim, and enhance the wilderness qualities, scenic beauties, and ecological regime of certain free-flowing streams. A Scenic Rivers Permit will be required for Alignment D if LDWF determines that the levee has the potential to directly and significantly degrade the ecological integrity of the river. Please contact Mr. Keith Cascio at 318-343-4045 or kcascio@wlf.la.gov concerning this Natural and Scenic River.

**Wildlife Management Area**

Our database indicates that all levee Alignments (i.e., A, C and D) occur within the boundaries of Maurepas Swamp Wildlife Management Area (WMA). However, Alignment D will impact the WMA more significantly than the other alignments. No activities shall occur within any WMA/refuge without first obtaining proper authorization from LDWF. Please contact Mr. Mike Windham at 504-284-5268 or cwindham@wlf.la.gov for more information about appropriate WMA authorizations.

**Endangered Species**

Manatees (*Trichechus manatus*) are known to occur in the surrounding water bodies of Alignment D. Manatees are large mammals inhabiting both fresh and salt water. Although most manatees are year round residents of Florida or Central America, they have been known to migrate to areas along the

Atlantic and Gulf Coast during the summer months. Manatees are an endangered species protected under the Endangered Species Act of 1973 and the Federal Marine Mammal Protection Act of 1972. In Louisiana, taking or harassment of the manatee is a violation of state and federal laws. Critical habitat for manatees includes marine submergent vascular vegetation (sea-grass beds). Areas with sea-grass beds should be avoided during project activities if possible. Please contact Mr. Beau Gregory at 337-491-2575 or bgregory@wlf.la.gov for more information about manatees.

**Bird Nesting Colonies**

Our Natural Heritage Program database indicates the presence of bird nesting colonies within one mile of the western end of Alignment D. Please be aware that entry into or disturbance of active breeding colonies is prohibited by LDWF. To minimize disturbance to colonial nesting birds, LDWF prohibits work within a certain radius of an active nesting colony. The following restrictions on activity should be observed:

- For colonies containing nesting wading birds (i.e., herons, egrets, night-herons, ibis, roseate spoonbills, anhingas, and/or cormorants), all project activity occurring within 300 meters of an active nesting colony should be restricted to the non-nesting period (i.e., September 1 through February 15).
- For colonies containing nesting gulls, terns, and/or black skimmers, all project activity occurring within 400 meters (700 meters for brown pelicans) of an active nesting colony should be restricted to the non-nesting period (i.e., September 16 through April 1).

Please contact Ms. Carolyn Michon at 225-765-2357 or cmichon@wlf.la.gov for more information on bird nesting colonies.

**Compensatory Mitigation**

This levee project may result in the loss of significant habitat that provides ecological services such as resource production, water quality improvement, flood peak reduction and hurricane abatement. The loss of these ecological services must be compensated with mitigation. Therefore, if the proposed activity is approved by the regulatory agencies, the applicant shall develop a mitigation plan designed to off-set all impacts to wetland functions and fish and wildlife resources. A mitigation plan should be approved by the resource and regulatory agencies and be implemented concurrently with levee construction. Furthermore, the mitigation shall be located within the same hydrologic basin as the impacts.

**Planning Considerations**

LDWF believes that alternative borrow sites should be considered, including but not limited to, hauled in material to avoid further impacts. Hauled in material shall be free of contaminates. Borrow sites from within the project area would impact a larger footprint of wildlife and fisheries habitat.

The proposed levee alignments, in particular Alignment D, could potentially restrict recreational opportunities, boating access and other fishing vessels.

**Summary and Conclusions**

LDWF understands the need to protect these communities; nevertheless, we believe a proper plan would ensure that impacts are minimized and all necessary mitigation is carried out. LDWF believes Alignment A will result in the least amount of impact to valuable forested wetland habitat. Understandably, Alignment C might be more feasible from an engineering standpoint. Alignment D will likely result in the most impacts to fish and wildlife resources, including Maurepas Swamp WMA and Blind River.

Proposed Alignments C and D will impound wetlands thereby reducing exchange of nutrients which most estuarine species are dependent upon. LDWF believes that precautions should be taken to allow for

adequate aquatic species migration. Should Alignments C or D be chosen, adequately sized water control structures must be placed within the levee to allow for ingress and egress of estuarine species, proper drainage, tidal exchange, and the natural release of fresh water (sheet flow) into the coastal system. Water control structures, including but not limited to, culverts should be scaled as large as possible, located frequently, and should be placed in a way that mimics natural bottom contours.

LDWF is further concerned with indirect impacts which may result from the proposed activity. Specifically, by affording flood protection to an area comprised of wetlands, the project may promote future development in wetland areas. Additionally, the levee alignment may alter natural periods of inundation or soil saturation in the impounded wetlands and could prove detrimental to their function and longevity. Alignments C and D could likely reduce the natural storage capacity the wetlands provide, thereby, increasing the risk of induced flooding in other areas.

The Louisiana Department of Wildlife and Fisheries submits these recommendations to the U.S. Army Corps of Engineers in accordance with provisions of the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.). Please do not hesitate to contact Mr. Kyle Balkum at 225-765-2819 should you need further assistance.

Sincerely,

Jimmy L. Anthony
Assistant Secretary

c: LDNR, Office of Coastal Management
EPA, Marine & Wetlands Section
National Marine Fisheries Service
USFWS, Ecological Services
Keith Cascio, LDWF
Beau Gregory, LDWF
Barry Hebert, LDWF
Carolyn Michon, LDWF
Mike Windham, LDWF
Christian Winslow, LDWF

-----Original Message-----
From: Balkum, Kyle [mailto:kbalkum@wlf.la.gov]
Sent: Thursday, May 23, 2013 3:29 PM
To: Klein, William P Jr MVN
Cc: Winslow, Christian J.; Cascio, Keith; Hebert, Barry; Ribbeck, Kenny; Breaux, Catherine M MVN; 'Catherine_Breaux@fws.gov'; 'Lisa Abernathy'; 'Ettinger.John@epamail.epa.gov'; Richardson, Jerica M MVN; Varisco, Jeffrey J MVN; Myers, Randy; Tuma, Tommy; Mooney, Brad
Subject: LDWF Scoping Comments (Part 2) - West Shore Lake Pontchartrain

Bill,

In addition to our previously submitted scoping comments, LDWF is providing the West Shore-LP PDT with proposed mitigation measures that we believe can best offset impacts associate with levee construction. You will receive the following two documents today:

1. pdf-document that briefly describes the nine conceptual mitigation measures proposed by LDWF, and
2. jpg-map that illustrates the nine mitigation measures (to follow in a subsequent e-mail).

We hope that this draft mitigation plan is included in the Draft TSP.

We look forward to working with you to further develop these proposed mitigation measures in order to ensure that project impacts are adequately and appropriately mitigated for.

Thanks,
Kyle

Kyle F. Balkum
Biologist Program Manager, Habitat Section -
Louisiana Department of Wildlife and Fisheries
2000 Quail Dr., Baton Rouge, LA 70808
225-765-2819 / kbalkum@wlf.la.gov

**DRAFT Maurepas Swamp WMA Mitigation Proposals**

Prepared by the Louisiana Department of Wildlife and Fisheries (LDWF)

Presented to the West Shore-Lake Pontchartrain Project Delivery Team (PDT)

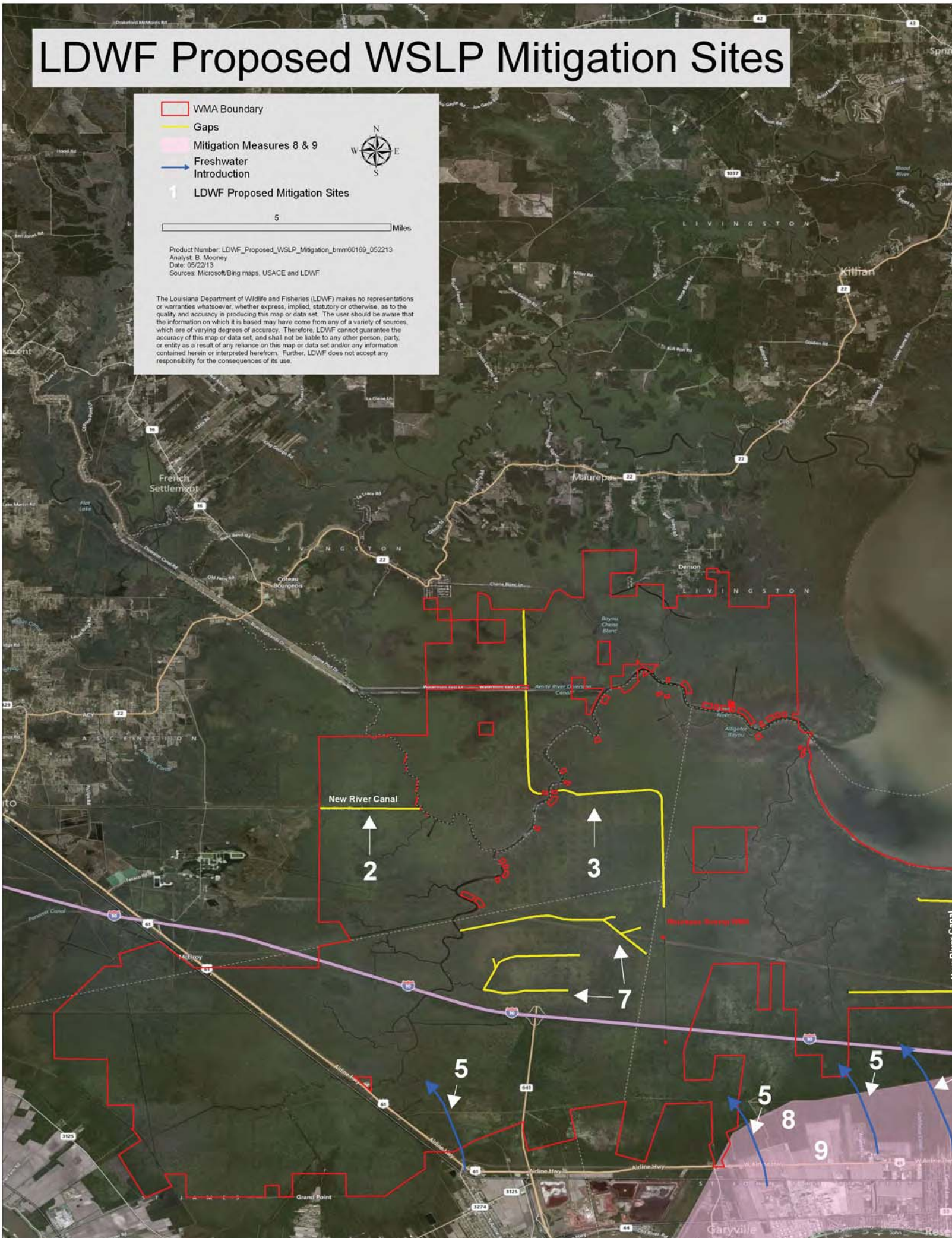
May 23, 2013

The elimination of nutrient and freshwater inputs threatens the sustainability of the Maurepas Swamp. The most effective strategy to restore health and productivity of the swamp is construction of Mississippi River reintroductions into Maurepas Swamp. However, additional measures such as eliminating barriers to surface flow patterns are also needed, not only to compliment the planned river reintroductions, but also to improve current hydrologic conditions. Therefore, the mitigation measures identified below by LDWF primarily aim to enhance or improve surface hydrology until such time that river reintroductions are constructed. The mitigation measures are still conceptual and will require further planning and engineering. LDWF also prioritized each measure (i.e., High, Medium or Low) to inform the PDT on which measures are believed to be most beneficial.

1. Gap spoil banks along Reserve Relief Canal (**High priority**).
2. Gap spoil banks along New River Canal (**High priority**).
3. Gap/degrade railroad bed which traverses the swamp beginning from Hope Canal and proceeding north and west to the northern property boundary (crossing Blind River and Amite River Diversion Canal (**High priority**).
4. Improve through flow of Hammond wastewater into existing Joyce WMA outfall area (**High priority**).
5. Make efficient use of stormwater and wastewater produced by communities south of I-10 (e.g., Laplace, Ascension Parish) by distributing this water into the Maurepas Swamp (**High priority**).
6. Diversion of freshwater from Bonnet Carre Spillway guide levee to the swamps and marshes to the northwest (**Medium priority**).
7. Gap any spoil banks north of I-10 in the area of Tennessee Williams (**Medium priority**).
8. Preserve existing wetlands by acquiring land in fee title that is enclosed within the levee (**Low priority**).
9. Restrict development in wetlands enclosed within the levee (**Low priority**).

The number of the proposed mitigation measure corresponds with the number on the accompanying map.

# LDWF Proposed WSLP Mitigation Sites



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**National Marine Fisheries Service Scoping / Planning Aid Letter**

**UNITED STATES DEPARTMENT OF COMMERCE**
**National Oceanic and Atmospheric Administration**
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701

January 29, 2009 F/SER46/RH:jk
225/389-0508

Ms. Elizabeth Wiggins, Chief
Environmental Compliance and Analysis Branch
New Orleans District
Department of the Army, Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Ms. Wiggins:

NOAA's National Marine Fisheries Service (NMFS) has received the public notice dated December 17, 2008, announcing a scoping meeting and the intention of the New Orleans District (NOD) to prepare an Environmental Impact Statement (EIS) for the **West Shore-Lake Pontchartrain, Louisiana; Hurricane and Storm Damage Risk Reduction Feasibility Study**. The purpose of the study is to assess the feasibility and impacts of providing hurricane and storm surge damage risk reduction measures to a study area bounded by the Bonnet Carre Spillway to the east, the Mississippi River to the south, Lakes Pontchartrain and Maurepas to the north, and the St. James Parish/Ascension Parish line to the west. According to the public notice, previous studies have identified four preliminary levee alignments. The draft EIS will consider those alignments and other reasonable alternatives to provide hurricane and storm risk reduction to the project area.

Aquatic and tidally influenced wetland habitats in portions of the study area are designated as essential fish habitat (EFH) for economically important fishery species managed by the Gulf of Mexico Fishery Management Council (GMFMC), including white shrimp and red drum. Primary categories of EFH in the study area include estuarine emergent wetlands, submerged aquatic vegetation, mud substrates, and estuarine water column. Detailed information on federally-managed fisheries and their EFH is provided in the 2005 generic amendment of the Fishery Management Plans for the Gulf of Mexico prepared by the GMFMC. The generic amendment was prepared as required by the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act, P.L. 104-297).

In addition to being designated as EFH for white shrimp and red drum, water bodies and wetlands in the study area provide nursery and foraging habitats supportive of a variety of economically important marine fishery species, such as striped mullet, Atlantic croaker, gulf menhaden, and blue crab. Some of these species also serve as prey for other fish species managed under the Magnuson-Stevens Act by the GMFMC (e.g., mackerels, snappers, and groupers) and highly migratory species managed by NMFS (e.g., billfishes and sharks).

NMFS recommends the EIS include separate sections titled "Essential Fish Habitat" and "Marine Fishery Resources" that identify the EFH and fisheries resources of the study area. The EIS should describe the potential direct and indirect impacts on fishery resources and each category of EFH used by federally managed fishery species and their life stages. A discussion should be included on direct adverse impacts that may result from placement of fill in wetlands to construct levee sections and the dredging of channels in shallow water areas to allow access of construction equipment. The EIS should evaluate alternatives to any activity that would result in an adverse impact to these resources and determine if there are lesser environmentally damaging methods. These sections also should evaluate whether mitigative actions would adequately offset net impacts to EFH and associated fishery resources.

The EIS developed for this project should include a section titled "Mitigation" that contains sufficient information to support a determination of compliance with the Clean Water Act Section 404(b)(1) guidelines and Section 2036 of the Water Resources Development Act of 2007. This includes the joint Environmental Protection Agency/Department of the Army final rule on compensatory mitigation for losses of aquatic resources, issued April 10, 2008, which amends the Clean Water Act guidelines. Perhaps most pertinent therein is the requirement that measures should be taken first to avoid, then minimize, and mitigate and that mitigation plans should include 12 components: 1) objectives; 2) site selection (rationale); 3) site protection instrument; 4) baseline information; 5) determination of credits; 6) mitigation work plan; 7) maintenance plan; 8) performance standards; 9) monitoring requirements; 10) long-term management plan; 11) adaptive management plan; and,12) financial assurances.

We appreciate the opportunity to provide input into the issues that should be evaluated in the EIS for this project. If you have any questions regarding our comments, please contact Mr. Richard Hartman of our Habitat Conservation Division, Baton Rouge office at (225) 389-0508, ext 203.

Sincerely,

Miles M. Croom
Assistant Regional Administrator
Habitat Conservation Division

c:
FWS, Lafayette
EPA, Dallas
LA DNR, Consistency
F/SER46, Swafford
F/SER4, Dale
Files

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**Natural Resources Conservation Service Prime and Unique Farmlands Coordination**

**United States Department of Agriculture**

NRCS

Natural Resources Conservation Service
3737 Government Street
Alexandria, LA 71302

(318) 473-7751
Fax: (318) 473-7626

June 8, 2013

Eric Williams
US Army Corp of Engineers
Eric.M.Williams@usace.army.mil

RE: St. John and St. Charles Parishes, LA – West Shore Lake Pontchartrain Levee

Dear Mr. Williams:

I have reviewed the above referenced project for potential requirements of the Farmland Protection Policy Act (FPPA) and potential impact to Natural Resource Conservation Service projects in the immediate vicinity.

Projects are subject to FPPA requirements if they may irreversibly convert farmland (directly or indirectly) to nonagricultural use and are completed by a federal agency or with assistance from a federal agency. For the purpose of FPPA, farmland includes prime farmland, unique farmland, and land of statewide or local importance. Farmland subject to FPPA requirements can be forest land, pastureland, cropland, or other land, but not water or urban built-up land.

The project map and narrative submitted with your request indicates that the proposed construction areas will potentially impact the following prime or unique farmland soils:

| | | |
|---|---|---|
| CmA – Cancienne silt loam, 0 to 1 percent slopes | 12.8 ac. | |
| GrA – Gramercy silty clay, 0 to 1 percent slopes | 31.0 ac. | |
| SkA – Schriever clay, 0 to 1 percent slopes | 11.6 ac | |
| Total acres prime farmland | 55.4 ac. | RV = 88 |

Please find attached an NRCS-CPA-106 Farmland Conversion Impact Rating for Corridor Type Projects with our agencies information completed. Furthermore, we do not predict impacts to NRCS work in the vicinity.

For specific information about the soils found in the project area, please visit our Web Soil Survey at the following location: http://websoilsurvey.nrcs.usda.gov/

For more information on FPPA requirements or the process to receive a Farmland Conversion Impact Rating (Form AD-1006 or CPA-106) please visit the following location:
http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/landuse/fppa/

Please direct all future correspondence to me at the address shown above.

Respectfully,

Sarah Haymaker
State Conservationist

Attachment

U.S. DEPARTMENT OF AGRICULTURE
Natural Resources Conservation Service

NRCS-CPA-106
(Rev. 1-91)

# FARMLAND CONVERSION IMPACT RATING FOR CORRIDOR TYPE PROJECTS

| | | |
|---|---|---|
| **PART I** *(To be completed by Federal Agency)* | 3. Date of Land Evaluation Request 6/7/13 | 4. Sheet 1 of ____ |
| 1. Name of Project **West Shore Lake Pontchartrain** | 5. Federal Agency Involved **US Army Corp of Engineers** | |
| 2. Type of Project **Levee** | 6. County and State **St. John and St. Charles Parishes, LA** | |
| **PART II** *(To be completed by NRCS)* | 1. Date Request Received by NRCS 6/7/13 | 2. Person Completing Form **M. Lindsey** |
| 3. Does the corridor contain prime, unique statewide or local important farmland? (If no, the FPPA does not apply - Do not complete additional parts of this form). YES ☑ NO ☐ | 4. Acres Irrigated -- | Average Farm Size 676 |
| 5. Major Crop(s) **Soybeans** | 6. Farmable Land in Government Jurisdiction Acres: 45143 % 33 | 7. Amount of Farmland As Defined in FPPA Acres: 33,193 % 24 |
| 8. Name Of Land Evaluation System Used **LESA** | 9. Name of Local Site Assessment System **NA** | 10. Date Land Evaluation Returned by NRCS 6/8/13 |

| **PART III** *(To be completed by Federal Agency)* | Maximum Points | Alternative Corridor For Segment ____ Corridor A | Corridor B | Corridor C | Corridor D |
|---|---|---|---|---|---|
| A. Total Acres To Be Converted Directly | | 245 | | | |
| B. Total Acres To Be Converted Indirectly, Or To Receive Services | | | | | |
| C. Total Acres In Corridor | | 245 | | | |
| **PART IV** *(To be completed by NRCS) Land Evaluation Information* | | | | | |
| A. Total Acres Prime And Unique Farmland | | 55.4 | | | |
| B. Total Acres Statewide And Local Important Farmland | | na | | | |
| C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted | | 0.16 | | | |
| D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value | | 100 | | | |
| **PART V** *(To be completed by NRCS) Land Evaluation Information Criterion Relative value of Farmland to Be Serviced or Converted (Scale of 0 - 100 Points)* | | 88 | | | |
| **PART VI** *(To be completed by Federal Agency) Corridor Assessment Criteria (These criteria are explained in 7 CFR 658.5(c))* | | | | | |
| 1. Area in Nonurban Use | 15 | | | | |
| 2. Perimeter in Nonurban Use | 10 | | | | |
| 3. Percent Of Corridor Being Farmed | 20 | | | | |
| 4. Protection Provided By State And Local Government | 20 | | | | |
| 5. Size of Present Farm Unit Compared To Average | 10 | | | | |
| 6. Creation Of Nonfarmable Farmland | 25 | | | | |
| 7. Availablility Of Farm Support Services | 5 | | | | |
| 8. On-Farm Investments | 20 | | | | |
| 9. Effects Of Conversion On Farm Support Services | 25 | | | | |
| 10. Compatibility With Existing Agricultural Use | 10 | | | | |
| TOTAL CORRIDOR ASSESSMENT POINTS | 160 | 0 | 0 | 0 | 0 |
| **PART VII** *(To be completed by Federal Agency)* | | | | | |
| Relative Value Of Farmland (From Part V) | 100 | 88 | 0 | 0 | 0 |
| Total Corridor Assessment (From Part VI above or a local site assessment) | 160 | 0 | 0 | 0 | 0 |
| **TOTAL POINTS** *(Total of above 2 lines)* | 260 | 88 | 0 | 0 | 0 |

| 1. Corridor Selected: | 2. Total Acres of Farmlands to be Converted by Project: | 3. Date Of Selection: | 4. Was A Local Site Assessment Used? YES ☐ NO ☐ |
|---|---|---|---|
| | | | |

5. Reason For Selection:

Signature of Person Completing this Part: | DATE

NOTE: Complete a form for each segment with more than one Alternate Corridor

# CORRIDOR - TYPE SITE ASSESSMENT CRITERIA

The following criteria are to be used for projects that have a linear or corridor - type site configuration connecting two distant points, and crossing several different tracts of land. These include utility lines, highways, railroads, stream improvements, and flood control systems. Federal agencies are to assess the suitability of each corridor - type site or design alternative for protection as farmland along with the land evaluation information.

(1) How much land is in nonurban use within a radius of 1.0 mile from where the project is intended?
More than 90 percent - 15 points
90 to 20 percent - 14 to 1 point(s)
Less than 20 percent - 0 points

(2) How much of the perimeter of the site borders on land in nonurban use?
More than 90 percent - 10 points
90 to 20 percent - 9 to 1 point(s)
Less than 20 percent - 0 points

(3) How much of the site has been farmed (managed for a scheduled harvest or timber activity) more than five of the last 10 years?
More than 90 percent - 20 points
90 to 20 percent - 19 to 1 point(s)
Less than 20 percent - 0 points

(4) Is the site subject to state or unit of local government policies or programs to protect farmland or covered by private programs to protect farmland?
Site is protected - 20 points
Site is not protected - 0 points

(5) Is the farm unit(s) containing the site (before the project) as large as the average - size farming unit in the County ? (Average farm sizes in each county are available from the NRCS field offices in each state. Data are from the latest available Census of Agriculture, Acreage or Farm Units in Operation with $1,000 or more in sales.)
As large or larger - 10 points
Below average - deduct 1 point for each 5 percent below the average, down to 0 points if 50 percent or more below average - 9 to 0 points

(6) If the site is chosen for the project, how much of the remaining land on the farm will become non-farmable because of interference with land patterns?
Acreage equal to more than 25 percent of acres directly converted by the project - 25 points
Acreage equal to between 25 and 5 percent of the acres directly converted by the project - 1 to 24 point(s)
Acreage equal to less than 5 percent of the acres directly converted by the project - 0 points

(7) Does the site have available adequate supply of farm support services and markets, i.e., farm suppliers, equipment dealers, processing and storage facilities and farmer's markets?
All required services are available - 5 points
Some required services are available - 4 to 1 point(s)
No required services are available - 0 points

(8) Does the site have substantial and well-maintained on-farm investments such as barns, other storage building, fruit trees and vines, field terraces, drainage, irrigation, waterways, or other soil and water conservation measures?
High amount of on-farm investment - 20 points
Moderate amount of on-farm investment - 19 to 1 point(s)
No on-farm investment - 0 points

(9) Would the project at this site, by converting farmland to nonagricultural use, reduce the demand for farm support services so as to jeopardize the continued existence of these support services and thus, the viability of the farms remaining in the area?
Substantial reduction in demand for support services if the site is converted - 25 points
Some reduction in demand for support services if the site is converted - 1 to 24 point(s)
No significant reduction in demand for support services if the site is converted - 0 points

(10) Is the kind and intensity of the proposed use of the site sufficiently incompatible with agriculture that it is likely to contribute to the eventual conversion of surrounding farmland to nonagricultural use?
Proposed project is incompatible to existing agricultural use of surrounding farmland - 10 points
Proposed project is tolerable to existing agricultural use of surrounding farmland - 9 to 1 point(s)
Proposed project is fully compatible with existing agricultural use of surrounding farmland - 0 points

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**State Historic Preservation Officer (SHPO) and**
**Tribal Coordination Letters**

*****Note: coordination and documentation will be completed during the feasibility-level analysis phase of this study which would occur following release of the Draft Environmental Impact Statement, and would be included in the Final Environmental Impact Statement.

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## Annex G

**U.S. Fish and Wildlife Service Draft Coordination Act Report**

United States Department of the Interior

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

June 5, 2013

Colonel Richard L. Hansen
District Commander
U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel Hansen:

Please reference the "West Shore, Lake Pontchartrain, Louisiana, Hurricane and Storm Damage Risk Reduction Feasibility Study." The study was authorized by resolutions adopted by the U.S. House Committee on Public Works on July 29, 1971, and the U.S. Senate Committee on Public Works September 20, 1974. The Fish and Wildlife Service (Service) has prepared five Planning-aid Reports dated January 21, 1985, June 30, 1987, April 3, 1997, May 4, 2001, and October 9, 2012, for previous reconnaissance studies and one letter for a Notice of Intent dated January 9, 2009.

This draft report contains a description of existing fish and wildlife resources in the project area, discusses future with-project (FWP) and future without-project (FWOP) habitat conditions, identifies fish and wildlife-related impacts, and provides recommendations to improve the proposed West Shore, Lake Pontchartrain project. This document does not constitute the report of the Secretary of the Interior as required by Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). The Service is coordinating with National Marine Fisheries (NMFS) and Louisiana Department of Wildlife and Fisheries (LDWF); their comments will be incorporated into the final report.

We appreciate the cooperation of your staff on this study. Should your staff have any questions regarding the enclosed report, please have them contact Ms. Catherine Breaux (504/862-2689) of this office.

Sincerely,

Jeffrey D. Weller
Supervisor
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Enclosure

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# Draft Fish and Wildlife Coordination Act Report for the West Shore, Lake Pontchartrain, Louisiana, Hurricane and Storm Damage Risk Reduction Feasibility Study in Ascension, St. Charles, St. James, and St. John the Baptist Parishes, Louisiana

SUBMITTED TO
NEW ORLEANS DISTRICT
U.S. ARMY CORPS OF ENGINEERS
AND
PONTCHARTRAIN LEVEE DISTRICT

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## INTRODUCTION

The U.S. Army Corps of Engineers (Corps) is conducting a study; the "West Shore, Lake Pontchartrain, Louisiana, Hurricane and Storm Damage Risk Reduction Feasibility Study" (WSLP) in Ascension, St. Charles, St. James, and St. John the Baptist Parishes, Louisiana, to determine the feasibility of providing Federal hurricane protection to the western shore of Lake Pontchartrain. The study was authorized by resolutions adopted by the U.S. House Committee on Public Works on July 29, 1971, and the U.S. Senate Committee on Public Works September 20, 1974. The Fish and Wildlife Service (Service) has prepared five Planning-aid Reports dated January 21, 1985, June 30, 1987, April 3, 1997, May 4, 2001, and October 9, 2012, for previous reconnaissance studies and one letter for a Notice of Intent dated January 9, 2009. The Service submits the following comments in accordance with the National Environmental Policy Act of 1969 (83 Stat. 852, as amended; 42 U.S.C. 4321 et seq.), the Migratory Bird Treaty Act (MBTA, 40 Stat. 755, as amended; 16 U.S.C. 703 et seq.), the Bald and Golden Eagle Protection Act (BGEPA) (54 Stat. 250, as amended, 16 U.S.C. 668a-d), the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.), and the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

The study area is bounded by the Bonnet Carré Spillway to the east, the Mississippi River to the south, Lakes Pontchartrain and Maurepas to the north, and St. James Parish/Ascension Parish line to the west. The communities in this area include Laplace, Reserve, Gramercy, Lutcher, Garyville, Riverland Heights, and Carrollwood. The Louisiana Department of Wildlife and Fisheries manages the Maurepas Wildlife Management Area (WMA), which contains a majority of the swampland within the project area.

According to an August 2012 map provided by the Corps, there are three preliminary levee alignments which have been identified through previous reconnaissance and feasibility studies that are being considered for the Tentatively Selected Plan (TSP) (Figure 1). Generally, those alignments extend from the west guide levee of the Bonnet Carré Spillway to the vicinity of Hope Canal north of Garyville in St. John the Baptist Parish. Alignment A generally follows the wetland/non-wetland interface from LaPlace to Hope Canal. Alignment C generally follows an existing pipeline corridor north of Alignment A. Alignments A and C both tie into the Mississippi River levee. Alignment D generally follows the Interstate Highway 10 (I-10) corridor and extends outside the original study area into Ascension Parish to tie into an existing non-federal levee.

In the screening of the structural plans the planning team decided that it would not be feasible to either extend Alternative A or C into St. James Parish or create a ring levee to address the limited damages there in order to protect the entire study area. Non-Structural features have been added to Alternatives A and C that would provide for the elevation of structures and/or acquisition (when elevating structures higher than 13 feet is not implementable) to address remaining storm surge damages west of Hope Canal. Alternative E, a stand alone non-structural plan that would acquire

14,512 structures in the flood zones and address all of the damages in the study area was screened out.

Alternative C has been selected as the TSP that will move forward for further feasibility level development. Alternative C begins at the West Guide Levee of the Bonnet Carre Spillway and goes west to the US-51 Interchange where it turns north across US-51 and parallels along a pipeline transmission corridor. At I-10 near the Belle Terre exit, Alternative C crosses the interstate and follows the pipeline corridor through the wetlands until it reaches the St. John / St. James Parish line. At that point the alignment turns southward and extends to the location where the ground elevation is equal to or higher than the levee design crest elevation (near the Mississippi River Levee). This alignment was added to evaluate the feasibility of avoiding multiple of pipeline and utility crossings. The nonstructural component was added for areas west of Hope Canal.

The alignment consists largely of earthen levees, but does contain T-walls for crossings of roadways and pipelines. There are also a number of pump stations and environmental control structures associated with the alignment. The total distance of the alignment is estimated at 18.27 miles. There is a need for approximately 3,100,000 cubic yards of earthwork fill, 3,365,000 square yards of geotextile, nearly 26,000 cubic yards of aggregate limestone road, 5,300 linear feet of T-Walls, 300 linear feet of flood gates, 200 linear feet of drainage gates, and 2 railroad gates. There are 4 pumping stations associated with Alignment C. The levee system would primarily be a gravity drainage system with pumps operated only during storm events. With approximately 1.7 storm events per year the gravity drainage would be closed for approximately 8.5 days every year.

## DESCRIPTION OF FISH AND WILDLIFE RESOURCE CONDITIONS

The dominant forested habitat types in the study area are bottomland hardwoods and swamp. Vegetation commonly found in these wetland areas includes sugarberry, red maple, sweetgum, American elm, black willow, green ash, overcup oak, Nuttall oak, and American sycamore in the bottomland hardwood habitat and baldcypress, tupelogum, blackgum, lizard's tail, swamp lily, buttonbush, swamp privet, and duckweeds in the swamp habitat. Scattered portions of upland hardwoods, scrub/shrub uplands, and scrub/shrub wetlands also are found along and within the developed areas. Except for Lake Pontchartrain, Lake Maurepas, and the Mississippi River, which border the study area, most of the open water within the study area consists mainly of tidal streams, canals, and ditches. The shallower open water areas may support submerged and/or floating aquatic vegetation such as coontail, pondweeds, naiads, fanwort, water hyacinth, pondweeds, American lotus, and widgeongrass.

Development for residential, commercial, and industrial purposes is located immediately adjacent to U.S. 61 and along the Mississippi River levee. Agriculture, primarily sugarcane production, is also extensive within that portion of the study area. Residential and commercial development is also becoming extensive between U.S. 61 and I-10, as wetlands are drained and/or filled to

accommodate growth. Most of U.S. 61 and portions of I-10 are not elevated above the swamps they cross thus impacting the hydrology of those swamps. The wetland complex they cross is part of the largest contiguous wetland area in Louisiana.

The fresh and low-salinity water of the study area supports many commercially and recreationally important fishes such as largemouth bass, black crappie, sunfishes, catfishes, freshwater drum, buffalos, and gars. The low-salinity waters and wetlands of the study area also provide habitat for many species of estuarine-dependent fishes and shellfishes including southern flounder, sand seatrout, spotted seatrout, Atlantic croaker, striped mullet, Gulf menhaden, blue crab, and white shrimp. Decaying plant material (detritus) is carried by surface runoff and tidal action from the study area wetlands into the adjacent estuarine waters, substantially contributing to the detritus-based food web that supports a high level of estuarine-dependent finfish and shellfish productivity.

The coastal marshes and forested wetlands of the Lake Pontchartrain Basin have been identified by the North American Waterfowl Management Plan (NAWMP), Gulf Coast Joint Venture (GCLV): Mississippi River Coastal Wetlands Initiative as a key waterfowl wintering area. The Gulf Coast is the terminus of the Central and Mississippi Flyways and is therefore one of the most important waterfowl areas in North America, providing both wintering and migration habitat for significant numbers of the continental duck and goose populations that use both flyways. The Mississippi River Coastal Wetlands Initiative area is dominated by coastal marsh, forested swamps, and seasonally flooded bottomland hardwoods that provide habitat for several species of wintering waterfowl. Wood ducks are the primary waterfowl species in forested wetlands, while other ducks (e.g., mallard, American widgeon, gadwall, and lesser scaup) use those forested habitats to a lesser degree. One strategy to achieving the goals and objectives of the GCJV is to maintain the existing functions and values of those habitats and prevent additional losses and degradation of those wetlands (Wilson 2002). Numerous other game birds are present in or adjacent to the study area, including American coot, rails, gallinules, wood duck, common snipe, and American woodcock. Non-game bird species also utilize the study area marshes, including least bittern, pied-billed grebe, black-necked stilt, American avocet, killdeer, black-bellied plover, willet, and various species of sandpipers, gulls, and terns. The study area supports many resident and transient hawks and owls including red-shouldered hawk, barn owl, common screech owl, great horned owl, and barred owl. Winter residents include red-tailed hawk, northern harrier, and American kestrel, while the Mississippi kite, swallow-tailed kite and broad-winged hawk are common summer residents. In addition, the project area supports many species of resident and migratory passerine birds. Some neo-tropical migrants that are currently experiencing a population decline (e.g., white-eyed vireo, northern parula) are dependent on large forested acreage to successfully reproduce. Also, present are cuckoos, swifts, hummingbirds, nighthawks, woodpeckers, and the belted kingfisher.

Important game mammals occurring in the project area include white-tailed deer, eastern cottontail, swamp rabbit, gray squirrel, and fox squirrel. Commercially important furbearers include muskrat,

nutria, river otter, raccoon, and mink. Other mammals expected include various species of insectivores, bats, rodents, and the nine-banded armadillo.

Numerous amphibians are expected to occur on stream and lake edges, ponds, and in forested wetlands of the study area including lesser siren, three-toed amphiuma, Gulf Coast toad, eastern narrow-mouthed toad, spring peeper, green treefrog, cricket frog, and bullfrog. Commercially important reptiles found in the streams, canals, and open water areas include American alligator, snapping turtle, alligator snapping turtle, smooth softshell turtle, spring softshell turtle, and diamondback terrapin. Other reptiles commonly found in the project area include red-eared turtle, painted turtle, Mississippi mud turtle, stinkpot, green anole, broad-headed skink, various water snakes, western ribbon snake, speckled kingsnake, and the western cottonmouth.

**Threatened and Endangered Species**

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 Suwannee 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. While sturgeon have been documented in study area waterways, those waterways are not designated critical habitat.

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. Should the proposed project involve activity in the aquatic environment in those areas during summer months, further consultation with this office will be necessary.

**Migratory Bird Treaty Act (MBTA) and Bald and Golden Eagle Protection Act (BGEPA)**

The proposed project area forested wetlands may provide nesting habitat for the bald eagle (*Haliaeetus leucocephalus*), which was officially removed from the List of Endangered and Threatened Species as of August 8, 2007. However, the bald eagle remains protected under the MBTA and BGEPA. There are approximately 28 known bald eagle nests in the study area. Comprehensive bald eagle survey data have not been collected by the Louisiana Department of Wildlife and Fisheries (LDWF) since 2008, and new active, inactive, or alternate nests may have been constructed within the proposed project area since that time. Bald eagles typically nest in large trees located near coastlines, rivers, or lakes that support adequate foraging from October through mid-May. In southeastern Louisiana parishes, eagles typically nest in mature trees (e.g., baldcypress, sycamore, willow, etc.) near fresh to intermediate marshes or open water.
During any project construction, on-site personnel should be informed of the possible presence of nesting bald eagles in the vicinity of the project boundary, and should identify, avoid, and immediately report any such nests to this office. If a bald eagle nest occurs or is discovered within 1,500 feet of the proposed project area, then an evaluation must be performed to determine whether the project is likely to disturb nesting bald eagles. That evaluation may be conducted on-line 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.

The proposed project would be located in an area where colonial nesting waterbirds may be present. There are approximately 6 known nesting bird colonies in the study area. Colonies may be present that are not currently listed in the database maintained by LDWF. 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 site for the presence of undocumented nesting colonies during the nesting season. To minimize disturbance to colonial containing nesting wading birds (i.e., herons, egrets, night-herons, ibis, and roseate spoonbills), anhingas, and/or cormorants, all activity occurring within 1,000 feet of a rookery should be restricted to the non-nesting period (i.e., September 1 through February 15, exact dates may vary within this window depending on species present). In addition, we recommend that on-site contract personnel be informed of the need to identify colonial nesting birds and their nests, and should avoid affecting them during the breeding season.

**Management Areas**

The LDWF operates two state wildlife management areas (WMAs) in the project vicinity including Maurepas Swamp WMA which encompasses over 100,000 acres of wetlands in and around the study area and Manchac WMA protecting over 7,000 acres of wetlands located in the northern tip of the study area. Both WMAs may be considered for mitigation of unavoidable direct and indirect impacts of swamp. Please contact the LDWF, Region 7 Office (225/765-2360), for further information regarding any additional permits that may be required to perform work on that WMA.

In addition, two federally approved wetland mitigation banks are located within the study area including the Sawgrass Bayou Mitigation Area owned by Blind River Properties (Mr. Dale Martin, 225/698-2700), and Lake Maurepas Mitigation Area owned by Stream Properties, LLC (Mr. Jeff Peterson, 337/433-1055, ext. 20). If the proposed project entails work within or adjacent to those bank sites, or if an alternative could potentially alter the hydrology of those sites, then the bank sponsors and the mitigation interagency review team should be contacted.

There is one Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA) project, River Reintroduction into Maurepas Swamp (PO-29) currently in Phase I in the study area. Any potential impacts to this CWPPRA project would need to be addressed.

Subsidence, sea level rise, and hydrologic modifications coupled with the isolation of project area wetlands from the natural overflow of the Mississippi River, that formerly sustained these wetlands, has begun to lead to the long-term degradation of the quality and quantity of project area wetlands. Projects such as the above CWPPRA have the goal of restoring some of the natural overflow processes.

## EVALUATION METHODOLOGY

To expedite the planning process, and be consistent with the new Corps SMART Planning Procedures, impacts were preliminarily determined utilizing existing information about the project area from the Coastwide Reference Monitoring System (CRMS) as a surrogate for habitat quality. Feasibility-level habitat analysis using Wetland Value Assessment (WVA) methodology should be conducted on the TSP, per the SMART Planning procedures, following release of the draft Integrated EIS and Feasibility Report for public review and be included in the final Integrated EIS and Feasibility Report.

The following information is taken from the CRMS Site Level Report Cards for sites CRMS0059, CRMS5373, CRMS0039, CRMS5167, and CRMS0065 (Louisiana Office of Coastal Protection and Restoration, 2013) and was used for assessment of wetland impacts.

The CRMS Site Level Report Card presents two ecological parameters that have been developed: a floristic quality index (FQI) and hydrologic index (HI). CRMS Analytical Teams, made up of agency and academic personnel, developed these indices, and others, based on the suite of parameters available from the 2006 to 2009 CRMS dataset. The FQI is used throughout the world to determine wetland quality based on plant species composition for a geographic area of interest. The FQI developed with the CRMS data is specific to coastal Louisiana. The FQI scores from 0 to 100 are calculated for a sampling station and are based on the percent cover values and the Coefficient of Conservatism (CC score) of the species present (Cretini et al. 2012). The HI jointly assesses the suitability of two critical aspects of wetland hydrology, average salinity and percent time flooded, in maximizing vegetation primary productivity. The HI score (between 0 and 100) corresponds to the percent of maximum vegetation productivity expected to occur if the separate effects of salinity and inundation interact in a multiplicative fashion on vegetation productivity (Snedden and Swenson 2012).

Based on the CRMS locations in proximity of each alignment we used a combination of site CRMS0059 and CRMS5373 for Alternatives A and C and all five sites for Alternative D. We averaged the FQI for the years 2007-2012 of each set of sites by alternative, then converted the index number into a value from 0.1 to 1.0 and then did the same for the HI for years 2008-2012. Unfortunately the HI was unavailable for sites CRMS0059 and CRMS0065 because those sites did not meet salinity and/or water level data completeness threshold (70% per water year) in order to calculate an HI score. In that case the HI for Alternatives A and C were averaged only with CRMS0059 for years 2008-2012. Next we averaged the FQI and HI numbers to obtain a single value to represent the habitat quality for each alternative. It should be noted that the FQI is calculated on the herbaceous vegetation. The CRMS Analytical Teams have developed a Forested FQI but it is still undergoing peer review. Though the forested FQI would have been preferred we feel the herbaceous FQI will still be useful in the intent of this comparison. The results of this analysis are presented in Table 1. Alternative C (TSP) and Alternative A have the same average FQI and HI, which was greater than Alternative D.

**Table 1. Hydro Index (HI) and Floristic Quality Index (FQI) Converted to Values Between 0.1-1.0 and Averaged for each Alternative in the Final Alternative Array. Taken from Coastwide Reference Monitoring System (CRMS) Site Level Report Cards for sites CRMS0059, CRMS5373, CRMS0039, CRMS5167, and CRMS0065 (Louisiana Office of Coastal Protection and Restoration, 2013).**

| Alternative | Hydro Index (HI) | Floristic Quality Index (FQI) | Average of HI + FQI |
|---|---|---|---|
| Alternative A and C | 0.864 | 0.197859 | 0.53093 |
| Alternative D | 0.769285714 | 0.184509 | 0.476898 |

Although this simplified approach is not ideal for assessing habitat quality, given the shortened study schedule and limitation on data gathering we felt this data driven approach is better than any other option explored. It is expected that once the TSP is selected the habitat evaluation team (HET) will conduct full WVA analysis on the TSP.

## PROJECT IMPACTS

Construction of Alternative C will result in the direct loss of approximately 775 acres of swamp and bottomland hardwoods (BLH) and encloses 8,424 acres of swamp habitat for a total of 9,199 acres of direct and indirect impacts (Table 2). Although Alternative C has a greatly reduced the number of total impacted acres compared to Alternative D (57,343 acres) it is still significantly greater than Alternative A (3,941 acres).

**Table 2. West Shore Lake Pontchartrain Acres Impacted**

| Alternative | Direct Acres | Indirect Acres | Total Acres |
|---|---|---|---|
| Alternative A | 377 | 3,564 | 3,941 |
| Alternative C | 775 | 8,424 | 9,199 |
| Alternative D | 1,115 | 56,228 | 57,343 |

Alternative C will provide levee protection for Laplace, Reserve, Garyville and nonstructural protection west of Hope Canal. This alternative is the second least environmentally damaging alternative while providing protection to the same communities in the study area. With Alternative C there could be some impacts to the Maurepas Swamp WMA and potentially some impacts to the CWPPRA River Reintroduction into Maurepas Swamp (PO-29) project. However, Alternative C avoids a myriad of pipeline and utility crossings and is expected provide additional storm water storage capacity for exceedence events (i.e. where a storm event is greater than the design elevation of the levee and overtopping or levee failure results) in the enclosed wetland area thus decreasing the flooding potential of nearby developed areas.

Preliminary hydrologic modeling indicates that the project design would have minimal changes to tidal flows or stages to protected-side swamps. To accomplish this, culverts would be included within the levee system along those presently unaltered areas in order to retain hydrologic connectivity between the protected and unprotected areas. Currently, these measures have not been fully developed and there is still uncertainty on whether maintaining existing flow/exchange can be achieved. The hydrologic modeling conducted addressed tidal exchange; however, tidal exchange is dampened that far inland from Lake Maurepas. In addition, elevations are greatest near the river and decrease toward the lake. Therefore, the protected side is primarily a run-off driven system. Interior drainage modeling has not yet been conducted to determine if the proposed levee would increase interior water levels and duration and frequency of swamp inundation.

Based on the 2008 to 2012 water level range data for stations CRMS0059 and CRMS5373 the swamps are temporarily flooded. Temporarily flooded is defined as surface water is present for brief periods during the growing season, but the water table usually lies well below the surface for most of the season. The wetlands of the study area that will be enclosed by the proposed levee alignment have moderate to low water flow/exchange due to the many berms (e.g., U.S. 61 and I-10) scattered throughout the area. Most of the flow is through existing canals and bayous. Maintaining existing flow/exchange may be possible if many of the existing openings are aligned with the proposed levee culverts. Because the existing berms will be at a lower elevation than the proposed levee, overbank flows will be eliminated.

In addition to the impact to water exchange in the protected-side swamp, the Service is concerned about reduced future water exchange due to Sea Level Rise (SLR) requiring increased structure closures. The frequency and duration of gate closures is expected to increase due to area-wide stage increases caused by relative SLR thereby leading to potential substantial affects to wetlands enclosed by the levee system. These potential impacts have not yet been fully determined; but are expected to be analyzed during the feasibility phase of the study. By the end of the period of analysis (i.e., 50 years), under the high SLR scenario, all gates could be closed all of the time, similarly under the intermediate SLR scenario there may be almost complete structure closures. At present, it is unknown how water levels within the system would be managed and there is a potential for substantial additional indirect impacts to swamp and fish and wildlife resources to occur.

If the proposed levee increases flood frequency and water depth the bald cypress swamp will become stressed which could result in a reduction in diversity and productivity (Krauss et. al. 2009). Increased water depth can also reduce the transfer of oxygen to roots. Over time, a stressed swamp could convert to marsh and/or open water. Reduced water exchange in the enclosed wetlands would lead to further water quality deterioration in the Lake Pontchartrain Basin by eliminating or reducing the filtering capacity of those wetlands. The potential wetland habitat impact to the largest remaining continuous forested wetlands in Louisiana would result in the reduction of resident fish and wildlife, reduced important wintering habitat for waterfowl and other migratory birds that use the Central and Mississippi Flyways, and reduced nursery habitat and detritus input important to the maintenance of estuarine-dependent fish and shellfish production

Developmental pressures on enclosed forested wetlands would likely increase with levee construction due to the reduced threat of flooding in the area but that would also be dependent on the proposed operation of pumps. According to the Corps Civil Works Program Five-Year Development Plan for Fiscal Year 2011 to Fiscal Year 2015, national flood damages are increasing and that is attributed to population migration to the coasts and development of floodplains, thus creating apparent contradiction between flood damage reduction investments and national flood damages (Corps of Engineers, 2011). Induced development of the protected-side wetlands would

not be conducive with the Corps' plan to reduce flood damages and also utilize this area for flood storage capacity during storms exceeding the project design. Another apparent inconsistency between programs is the planning of restoration projects while at the same time levees are being proposed to enclose floodplain habitat and permits are issued for development in these floodplains. More consistency between these programs needs to address the conflicting approaches between restoration and future development. Therefore, the Corps and local sponsor should acquire adequate protection of the enclosed wetlands to ensure and maintain preservation of those areas in perpetuity via the purchase of non-development easements and local flood zoning ordinances.

It is expected that three potential borrow sources will be used for this project: the Bonnet Carre borrow area located north of Airline Highway in St. Charles Parish, Louisiana; the Big Shake borrow site located in St. James Parish, a 441-acre actively-farmed sugarcane fields between LA-44 and LA-3125 in a rural area; and the River Bend II borrow site located at LaPlace, St. John the Baptist Parish which is currently used for sugarcane farming and has 7.39 acres of non-wetland bottomland hardwood (BLH) habitat located within the proposed site. All three sites have environmental clearance. The Bonnet Carre site was documented in the 2007 "Final Phase I Environmental Site Assessment, Bonnet Carre Borrow Area, North of Airline Highway, St. Charles Parish, Louisiana." The Big Shake site is documented in the Greater New Orleans Hurricane and Storm Damage Risk Reduction System (HSDRRS) Individual Environmental Report (IER) 30 Decision Record dated September 2009. The River BendII site is documented in the HSDRRS IER 35 Decision Record dated October 2011. If the proposed project needs more borrow than the already environmentally cleared borrow sites please consider that the Corps has almost completed full implementation of the newly-authorized protection levels for hurricane and flood protection projects in the Greater New Orleans area. The combined need for borrow necessary to complete authorized flood protection improvements and construction of other proposed and implemented Federal and non-Federal hurricane and flood protection levees may have diminished local availability. The search for levee-building material has been conducted on a project-by-project basis, and has led to the least-expensive and easiest sources for borrow material, which is usually located within wetlands and/or bottomland hardwoods adjacent to the proposed levee. Use of such on-site sources often has adverse impacts on wetlands and is frequently inconsistent with coastal restoration efforts. Use of those sites will be counterproductive with respect to minimizing wetland impacts and attaining the goal of increasing non-structural hurricane protection within a sustainable ecosystem. The Service's priority selection process for borrow material outlined in our August 7, 2006, letter to the Corps regarding the Greater New Orleans Hurricane and Storm Damage Risk Reduction project should be utilized (Appendix A). The Service recommends further investigation of the identified potential borrow areas (map provided via a March 2013 email) that are likely to have minimal impacts to fish and wildlife areas identified on that map should be investigated first as potential borrow sources.

## SERVICE POSITION AND RECOMMENDATIONS

The Service would prefer to see selection of the least environmentally damaging alterative which is Alternative A. However, we recognize and understand the logic and reasoning for selecting Alternative C, which includes avoidance of the costly relocation of pipelines and utilities and is expected to provide additional storm water storage capacity for exceedence events thus decreasing the flooding potential of nearby developed areas. Construction of Alternative C will result in the direct loss of approximately 775 acres of swamp and BLH and encloses 8,424 acres of valuable swamp habitat for a total of 9,199 acres of direct and indirect acres.

The Service's Mitigation Policy (Federal Register, Volume 46, No. 15, January 23, 1981) identifies four resource categories that are used to ensure that the level of mitigation recommended by Service biologists will be consistent with the fish and wildlife resource values involved. Considering the high value of forested wetlands for fish and wildlife and the relative scarcity of that habitat type, that habitat type is designated as Resource Category 2, the mitigation goal for which is no net loss of in-kind habitat value. The scrub-shrub habitat that may be impacted, however, is placed in Resource Category 3 due to their reduced value to wildlife, fisheries and degraded wetland functions. The mitigation goal for Resource Category 3 habitats is no net loss of habitat value.

The Service respectfully requests the following recommendations are implemented concurrently with project implementation:

1. Over 8,000 acres of swamp will be enclosed within the levee of Alternative C. The proposed alternative may alter natural periods of inundation or soil saturation in the impounded wetlands and could prove detrimental to their function and longevity. Interior drainage modeling has not yet been conducted to determine if the proposed levee would increase interior water levels and duration and frequency of swamp inundation. Therefore, the Service recommends;
    a. interior drainage modeling be conducted to determine effects of the project on water circulation, water levels, and inundation duration and frequency of protected-side swamps based on the proposed project features.
    b. the installation of sufficient culverts and water control structures in the levee that could be properly operated to ensure adequate water exchange (such structures should be closed only in advance of tropical storms).
    c. to aid in water quality improvements, the Service recommends that any pumping stations associated with the project should not discharge directly into canals or other open water bodies, but rather into wetland systems that can assimilate nutrients being discharged.
    d. The Service recommends hydrologic gauges be placed and maintained in appropriate locations to assist in determining future impacts to enclosed swamps. These gauges

could be supported through existing activities such as through the US Geological Survey (USGS) or CRMS.

2. Additional information is needed by the Service to complete the required evaluation of project effects and fulfill our reporting responsibilities under Section 2(b) of the Fish and Wildlife Coordination Act. Much of that information will not be available until the feasibility phase of the project has progressed. To help ensure that sufficient information is provided, the Service recommends that the Corps perform the following tasks during the feasibility phase. Provide additional information on anticipated construction details, such as structure size and locations, operation plan of structures, hydrologic (drainage) impacts to interior wetlands as a result of the levee including water level changes and projections of relative SLR on frequency and duration of structure closures.

3. Operational plans for floodgates and water control structures should be developed to maximize the open cross-sectional area for as long as possible. Development of water control structure operation manuals or plans should be done in coordination with the Service and other natural resource agencies.

4. The Service recommends preservation of enclosed wetlands be ensured (in perpetuity) via the purchase of non-development easements and local flood zoning ordinances. Providing perpetual preservation of enclosed wetlands would also guarantee flood storage areas within the levee system.

5. Alternative C could potentially have impacts to the CWPPRA River Reintroduction into Maurepas Swamp (PO-29) project. The Service recommends close coordinate with the planning objectives and planning team of the restoration project and that any potential impacts to this CWPPRA project be addressed.

6. If it becomes necessary to use borrow sources other than the previously proposed environmentally cleared sites, the Service recommends investigating potential borrow sources based on the map identifying potential borrow areas that are likely to have minimal impacts to fish and wildlife resources that we provided, via a September 9, 2008, letter and based on our priority selection process for borrow material outlined in our August 7, 2006, letter to the Corps regarding the Greater New Orleans Hurricane and Storm Damage Risk Reduction project (Appendix A) should be utilized (please contact Cathy Breaux (504)862-2689 or David Walther (337)291-3122 for more information).

7. The enclosure of wetlands within the proposed levee is necessary to avoid pipeline and utility relocations and to provide for floodwater storage. Full, in-kind compensation (quantified as Average Annual Habitat Units) should be provided for unavoidable direct (levee footprint) adverse impacts and indirect habitat value losses (enclosed wetlands) on forested wetlands associated with levee construction, including any additional losses identified during the feasibility phase and engineering and design studies. Detailed mitigation needs should be determined in the feasibility stage. Mitigation planning, including site selection and design, should be closely coordinated with the Service, LDWF, and other interested natural resource agencies. To help ensure that the proposed mitigation features meet their goals, the Service provides the following recommendations.
    a. If applicable, a General Plan should be developed by the Corps, LDWF, and the Service in accordance with Section 3(b) of the Fish and Wildlife Coordination Act for mitigation lands.
    b. Mitigation should, to the greatest extent practical, include potential mitigation sites and features on the nearby Maurepas WMA previously provided by LDWF (Appendix B).
    c. Mitigation measures should be constructed concurrently with the flood damage reduction features that they are mitigating (i.e., mitigation should be completed no later than 18 months after levee construction has begun). Completion of mitigation means that success criteria have been achieved. If a portion of the mitigation is provided via a mitigation bank, completed mitigation would be achieved when credits are purchased from an approved mitigation bank and documentation of credit is provided to the resource agencies.
    d. The Service and LDWF recommend the Maurepas WMA be used to the greatest extent practical for in-kind mitigation and at a minimum, all impacts to the Maurepas WMA should be mitigated for on the WMA. Because adequate and appropriate mitigation is available both on the WMA and through approved mitigation banks, use of in-lieu fee mitigation is not recommended.
    e. If mitigation is not implemented concurrent with levee construction, the amount of mitigation needed should be reassessed and adjusted to offset temporal losses of wetlands.
    f. The Corps should remain responsible for the required mitigation until the mitigation is demonstrated to be fully compliant with success and performance criteria. At a minimum, this should include compliance with the requisite vegetation, elevation, acreage, and dike gapping criteria.
    g. The acreage restored and/or managed for mitigation purposes, and adjacent affected wetlands, should be monitored over the project life. This monitoring should be used to evaluate project impacts, the effectiveness of the compensatory mitigation measures, and the need for additional mitigation should those measures prove insufficient.

8. The Service recommends enough money be set aside for adaptive management to address potential impacts of the enclosed wetlands and the adjacent CWPPRA River Reintroduction into Maurepas Swamp (PO-29) project. The Service, LDWF, and other natural resource agencies should be consulted in the development of plans and specifications for all mitigation features and any monitoring and/or adaptive management plans. In addition the Service recommends the Monitoring and Adaptive Management Plan, as it is further developed, be provided to the Service, NMFS, and LDWF for review, comment, and input.

9. Alignment C will occur partly within the boundaries of Maurepas Swamp WMA. Please coordinate all activities within the WMA with LDWF. Please contact Mr. Christain Winslow (985-543-4781 or cwinslow@wlf.la.gov) and Mr. Mike Windham at 504-284-5268 or cwindham@wlf.la.gov for more information about appropriate WMA authorizations.

10. Blind River is a Louisiana designated Natural and Scenic River. The Corps must obtain authorization from the LDWF, Scenic Rivers Program prior to initiating any of the proposed activities within or adjacent to the banks of Blind River. Scenic Rivers Coordinator Keith Cascio can be contacted at (318) 343-4045 or kcascio@wlf.la.gov.

11. Unavoidable impacts to wetlands within Maurepas WMA should be mitigated on the WMA, including those associated with fisheries, wildlife passage, and recreational use of the Maurepas WMA.

12. Should long segments of levee be topped with T or I-walls, the Service and LDWF recommend wildlife crossings be provided so as to prevent barriers to wildlife movement.

13. The Corps should coordinate closely with the Service, LDWF, and other fish and wildlife conservation agencies throughout the feasibility, pre-construction engineering, and design phase of project features including levees, floodgates, and environmental water control structures to ensure that those features are designed, constructed and operated consistent with wetland restoration purposes and associated fish and wildlife resource needs, and to update and finalize impacts and to develop an adequate mitigation plan.

14. 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). During in-water work in areas that potentially support manatees all personnel associated with the project should be instructed about the potential presence of

manatees, manatee speed zones, and the need to avoid collisions with and injury to manatees. All personnel should be advised that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973. Additionally, personnel should be instructed not to attempt to feed or otherwise interact with the animal, although passively taking pictures or video would be acceptable. For more detail on avoiding contact with manatee contact this office. Should a proposed action directly or indirectly affect the West Indian manatee, further consultation with this office will be necessary.

15. Avoid adverse impacts to nesting bald eagles and wading bird colonies through careful design project features and timing of construction. The Service and LDWF recommends that a qualified biologist inspect the proposed work site for the presence of undocumented nesting colonies and bald eagles during the nesting season (i.e., September 1 through February 15 for wading bird nesting colonies and October through mid-May for bald eagles).

16. If proposed project features, including adaptive management features, are changed significantly or are not implemented within one year of the Endangered Species Act consultation letter, we recommend that the Corps reinitiate coordination with the Service and NMFS to ensure that the proposed project would not adversely affect any Federally listed threatened or endangered species or their critical habitat.

Given that design and evaluation of most project features has been at a programmatic level, the Service cannot fulfill its Coordination Act responsibilities at this time. We hope to complete the assessment of impacts in time for inclusion in the Final Environmental Impact Statement. To complete those assessments, we may require additional funding during the next several months. Estimates of those funding needs should be coordinated in advance with the Service, and should be based on the nature and complexity of issues associated with the project design and implementation. For those features that undergo additional design work during the Pre-construction and design phase (PED) the Corps should coordinate that work with the Service and other natural resource agencies in accordance with the FWCA. Funding for such work may also be necessary.

We appreciate the Corps' consideration of our recommendations for further development of a TSP for the proposed project. Provided that the above recommendations are included in the final feasibility report and related authorizing documents, the Service does not oppose further planning of the TSP. Should you or your staff have any questions, or if you would like to meet with us regarding the content of this letter, please contact Mrs. Catherine Breaux (504/862-2689) of this office.

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Wilson, B.C., C.A. Manlove, and C.G. Esslinger. 2002. North American Waterfowl Management Plan, Gulf Coast Joint Venture: Mississippi River Coastal Wetlands Initiative. North American Waterfowl Management Plan, Albuquerque, NM. 28 pp. + appendix.

## Appendix A

The Service's priority selection process for borrow material as outlined in our August 7, 2006, letter to the Corps

This information is provided in accordance with the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.), Fish and Wildlife Coordination Act (FWCA, 48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), and the Migratory Bird Treaty Act (40 Stat. 755, as amended; 16 U.S.C. 703 et seq.).

Through the efforts of Task Force Guardian, the Corps restored Hurricane Katrina-damaged hurricane/flood protection projects to their authorized or previously permitted/constructed protection levels. Identification of borrow areas needed to complete those repairs utilized a protocol that prioritized selection of those sites in the following order: existing commercial pits, upland sources, previously disturbed/manipulated wetlands within a levee system, and low-quality wetlands outside a levee system. The Service supports the use of such protocols to avoid and minimize impacts to wetlands and bottomland hardwoods within project areas. Avoidance and minimization of those impacts helps to provide consistency with restoration strategies and compliments the authorized hurricane protection efforts. Such consistency is also required by Section 303(d)(1) of the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA).

Accordingly, the Service recommends that prior to utilizing borrow sites every effort should be made to reduce impacts by using sheetpile, floodwalls or deep soil mixing to decrease levee widths wherever feasible. In addition, the Service recommends that the following protocol be adopted and utilized to identify borrow sources in descending order of priority:

1. Permitted commercial sources, authorized borrow sources for which environmental clearance and mitigation have been completed, or non-functional levees after newly constructed adjacent levees are providing equal protection.

2. Areas under forced drainage that are protected from flooding by levees, and that are:

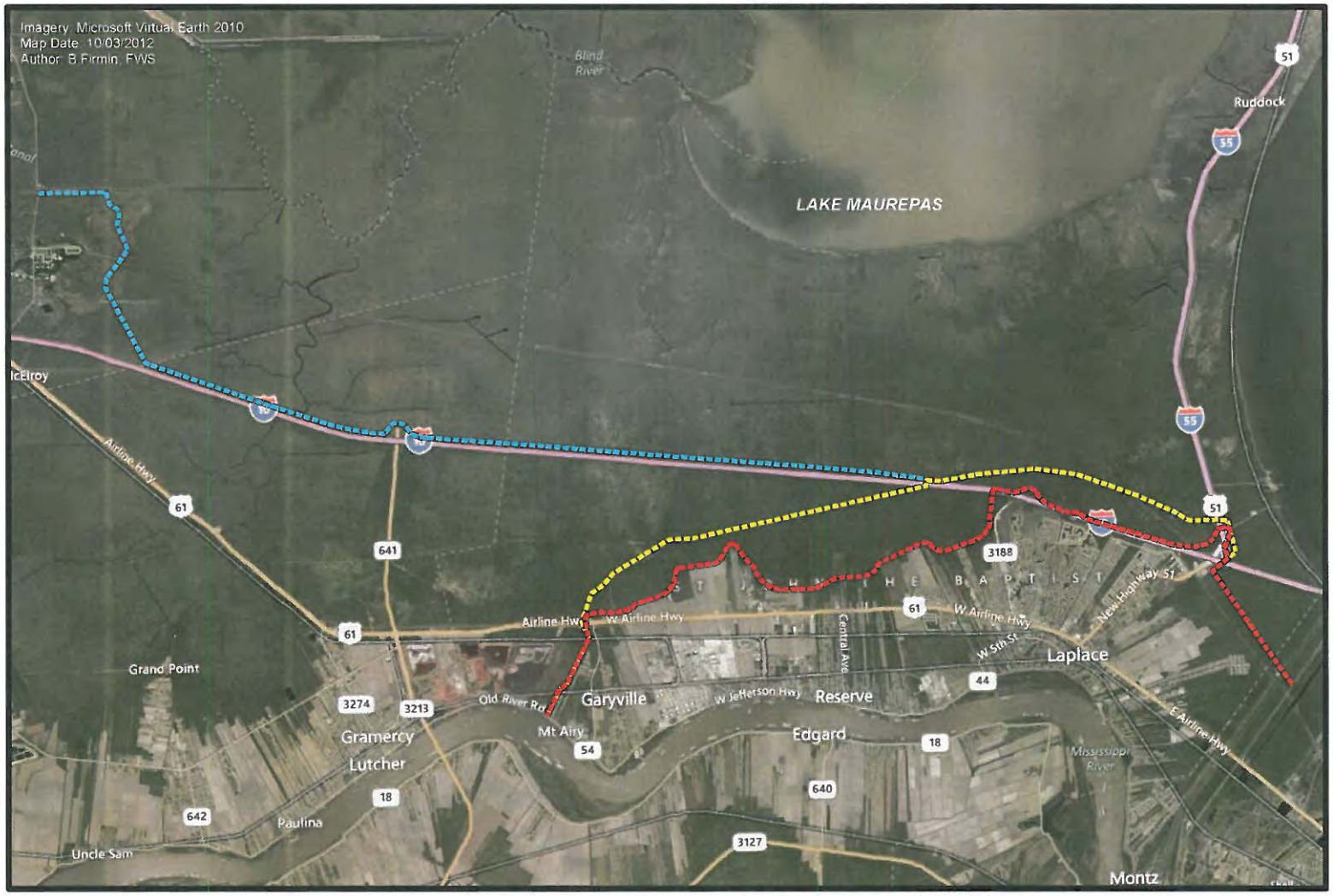
   a) non-forested (e.g., pastures, fallow fields, abandoned orchards, former urban areas) and non-wetlands;

   b) wetland forests dominated by exotic tree species (i.e., Chinese tallow-trees) or non-forested wetlands(e.g., wet pastures), excluding marshes;

   c) disturbed wetlands (e.g., hydrologically altered, artificially impounded).

3. Sites that are outside a forced drainage system and levees, and that are:

**Figure 1. Proposed alignments for the West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study**



# Appendix B

**DRAFT Maurepas Swamp WMA Mitigation Proposals**
Prepared by the Louisiana Department of Wildlife and Fisheries (LDWF)
Presented to the West Shore-Lake Pontchartrain Project Delivery Team (PDT)
May 23, 2013

The elimination of nutrient and freshwater inputs threatens the sustainability of the Maurepas Swamp. The most effective strategy to restore health and productivity of the swamp is construction of Mississippi River reintroductions into Maurepas Swamp. However, additional measures such as eliminating barriers to surface flow patterns are also needed, not only to compliment the planned river reintroductions, but also to improve current hydrologic conditions. Therefore, the mitigation measures identified below by LDWF primarily aim to enhance or improve surface hydrology until such time that river reintroductions are constructed. The mitigation measures are still conceptual and will require further planning and engineering. LDWF also prioritized each measure (i.e., High, Medium or Low) to inform the PDT on which measures are believed to be most beneficial.

1. Gap spoil banks along Reserve Relief Canal (**High priority**).

2. Gap spoil banks along New River Canal (**High priority**).

3. Gap/degrade railroad bed which traverses the swamp beginning from Hope Canal and proceeding north and west to the northern property boundary (crossing Blind River and Amite River Diversion Canal (**High priority**).

4. Improve through flow of Hammond wastewater into existing Joyce WMA outfall area (**High priority**).

5. Make efficient use of stormwater and wastewater produced by communities south of I-10 (e.g., Laplace, Ascension Parish) by distributing this water into the Maurepas Swamp (**High priority**).

6. Diversion of freshwater from Bonnet Carre Spillway guide levee to the swamps and marshes to the northwest (**Medium priority**).

7. Gap any spoil banks north of I-10 in the area of Tennessee Williams (**Medium priority**).

8. Preserve existing wetlands by acquiring land in fee title that is enclosed within the levee (**Low priority**).

9. Restrict development in wetlands enclosed within the levee (**Low priority**).

The number of the proposed mitigation measure corresponds with the number on the accompanying map.

a) non-forested (e.g., pastures fallow fields, abandoned orchards, former urban areas) and non-wetlands;

b) wetland forests dominated by exotic tree species (i.e., Chinese tallow-trees) or non-forested wetlands(e.g., wet pastures), excluding marshes;

c) disturbed wetlands (e.g., hydrologically altered, artificially impounded).

Notwithstanding this protocol, the location, size and configuration of borrow sites within the landscape is also critically important. Coastal ridges, natural levee flanks and other geographic features that provide forested/wetland habitats and/or potential barriers to hurricane surges should not be utilized as borrow sources, especially where such uses would diminish the natural functions and values of those landscape features.

To assist in expediting the identification of borrow sites, the Service recommends that immediately after the initial identification of a new borrow site the Corps should initiate informal consultation with the Service regarding potential impacts to federally listed threatened or endangered species. To aid you in complying with those proactive consultation responsibilities, the Service has enclosed a list of threatened and endangered species and their critical habitats within the coastal parishes of the New Orleans District.

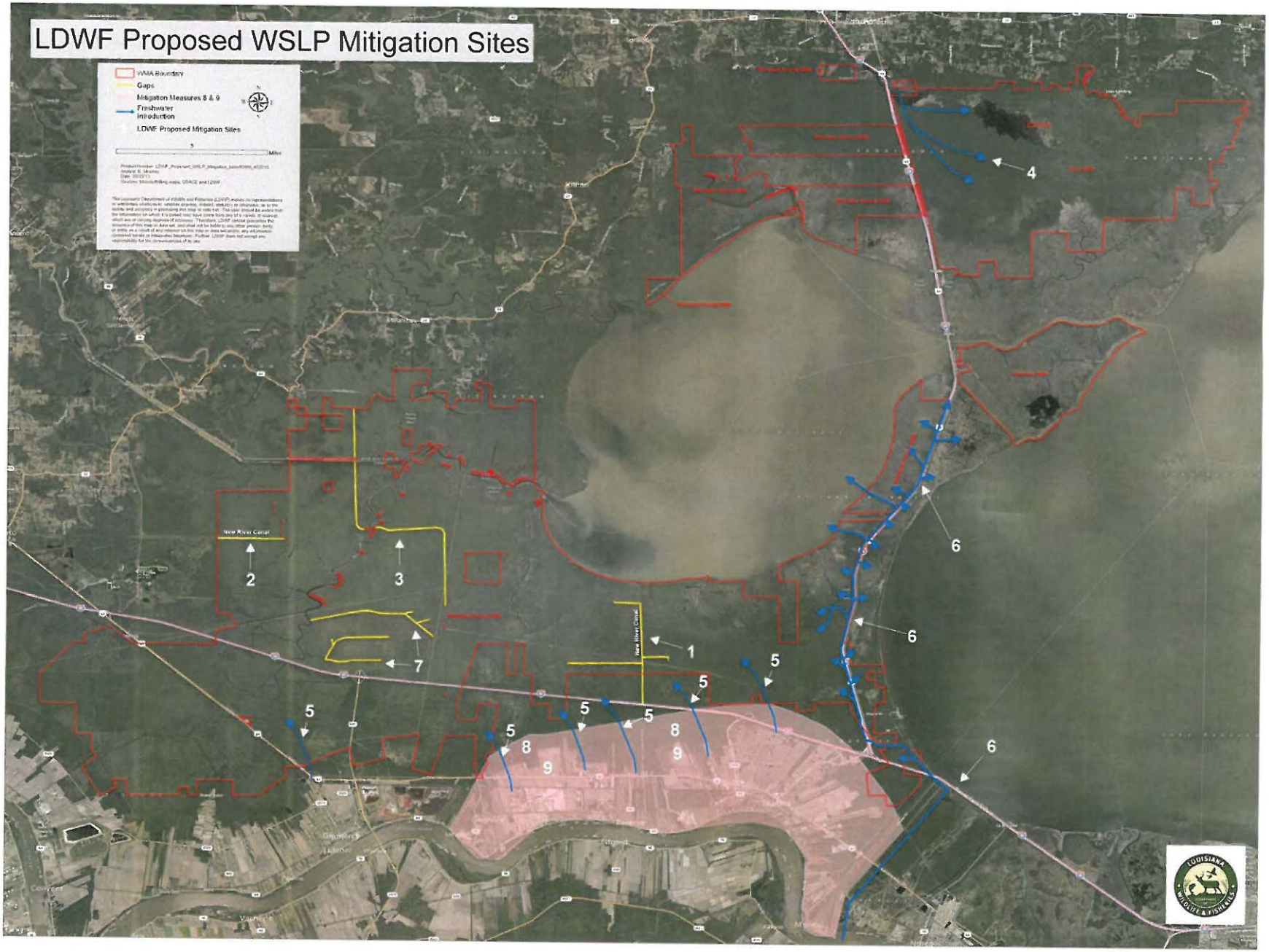
The Service offers the following additional recommendations for reducing borrow site impacts on fish and wildlife resources and, where feasible, enhancing those resources. However, these additional recommendations should not be implemented if they would result in the expansion of existing borrow pits or construction of new borrow pits in wetlands or bottomland hardwoods.

1. A minimum of 30 percent of the borrow pits edge should slope no greater than 5 horizontal (H):1 vertical (V), starting from the water line down to a depth of approximately 5 feet.

2. Most of the woody vegetation removed during clearing and grubbing should be placed into the deepest parts of the borrow pits and the remaining debris should be placed in the water along the borrow pit shorelines, excluding those areas where the 5H:1V slope, per recommendation 1, have been constructed.

3. Following construction, perimeter levees (if constructed) around each borrow pit should be gapped at 25-foot intervals with an 8-foot-wide breach, the bottom elevation of which should be level with the adjacent natural ground elevation.

When avoidance and minimization of bottomland hardwood and wetland impacts is not practicable, all unavoidable net losses of those habitats should be fully offset via compensatory mitigation. Such compensatory mitigation should sited within the watershed and/or hydrologic unit where the impact occurred, and should be completed concurrently with borrow operations, or as soon thereafter as possible.


LDWF Proposed WSLP Mitigation Sites
WMA Boundary
Gaps
Mitigation Measures 8 & 9
Freshwater Introduction
LDWF Proposed Mitigation Sites
New River Canal
1
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United States Department of the Interior

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

June 5, 2013

Mr. Richard Hartman
Branch Chief
Habitat Conservation Division
National Marine Fisheries Service
c/o Louisiana State University
Baton Rouge, Louisiana 70803-7535

Dear Mr. Hartman:

Attached is the Draft Fish and Wildlife Coordination Act Report on the "West Shore, Lake Pontchartrain, Louisiana, Hurricane and Storm Damage Risk Reduction Feasibility Study." This report does not constitute the 2(b) report of the Fish and Wildlife Service (Service). The Service will incorporate your agency's comments into the final report prior to its submission to the U.S. Army Corps of Engineers. Should your staff have any questions regarding this report, please have them contact Catherine Breaux (504/862-2689) of this office.

Sincerely,

Jeffrey D. Weller
Supervisor
Louisiana Ecological Services Office

United States Department of the Interior

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

June 5, 2013

Robert Barham
Secretary
Louisiana Department of Wildlife and Fisheries
Post Office Box 98000
Baton Rouge, Louisiana 70898-9000

Dear Mr. Barham:

Attached is the Draft Fish and Wildlife Coordination Act Report on the "West Shore, Lake Pontchartrain, Louisiana, Hurricane and Storm Damage Risk Reduction Feasibility Study." This report does not constitute the 2(b) report of the Fish and Wildlife Service (Service). The Service will incorporate your agency's comments into the final report prior to its submission to the U.S. Army Corps of Engineers. Should your staff have any questions regarding this report, please have them contact Catherine Breaux (504/862-2689) of this office.

Sincerely,

Jeffrey D. Weller
Supervisor
Louisiana Ecological Services Office

# WEST SHORE LAKE PONTCHARTRAIN
# HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY
# INTEGRATED DRAFT FEASIBILITY REPORT
# AND
# ENVIRONMENTAL IMPACT STATEMENT

## APPENDIX A
## Annex H

**U.S. Fish and Wildlife Service Scoping / Planning Aid Letter**

United States Department of the Interior

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

January 9, 2009

Colonel Alvin B. Lee
District Engineer
Attention: Mr. Bill Klein, CEMVN-PM-RS
U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel Lee:

The U.S. Fish and Wildlife Service (Service) has reviewed the Department of the Army, Corps of Engineers (Corps), Notice of Intent (NOI) to prepare a Draft Environmental Impact Statement (DEIS) for the West Shore, Lake Pontchartrain, Louisiana, Hurricane and Storm Damage Risk Reduction Feasibility Study. The NOI was published in the Federal Register (Volume 73, No. 235, pg. 74150) on December 5, 2008 (Department of Interior No. ER86/1259). The study was authorized by resolutions adopted by the House Committee on Public Works on July 29, 1971, and the Senate Committee on Public Works September 20, 1974. The Fish and Wildlife Service has prepared three Planning-aid Reports dated January 21, 1985, June 30, 1987, and April 3, 1997, for previous reconnaissance studies on this proposed project. The Service submits the following comments in accordance with the National Environmental Policy Act of 1969 (83 Stat. 852, as amended; 42 U.S.C. 4321 et seq.), the Migratory Bird Treaty Act (MBTA, 40 Stat. 755, as amended; 16 U.S.C. 703 et seq.), the Bald and Golden Eagle Protection Act (BGEPA) (54 Stat. 250, as amended, 16 U.S.C. 668a-d), the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.), and the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

The Corps is conducting a study to determine the feasibility of providing Federal hurricane protection to the western shore of Lake Pontchartrain. Four preliminary levee alignments have been identified through previous reconnaissance and feasibility studies. Generally, those alignments extend from the west guide levee of the Bonnet Carré Spillway to the vicinity of Hope Canal north of Garyville in St. John the Baptist Parish, with one alternative alignment extending into Ascension Parish to tie into an existing non-federal levee. The study area is bounded by the Bonnet Carré Spillway to the east, the Mississippi River to the south, Lakes Pontchartrain and Maurepas to the north, and St. James Parish/Ascension Parish line to the west.

## DESCRIPTION OF FISH AND WILDLIFE RESOURCE CONDTIONS

## DESCRIPTION OF FISH AND WILDLIFE RESOURCE CONDTIONS

The dominant forested habitat types in the study area are bottomland hardwoods and swamp. Vegetation commonly found in these wetland areas includes sugarberry, red maple, sweetgum, American elm, black willow, green ash, overcup oak, Nuttall oak, and American sycamore in the bottomland hardwood habitat and baldcypress, tupelogum, blackgum, lizard's tail, swamp lily, buttonbush, swamp privet, and duckweeds in the swamp habitat. Scattered portions of upland hardwoods, scrub/shrub uplands, and scrub/shrub wetlands also are found along and within the developed areas. Except for Lake Pontchartrain, Lake Maurepas, and the Mississippi River, which border the study area, most of the open water within the study area consists mainly of tidal streams, canals, and ditches. The shallower open water areas may support submerged and/or floating aquatic vegetation such as coontail, pondweeds, naiads, fanwort, water hyacinth, pondweeds, American lotus, and widgeongrass.

Development for residential, commercial, and industrial purposes is located immediately adjacent to U.S. 61 and along the Mississippi River levee. Agriculture, primarily sugarcane production, is also extensive within that portion of the study area. Residential and commercial development is also becoming extensive between U.S. 61 and I-10, as wetlands are drained and/or filled to accommodate growth.

The fresh and low-salinity water of the study area supports many commercially and recreationally important fishes and shellfishes such as largemouth bass, black crappie, sunfishes, catfishes, freshwater drum, buffalos, and gars. The low-salinity waters and wetlands of the study area also provide habitat for many species of estuarine-dependent fishes and shellfishes including southern flounder, sand seatrout, spotted seatrout, Atlantic croaker, striped mullet, Gulf menhaden, blue crab, and white shrimp. Decaying plant material (detritus) is carried by surface runoff and tidal action from the study area wetlands into the adjacent estuarine waters, substantially contributing to the detritus-based food web that supports a high level of estuarine-dependent finfish and shellfish productivity.

The coastal marshes and forested wetlands of the Lake Pontchartrain Basin have been identified by the North American Waterfowl Management Plan (NAWMP), Gulf Coast Joint Venture (GCLV): Mississippi River Coastal Wetlands Initiative as a key waterfowl wintering area. The Gulf Coast is the terminus of the Central and Mississippi Flyways and is therefore one of the most important waterfowl areas in North America, providing both wintering and migration habitat for significant numbers of the continental duck and goose populations that use both flyways. The Mississippi River Coastal Wetlands Initiative area is dominated by coastal marsh, forested swamps, and seasonally flooded bottomland hardwoods that provide habitat for several species of wintering waterfowl. Wood ducks are the primary waterfowl species in these forested wetlands, while other ducks (e.g., mallard, American widgeon, gadwall, and lesser scaup) use these habitats to a lesser degree. One strategy to achieving the goals and objectives of the GCJV is to maintain the existing functions and values of those habitats and prevent additional losses and degradation of those wetlands (Wilson 2002). Numerous other game birds are present in or adjacent to the study area, including American coot, rails, gallinules, wood duck, common snipe, and American woodcock. Non-game bird species also utilize the study area marshes, including

least bittern, pied-billed grebe, black-necked stilt, American avocet, killdeer, black-bellied plover, willet, and various species of sandpipers, gulls, and terns. The study area supports many resident and transient hawks and owls including red-shouldered hawk, barn owl, common screech owl, great horned owl, and barred owl. Winter residents include red-tailed hawk, northern harrier, and American kestrel, while the Mississippi kite, swallow-tailed kite and broad-winged hawk are common summer residents. In addition, the project area supports many species of resident and migratory passerine birds. Some neo-tropical migrants that are currently experiencing a population decline (e.g., white-eyed vireo, northern parula) are dependent on large forested acreage to successfully reproduce. Also, present are cuckoos, swifts, hummingbirds, nighthawks, woodpeckers, and the belted kingfisher.

Important game mammals occurring in the project area include white-tailed deer, eastern cottontail, swamp rabbit, gray squirrel, and fox squirrel. Commercially important furbearers include muskrat, nutria, river otter, raccoon, and mink. Other mammals expected include various species of insectivores, bats, rodents, and the nine-banded armadillo.

Numerous amphibians are expected to occur on stream and lake edges, ponds, and in forested wetlands of the study area including lesser siren, three-toed amphiuma, Gulf Coast toad, eastern narrow-mouthed toad, spring peeper, green treefrog, cricket frog, and bullfrog. Commercially important reptiles found in the streams, canals, and open water areas include American alligator, snapping turtle, alligator snapping turtle, smooth softshell turtle, spring softshell turtle, and diamondback terrapin. Other reptiles commonly found in the project area include red-eared turtle, painted turtle, Mississippi mud turtle, stinkpot, green anole, broad-headed skink, various water snakes, western ribbon snake, speckled kingsnake, and the western cottonmouth.

Threatened and Endangered Species

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 Suwannee 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. While sturgeon have been documented in study area waterways, those waterways are not designated critical habitat.

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. Should the proposed project involve activity in the aquatic environment in those areas during summer months, further consultation with this office will be necessary.

Other Federal Trust Species

The project-area forested wetlands may provide nesting habitat for the bald eagle (*Haliaeetus leucocephalus*), which was officially removed from the List of Endangered and Threatened Species on August 8, 2007. 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. Areas with high numbers of nests include the Lake Verret Basin south to Houma, the marsh/ridge complex south of Houma to Bayou Vista, the north shore of Lake Pontchartrain, and the Lake Salvador area. Eagles also winter, and infrequently nest, in mature pine trees near large lakes in central and northern Louisiana. Major threats to this species include habitat alteration, human disturbance, and environmental contaminants (i.e., organochlorine pesticides and lead).

Breeding bald eagles occupy "territories" that they will typically defend against intrusion by other eagles, and that they likely return to each year. A territory may include one or more alternate nests that are built and maintained by the eagles, but which may not be used for nesting in a given year. Potential nest trees within a nesting territory may, therefore, provide important alternative bald eagle nest sites. Shoreline trees or snags located near large waterbodies provide the visibility and accessibility needed to locate aquatic prey. Bald eagles are vulnerable to disturbance during courtship, nest building, egg laying, incubation, and brooding. Disturbance during this critical period may lead to nest abandonment, cracked and chilled eggs, and exposure of small young to the elements. Human activity near a nest late in the nesting cycle may also cause flightless birds to jump from the nest tree, thus reducing their chance of survival.

Although the bald eagle has been removed from the List of Endangered and Threatened Species, it continues to be protected under the MBTA and the BGEPA. The Service developed the National Bald Eagle Management (NBEM) Guidelines to provide landowners, land managers, and others with information and recommendations 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/southeast/es/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. If a bald eagle nest is discovered within or adjacent to the proposed project area, then an evaluation must be performed to determine whether the project is likely to disturb nesting bald eagles. That evaluation may be conducted on-line 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. 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 this office.

The proposed study area is known to support colonial nesting waterbirds. Colonies may be present that are not currently listed in the database maintained by the Louisiana Department of Wildlife and Fisheries (LDWF). 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 site for the presence of undocumented nesting colonies during the nesting season. To minimize disturbance to colonies containing nesting wading birds (i.e., herons, egrets, night-herons, ibis, and roseate spoonbills), anhingas, and/or cormorants, all activity occurring within 1,000 feet of a rookery should be restricted to the non-nesting period (i.e., September 1 through February 15, exact dates may vary within this window depending on species present). In addition, we recommend that on-site contract personnel be informed of the need to identify colonial nesting birds and their nests, and should avoid affecting them during the breeding season.

Management Areas

As you are aware, the Maurepas Swamp Wildlife Management Area (WMA) is located within the study area. Please contact the LDWF, Region 7 Office (225/765-2360), for further information regarding any additional permits that may be required to perform work on that WMA.

In addition, two federally approved wetland mitigation banks are located within the study area including the Sawgrass Bayou Mitigation Area owned by Blind River Properties (Mr. Dale Martin, 225/698-2700), and Lake Maurepas Mitigation Area owned by Stream Properties, LLC (Mr. Jeff Peterson, 337/433-1055, ext. 20). If the proposed project entails work within or adjacent to those bank sites, or if an alternative could potentially alter the hydrology of those sites, then the bank sponsors should be contacted.

## POTENTIAL SIGNIFICANT IMPACTS

Depending on the alignment, construction of a flood protection levee has the potential to result in the direct loss and enclosure of valuable swamp and bottomland hardwood habitats. Developmental pressures on enclosed forested wetlands would likely increase with levee construction due to the reduced threat of flooding in the area. Reduced water exchange in the enclosed wetlands would lead to further water quality deterioration in the Lake Pontchartrain Basin by eliminating or reducing the filtering capacity of those wetlands. Wetland habitat losses would reduce populations of resident fish and wildlife, reduce important wintering habitat for waterfowl and other migratory birds, and reduce nursery habitat and detritus input important to the maintenance of estuarine-dependent fish and shellfish production.

## PROBLEMS, OPPORTUNITIES, AND PLANNING OBJECTIVES

The most significant fish and wildlife related problem in the study area and throughout coastal Louisiana is the rapid loss of valuable wetland habitat. Between 1956 and 1978, baldcypress-tupelogum swamp within the Lake Pontchartrain Basin declined by 43,596 acres and total marsh declined by 79,232 acres (Bahr et al. 1983). During that same period, estuarine open water increased by more than 140,300 acres. This transition from vegetated wetlands to open water is believed to be associated with navigation and flood control projects, oil and gas exploration and extraction activities, shoreline erosion, subsidence, and saltwater intrusion. Between 1978 and 1988, over 23,000 acres of swamp between Lake Pontchartrain and Lake Maurepas were converted to marsh, due to the above factors. Land loss in those swamps in the next 20 years should reach approximately 1,200 acres. Approximately, 3,500 acres of marsh and nearly 6,300 acres of swamp are projected to be lost by the year 2045 (Louisiana Coastal Wetlands Conservation and Restoration Task Force 1993).

As a part of the 2004, Louisiana Coastal Area Ecosystem Restoration Study (LCA Plan) several near-term restoration projects have been identified for this hydrologic basin including the Blind River Diversion project and Hope Canal diversion project, which is also being evaluated under the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA) program. The goals of those restoration projects along with the coastal flood protection goals of the proposed study are interrelated and necessitate an integrated solution. Those projects should be designed in collaboration with one another to ensure that a system-wide solution for coastal flood protection and restoration for the Lake Pontchartrain basin is achieved.

Deteriorating water quality in the Lake Pontchartrain Basin is at least partially correlated to the loss of that basin's wetlands; hence, a reduction in the waste assimilation capacity of the area is another problem adversely affecting fish and wildlife in the study area. According to Schurtz et al. (1984), factors adversely affecting water quality in Lake Pontchartrain are those related to urban development and urban pollution, altered land use patterns, and hydrologic modifications within the lake's watershed.

Water quality deterioration may be minimized by preserving remaining wetlands via limiting

urban expansion and associated pollution discharges into wetlands. To that end, in order to discourage further wetland loss, the proposed hurricane protection levee should be at or as close to the wetland/non-wetland interface as possible. Should some wetlands be unavoidably enclosed within the levee, the integrity of present hydrologic regimes should be maintained via installation of water control structures in the levee to ensure adequate water circulation. Preservation of enclosed wetlands could be ensured via the purchase of non-development easements or local flood zoning ordinances. Furthermore, any pumping stations associated with the project should not discharge directly into canals or other open water bodies, but rather into wetland systems that can assimilate those nutrients being discharged.

The Corps is currently planning and implementing the construction of hurricane and flood protection projects to their newly-authorized protection levels for the Greater New Orleans area. It is currently estimated that approximately 75 million cubic yards of material would be needed to achieve the authorized level of protection for that project. The combined need for borrow necessary to complete authorized flood protection improvements and construction of proposed Federal and non-Federal hurricane and flood protection levees may exceed local availability. The searches for levee-building material has been conducted on a project-by-project basis, and has led to the least-expensive and easiest sources for borrow material, which are usually located within wetlands and/or bottomland hardwoods adjacent to the proposed levee. Use of such on-site sources often has adverse impacts on wetlands and is frequently inconsistent with coastal restoration efforts. Use of those sites will be counterproductive with respect to minimizing wetland impacts and attaining the goal of increasing non-structural hurricane protection within a sustainable ecosystem.

In order to address the above problems and opportunities, the Service recommends that the following planning objectives and constraints be included in any further planning of hurricane protection features for the study area:

1. Preserve and/or minimize impacts to wetlands and bottomland hardwoods in the study area.

2. The Service's priority selection process for borrow material outlined in our August 7, 2006, letter to the Corps regarding the Greater New Orleans Hurricane and Storm Damage Risk Reduction project (enclosed) should be utilized. In addition, the Service provided, via a September 9, 2008, letter, a map identifying potential borrow areas that are likely to have minimal impacts to fish and wildlife resources. Areas identified on that map should be investigated first as potential borrow sources.

3. Coordinate with the planning objectives and planning team of the LCA Plan near-term restoration projects identified for the Lake Pontchartrain Basin, particularly the Hope Canal Diversion project.

4. Avoid impacts to threatened and endangered species and their habitat.

## FISH AND WILDLIFE CONSERVATION MEASURES

Implementation of the proposed levee could potentially have significant direct impacts on fish and wildlife resources. Of equal concern is the potential for loss, via future development, of fish and wildlife habitat enclosed by the levee. The Service believes that project plans can be designed to mitigate those negative impacts.

The President's Council on Environmental Quality defined the term "mitigation" in the National Environmental Policy Act regulations to include: (a) avoiding the impact altogether by not taking a certain action or parts of an action; (b) minimizing impacts by limiting the degree or magnitude of the action and its implementation; (c) rectifying the impact by repairing, rehabilitating, or restoring the affected environment; (d) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and (e) compensating for the impact by replacing or providing substitute resources or environments.

The Service's Mitigation Policy (Federal Register Volume 46, No. 15, January 23, 1981) supports and adopts this definition of mitigation and considers its specific elements to represent the desirable sequence of steps in the mitigation planning process. That policy identifies four resource categories that are used to insure that the level of mitigation recommended by Service biologists will be consistent with the fish and wildlife resource values involved.

Considering the high value for fish and wildlife and the relative scarcity of the forested wetlands potentially impacted by the proposed levee, those wetlands have been designated Resource Category 2 habitats. The mitigation goal for habitats in this resource category is no net loss of in-kind habitat value. This goal could best be achieved via loss avoidance; in this case, realigning the levee such that forested wetlands lost to levee construction would be minimized and forested wetlands would not be enclosed within the levee.

If the enclosure of wetlands within the proposed levee is necessary to provide for floodwater storage, mechanisms for protecting enclosed wetlands and for compensating habitat value losses associated with levee construction would have to be developed. Preservation of enclosed wetlands might be accomplished by installing water control structures in the levee that could be properly operated to ensure adequate water exchange. Further, protection of the enclosed wetlands from future development (thus preserving floodwater storage areas) could be ensured via purchase of non-development easements. Compensation for wetland habitat value losses associated with levee construction would likely involve acquisition and management of another similar wetland area. Detailed mitigation needs will be determined in the feasibility stage.

1. Mitigate impacts to wetlands and bottomland hardwoods by:

    A. Incorporating hurricane protection features (e.g., floodwalls, etc.) that would minimize impacts to fish and wildlife habitat;

    B. Requiring that hurricane protection levees follow, as closely as possible, the wetland/non-wetland interface and limiting hurricane protection to existing

urban developments;

C. Requiring that borrow needed for levee construction be taken from non-forested, non-wetland areas [the Service's priority selection process for borrow material should be utilized, and areas identified on the Service's potential borrow map should be investigated (enclosures)];

D. Installing an adequate number of water-control structures in hurricane protection levees that enclose wetlands to maintain normal water exchange and preclude drainage (such structures should be closed only in advance of tropical storms);

E. Acquiring non-development easements on enclosed wetlands to ensure their continued use as floodwater storage areas and to preclude any secondary development;

F. Incorporating water quality improvements by routing urban runoff through enclosed wetlands and discharging any pumped water into floodside wetlands;

F. Ensuring adequate internal drainage exists within the leveed area to prevent levees from compounding existing flooding problems, thus leading to future flood control projects with a resulting loss of wetlands and fish and wildlife resources; and,

G. Implementing measures to compensate for unavoidable losses of wetland habitat values.

2. Avoid impacts to endangered or threatened species and their habitats.

3. Avoid impacts to active wading bird rookeries. Avoid construction activities within 1,500 feet of any active wading bird rookery during the nesting season.

## UPCOMING FISH AND WILDLIFE ACTIVITIES

The following data will be needed to enable the Service to conduct a detailed analysis of project impacts on fish and wildlife resources and to formulate measures to mitigate any losses to those resources.

1. Identification of any new alternatives to be considered, including detailed project plans (e.g., a written description and map) for those alternatives.

2. An estimate of current, future-with and future-without-project development rates within the project area(s), presented in 10-year intervals, to be impacted by alternatives being considered.

3. Identification of habitats, by type and acreage, to be impacted by various

alternatives being considered. That data should also be presented in 10-year intervals.

We look forward to assisting the Corps in the documentation of existing conditions, development of alternatives, and assessment of effects of project alternatives on Federal trust resources during the subsequent feasibility study. Should you have any questions regarding our comments, please contact Angela Trahan (337/291-3137) of this office.

Sincerely,

James F. Boggs
Supervisor
Louisiana Field Office

Enclosures

cc: DOI, OEPC, Washington, D.C. (Attn.: Loretta Sutton)
DOI, OEPC, Albuquerque, NM (Attn.: Steven Spencer)
FWS, BAP & HC (ERT), Arlington, VA (Attn.: Stefanie Stavrakas)
FWS, Atlanta, GA (Attn.: Richard Warner)
EPA, Dallas, TX
NMFS, Baton Rouge, LA
LDWF, Region 7 Office, Baton Rouge, LA
LDWF, Baton Rouge, LA (Attn.: Heather Finley)
LDWF, Natural Heritage Program, Baton Rouge, LA

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Bahr, L.M., Jr. R. Costanza, J.W. Day, S.E. Bayley, C. Neill, S.G. Leibowitz, and J. Fruci. 1983. Ecological characterization of the Mississippi Deltaic Plain Region: a narrative with management recommendations. U.S. Fish and Wildlife Service, Division of Biological Services, Washington, D.C. FWS/OBS-82/69. 189 pp.

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# United States Department of the Interior

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

October 9, 2012

Colonel Edward R. Fleming
District Commander
U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel Fleming:

The Fish and Wildlife Service (Service) is submitting this Planning-aid Letter (PAL) based upon recent information provided by the U.S. Army Corps of Engineers' (Corps) Project Delivery Team (PDT) for the West Shore, Lake Pontchartrain, Louisiana, Hurricane and Storm Damage Risk Reduction Feasibility Study (WSLP) in Ascension, St. Charles, St. James, and St. John the Baptist Parishes, Louisiana. The Service is aware that the Corps plans to choose a Tentatively Selected Plan (TSP) by the end of 2012, and we submit the following recommendations for consideration in that project development decision in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). This PAL does not constitute the report of the Secretary of the Interior as required by Section 2(b) of the Fish and Wildlife Coordination Act.

The Corps is conducting a study to determine the feasibility of providing Federal hurricane protection to the western shore of Lake Pontchartrain. The study area is bounded by the Bonnet Carré Spillway to the east, the Mississippi River to the south, Lakes Pontchartrain and Maurepas to the north, and St. James Parish/Ascension Parish line to the west. The communities in this area include Laplace, Reserve, Gramercy, Lutcher, Garyville, Riverland Heights, and Carrollwood. The Louisiana Department of Wildlife and Fisheries manages the Maurepas Wildlife Management Area (WMA), which consists of a majority of the swampland within the project area.

According to an August 2012 map provided by the PDT, there are three preliminary levee alignments which have been identified through previous reconnaissance and feasibility studies that are being considered for the TSP (Figure 1). Generally, those alignments extend from the west guide levee of the Bonnet Carré Spillway to the vicinity of Hope Canal north of Garyville in St. John the Baptist Parish. Alignment A generally follows the wetland/non-wetland interface from LaPlace to Hope Canal. Alignment C generally follows en existing pipeline corridor north of Alignment A. Alignments A and C both tie into the Mississippi River levee. Alignment D generally follows the Interstate Highway 10 (I-10) corridor and extends outside the original project study area into Ascension Parish to tie into an existing non-federal levee.

For descriptions of fish and wildlife resource conditions, threatened and endangered species, other species of management concern, and existing management areas within the project study area, please reference the Service's January 9, 2009, letter (enclosed) in response to the Corps' Notice of Intent to prepare a Draft Environmental Impact Statement. Those descriptions and concerns have not changed since our 2009 letter. Please note that the Service will provide guidelines for in-water work in areas that potentially support the endangered West Indian manatee (*Trichechus manatus*) to avoid and minimize impacts to that species during project construction. Also, on September 11, 2009, the Service published two federal regulations establishing the authority to issue permits for non-purposeful bald eagle take (typically disturbance) and eagle nest take when recommendations of the National Bald Eagle Management Guidelines (http://www.fws.gov/southeast/es/baldeagle/NationalBaldEagleManagementGuidelines.pdf) cannot be achieved. Should you need further assistance interpreting the guidelines, avoidance measures, or performing an on-line project evaluation to determine whether application for a permit is necessary, please contact this office.

Depending on the alignment, construction of a flood protection levee has the potential to result in the direct loss and enclosure of valuable swamp and bottomland hardwood habitats. Developmental pressures on enclosed forested wetlands would likely increase with levee construction due to the reduced threat of flooding in the area. Reduced water exchange in the enclosed wetlands would lead to further water quality deterioration in the Lake Pontchartrain Basin by eliminating or reducing the filtering capacity of those wetlands. Wetland habitat losses would reduce populations of resident fish and wildlife, reduce important wintering habitat for waterfowl and other migratory birds, and reduce nursery habitat and detritus input important to the maintenance of estuarine-dependent fish and shellfish production.

The Service recommends implementation of Alignment A because it discourages wetland loss by enclosing the least amount of wetlands, involves the least amount of direct wetland impacts due to construction, and has the least impact to the Maurepas WMA (Table 1). If implementation of Alignment A is determined to be infeasible, then the Service would support Alignment C because it is the next least-damaging alternative to Alignment A (Table 1). The Service discourages selection of Alignment D because of the amount and quality of forested wetlands that would be enclosed, the amount of direct impacts to high quality forested wetlands that would be affected during construction, the alteration of the present hydrologic regime over a much larger area of high quality fish and wildlife habitat, the enclosure of the southern portion of the Maurepas WMA (Table 1, Figure 2), and the impacts to two proposed coastal restoration projects (i.e., the Convent to Blind River Diversion and the Hope Canal Freshwater Reintroduction).

The Service is aware that Alignments A and C do not provide protection to the entrance and exit ramps to I-10 at its intersections with United States Highway 61 (Hwy 61) and Louisiana State Highway 641 (Hwy 641), which undergo flooding during excessive rainfall events as well as during major storm events. Those alignments would also not provide flood protection to structures within St. James Parish, which are included within the study area and for which that Parish would like flood protection. In order to provide maximum consideration to the conservation of fish and wildlife habitats, as well as to address the goals of the proposed study, the Service recommends that the Corps consider installing localized ring levees at I-10 and its intersections with Hwy 61 and Hwy 641 to eliminate flooding and to maintain evacuation and emergency vehicle routes between

Baton Rouge and New Orleans. We also recommend extending Alignment C along either: (1a) the wetland/non-wetland interface up to Louisiana State Highway 3125 (Hwy 3125) west of Grand Point; or (1b) Hwy 61 to its intersection with I-10. The Service proposes Alignments C-1a and C-1b (Table 1, Figure 2), along with the localized ring levees, as possible alternatives to Alignment D. Those additional alternatives would allow for reducing and minimizing impacts to fish and wildlife resources while providing flood protection for structures within St. James Parish as well as the major highway intersections that allow ingress and egress to the affected areas and maintain evacuation and emergency routes between Baton Rouge and New Orleans. The Service is willing to work with the Corps on a finalized alternative alignment.

Table 1. Proposed alignments and the Service's recommended alignment revisions for consideration as alternatives to Alignment D.

| ALIGNMENT | LENGTH* | ENCLOSED WETLANDS* | IMPACTS, ISSUES, and PROTECTION |
|---|---|---|---|
| Alignment A | 19 miles | 5 square miles | • Least damaging alternative<br>• Encloses minimal amount of wetlands<br>• Least impacts to Maurepas WMA<br>• No impacts to Convent/Blind River Diversion<br>• Impacts to Hope Canal Diversion need to be addressed<br>• Provides protection for Montz, Laplace, Reserve, Garyville |
| Alignment C | 19 miles | 16 square miles | • Second least damaging alternative<br>• Encloses additional wetlands<br>• Small impacts to Maurepas WMA<br>• No impacts to Convent/Blind River Diversion<br>• Impacts to Hope Canal Diversion need to be addressed<br>• Provides protection for Montz, Laplace, Reserve, Garyville |
| Alignment C-1a | 29 miles | 20.5 square miles | • Encloses additional wetlands<br>• Few impacts to Maurepas WMA<br>• No impacts to Convent/Blind River Diversion<br>• Impacts to Hope Canal Diversion need to be addressed<br>• Provides protection for Montz, Laplace, Reserve, Garyville, Gramercy, Lutcher, Grand Point |
| Alignment C-1b | 28 miles | 61 square miles | • Encloses extensive wetland areas<br>• Impacts the southwestern portion of Maurepas WMA<br>• Impacts to Hope Canal Diversion need to be addressed<br>• Impacts to Convent/Blind River Diversion need to be addressed<br>• Provides protection for Montz, Laplace, Reserve, Garyville, Gramercy, Lutcher, Grand Point, Convent, Romeville |
| Alignment D | 27 miles | 79 square miles | • Encloses greatest amount of wetlands<br>• Impacts southern portion of Maurepas WMA<br>• Impacts to Hope Canal Diversion need to be addressed<br>• Impacts to Convent/Blind River Diversion need to be addressed<br>• Provides protection for Montz, Laplace, Reserve, Garyville, Gramercy, Lutcher, Grand Point, Convent, Romeville |

* Unrefined estimates using ArcMap® and Corps' estimates from their Feasibility Scoping Meeting information.

Regardless of which alignment the Corps chooses as the TSP, the Service recommends that (1) the integrity of present hydrologic regimes be maintained via installation of water control structures in the levee to ensure adequate water circulation, and (2) preservation of enclosed wetlands be ensured in perpetuity via the purchase of non-development easements and/or local flood zoning ordinances. Providing perpetual preservation of enclosed wetlands would also provide for flood storage areas within the levee system during excessive rainfall events. The Service also recommends that any pumping stations associated with the project should not discharge directly into canals or other open water bodies, but rather into wetland systems that can assimilate those nutrients being discharged.

The Corps has almost completed full implementation of the newly-authorized protection levels for hurricane and flood protection projects in the Greater New Orleans area. The combined need for borrow necessary to complete authorized flood protection improvements and construction of other proposed and implemented Federal and non-Federal hurricane and flood protection levees may have diminished local availability. The searches for levee-building material have been conducted on a project-by-project basis, and have led to the least-expensive and easiest sources for borrow material, which are usually located within wetlands and/or bottomland hardwoods adjacent to the proposed levee. Use of such on-site sources often has adverse impacts on wetlands and is frequently inconsistent with coastal restoration efforts. Use of those sites will be counterproductive with respect to minimizing wetland impacts and attaining the goal of increasing non-structural hurricane protection within a sustainable ecosystem. The Service's priority selection process for borrow material outlined in our August 7, 2006, letter to the Corps regarding the Greater New Orleans Hurricane and Storm Damage Risk Reduction project (enclosed) should be utilized. In addition, the Service provided, via a September 9, 2008, letter, a map (enclosed) identifying potential borrow areas that are likely to have minimal impacts to fish and wildlife resources. Areas identified on that map should be investigated first as potential borrow sources. The Service will provide an updated map that is more specific to the subject study area.

We appreciate the Corps' consideration of our recommendations for further development of a TSP for the proposed project. Should you or your staff have any questions, or if you would like to meet with us regarding the content of this letter, please contact Ms. Brigette Firmin (337/291-3108) of this office.

Sincerely,

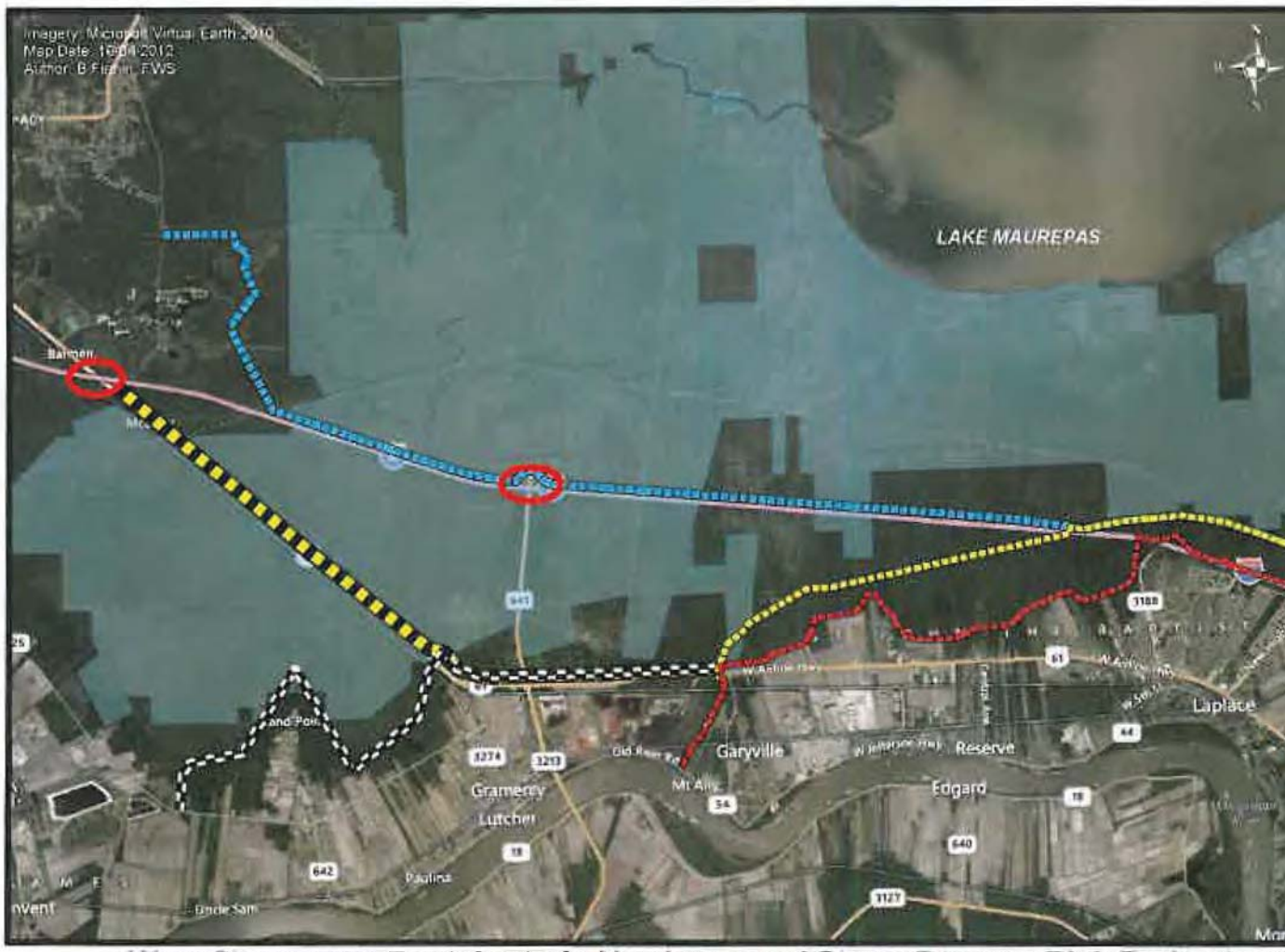
Jeffrey D. Weller
Supervisor
Louisiana Ecological Services Office

Enclosures

cc: EPA, Dallas, TX
LDWF, Baton Rouge, LA
CPRA, Baton Rouge, LA
LDNR, Coastal Management Division, Baton Rouge, LA

Figure 1. Currently proposed alignments for the West Shore Lake Pontchartrain Hurricane and Storm Damage R

Figure 2. Proposed revised alignments for the West Shore Lake Pontchartrain Hurricane and Storm Damage Ris



# United States Department of the Interior

FISH AND WILDLIFE SERVICE
646 Cajundome Blvd.
Suite 400
Lafayette, Louisiana 70506
August 7, 2006

Colonel Richard P. Wagenaar
District Commander
U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel Wagenaar:

As you know, the U.S. Fish and Wildlife Service (Service) is assisting the U.S. Army Corps of Engineers (Corps) in assessing impacts of, and mitigation requirements for, borrow sites which are needed to complete authorized improvements, and to construct Federal and non-Federal hurricane/flood protection levees in southern Louisiana. These improvements to hurricane and flood control projects are authorized by the Emergency Supplemental Appropriations to Address Hurricanes in the Gulf of Mexico (Public Laws 109-148, PL 84-99 and PL 109 234 (4th supplemental)). This letter is provided in accordance with the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.), Fish and Wildlife Coordination Act (FWCA, 48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), and the Migratory Bird Treaty Act (40 Stat. 755, as amended; 16 U.S.C. 703 et seq.), but it does not constitute the final report of the Secretary of the Interior as required by Section 2(b) of the Fish and Wildlife Coordination Act.

Through the efforts of Task Force Guardian, the Corps has restored Hurricane Katrina-damaged hurricane/flood protection projects to their authorized or previously permitted/constructed protection levels. Identification of borrow areas needed to complete those repairs utilized a protocol that prioritized selection of those sites in the following order: existing commercial pits, upland sources, previously disturbed/manipulated wetlands within a levee system, and low-quality wetlands outside a levee system. The Service supports the use of such protocols to avoid and minimize impacts to wetlands and bottomland hardwoods within project areas. Avoidance and minimization of those impacts helps to provide consistency with restoration strategies and compliments the authorized hurricane protection efforts. Such consistency is also required by Section 303(d)(1) of the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA).

Accordingly, the Service recommends that prior to utilizing borrow sites every effort should be made to reduce impacts by using sheetpile and/or floodwalls to increase levee heights wherever feasible. In addition, the Service recommends that the following protocol be adopted and utilized to identify borrow sources in descending order of priority:

1. Permitted commercial sources, authorized borrow sources for which environmental clearance and mitigation have been completed, or non-functional levees after newly constructed adjacent levees are providing equal protection.

2. Areas under forced drainage that are protected from flooding by levees, and that are:

   a) non-forested (e.g., pastures, fallow fields, abandoned orchards, former urban areas) and non-wetlands;

   b) wetland forests dominated by exotic tree species (i.e., Chinese tallow-trees) or non-forested wetlands(e.g., wet pastures), excluding marshes;

   c) disturbed wetlands (e.g., hydrologically altered, artificially impounded).

3. Sites that are outside a forced drainage system and levees, and that are:

   a) non-forested (e.g., pastures fallow fields, abandoned orchards, former urban areas) and non-wetlands;

   b) wetland forests dominated by exotic tree species (i.e., Chinese tallow-trees) or non-forested wetlands(e.g., wet pastures), excluding marshes;

   c) disturbed wetlands (e.g., hydrologically altered, artificially impounded).

Notwithstanding this protocol, the location, size and configuration of borrow sites within the landscape is also critically important. Coastal ridges, natural levee flanks and other geographic features that provide forested/wetland habitats and/or potential barriers to hurricane surges should not be utilized as borrow sources, especially where such uses would diminish the natural functions and values of those landscape features.

To assist in expediting the identification of borrow sites, the Service recommends that immediately after the initial identification of a new borrow site the Corps should initiate informal consultation with the Service regarding potential impacts to federally listed threatened or endangered species. To aid you in complying with those proactive consultation responsibilities, the Service has enclosed a list of threatened and endangered species and their critical habitats within the coastal parishes of the New Orleans District.

The Service offers the following additional recommendations for reducing borrow site impacts on fish and wildlife resources and, where feasible, enhancing those resources. However, these additional recommendations should not be implemented if they would result in the expansion of existing borrow pits or construction of new borrow pits in wetlands or bottomland hardwoods.

1. A minimum of 30 percent of the borrow pits' edge should slope no greater than 5 horizontal (H):1 vertical (V), starting from the water line down to a depth of approximately 5 feet.

2. Most of the woody vegetation removed during clearing and grubbing should be placed into the deepest parts of the borrow pits and the remaining debris should be placed in the water along the borrow pit shorelines, excluding those areas where the 5H:1V slope, per recommendation 1, have been constructed.

3. Following construction, perimeter levees (if constructed) around each borrow pit should be gapped at 25-foot intervals with an 8-foot-wide breach, the bottom elevation of which should be level with the adjacent natural ground elevation.

When avoidance and minimization of bottomland hardwood and wetland impacts is not practicable, all unavoidable net losses of these habitats should be fully offset via compensatory mitigation. Such compensatory mitigation should sited within the watershed and/or hydrologic unit where the impact occurred, and should be completed concurrently with borrow operations, or as soon thereafter as possible.

The combined need for borrow necessary to complete authorized improvements to and construction of Federal and non-Federal hurricane/flood protection levees, and the potential construction of levees capable of withstanding a category 5 hurricane, will require substantial amounts of borrow. It is highly likely such amounts would exceed local availability. In the case of ongoing hurricane/flood protection projects (e.g., Morganza to the Gulf) the search for levee-building material has been conducted primarily on project-by-project basis. In the context of such project-by-project searches for borrow material, the least-expensive and easiest sources of borrow material are usually located within wetlands and/or bottomland hardwoods, adjacent to the proposed levee. Such on-site sources, however, often involve adverse impacts to wetlands, thus exacerbating the overall wetland loss problem in all coastal basins, especially those in the deltaic plain of southeast Louisiana. In short, while such on-site sources are relatively inexpensive, they will frequently be inconsistent with coastal restoration efforts and, to the extent that wetlands will be adversely impacted, use of those sites will be counterproductive with respect to minimizing wetland impacts and attaining the goal of increasing non-structural hurricane protection within a sustainable ecosystem.

Large-scale, off-site borrow sources could have the potential to reduce environmental impacts from levees and expedite project-by-project environmental review. Such potential "programmatic" borrow sources could include uplands along the Mississippi River, beneficial use of sediments dredged for navigation purposes (including the raising of disposal sites), the Mississippi River, and offshore deposits (e.g., Ship Shoal). As part of the planning process, we recommend that the Corps begin investigating the practicability of various large-scale, off-site borrow sources and actively involve all resource agencies with the Protection and Restoration Office's Borrow Team efforts.

Programmatic planning would be essential to identify borrow sites of acceptable quantity and quality, while avoiding and/or minimizing adverse environmental impacts. We therefore recommend that a plan be developed that integrates borrow resources, uses, and needs for various programs and activities. Guiding principles should be developed to identify borrow resources, borrow-site designs, and prioritize uses to avoid competing for resources, maximize benefits with those resources, and avoid adverse environmental impacts.

We appreciate the opportunity to provide this planning-aid letter and would be pleased to assist your agency in further identification of potential borrow sources. Should you or your staff have any questions regarding this letter, please contact David Walther (337/291-3122) of this office.

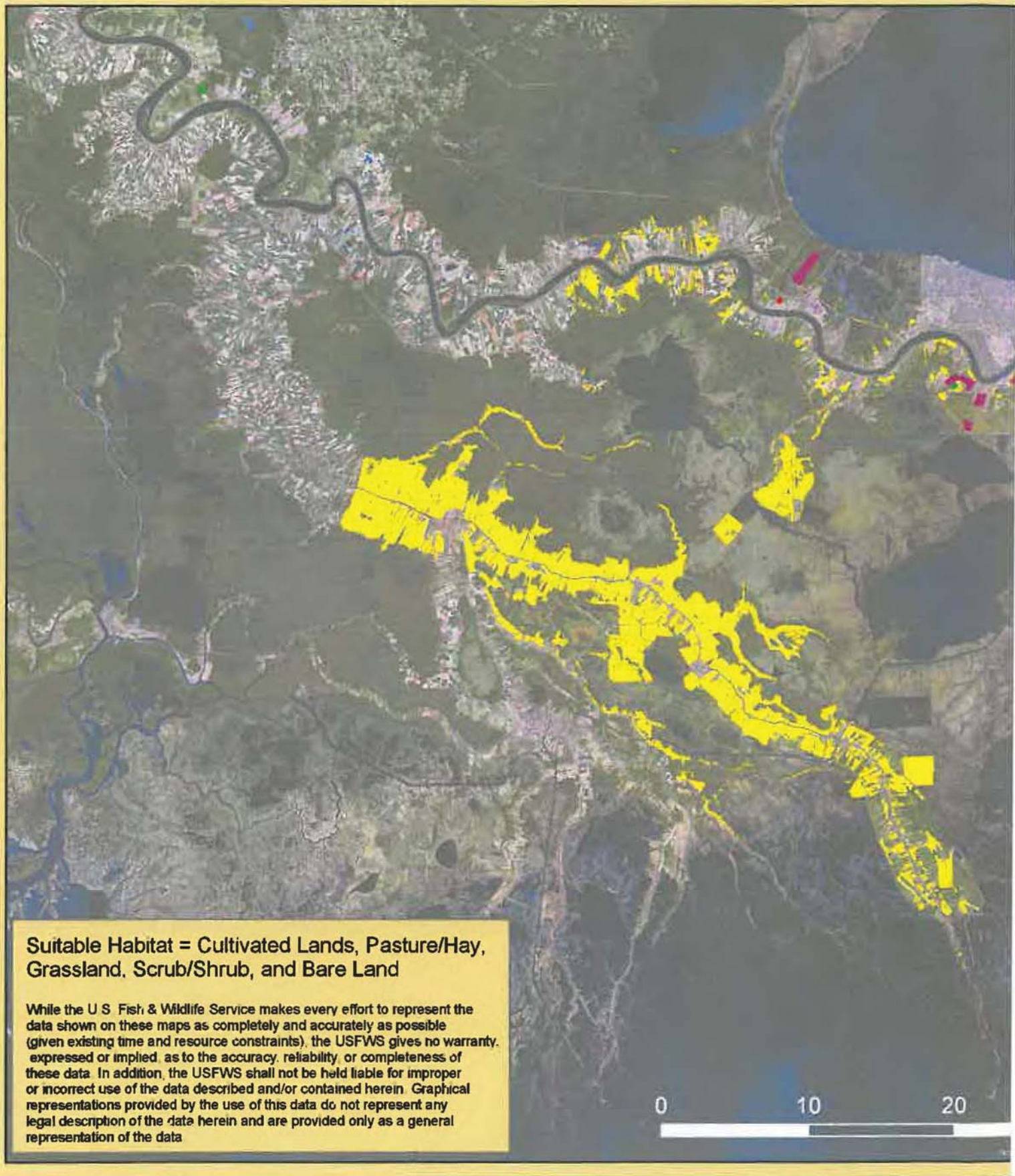
Sincerely,

Russell C. Watson
Supervisor
Louisiana Field Office

Enclosure

cc: National Marine Fisheries Service, Baton Rouge, LA
EPA, Dallas, TX
LA Dept. of Wildlife and Fisheries, Baton Rouge, LA
LA Dept. of Natural Resources, CMD, Baton Rouge, LA
LA Dept. of Natural Resources, CRD, Baton Rouge, LA

# U.S. Fish & Wildlife Service




Suitable Habitat = Cultivated Lands, Pasture/Hay, Grassland, Scrub/Shrub, and Bare Land

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## APPENDIX A
## Annex I

**Technical, Institutional and Public Significance of Relevant Resources**

**Table I-1: Significance of relevant resources located within the project area.**

| Resource | Institutionally Significant | Technically Significant | Publicly Signifi |
|---|---|---|---|
| **Soils, Water bottoms, Prime and Unique Farmlands** | Council on Environmental Quality (CEQ) memorandum dated August 11, 1980, entitled "Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing the National Environmental Policy Act (NEPA)"; Executive Order 11990 - Protection of Wetlands; Agriculture and Food Act of 1981 (Public Law 97-98) containing the Farmland Protection Policy Act (PL 97-98; 7 U.S.C. 4201 *et seq*.). | Technically significant in determining soils engineering and environmental suitability, based on their physical and chemical properties, for proposed activities. Water bottoms are technically significant because the estuarine bottom sediment characteristics (water bottoms) benthic organismal distribution and is an integral component of the benthic boundary layer. | Significant to th suitability of cor agriculture suita tank type dispos |
| **Hydrology** | NEPA of 1969; Clean Water Act of 1972; Storm damage Control Act of 1944; Coastal Barrier Resources Act of 1982; Rivers and Harbors Act of 1899; River and Harbor and Storm damage Control Act of 1970; Watershed Protection and Storm damage Prevention Act of 1954; Submerged Lands Act of 1953; Coastal Zone Management Act of 1972; Safe Drinking Water Act of 1974; Estuary Protection Act of 1968; Resource Conservation and Recovery Act of 1976; Comprehensive Environmental Response, Compensation and Liability Act of 1980; Executive Order 11988 Floodplain Management. | Civil Works water resources development projects typically impact (positively or negatively) the interrelationships and interactions between water and its environment. | Publicly signific demands clean w and protection o management. |
| **Water Quality** | Clean Water Act of 1972; Pollution Prevention Act of 1990, the Safe Drinking Water Act of 1974; Water Resources Planning Act of 1965. | Technically significant to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. | Publicly signific clean water and boating, swimm potable water. |
| **Vegetation Resources** | Coastal Barrier Resources Act of 1982; Coastal Zone Management Act of 1972; Emergency Wetlands Resources Act of 1986; Estuary Protection Act of 1968; Fish and Wildlife Conservation Act of 1980; Fish and Wildlife Coordination Act of 1958; NEPA of 1969; North American Wetlands Conservation Act of 1989; the Water Resources Development Acts of 1976, 1986, 1990, and 1992; Executive Order 13186 - Migratory Bird Habitat Protection. | Technically significant because they are a critical element of the barrier shoreline habitats. Vegetation resources serve as the basis of productivity, contribute to ecosystem diversity, provide various habitat types for fish and wildlife, and are an indicator of the health of coastal habitats. | Publicly signific that the public p recreational, and |
| **Wildlife Resources** | NEPA of 1969; Coastal Zone Management Act of 1972; Estuary Protection Act of 1968; Fish and Wildlife Coordination Act of 1958; Migratory Bird Conservation Act of 1929; Migratory Bird Treaty Act of 1918; Endangered Species Act of 1973; Fish and Wildlife Conservation Act of 1980; North American Wetlands Conservation Act of 1989; Executive Order 13186 - Migratory Bird Habitat Protection; Marine Mammal Protection Act of 1972. | Technically significant because they are a critical element of the barrier shoreline ecosystem, they are an indicator of the health of various coastal habitats, and many wildlife species are important recreation and commercial resources. | Publicly signific that the public p recreational, and |

**Table I-1: Significance of relevant resources located within the project area.**

| Resource | Institutionally Significant | Technically Significant | Publicly Signifi |
|---|---|---|---|
| **Aquatic Resources** | National Environmental Policy Act of 1969; Coastal Zone Management Act of 1972; Estuary Protection Act of 1968. | Technically significant because plankton provide a major, direct food source for animals in the water column and in the sediments; are responsible for at least 40 percent of the photosynthesis occurring on the earth; important for their role in nutrient cycling; plankton productivity is a major source of primary food-energy for most estuarine systems throughout the world; and phytoplankton production is the major source of autochthonous organic matter in most estuarine ecosystems (Day et al. 1989). | Publicly signific the lowest troph organisms impo recreational fish concern with no and brown tides large-scale bloo conditions, whic |
| **Fisheries** | Fish and Wildlife Coordination Act of 1958; Endangered Species Act of 1973; Magnuson-Stevens Fishery Conservation and Management Act of 1976; Coastal Zone Management Act of 1972; Estuary Protection Act of 1968. | Technically significant because they are a critical element of many valuable freshwater and marine habitats, they are an indicator of the health of various freshwater and marine habitats, and many fish species are important commercial resources. | Publicly signific that the public p recreational, and resources in the estuarine finfish |
| **Essential Fish Habitat** | Magnuson-Stevens Fishery Conservation and Management Act of 1976. | Technically significant because it includes those waters and substrate necessary to Federally-managed fish species for spawning, breeding, feeding or growth to maturity. | Publicly signific that the public p recreational and provides. |
| **Threatened and Endangered Species** | Endangered Species Act of 1973; Marine Mammal Protection Act of 1972; Bald Eagle Protection Act of 1940. | Technically significant because the status of such species provides an indication of the overall health of an ecosystem. | Publicly signific public to protect |
| **Cultural and Historic Resources** | National Historic Preservation Act of 1966; Abandoned Shipwreck Act of 1987; Archeological Resources Protection Act of 1979; National Environmental Policy Act of 1969. | Technically important because of their association or linkage to past events, to historically important persons, and to design and/or construction values; and for their ability to yield important information about prehistory and history. | Publicly importa and private indiv restoration, enha |
| **Recreational Resources** | Federal Water Project Recreation Act of 1965; Land and Water Conservation Fund Act of 1965. | Technically significant because of the high economic value of recreational activities and their contribution to local, state, and national economies. | Publicly signific that the public p boating, as meas fishing and hunt and the large per boat registration |
| **Air Quality** | Clean Air Act of 1963, as amended, and the Louisiana Environmental Quality Act of 1983, as amended. | Air quality is technically significant because of the status of regional ambient air quality in relation to the National Ambient Air Quality Standards (NAAQS). | Air quality is pu the desire for cle concerns expres |
| **Socioeconomic and Human Resources** | National Environmental Policy Act of 1969; Estuary Protection Act of 1968; Clean Water Act of 1972; Rivers and Harbors Act of 1899; Watershed Protection and Storm damage Protection Act of 1954. Executive Order 12898 of 1994 – Environmental Justice. | Technically significant because the social and economic welfare of the Nation may be positively or adversely impacted by the proposed action; the social and economic welfare of minority and low-income populations may be positively or disproportionately impacted by proposed actions. | Publicly signific concern for heal social well-being projects; also pu fair and equitabl |

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## Annex J

**Environmental Compliance Laws**

| Table J-1: Relevant Environmental Federal Statutory Authorities and Executive Orders. (Note: this list is not complete or exhaustive.) | |
|---|---|
| Abandoned Shipwreck Act of 1987 | Marine Mammal Protection Act of 1972 |
| American Indian Religious Freedom Act of 1978 | Marine Protected Areas (EO 13158) of 2000 |
| Anadromous Fish conservation Act of 1965 | Marine Protection, Research, and Sanctuaries Act of 1972 |
| Antiquities Act of 1906 | Migratory Bird Conservation Act of 1929 |
| Archeological Resources Protection Act of 1979 | Migratory Bird Treaty Act of 1918 |
| Archeological and Historical Preservation Act of 1974 | Migratory Bird Habitat Protection (EO 13186) of 2001 |
| Bald Eagle Protection Act of 1940 | National Environmental Policy Act of 1969 |
| Clean Air Act of 1970 | National Historic Preservation Act of 1966 |
| Clean Water Act of 1977 | Native American Graves Protection and Repatriation Act of 1990 |
| Coastal Barrier Improvement Act of 1990 | Neotropical Migratory Bird Conservation Act of 2000 |
| Coastal Barrier Resources Act of 1982 | Noise Control Act of 1972 |
| Coastal Wetlands Planning, Protection, and Restoration Act of 1990 | Nonindigenous Aquatic Nuisance Prevention and Control Act of 1996 |
| Coastal Zone Management Act of 1972 | North American Wetlands Conservation Act of 1989 |
| Comprehensive Environmental Response, Compensation, and Liability Act of 1980 | Oil Pollution Act of 1990 |
| Consultation and Coordination with Indian Tribal Governments (EO 13175) of 2000 | Outer Continental Shelf Lands Act of 1953 |
| Emergency Planning and Community Right-to-Know Act of 1986 | Pollution Prevention Act of 1990 |
| Emergency Wetlands Restoration Act of 1986 | Prime and Unique Farmlands, 1980 CEQ Memorandum |
| Endangered Species Act of 1973 | Protection and Enhancement of the Cultural Environment (EO 11593) of 1971 |
| Environmental Quality Improvement Act of 1970 | Protection and Enhancement of Environmental Quality (EO 11991) of 1977 |
| Estuaries and Clean Water Act of 2000 | Protection of Children from Environmental Health Risks and Safety Issues (EO 13045) of 1997 |
| Estuary Protection Act of 1968 | Protection of Cultural Property (EO 12555) of 1986 |
| Estuary Restoration Act of 2000 | Protection of Wetlands (EO 11990) of 1977 |
| Exotic Organisms (EO 11987) of 1977 | Reclamation Projects Authorization and Adjustments Act of 1992 |
| Farmland Protection Policy Act of 1981 | Recreational Fisheries (EO 12962) of 1995 |
| Federal Actions to Address Environmental Justice in Minority Populations & Low-Income Populations (EO 12898) of 1994 | Resource Conservation and Recovery Act of 1976 |
| Federal Emergency Management (EO 12148) of 1979 | Responsibilities of Federal Agencies to Protect Migratory Birds (EO 13186) of 2001 |
| Federal Facilities Compliance Act of 1992 | Rivers and Harbors Acts of 1899 and 1956 |
| Federal Land Policy and Management Act of 1976 | River and Harbor and Flood Control Act of 1970 |
| Federal Water Pollution Control Act of 1972 | Safe Drinking Water Act of 1974 |
| Federal Water Project Recreation Act of 1965 | Submerged Land Act of 1953 |
| Fish and Wildlife Conservation Act of 1980 | Sustainable Fisheries Act of 1996 |
| Fish and Wildlife Coordination Act of 1934 | Toxic Substances Control Act of 1976 |
| Flood Control Act of 1944 | Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 |
| Floodplain Management (EO 11988) of 1977 | Water Resources Development Acts of 1976, 1986, 1990, 1992, and 2007 |
| Food Security Act of 1985 | Water Resources Planning Act of 1965 |
| Greening of the Government Through Efficient Energy Management (EO 13148) of 2000 | Watershed Protection & Flood Prevention Act of 1954 |
| Historic Sites Act of 1935 | Water Pollution Control Act Amendments of 1972 |
| Historical and Archeological Data-Preservation Act of 1974 | Wild and Scenic River Act of 1968 |
| Indian Sacred Sites (EO 13007) of 1996 | Wilderness Act of 1964 |
| Invasive Species (EO 13112) of 1999 | |
| Land & Water Conservation Fund Act of 1965 | |
| Magnuson-Stevens Fishery Conservation and Management Act of 1976 | |

**Table J-2: Relevant Environmental State Statutory Authorities.**

| **(Note: this list is not complete or exhaustive.)** | |
|---|---|
| Air Control Act | Louisiana Threatened and Endangered Species and Rare & Unique Habitats |
| Archeological Treasury Act of 1974 | Protection of Cypress Trees |
| Louisiana Coastal Resources Program | Water Control Act |
| Louisiana Scenic Rivers Act of 1988 | |

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## Annex K

**Mitigation Plan**

## K.1 Mitigation

Mitigation planning was integrated into the plan formulation process by considering, individually and collectively, each of the NEPA mitigation actions (40 CFR 1508.20) of avoiding, minimizing, reducing and rectifying potential adverse impacts to all significant resources, to the extent practicable. Mitigation planning was accomplished using a watershed approach consistent with ER 1105-2-100 paragraph C-3(d)(3)(1) and CECW-PC memorandum dated August 31, 2009 entitled "Implementation Guidance for Section 2036 (a) of the Water Resources Development Act of 2007 (WRDA 2007) – Mitigation for Fish and Wildlife and Wetland Losses." Examples of the mitigation plan formulation considerations include:

- Avoiding: the PDT examined alternatives that would avoid potential impacts to wetlands by designing levee alignments which followed the wetland – non-wetland interface (e.g., Alternative A); and by developing non-structural measures such as structure raising, acquisitions of structures.
- Minimizing: the PDT screened out measures and alignments that could cause potential adverse impacts but had no additional storm damage risk reduction benefits (e.g., alignments along Lakes Pontchartrain and Maurepas).
- Rectifying: the PDT developed measures for rectifying adverse impacts of restricting tidal exchange (e.g., culverts under the levee which would provide tidal exchange).
- Reducing: the PDT developed the levee system to simulate the existing hydrologic connectivity. Pumps are included in the system and would only be operated during the approximately 1.7 storm events per year and would be closed for only approximately 8.5 days per year. Consequently, hydrologic connectivity would be generally maintained with the surrounding swamps and Lakes Maurepas and Pontchartrain, except during the closing of the system for hurricane and tropical storm events in the area as described in the Main Report.

Although mitigation planning was integrated into the overall alternative plan formulation process, implementation of the Tentatively Selected Plan – Alternative C requires compensatory mitigation for unavoidable project-induced impacts which will require replacing or providing substitute resources. This section, in conjunction with **Appendix A** (Mitigation Plan when developed), serves as the mitigation plan for the Tentatively Selected Plan – Alternative C, as required by 33 CFR 332.4(c) and 40 CFR 230.92.4(c).

### K.1.1 Water Quality Mitigation

Construction of the proposed project would follow best management practices (BMPs) to minimize the introduction of suspended solids into surrounding waters during project construction. BMPs could include such practices as the use of siltation fences and hay bales to reduce erosion at construction sites, vegetated buffers, spill boxes with settlement devices, coffer dam and others. Requirements to comply with BMPs would be included in, and made part of, construction contracts.

### K.1.2 Wetland Mitigation

An interagency Habitat Evaluation Team (HET) was formed to use habitat assessment methodologies to assess the quality of wetlands of the project area and mitigation areas, make a determination of the various project-induced impacts on future conditions, and determine mitigation required to compensate for unavoidable impacts caused by the constructible project features. The HET was composed of representatives from the USFWS, NMFS, USACE, USEPA, LDWF, LDEQ, and LDNR.

Because a feasibility-level habitat analysis, i.e., Wetland Value Assessment (WVA) methodology has not yet been conducted, a preliminary habitat assessment was conducted using Coastwide Reference Monitoring System (CRMS). The CRMS is a multiple reference approach that uses aspects of hydrogeomorphic functional assessments and probabilistic sampling (source: http://lacoast.gov/crms2/home.aspx accessed May 9, 2013). This approach includes a suite of sites that encompass the range of ecological conditions for each stratum, with projects placed on a continuum of conditions found for that stratum. Trajectories in reference sites are then compared with project trajectories through time. As indicated on the website, this approach could serve as a model for evaluating wetland ecosystems.

A brief description of the preliminary habitat assessment methodology utilizing CRMS data, analysis, and assumptions may be found in **Section** 4.3.2 **Vegetation Resources**. Detailed feasibility-level project design will be conducted on Alternative C (TSP) following release of the draft Integrated Feasibility Report and EIS; following which, habitat impact assessment utilizing the Wetland Value Assessment (WVA) methodology will be utilized for a more through habitat analysis of project impacts and compensatory mitigation requirements and included in the final Integrated Feasibility Report and EIS.

### K.1.3 Mitigation Plan

The Mitigation Plan will be designed to compensate for unavoidable project-induced impacts (both direct and indirect) to significant environmental resources, such as wetland habitats. At the present level of design, Alternative C (TSP) would directly impact a total of approximately 719 acres of forested wetlands/swamp and 55 acres of dry and/or wet BLH habitats and could indirectly impact up to approximately 8,424 acres of primarily forested wetlands/swamp habitats. However, feasibility-level project design and habitat evaluation and analysis remain to be completed. Based on information that is currently available, compensatory mitigation may be required for a total of up to 9,143 acres of forested wetlands/swamps and BLH habitats. It is anticipated that feasibility-level hydrologic exchange modeling and subsequent project designs and operation schemes will include sufficient project features, such as hydrologic exchange features (e.g., culverts within the levee) thereby reducing potential indirect impacts to enclosed wetlands.

The CRMS analysis used to determine TSP impacts had an average Floristic Quality Index (FQI) of 19.7859, a Hydrologic Index (HI) of 0.864 and a combined average (FQI + HI) score of

0.53093 (**Table K-1**). The FQI score for the TSP was compared to both the Pontchartrain Basin Scale and Coastwide Scale FQI scores of 2006 through 2012. The TSP FQI and HI score comparisons to the Pontchartrain Basin and Coastwide Scales indicates that resources impacted by the TSP are within the < 25$^{th}$ percentile and therefore characterized as poor quality habitat. However, the FQI is based upon herbaceous vegetation (understory), not the canopy and/or midstory (trees). Therefore, characterization of the project area as poor quality habitat maybe an undervalued estimation of the actual habitat quality of forested wetland/swamp habitat in the project area. The TSP HI score compared to the Pontchartrain Basin Scale and Coastwide Scale HI scores of 2007 through 2012, indicates that resources impacted by the TSP fall within the 25$^{th}$ – 75$^{th}$ percentile range and is characterized as fair (source: http://www.lacoast.gov/chartingwebservices2/report_cards/CRMS5373_2013_ReportCard.pdf accessed May 9, 2013). Utilizing a similar percentile classification scheme approach for classifying the combined FQI + HI scores, Alternative C (TSP) would be characterized as fair quality or better habitat; this characterization is similar for all other final array alternatives (see **Section 4.3.2 Vegetation Resources).**

Based on the CRMS habitat quality determination, assumptions for mitigation replacement ratios would range between 1.5:1 acres under the best case scenario and 4:1 acres under the worst case scenario. However, due to the availability of only preliminary hydrologic flow and inundation comparisons between the No Action Alternative and Alternative C (TSP), a different approach was required to determine potential mitigation acreage and costs estimates. This approach was taken because of the uncertainties of Alternative C (TSP) performance, the unknown potential for significant indirect impacts, and utilizing a risk-based habitat quality methodology (CRMS analysis). The rough order of magnitude mitigation impacts and associated costs are presented in **Table K-1**.

### K.1.3.1 Compensatory Mitigation Alternatives

Compensatory mitigation alternatives included consideration of purchasing mitigation credits from approved mitigation banks and various USACE constructed in-kind mitigation features. Section 2036 (c)(1) of the WRDA 2007 requires that where appropriate and where impacts are located within the service area of an approved mitigation bank, the USACE first consider using commercial mitigation banks to provide compensation for impacts to wetlands. The USACE determined the use of mitigation banks was not feasible because the project area is not located within the service area of approved mitigation banks with credits for forested wetlands and swamps were located in the vicinity of the project area.

Thus, the mitigation alternative selected will consist of USACE-constructed features whereby degraded forested wetlands/swamp and BLH habitats would be restored/created within the adjacent Maurepas Swamp to the extent practicable. When completed, the mitigation appendices will contain detailed description of the mitigation plan proposed to compensate for unavoidable, project-induced direct and indirect impacts of implementing the Tentatively Selected Plan.

**Table K-1. Estimated direct and indirect impacted acres And costs for all alternatives**

| DIRECT MITIGATION COSTS | | | | |
|---|---|---|---|---|
| | acres | **Max Cost** | **Min Cost** | **Average Cost** |
| **Alternative A** | 377 | $29,786,198 | $4,215,383 | $17,000,791 |
| **Alternative C** | 775 | $62,664,599 | $8,757,023 | $35,710,811 |
| **Alternative D** | 1,115 | $75,645,552 | $11,001,176 | $43,323,364 |
| | | | | |
| **INDIRECT MITIGATION COSTS** | | | | |
| | **Hab value reduction** | **Max Cost** | **Min Cost** | **Average Cost** |
| **Alternative A** | | | | |
| 3,564 | 75% | $201,877,610 | $29,359,178 | $115,618,394 |
| | 50% | $134,585,074 | $19,572,785 | $77,078,929 |
| | 25% | $67,292,537 | $9,786,393 | $38,539,465 |
| | 15% | $40,375,522 | $5,871,836 | $23,123,679 |
| | 10% | $26,917,015 | $3,914,557 | $15,415,786 |
| | 5% | $12,953,096 | $1,957,279 | $7,455,187 |
| **Alternative C** | | | | |
| 8,424 | 75% | $477,165,261 | $69,394,421 | $273,279,841 |
| | 50% | $318,110,174 | $46,262,947 | $182,186,560 |
| | 25% | $159,055,087 | $23,131,474 | $91,093,280 |
| | 15% | $95,433,052 | $13,878,884 | $54,655,968 |
| | 10% | $63,622,035 | $9,252,589 | $36,437,312 |
| | 5% | $31,811,017 | $4,626,295 | $18,218,656 |
| **Alternative D** | | | | |
| 56,228 | 75% | $2,860,824,840 | $416,051,416 | $1,638,438,128 |
| | 50% | $1,907,216,560 | $277,367,610 | $1,092,292,085 |
| | 25% | $953,608,280 | $138,683,805 | $546,146,043 |
| | 15% | $572,164,968 | $83,210,283 | $327,687,626 |
| | 10% | $381,443,312 | $55,473,522 | $218,458,417 |
| | 5% | $190,721,656 | $27,736,761 | $109,229,209 |
| | | | | |
| **TOTAL MITIGATION COSTS** | | | | |
| Direct + Indirect Impacts | | | | |
| **Alternative A** | **Hab value** | **Max Cost** | **Min Cost** | **Average Cost** |
| 3,941 | 75% | $231,663,808 | $33,574,561 | $132,619,185 |
| | 50% | $164,371,272 | $23,788,168 | $94,079,720 |
| | 25% | $97,078,735 | $14,001,776 | $55,540,255 |
| | 15% | $70,161,720 | $10,087,219 | $40,124,469 |
| | 10% | $56,703,213 | $8,129,940 | $32,416,576 |
| | 5% | $42,739,294 | $6,172,662 | $24,455,978 |
| **Alternative C** | | | | |
| 9,199 | 75% | $539,829,860 | $78,151,444 | $308,990,652 |
| | 50% | $380,774,773 | $55,019,970 | $217,897,371 |
| | 25% | $221,719,686 | $31,888,497 | $126,804,091 |
| | 15% | $158,097,651 | $22,635,907 | $90,366,779 |
| | 10% | $126,286,634 | $18,009,612 | $72,148,123 |
| | 5% | $94,475,616 | $13,383,318 | $53,929,467 |
| **Alternative D** | | | | |
| 57,343 | 75% | $2,936,470,392 | $427,052,592 | $1,681,761,492 |
| | 50% | $1,982,862,112 | $288,368,787 | $1,135,615,449 |
| | 25% | $1,029,253,832 | $149,684,982 | $589,469,407 |
| | 15% | $647,810,520 | $94,211,460 | $371,010,990 |
| | 10% | $457,088,864 | $66,474,699 | $261,781,781 |
| | 5% | $266,367,208 | $38,737,938 | $152,552,573 |
| | | | | |
| Notes: Max cost is based on Morganza to the Gulf and HSDRSS LPV Mitigation estimates | | | | |
| Minimum cost are based on New Orleans District mitigation bank cost for swamp and BLH | | | | |
| Mitigation bank will not likely have sufficient availability for the large-scale needs of WSLP mitigation | | | | |
| Includes mitigation, monitoring, and 25% contingency cost | | | | |
| Habitat quality based on CRMS sites quality indices. | | | | |

Topics addressed in the mitigation plan will include:

- Conceptual ecological model.
- Mitigation objectives (including determination of mitigation credits).
- Mitigation success criteria (performance standards).
- Mitigation work plan.
- Mitigation plans and specifications
- Mitigation maintenance and management plan.
- Mitigation monitoring and reporting requirements (including estimated monitoring/reporting cost).
- Adaptive Management Plan.
- Land acquisition and preservation/protection of mitigation features.
- Financial assurances.

Following feasibility-level design of Alternative C (TSP), updated baseline wetland characterization information, from WVA assessments, will be conducted for both the proposed action area and mitigation sites. This updated analysis and documentation will be provided in **Section 4.3.2 Vegetation Resources** and in the **Appendix A** of the Final Integrated Feasibility Report and EIS.

The following lists and drawings depict conceptual mitigation ideas and boundaries of potential mitigation areas. More area than may potentially be required has been identified in the conceptual figures to allow for potential shift in mitigation feature locations due to unforeseen circumstances.

The WRDA of 2007, Section 2036 (a); and implementation guidance CECW-PC 31 August 2009 Memorandum: "Implementation Guidance for Section 2036 (a) of the WRDA 2007 – Mitigation for Fish and Wildlife and Wetland Losses" requires adaptive management (AM) and monitoring be included in mitigation for fish and wildlife and wetland losses. A fully developed Adaptive Management and Monitoring Plan (AM&M Plan) will be provided in the appendices of the final Integrated Feasibility Report and EIS.

Proposed compensatory mitigation actions would include construction, with the NFS responsible for 100 percent of the OMRR&R, of functional elements of mitigation features as they are completed. On a cost-shared basis, the USACE would monitor completed mitigation features to determine whether additional adaptive management actions are necessary to achieve mitigation (ecological) success. The USACE would undertake additional actions necessary to achieve mitigation success in accordance with cost-sharing applicable to the project and subject to the availability of funds. Once the USACE determines that the mitigation has achieved initial success criteria, monitoring would be performed by the NFS as part of its OMRR&R obligations. If, after meeting applicable initial mitigation success criteria, the mitigation feature fails to meet its other mitigation success criteria, USACE would consult with other agencies and the NFS to determine whether operational changes would be sufficient to achieve the mitigation success criteria. If, instead, structural changes are deemed necessary to achieve mitigation success, USACE would instruct the NFS to implement appropriate adaptive management measures in

accordance with the AMP (contingency plan) subject to OMRR&R cost-sharing requirements, availability of funding, and current budgetary and other guidance.

### K.1.3.2 Wetland Mitigation Plan

**Table K-1** provides a preliminary estimation of the direct and indirect habitat acreage impacts that could result from construction and implementation of Alternative C (TSP). Because of the uncertainty of project-specific impacts, the following conceptual mitigation measures being considered will be further developed and designed during the feasibility-level analysis phase of this study. The following proposed mitigation sites depict conceptual boundaries that could serve as mitigation for project-induced forested wetland/swamp and BLH habitat impacts. The proposed mitigation measures are conceptual and do not necessarily reflect boundaries of mitigation measures that may ultimately be included in the completed Wetland Mitigation Plan which will be included in **Appendix A** to the final Integrated Feasibility Report and EIS.

Because of the recognized Federal interest and demonstrated need for restoration within the Maurepas Swamp (e.g., the Maurepas Swamp Diversions), the USACE proposes to establish mitigation features for the WSLP project within degraded portions of the Maurepas Swamp. The LDWF and USFWS have, independently, recognized the importance of implementing mitigation in the Maurepas Swamp to complement river reintroductions and have made the similar recommendations.

Louisiana Department of Wildlife and Fisheries Mitigation Proposals

Mitigation measures identified by LDWF (personal communication Mrs. Kyle Balkum and Brad Mooney, LDWF, May 23, 2013) aim to enhance or improve surface hydrology until such time that river reintroductions into the Maurepas Swamp are constructed. The LDWF indicate these mitigation measures are still conceptual and will require further planning, design and engineering. LDWF also prioritized each measure (i.e., High, Medium or Low) to inform the PDT on which measures are believed to be most beneficial (see **Figure K-1**).

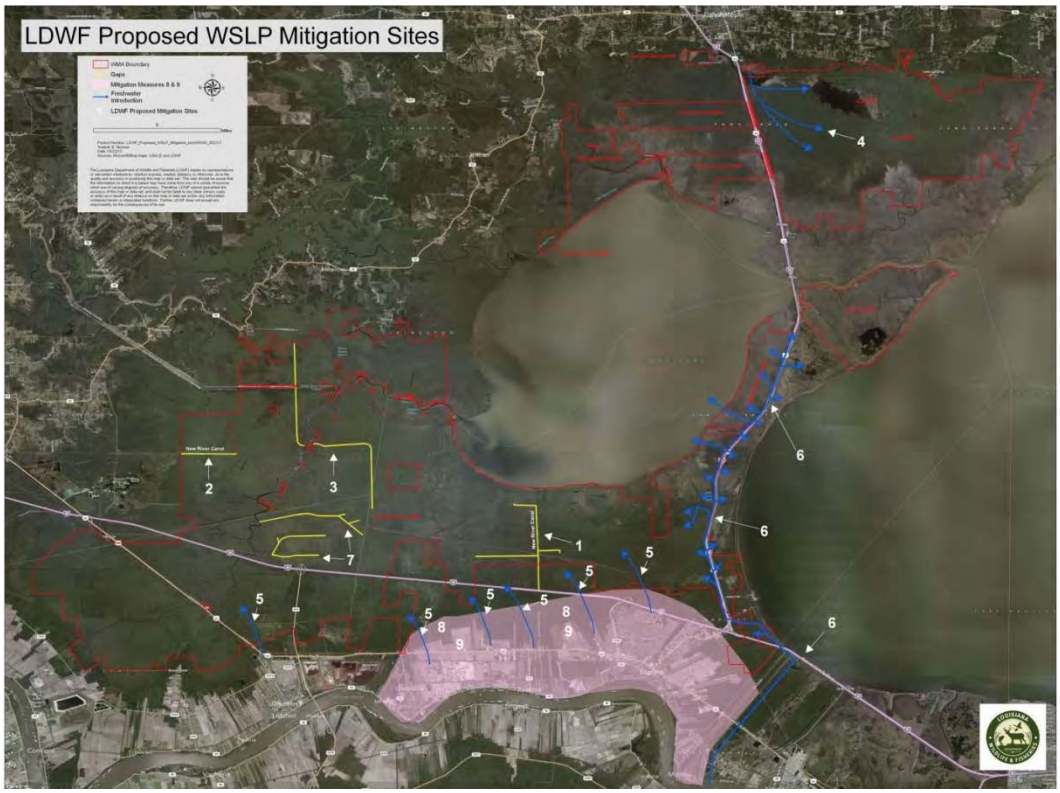


**Figure K-1: Louisiana Department of Wildlife and Fisheries proposed mitigation sites**

The number of the LDWF proposed mitigation measure described below corresponds with the number displayed on **Figure K-1**.

1. Gap spoil banks along Reserve Relief Canal (High priority).
2. Gap spoil banks along New River Canal (High priority).
3. Gap/degrade railroad bed which traverses the swamp beginning from Hope Canal and proceeding north and west to the northern property boundary (crossing Blind River and Amite River Diversion Canal (High priority).
4. Improve through flow of Hammond wastewater into existing Joyce WMA outfall area (High priority).
5. Make efficient use of storm water and wastewater produced by communities south of I-10 (e.g., Laplace, Ascension Parish) by distributing this water into the Maurepas Swamp (High priority).
6. Diversion of freshwater from Bonnet Carre Spillway guide levee to the swamps and marshes to the northwest (Medium priority).
7. Gap any spoil banks north of I-10 in the area of Tennessee Williams (Medium priority).
8. Preserve existing wetlands by acquiring land in fee title that is enclosed within the levee (Low priority).
9. Restrict development in wetlands enclosed within the levee (Low priority).

Other Potential Mitigation Measures

**Figure K-2** displays other potential mitigation sites within the Maurepas Swamp that will also be considered. USACE-constructed mitigation features would be located and constructed in a manner that avoids adverse impacts to existing wetland habitats to the greatest degree practicable. Any unavoidable adverse impacts to existing wetland habitats or to other habitats would be fully compensated as part of the mitigation plan, as necessary.

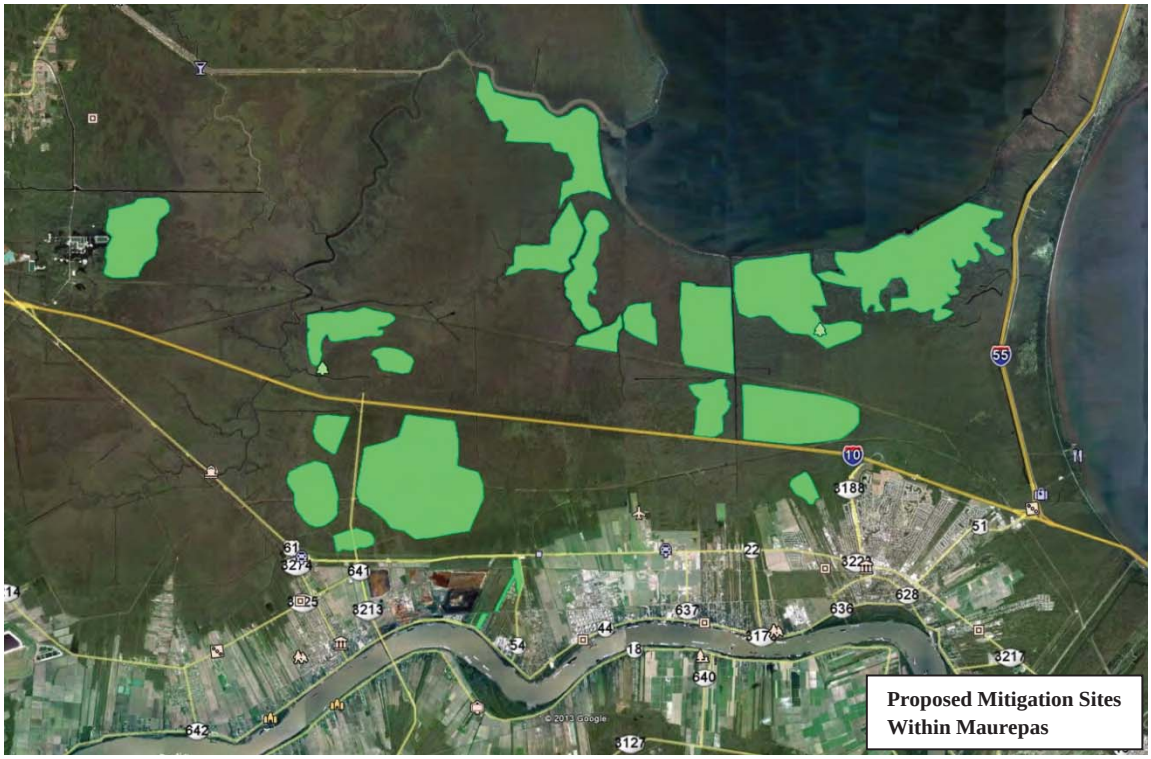


**Figure K-2: Proposed mitigation sites within Maurepas Swamp**

Analysis conducted in the LCA ARDC and LCA CBRD restoration projects (USACE 2010a and 2010b), determined that changes in surface hydrology attributable to both natural (e.g., subsidence and sea level rise) and man-made (e.g., logging practices, levees along the Mississippi River and Tributaries) forces have synergistically interacted to restrict annual river storm damaging inputs of sediments and nutrients and impound vast areas of the Maurepas Swamp thereby resulting in the conversion of existing forested wetlands/swamp habitats to marsh and open water within 10 to 50 years. Therefore, consistent with resource agency recommendations, mitigation measures would enhance or improve surface hydrology and restore degraded forested wetlands/swamp habitats to complement authorized river reintroductions into the Maurepas Swamp as constructed.

The following examples of proposed mitigation measures would be similar to the restoration efforts of the LCA ARDC project. Conceptual examples of some the below proposed measures are also presented.

- Breach Hydrologic Barriers: breach existing hydrologic barriers (e.g., old railroad beds, spoil banks along canals used for logging and storm damage relief canals) to re-establish hydrologic connectivity in selected hydrologic subunits throughout the Maurepas Swamp (see **Figure K-2**).
- Vegetative Planting: areas where inundation and storm damaging prevents or limits natural regeneration of the cypress-tupelo forest, artificial regeneration through tree planting may be the only viable method to regenerate the most degraded portions of the Maurepas Swamp. Identified mitigation areas (**Figure K-2**) are degraded to the point where the canopy, mid-story, and established regeneration is limited or severely stressed. Some portions of the Maurepas Swamp are altered to such a significant extent that even artificial regeneration may not be possible and it may be necessary to conduct this mitigation measure along with other proposed mitigation measures. Vegetative planting to restore bald cypress-tupelo communities at targeted mitigation sites, i.e., the most degraded areas in the Maurepas Swamp (**Figure K-2**), would contribute to preventing habitat conversion and future land loss, increasing swamp vegetative productivity, and restoring and preserving wildlife habitats. Vegetative plantings would serve as a means of creating a seed source in the mitigation sites for future regeneration. Vegetative plantings would be conducted by hand and would have no significant direct impacts on existing wetland resources, but would contribute to the improved health of the freshwater swamp system. Vegetative plantings would also increase the potential for reversing on-going habitat conversion (see LCA ARDC and LCA CRBD) and would further stabilize targeted degraded portions of the Maurepas Swamp in addition to providing compensatory migration. Plantings would be implemented in two phases:

    - A primary or initial planting would be implemented in the designated mitigation areas concurrent with construction of Alternative C (TSP) project features. Approximately 16 months after primary plantings are established; a mortality analysis would be conducted to establish the quantity of plantings required for the secondary planting.
    - It is assumed that 50 percent of the primary plantings would perish. Four months after this determination is made, a secondary planting would be implemented. Based on experience with the LCA ARDC project for similarly degraded areas, both the primary and secondary plantings would consist of 173 trees per acre. Each acre planted would be composed of 75 percent bare-root, 15 percent one-gallon potted, and 10 percent three-gallon potted plants. These plantings are considered an important component of the mitigation design, due to the native regeneration they would likely provide for the highly degraded areas selected for mitigation. The plantings should only occur during the non-growing season (November to March). Vegetative plantings would provide compensatory mitigation by increasing the acreage of forested wetlands/swamp habitats used by fish and wildlife for shelter, nesting, feeding, roosting, cover, nursery, and other life requirements. In addition, the increased vegetation growth and productivity would reduce inter- and intra specific competition between resident and migratory fish and wildlife species for limited coastal forested wetland/swamp habitat resources. Areas where inundation and storm damaging prevents or limits natural regeneration of the cypress-tupelo forest, artificial

regeneration through tree planting may be the only viable method to regenerate the swamp.

- Vegetative plantings of native trees are necessary to become reestablished and overcome competition from exotic and invasive species, such as Chinese tallow trees. In addition, nutria exclusion methods will be required for all plantings to prevent nutria from damaging or killing newly-planted seedlings.

- Ridge Habitat: Use portions of railroad beds as ridge habitat and re-vegetate with BLH plan species (e.g., oaks). Plantings would be conducted similar, but with BLH species such as oaks, to the above described forested wetland/swamp plantings. BLH species would provide significantly more mast than forested wetland/swamp species.
- Invasive Species Control: control/eradicate invasive species specifically Chinese tallow and nutria. Methods to control nutria could include: exclusion, repellants, toxicants, trapping, and shooting. Chinese tallow control could include treatments using the herbicide injection system, frill cut and spray (Roundup or Arsenal) and basal stem sprays with triclopyr. Seedlings may be burned, hand pulled and foliar sprays.
- Wastewater Introduction: introduce wastewater from local municipal wastewater as a means of adding nutrients to the forested wetlands/swamp habitat. An increase in nutrients provided to areas presently impounded and therefore cut off from any nutrient supply nutrients would increase the production of tree species.
- Clearing and Snagging: clearing and snagging of natural waterways, as well as old logging canals at various locations within the hydrologic subunits thereby contributing to establishing hydrologic connectivity, allowing seasonal drying and promoting water circulation to improve water quality.
- Channel Dredging: channel dredging of natural waterways and storm damage relief channels at various locations within hydrologic subunits could contribute to establishing hydrologic connectivity, allowing seasonal drying and promoting water circulation to improve water quality.
- Spray Dredging: Spray dredging of proposed mitigation sites in which dredged material is broadcast within a specific area in order to supplement vertical accretion. This measure could preventing habitat conversion and future land loss due to RSLR as well as restore and preserve wildlife habitats.
- Habitat Creation via Placement of Dredged Material: Working in concert with the above proposed dredging actions, the placement of dredged material as additional upland and bottomland hardwood habitat could serve as refuge various wildlife during high-water events while also providing areas to implement supplemental plantings of BLH tree species.
- Synergistic Interactions with LCA ARDC and LCA CBRD: implement combinations of the above described measures for specifically targeted areas adjacent to, but outside of, the authorized LCA ARDC and LCA CBRD projects in order to work more synergistically with these authorized restoration projects.
- Project-Enclosed Wetlands: Improve through flow of Laplace, Reserve and other municipal wastewater into adjacent forested wetlands/swamp habitats, including those habitats that would be enclosed by the Tentatively Selected Plan.
- Restore Hydrologic Connections: Placement of cuts or gaps in existing railroad grades and storm damage relief channel spoil banks would provide further hydrologic connectivity thereby draining impounded water from inundated areas of the swamp and restore hydrologic connectivity with the surrounding area and Lake Maurepas. Openings would promote the introduction of freshwater, sediments, and nutrients into the swamp and allow the oxidation of sediments and removal of toxic metabolites thereby improving degraded swamp stands and

decreasing the transition to marsh and ultimately, open water. Once hydraulic connection is restored within the degraded mitigation area, tree vigor and stand productivity should increase (Shaffer et al. 2009). Identified mitigation areas (**Figure K-3**) are degraded to the point where the canopy, mid-story, and established regeneration is limited or severely stressed due to impoundment and lack of hydrologic connectivity.

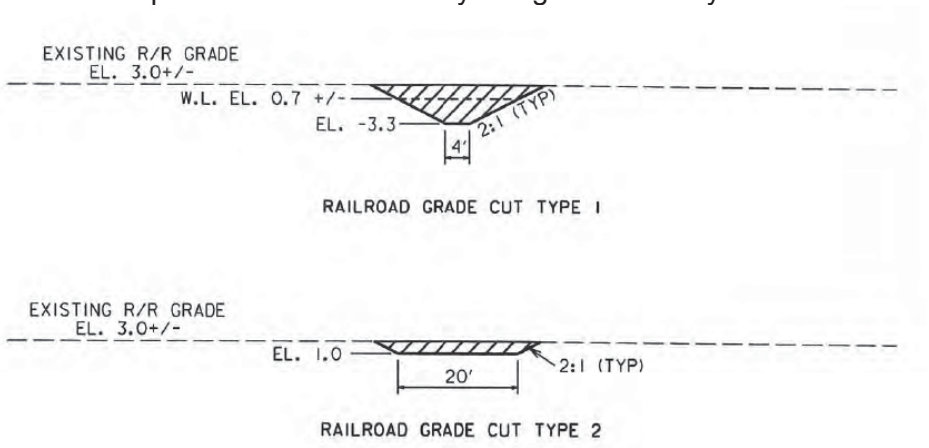


**Figure K-3: Conceptual railroad/spoil bank cut (adapted from LCA ARDC (USACE 2010a)**

These proposed mitigation measures were adapted from the development of the LCA ARDC restoration project located in the western Maurepas Swamp . Vegetative plantings and invasive species control, in conjunction with reestablishing hydrologic connectivity, would help to reestablish a productive stand and adequate canopy cover where natural regeneration would not likely occur and before the effects of RSLR permanently inundated the system. Permanent inundation would prevent planted or naturally regenerated species from becoming established. However, a multi-mitigation measure approach should allow for success.

### K.1.3.3 Mitigation Implementation Commitments

USACE-constructed mitigation features necessary to fully compensate for unavoidable direct and indirect project-induced impacts would be implemented concurrent with construction of the project The exact sequencing and schedule for construction of the various project mitigation features cannot be accurately estimated at this time.

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## APPENDIX A
## Annex L

**Adaptive Management and Monitoring Plan**

Incorporation of Adaptive Management and Monitoring (AM&M) activities during the life-cycle of the Mitigation Project will address ecological and other uncertainties that could prevent successful implementation of mitigation project measures once developed. The AM&M Plan will establish a framework for decision-making that utilizes monitoring results and other information, as it becomes available, to update project knowledge and adjust mitigation management actions through a deliberate adaptive management program. Integration of AM&M into the mitigation project will ensure success under a wide range of conditions and enable implementing corrective actions in cases where monitoring demonstrates that the mitigation project or measures are not achieving ecological success.

An AM&M Plan will be developed for the mitigation plan consistent with the requirements of the WRDA 2007, Section 2036 (a) and implementation guidance (CECW-PC 31 August 2009 Memorandum: "Implementation Guidance for Section 2036 (a) of the Water Resources Development Act of 2007 (WRDA 2007) – Mitigation for Fish and Wildlife and Wetland Losses" and included as part of the mitigation plan in the final Integrated Feasibility Report and EIS appendices. Section 2036(a) requires an AM plan (Contingency Plan) be appropriately scoped to the project scale and if the need for a specified adjustment is anticipated, due to high uncertainty, the nature and costs for AM actions should be explicitly described as part of the decision document. Information provided by the monitoring plan will be used by the District Engineer and Division Commander to guide decisions on operational and or structural changes that may be needed to insure the mitigation project or measures meet success criteria. Identified physical modifications to mitigation features will be cost-shared and must be agreed upon by the local non-Federal sponsor. AM plan costs should be shown in the 06 feature code of the cost estimate. Any changes to the AM plan approved in the decision document must be coordinated with USACE Headquarters. Significant changes needed to achieve ecological success that cannot be addressed through operational changes or are not included in the approved AM plan may be examined under other authorities.

The AM&M Plan elements will include:

- The organizational structure for the AM&M process
- Conceptual Ecological Model
- Key project uncertainties
- Evaluation of mitigation measures and alternatives as candidates for AM actions
- Identification of potential AM actions and description of the monitoring design developed to evaluate progress towards meeting the identified mitigation success criteria

### L.1.1 AM&M Planning Process

The AM&M Plan framework includes both a Set-up Phase, which proceeds concurrently with the planning process and development of the mitigation plan; and an Implementation Phase which puts the AM&M Plan into action. The Mitigation Project will be designed, constructed, monitored, and assessed to determine mitigation success. The AM&M Plan will utilize monitoring results to understand ecological system responses to mitigation actions and compared to stated targets, goals, objectives and success criteria. Leadership will then decide

one of two actions: (1) alter specific mitigation measures or the entire mitigation project utilizing AM actions to improve mitigation project/measure performance based on assessment results; (2) declare mitigation (ecological) success and implement OMRR&R.

### L.1.2 Conceptual Ecological Model

A Conceptual Ecological Model (CEM) will be developed that identifies major stressors and drivers affecting each proposed mitigation measure. A CEM is a simple qualitative model that usually diagrams general ecosystem relationships between major anthropogenic and natural stressors, biological indicators, and target ecosystem conditions. The CEM will not try to explain all possible relationships of potential factors influencing the mitigation sites. Rather, the CEM will develop and present only those relationships and factors deemed most relevant to obtaining mitigation success.

### L.1.3 Performance Measures, Success Criteria and Adaptive Management Triggers

The CEM will be used to determine performance measures, success criteria and AM triggers for determining mitigation/ecological success and if, and when, AM actions are required. Performance measures are indicators of progress toward a goal, objective, or target. The endpoint “Mitigation/Ecological Success” will be used by the Division Commander to determine when ecological success has been achieved. All performance measures and success criteria will be based on the mitigation project’s goals, objectives, and the stressors and attributes identified in the conceptual models and should: (1) be measurable; (2) have a relatively strong degree of predictability; (3) change in response to project implementation; and (4) verify progress and evaluate hypotheses through monitoring and assessment (Fischenich et al., 2012).

AM decision criteria/triggers will be used to determine if and when AM actions should be implemented. AM triggers are specific values of monitored parameters used in evaluating the mitigation project/measure(s) performance. Criteria will be developed to determine if the monitoring results support continued implementation of the mitigation project/measure(s) as designed, or if adaptive management actions should be undertaken.

Once the mitigation project/measure(s) are constructed and implemented they will be monitored against these decision criteria/triggers. Once a mitigation project/measure(s) meets or exceeds the established criteria/trigger, an AM action would be recommended to alter project performance (i.e., structural or operational changes). In some cases, additional modeling or experimental efforts may be required to understand and manage the observed ecological responses before a recommendation for a potential AM action can be made.

Below is an example of the typical performance measures, success criteria and thresholds/targets that would be considered during the feasibility-level analysis phase of this study:

Objective 1: Mitigate for project-induced impacts by creating 3,000 acres of forested wetlands/swamp and BLH habitat.

*Performance Measure 1a: Swamp vegetation production and extent.*
Desired Outcome: Increase in basal area increment of baldcypress & tupelo in the swamp from existing conditions
Monitoring Design: Diameter at breast height (dbh) and overstory tree cover will be measured in the fall in two pre-construction years and four post-construction years (within the first 10 years).
*Performance Measure 1b: Number of baldcypress and tupelo saplings*
Desired Outcome: A 25% increase in the number of naturally recruited baldcypress and tupelo saplings per acre from pre-project conditions ten years after project implementation. Performance of this measure is most dependent on achieving extended dry periods in the swamp. Existing conditions defined from WVA pre-mitigation planting measurements.
Monitoring Design: Understory vegetation (herbaceous, seedling, and sapling) will be measured in the fall in one pre-mitigation planting and four post-mitigation planting years (within the first 10 years) to assess regeneration and changes in cover classes
*Performance Measure 2: Species composition and percent cover for vegetation plantings in permanent plots and transects.*
Success Criteria (Desired Outcome): Generally, increase in percent cover in vegetation plots. 1) At 4 years post construction, attain at least 80% survival of planted species, or achieve a minimum cover of 50% comprised of native herbaceous (including planted and volunteer species). 2) Year 6 maintain 75% native cover, 3) years 7-27 maintain 80% native vegetation cover
Threshold/Trigger: If the identified success criteria are not met there may be a need for an adaptive management actions including replanting of areas that no longer meet success criteria and or replanting of areas that required topographic alterations.

### L.1.4 Key Sources of Uncertainty and Associated Risks

A fundamental tenet of AM is decision making and achieving desired mitigation project outcomes in the face of uncertainties. There are many uncertainties associated with mitigation/restoration of coastal ecosystems. Uncertainties for the mitigation project/measure(s) will be documented and incorporated into the final mitigation plan as well as the adaptive management and monitoring planning. Examples of some key sources of uncertainty and risks that are expected to be relevant include:

- Climate change such as drought conditions and variability of tropical storm frequency, intensity, and timing
- Relative sea level rise, subsidence, salinity, and water level trends
- Subsidence rates (+/-) throughout the mitigation project life
- Water level trends (+/-) throughout the mitigation project life
- Water, sediment, and nutrient requirements
- Magnitude and duration of wet/dry cycles for swamp

- Nutrients required for desired productivity
- Growth curves based on hydroperiod and nutrient application
- Tree and marsh litter production based on nutrient and water levels
- Tree propagation in relation to management/regulation of hydroperiod
- Self-Sustainability of Project Once Ecological Success Criteria are Achieved

### L.1.5 Adaptive Management Evaluation

Mitigation project/measure(s) will be evaluated against the need for AM actions. All restoration and mitigation projects are required to consider AM; however, there may be some mitigation projects/measures for which AM is not applicable. Adaptive management is warranted when there are consequential decisions to be made, there are high uncertainties, when there is an opportunity to apply learning, when the value of reducing uncertainty is high, and when a monitoring system can be put in place to reduce uncertainty. In cases where AM is not warranted, the mitigation project would still develop an AM Plan but the plan would clearly describe the rationale as to why AM actions would not be warranted. A mitigation project where AM is not warranted would still contain a Monitoring Plan to measure project success. The mitigation project/measures will be evaluated against the potential need for AM actions.

### L.1.6 Monitoring for Ecological Success

A Monitoring Plan will be developed including each mitigation project measure and habitat type within the Mitigation Plan to determine if the project mitigation is ecologically successful. The Monitoring Plan will identify the monitoring design and protocols, the schedule for the monitoring events and the specific content for the monitoring assessment reports that will measure progress towards meeting the success criteria. Upon completion of each mitigation project measure, monitoring for ecological success will be initiated and continued until ecological success, as defined by the mitigation success criteria, is achieved for each mitigation measure and the overall mitigation project. Typical monitoring elements for swamp and BLH would include:

- Aerial imagery
- Vegetation surveys: species composition, diameter breast height (DBH), percent coverage, regeneration, mortality
- Land/water and habitat classifications
- Hydrological surveys—water level, salinity, temperature, dissolved oxygen; and
- Surface elevation, subsidence and accretion

### L.1.7 Potential AM actions

To better ensure successful performance of mitigation measures, future scenarios for the mitigation project/measures will be based on identified critical uncertainties (e.g., salinities, wetland hydrology, inundation, increased subsidence, reduced accretion, and RSLR, etc.). Potential AM actions that would be incorporated should monitoring reports indicate success criteria are not being achieved and adjustment of mitigation measure(s) is needed could include:

- Renourishment of wetland areas (i.e. add additional fill to increase elevation)
- Vegetative plantings
- Hydrologic adjustments to depth, duration and frequency of storm damaging

### L.1.8 Adaptive Management and Monitoring Responsibility

The USACE and the NFS will be responsible, on a cost shared basis for conducting baseline monitoring, subsequent project/measure monitoring and preparing monitoring reports until such time that mitigation initial success criteria are achieved. Once specified success criteria are achieved, the NFS will be solely responsible for conducting all subsequent monitoring and preparing the associated monitoring reports.

Proposed compensatory mitigation actions would include construction, with the NFS responsible for 100 percent of the OMRR&R, of functional elements of mitigation features as they are completed. On a cost-shared basis, the USACE would monitor completed mitigation features to determine whether additional adaptive management actions are necessary to achieve mitigation (ecological) success. The USACE would undertake additional actions necessary to achieve mitigation success in accordance with cost-sharing applicable to the project and subject to the availability of funds. Once the USACE determines that the mitigation has achieved initial success criteria, monitoring would be performed by the NFS as part of its OMRR&R obligations. If, after meeting applicable initial mitigation success criteria, the mitigation feature fails to meet its other mitigation success criteria, USACE would consult with other agencies and the NFS to determine whether operational changes would be sufficient to achieve the mitigation success criteria. If, instead, structural changes are deemed necessary to achieve mitigation success, USACE would instruct the NFS to implement appropriate adaptive management measures in accordance with the AMP (contingency plan) subject to OMRR&R cost-sharing requirements, availability of funding, and current budgetary and other guidance.

In the event the monitoring reports submitted to CEMVN reveal that any success criteria have not been met after the mitigation project is turned over and in the OMRR&R phase, the NFS, or its assigns after consultation with CEMVN and other appropriate agencies, will take all necessary measures to modify management practices in order to achieve these criteria in the future.

### L.1.9 Costs

Costs will be developed for the AM&M program once a mitigation plan and specific mitigation measures have been fully developed. AM&M costs will include estimates for baseline and post-construction monitoring/data collection, data evaluation and assessment, data management, program management, reporting and identified potential AM actions.

These costs will be included in the overall construction budget. Monitoring/data collection costs for recent mitigation plans including the Morganza to the Gulf and HSDRSS LPV mitigation were estimated around $2,800/acre.

### L.1.10 Mitigation Banks

In those instances when a Mitigation Bank is selected, the Mitigation Banking Instrument (MBI) sets forth the success criteria, mitigation monitoring and reporting requirements, and mitigation management and maintenance activities for each particular bank. In cases where the Mitigation Project involves purchase of credits from a mitigation bank, the bank sponsor (bank permittee) is responsible for these activities rather than the USACE and/or the NFS. USACE Regulatory staff review mitigation bank monitoring reports and conduct periodic inspections of mitigation banks to ensure compliance with mitigation success criteria stated in the MBI.

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**Water Quality Analysis**

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# 1.0 Affected Environment

## 1.1 Introduction

This resource is institutionally significant because of the Clean Water Act, as amended, the Pollution Prevention Act, the Safe Drinking Water Act, and the Water Resources Planning Act, regulations which provide for the protection of U.S. waters for the purposes of drinking, recreation, and wildlife. This resource is technically significant for the purposes of restoring and maintaining the chemical, physical, and biological integrity of the Nation's waters. This resource is publicly significant because of the desire for clean water and water-related activities such as boating, swimming, fishing, and as a source of potable water for human and animal consumption.

### 1.1.1 Study Area Description

The study area is located in the southwestern portion of the Pontchartrain basin, a 9,700 square mile drainage basin connected to the Gulf of Mexico (Keddy et al. 2007). The northern basin includes sloping uplands, while the lower basin is estuarine, and in the northern limits of the Mississippi River delta plain (Blum and Roberts 2012). Primary surface water sources of the basin include the major tributaries of lakes Maurepas and Pontchartrain (the Tchefuncte, Tangipahoa, Amite-Comite, and Tickfaw rivers). Lakes Maurepas, Pontchartrain, and Borgne are the major estuarine embayments linking the basin to the Gulf of Mexico. Natural passes connecting these lakes include North Pass and Pass Manchac between lakes Maurepas and Pontchartrain, and Pass Rigolets and Chef Menteur Pass between lakes Pontchartrain and Borgne; the Inner Harbor Nagivation Canal (IHNC), Gulf Intracoastal Waterway (GIWW), and Mississippi River Gulf Outlet (MRGO) provide artificial connections between lakes Pontchartrain and Borgne, and the Gulf of Mexico (McCorquodale et al. 2009). The estuarine end of the basin also receives freshwater input from the adjacent Pearl River, and from episodic diversions of Mississippi River water for flood control. It includes swamp which transitions to marsh of increasing salinity regime eastward surrounding the lakes, followed by open bay and barrier islands at the eastern limits of the estuary.

The study area is bounded to the south and west by the Mississippi River, to the north by the St. James and St. John the Baptist Parish boundaries, and to the east by the western guide levee of the Bonnet Carré Spillway and the St. John the Baptist Parish boundary (Figure 1.1). This area, having a total footprint of approximately 234,000 acres, includes 1,250 acres of developed lands, 480 acres of undeveloped lands, approximately 113,000 acres of wetlands, and approximately 119,000 acres of open water. Wetlands in the area are largely comprised of environmentally stressed second-growth bald cypress-tupelo swamp.

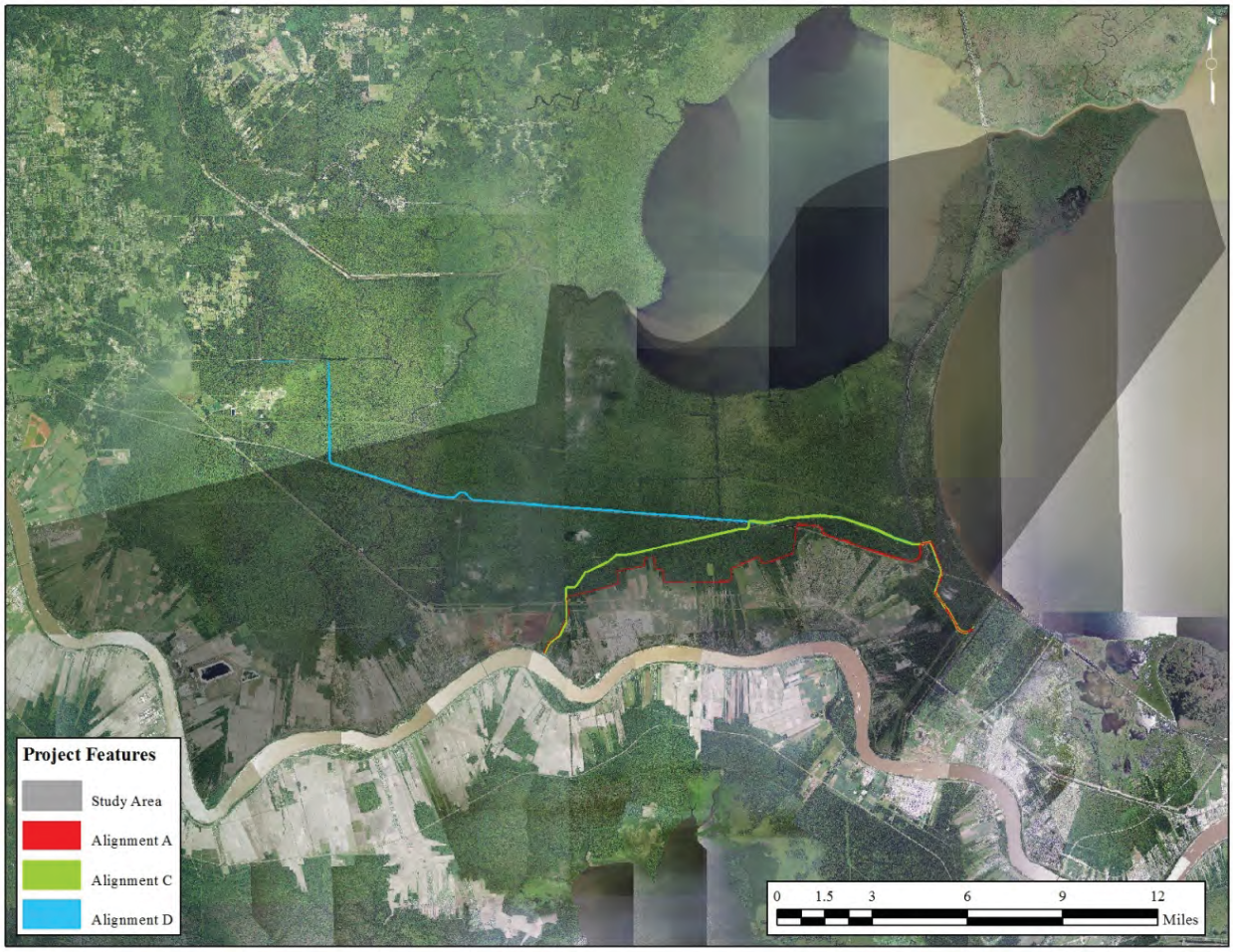


**Figure 1.1. Study area and project alternatives.**

### 1.1.2 Project Description

The proposed project is intended to provide hurricane storm damage risk reduction for communities on the east bank of the Mississippi River, in the parishes included in the study area (St. James and St. John the Baptist). The proposed levee alignment (Alignment C) is included in Figure 1.1; the proposed alignment includes the construction of approximately 21 miles of hurricane protection in the form of levees, t-walls, and miscellaneous gated structures. Because the proposed project would enclose adjacent wetlands, artificial drainage would be included in the project in the form of environmental water control structures, in order to reduce project impacts to water exchange between protected and flood side wetlands an waterbodies, in turn reducing project impacts to hydrology, biology, and water chemistry.

### 1.1.3 Study Area Water Quality Influences

Study area water quality is influenced by basin elevations, surface water budget, land cover and use, coastal and geological processes, and regional weather. The study area is in the southwestern portion of a basin consisting of uplands to the north and estuary to the south, with increasing estuary salinity eastward. As described in earlier, the basin is influenced by several rivers which provide freshwater to estuarine lakes connected to each other and, ultimately, to the Gulf of Mexico via several major passes.

The estuary has experienced hydromodification via the construction of canals and embankments. Major waterways within the estuary include the IHNC, MRGO, and GIWW. The estuary was formerly (1963-2009) connected to the Gulf of Mexico via the MRGO, which resulted in increased salinities (Sikora and Kjerive 1985; Tate et al. 2002); a rock barrier near Hopedale currently provides a disconnect at normal water levels. The estuary has also been subjected to canal construction for oil exploration and cypress logging (Keddy et al. 2007). These canals and their associated spoil banks can modify local flow and drainage patterns. Additionally, road and railroad beds, as well as hurricane protection features, provide hydraulic barriers within the estuary.

The basin includes upland forest and agricultural land north of the estuary, wetlands and open water within the estuary, development and agriculture along the Mississippi River corridor, and urban areas in greater New Orleans and Baton Rouge, and near the northern shorelines of lakes Pontchartrain and Maurepas (Demcheck et al. 2004). Tributaries of these lakes receive runoff from a mixture of non-developed, agricultural, and urban lands, having water quality characteristics associated with land cover and use. Undeveloped, forested areas in the northern basin contain aquatic communities associated with excellent water quality, while agricultural and urban areas have streams with water chemistry reflecting anthropogenic sources, including regional farming practices, treated and untreated sanitary inflows, and stormwater runoff. Increasing development in the watershed of study area tributaries has led to changes in stream discharge and/or water quality (Brown et al. 2010; Wu and Xu 2007; Turner et al. 2002; Patil and Deng 2008).

Chemical transformations occurring in the estuary can be biologically mediated by estuary wetlands. Wetlands have the ability to remove constituents such as nutrients, suspended sediments, organic matter, and metals from the water column, but can also serve as a source for these constituents, depending on factors such as duration of exposure to chemical loadings, wetland type, and hydrologic conditions (Mitsch and Gosselink 2000). Louisiana wetlands are not uniform in their ability to assimilate constituents (Rabalais et al. 1995).

A diversity of wetland types exist within the estuary, and are distributed based on surface water salinity as well as historical and current ground elevations. These wetlands are affected by marine and geological processes such as tidal variation, subsidence, and marine reworking of sediments (Gosselink 1984). Recently, anthropogenic factors are believed to have led to accelerated deterioration of estuary wetlands. In the study area, subsidence and impoundment has led to excessive flooding in the Maurepas Swamp, which prevents seed germination and recruitment of primary overstory tree species (Baldcypress and Water Tupelo), and can lead to tree stress and mortality (Keddy et al. 2007).

Regional and continental weather can also influence estuary water quality. For example, variations in precipitation, temperature, and wind direction can affect level of estuary marine influence, flow direction, water level, and wetlands biogeochemistry (Gosselink 1984). The estuary is periodically affected by tropical activity and the diversion of Mississippi River flood waters, which can lead to the influx of large volumes of salt- and/or freshwater. Recently, major hurricanes have affected the area approximately once every three years (in 2005, 2008, and 2011), while the influx of Mississippi River water through the Bonnet Carré Spillway for flood relief occurred in 1997, 2008, and 2011. Timing and amount of precipitation can also affect water quality. For example, Demcheck et al. (2004) found that pesticide and nutrient concentrations in Louisiana streams can vary seasonally based on timing of fertilizer and

pesticide application. In the study area, a drought form spring 1999 to summer 2001 is believed to have contributed to an increased mortality rate of forested wetland tree species (Keddy et al. 2007).

## 1.2 Methods, Criteria, and Guidelines for Evaluation of Sediment and Water Quality

### 1.2.1 Water Quality

#### 1.2.1.1 Louisiana Water Quality Inventory

The Clean Water Act (CWA) established a process for states to develop information on the quality of their water resources. Section 305(b) requires that each state develop a program to monitor the quality of its surface and groundwater, and prepare a report describing the status of its water quality. Section 303(d) requires states to list impaired waterbodies where water quality standards are not met and designated uses are not fully supported, and to develop a Total Maximum Daily Load (TMDL) for those waterbodies. The *Louisiana Water Quality Inventory Report: Integrated Report* (LDEQ 2013), prepared by the Louisiana Department of Environmental Quality (LDEQ), is the current form of biennial reporting of the status of Louisiana waters in accordance with CWA sections 305(b) and 303(d).

For the purpose of water quality monitoring and assessment and development of TMDLs, Louisiana is divided into twelve major basins, and each basin is further divided into subsegments. This subsegment approach divides the State's waters into discrete hydrologic units. The subsegment system within each basin provides a framework for evaluating state waters. Subsegments are periodically added or removed as water quality standards related to a subsegment or group of subsegments are revised.

Section 305(b) of the Clean Water Act requires, among other items, a water quality assessment for each subsegment, which includes a description of each subsegment and the extent to which their waters provide for the protection and propagation of fish and wildlife and allow for recreational activities in and on the water (USEPA 2011). All assessments are prepared using existing and readily available water quality data and information in order to comply with rules and regulations under Section 305(b) of the Clean Water Act.

Subsequently, Section 303(d) of the Clean Water Act requires the identification, listing, and ranking for development of Total Maximum Daily Loads (TMDLs) for waters that do not meet applicable water quality standards after implementation of technology-based controls. By definition, a TMDL is the maximum amountof a pollutant that can be discharged into a water body from all sources (both point and non-point) and still maintain water quality standards.

Louisiana Water Quality Standards (*LAC 33:IX.1123*) define eight designated uses for surface waters, including: primary contact recreation; secondary contact recreation; fish and wildlife propagation; drinking water supply; oyster propagation; agriculture; outstanding natural resource; and limited aquatic life and wildlife use. Principal designated uses for Louisiana waterbodies include primary contact recreation, secondary contact recreation, and fish and wildlife propagation. The definitions for these primary uses are:

- *Primary Contact Recreation*—any recreational or other water contact activity involving prolonged or regular full-body contact with the water and in which the probability of ingesting appreciable amounts of water is considerable. Examples of this type of water use include

swimming, skiing, and diving.

- *Secondary Contact Recreation*—any recreational or other water contact activity in which prolonged or regular full-body contact with the water is either incidental or accidental, and the probability of ingesting appreciable amounts of water is minimal. Examples of this type of water use include fishing, wading, and boating.
- *Fish and Wildlife Propagation*—the use of water for aquatic habitat, food, resting, reproduction, cover, and/or travel corridors for any indigenous wildlife and aquatic life species associated with the aquatic environment. This use also includes the maintenance of water quality at a level that prevents damage to indigenous wildlife and aquatic life species associated with the aquatic environment and contamination of aquatic biota consumed by humans. The use subcategory of *limited aquatic life and wildlife* recognizes the natural variability of aquatic habitats, community requirements, and local environmental conditions. *Limited aquatic life and wildlife* use may be designated for water bodies having habitat that is uniform in structure and morphology, with most of the regionally expected aquatic species absent, low species diversity and richness, and/or a severely imbalanced trophic structure. Aquatic life able to survive and/or propagate in such water bodies includes species tolerant of severe or variable environmental conditions. Water bodies that might qualify for the *limited aquatic life and wildlife* use subcategory include intermittent streams, and naturally dystrophic and man-made water bodies with characteristics including, but not limited to, irreversible hydrologic modification, anthropogenically and irreversibly degraded water quality, uniform channel morphology, lack of channel structure, uniform substrate, lack of riparian structure, and similar characteristics making the available habitat for aquatic life and wildlife suboptimal.

Designated uses and criteria for each subsegment are listed in the Louisiana Water Quality Standards. Designated uses have a specific suite of ambient water quality parameters used to assess their support. Data and information collected from within or immediately downstream of a subsegment are used to evaluate each subsegment's designated uses. Where more than one parameter and criterion define a designated use, support for each use is defined by the designated use's poorest performing (most severely impaired) parameter. Likewise, where data from more than one sample station are available, the most severely impaired station is used to make the assessment.

Following statistical determination of a water body's designated use support, along with a determination of the chemical parameters in the subsegment which might be impaired, a determination is then made as to which Integrated Report Category (IRC) the suspected water body impairment combination (WIC) should be placed in. A WIC is a single impairment affecting one subsegment. Based on the IR Category, it is possible that either a TMDL is required, or has been completed, for a particular subsegment.

In addition to use of numerical data, LDEQ regional staff members are asked for input regarding significant suspected sources of impairment, or whether impairment due solely to natural sources is occurring. Numerical data alone can suggest impairment for some Louisiana water bodies when in fact there is no impairment or the impairment is due exclusively to natural causes. Using best professional judgment, regional staff members familiar with the area suggest one or more suspected source for a subsegment's impairment.

Total maximum daily loads (TMDLs) indicate that the majority of the pollutant load entering state waters comes from nonpoint sources of pollution; therefore, LDEQ is implementing a watershed-based approach to reducing those loads in the water bodies where TMDLs have

been completed. Presently, LDEQ utilizes both regulatory and non-regulatory mechanisms to control nonpoint sources of pollution. Urban storm water for cities with populations of 50,000 or greater and construction sites of one acre or more are regulated through the Louisiana Pollutant Discharge Elimination System (LPDES) permit program. Home sewage treatment systems are regulated through the LDHH. LDEQ's Water Quality Assessment Division (WQAD) currently houses the state's Nonpoint Source Management Program, which has been successful in implementing voluntary programs for forestry and agricultural sources of pollution. This has been done through coordination with other concerned agencies, such as the Louisiana Department of Agriculture and Forestry (LDAF), the U.S. Natural Resource Conservation Service (NRCS), and the Louisiana State University (LSU) AgCenter. LDEQ will continue to monitor state waters through the four-year cyclic process to determine whether the current implementation strategy is successful in restoring and maintaining water quality and the designated uses within Louisiana.

#### 1.2.1.2 Louisiana Pollutant Discharge Elimination System (LPDES)

Louisiana's water quality regulations require permits for the discharge of pollutants from any point source into waters of the state of Louisiana. This surface water discharge permitting system is administered under the Louisiana Pollutant Discharge Elimination System (LPDES) program.

LPDES permits are official authorization developed and promulgated by the Office of Environmental Services of LDEQ. The LPDES permit establishes the wasteload content of wastewaters discharged into waters of the state. The permitting process allows the state to control the amounts and types of wastewaters discharged into its surface waters, in order to meet water quality standards. In 1996, LDEQ assumed responsibility for administering the permitting, compliance, and enforcement activities of the National Pollutant Discharge Elimination System (NPDES) from the U.S. Environmental Protection Agency (USEPA).

#### 1.2.1.3 Louisiana Nonpoint Source Management Plan

Nonpoint source pollution is a type of pollution which is generated during rainfall events, and includes, among other things, agricultural and urban runoff. Section 319 of the Clean Water Act requires that states develop a nonpoint source management plan to reduce and control nonpoint sources of pollution from the various types of land uses that contribute to water quality problems across the United States. Louisiana has determined that agriculture, forestry, urban runoff, home sewage systems, sand and gravel mining, construction, and hydromodification all contribute to nonpoint source pollution problems across the state. Nonpoint source pollution is the largest remaining type of water pollution that needs to be addressed within Louisiana, and across the nation, in order to restore full support for designated uses of impaired waterbodies.

Louisiana's Nonpoint Source Program is managed by the LDEQ, and the goal of the program is to provide education regarding nonpoint source pollution and nonpoint source pollution prevention. The state of Louisiana has applied for and received Section 319 funds to implement both statewide and watershed projects to address nonpoint source pollution.

#### 1.2.1.4 Water Quality Criteria

Water quality criteria are elements of state water quality standards expressed as constituent concentrations, levels, or narrative statements representing the quality of water supporting a

particular designated use. When criteria are met, water quality will protect the designated use. Louisiana has both general and numeric criteria in *LAC 33:IX.1113*. General criteria are expressed in a narrative form and include aesthetics, color, suspended solids, taste and odor, toxic substances (in general), oil and grease, foam, nutrients, turbidity, flow, radioactive materials, and biological and aquatic community integrity. Numeric criteria are generally expressed as concentrations or scientific units and include pH, chlorides, sulfates, total dissolved solids, dissolved oxygen, temperature, bacteria, and specific toxic substances.

The USEPA has published national criteria recommendations for a number of substances, and states may incorporate these without modifications into their water quality standards. However, while states generally use USEPA guidance and recommendations in developing and adopting their own criteria, they are allowed the flexibility to develop their own methodology as well. USEPA guidance is under continuous development and revision. States review and incorporate these developments and revisions into their water quality standards as appropriate.

Aquatic life criteria are designed to protect all aquatic life, including plants and animals, and include two types of criteria: acute, for short-term exposures (e.g., spills); and chronic for long-term or permanent exposures. One or both of the acute and chronic criteria may be related to other water quality characteristics, such as pH, temperature, or hardness. Separate criteria are developed for fresh and salt waters. The federal water quality standards regulations allow states to develop numerical criteria or modify USEPA's recommended criteria to account for site-specific or other scientifically defensible factors.

Human health criteria provide guidelines that specify the potential risk of adverse effects to humans due to substances in the water. Factors considered include body weight, risk level, fish consumption, drinking water intake, and incidental ingestion while swimming. Categories of criteria are then developed for each toxic substance for public drinking water supply, non-drinking water (swimming), and non-swimming water.

## 1.3 Study Area Historical and Existing Water Quality

### 1.3.1 Literature Review

Increasing development within the Pontchartrain basin with minimal regard for maintaining environmental quality during most of the twentieth century is cited as the primary cause of historical degradation of estuary waters (Hastings 2009). Associated pollution sources include sewage discharges into estuary tributaries, increased urbanization and farming, mining of waterbottoms, and oil and gas activities. While in recent decades many of these sources (particularly sewage discharges, shell dredging in Lakes Maurepas and Pontchartrain, oil and gas exploration) have been curtailed, urbanization and farming continue, and in some areas is increasing (Patil and Deng 2008, Brown et al. 2010, Turner et al. 2002, Wu and Xu 2007).

Historical study area water quality is depicted in several references which include the review of data from basin tributaries and estuary lakes and passes. Garrison (1999) provides a summary of general parameters, major ions, nutrients, trace metals, and organic compounds for water quality data collected in Lake Maurepas between 1943 and 1995 (detected parameters are summarized in Table 1.1). Overall, the summary suggests the lake has historically been freshwater and oligotrophic, with generally low contaminant levels.

**Table 1.1. Lake Maurepas historical water quality summary (source: Garrison[1999])**

| Group | Parameter | Units | Lake Maurepas, in Middle | | | Pass Manchac at Lake Maurepas | | |
|---|---|---|---|---|---|---|---|---|
| | | | Percentile | | | Percentile | | |
| | | | 25th | 50th (Median) | 75th | 25th | 50th (Median) | 75th |
| Physical properties | Specific Conductance | µmhos/cm | 159 | 281 | 684 | 2120 | 2550 | 3700 |
| | pH | SU | 7 | 7.2 | 7.3 | 6.5 | 6.6 | 6.8 |
| | Water Temperature | °C | 16.8 | 21.5 | 26.5 | | | |
| | Dissolved Oxygen | mg/L | 7.2 | 7.8 | 9.1 | | | |
| | Dissolved Solids | | | | | 1230 | 1470 | 2150 |
| Major cations | Calcium (Dissolved) | mg/L | 5.9 | 7.2 | 11 | 20 | 24 | 38 |
| | Magnesium (Dissolved) | | 3.6 | 5.8 | 13 | 36 | 46 | 72 |
| | Sodium (Dissolved) | | 17 | 25 | 52 | 320 | 410 | 590 |
| | Potassium (Dissolved) | | 2.5 | 3.1 | 4.7 | 11 | 15 | 30 |
| Major Anions | Alkalinity, Total as CaCO3 | mg/L | 18 | 21 | 25 | | | |
| | Sulfate (Dissolved) | | 10 | 17 | 32 | 89 | 120 | 150 |
| | Chloride (Dissolved) | | 29 | 60 | 180 | 580 | 720 | 1100 |
| Nutrients | Nitrate + Nitrite, Total as Nitrogen | mg/L | 0.09 | 0.18 | 0.31 | | | |
| | Phosphorus, Total as Phosphorus | | 0.09 | 0.11 | 0.14 | | | |
| Trace Metals | Copper (Dissolved) | µg/L | <2 | 2 | 4 | | | |
| | Iron (Dissolved) | | 50 | 140 | 230 | | | |
| Organic Compounds | 2,4-D (Total) | µg/L | 0.03 | 0.04 | 0.06 | | | |

Sikora and Kjerve (1985) and Tate et al (2002) both reviewed pre- and post-MRGO salinity trends in the Pontchartrain estuary, with the monitoring site closest to the study area included in the review located on the western end of Pass Manchac. Findings suggest average salinities in Pass Manchac increased by 0.2-0.4 PPT post-MRGO. Sikora and Kjerve (1985) suggested that increased salinities were likely the result of short-lived influxes of high-salinity water. Both of these studies utilized data from prior to the 1999-2001 drought suspected of contributing to elevated salinities in the study area.

Patil and Deng (2008) investigated water quality and sediment load of the Amite River, the largest tributary of the Pontchartrain estuary, located on the northern border of the study area just west of Lake Maurepas. Median dissolved oxygen concentration in the lower Amite River decreased by 1 mg/L when comparing 1975-1990 and 1991-2005 monitoring data (6.8 mg/L vs. 5.7 mg/L), despite decreased median nutrient (nitrate plus nitrite, total phosphorus) concentrations between the same time periods, which was attributed to discontinued use of phosphate detergents and adoption of best management practices for agriculture and forestry in the watershed. Median total organic carbon and total suspended solids increased between time periods, suggesting factors other than nutrient enrichment, such as continued sand and gravel mining in the upper Amite River, and increased urbanization of the greater Baton Rouge area, may be responsible for the reduction in dissolved oxygen concentrations. Recently, a TMDL for organic enrichment and low dissolved oxygen levels was developed for this the Lower Amite River subsegment, with the associated report suggesting that increased conveyance in the Amite River diversion canal is contributing to reduced water velocities (and, therefore, increasing stagnation) in the lower river, which has served to concurrently reduce dissolved oxygen concentrations (LDEQ 2011).

Several studies within the study area were conducted in support of the diversion of Mississippi River water into the Maurepas Swamps (e.g., Lee Wilson and Associates 2001, Shaffer et al. 2003, Hoeppner et al. 2008, Lane et al. 2003, Shaffer et al. 2009), and include some discussion of study area water quality. Lane et al. (2003) provides a summary of water quality for surface water samples collected monthly from April to October 2000 (during the 1999-2001 drought in southern Louisiana) in the Blind River, Hope Canal, Dutch Bayou, Reserve Canal, and Lake Maurepas. Ranges of averages for measured parameters are as follows: nitrate plus nitrite – 0-

0.5 mg/L, total nitrogen – 0.35-0.9 mg/L, ammonium – 0-0.03 mg/L, chlorophyll a – 2-21 µg/L, phosphate – 0.015-0.95 mg/L, total phosphorus – 0.03-0.13 mg/L, total suspended solids – 9-44 mg/L, salinity – 2.2-9 PPT. Because of drought conditions during the sampling period, the data included in the study may not be representative of general water quality conditions in the study area. The remaining studies referenced include descriptions of the condition of swamp habitat as it relates to water quality. In general, studies show correlation between elevated salinities in the swamps surrounding Lake Maurepas and high rates of tree mortality in the years following the 1999-2001 drought, as well as increased plant production with combined nutrient addition and herbivory control. These studies primarily suggest that river water diversions during droughts may prevent some areas around the lake from experiencing high mortality rates of primary overstory tree species during times of elevated surface water salinities, and that increasing nutrient inputs (e.g., with diversions) while controlling for herbivory on a watershed scale may lead to increased swamp aboveground productivity.

### 1.3.2 Louisiana Water Quality Inventory

To provide a general assessment of study area historical water quality, a review of historical water quality inventories for subsegments within the study area was conducted. Table 1.2 and Figure 1.2 depict all subsegments included in the study area.

**Table 1.2. Study area subsegments**

| Subsegment | Subsegment Description | Type | Size |
|---|---|---|---|
| 040401 | Blind River-Amite River Diversion canal to mouth at Lake Maurepas (Scenic) | River | 5 |
| 040403 | Blind River-Source to confluence with Amite River Diversion Canal (Scenic) | River | 20 |
| 040404 | New River-Headwaters to New River Canal | River | 24 |
| 040601 | Pass Manchac-Lake Maurepas to Lake Pontchartrain | River | 7 |
| 040602 | Lake Maurepas | Estuary | 91 |
| 041001 | Lake Pontchartrain-West of La. Hwy. 11 Bridge (Estuarine) | Estuary | 559 |

Clean Water Act Section 305(b) assessments of study area subsegments, for each reporting period between 1998 and 2010, were included in the review. For each subsegment, an average designated use support value was calculated. The calculated average support values were a function of designated use and level of support. Support levels for each combination of subsegment, year, and designated use were as follows:

0: subsegment not supporting designated use
1: subsegment fully supporting designated use

The average support value calculated for each subsegment serves as a simplistic representation for subsegment health with respect to designated uses (with zero being the least healthy value possible, and one being the most). In order to develop a visual representation of the long-term health of each subsegment with respect to designated uses, the average support values for subsegments were color-coded, with breakpoints of 0.5 and 0.75. Table 1.3 and Figure 1.2 illustrates the average support values for each subsegment.

**Table 1.3. Subsegment average support values, 1998-2012**

| Subsegment | Average of Support, 1998-2010 |
|---|---|
| 040401 | 0.46 |
| 040403 | 0.50 |
| 040404 | 0.17 |
| 040601 | 0.88 |
| 040602 | 0.45 |
| 041001 | 0.74 |

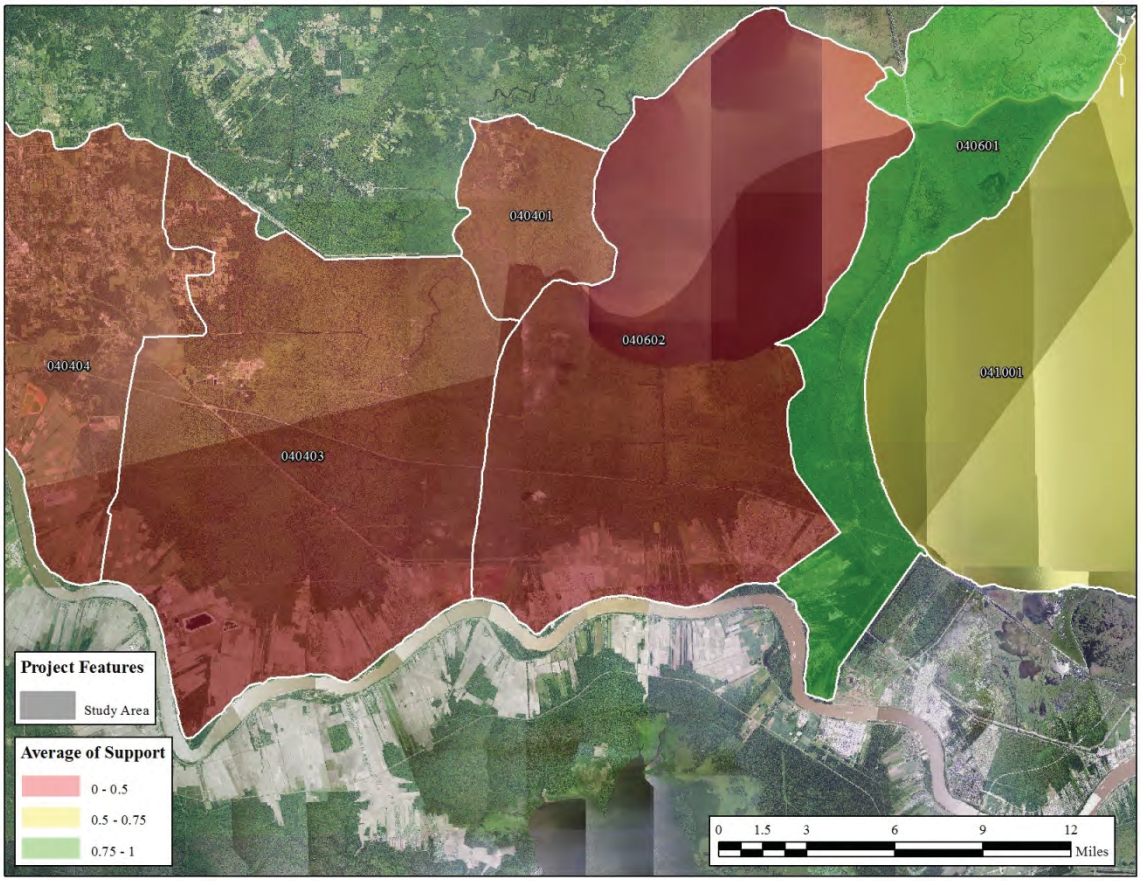


**Figure 1.2. Map of study area subsegments and subsegment average support values**

Long-term average support values reveal that impairments are commonplace in subsegments west of the Maurepas landbridge, and less common eastward.

To determine the most prevalent water quality issues present in the study area, historical Section 305(b) assessments were reviewed to determine the most significant causes and sources of subsegment impairment (Appendix Tables A.1 and A.2). Between 1998 and 2010, the most commonly suspected causes were non-native aquatic plants, low dissolved oxygen, mercury, fecal coliform, total phosphorus, sedimentation/siltation, and elevated turbidity, while the most commonly suspected sources were unknown sources, atmospheric deposition, introduction of non-native organisms, on-site treatment systems, wetland habitat modification,

and site clearance for land development/redevelopment.

The most current (2012) 303(d) list for the study area is depicted in Table 1.4. Ordered by decreasing frequency cited, suspected causes of impairment include non-native aquatic plants, low dissolved oxygen, mercury, elevated turbidity, and fecal coliform, while suspected sources of impairment include wetland habitat modification, introduction of non-native organisms, atmospheric deposition, unknown sources, on-site treatment systems, natural sources, and agriculture.

**Table 1.4. Study area 2012 303(d) list**

| Subsegment | Impaired Use for Suspected Cause | Suspected Cause of Impairment | Suspected Source of Impairment | IR Category | TMDL Priority |
|---|---|---|---|---|---|
| 040401 | FWP | Dissolved Oxygen | Wetland Habitat Modification | IRC 5 | L |
| | | Mercury | Atmospheric Deposition | IRC 4a | |
| | | | Source Unknown | IRC 4a | |
| | | Non-Native Aquatic Plants | Introduction of Non-native Organisms | IRC 4b | |
| | | Turbidity | Wetland Habitat Modification | IRC 4a | |
| | ONR | Turbidity | Wetland Habitat Modification | IRC 4a | |
| | PCR | Water Temperature | Natural Sources | IRC 5 | L |
| | | | Wetland Habitat Modification | IRC 5 | L |
| 040403 | FWP | Dissolved Oxygen | Agriculture | IRC 5 | L |
| | | | Wetland Habitat Modification | IRC 5 | L |
| | | Mercury | Atmospheric Deposition | IRC 4a | |
| | | | | IRC 5 | L |
| | | | Source Unknown | IRC 4a | |
| | | | | IRC 5 | L |
| | | Non-Native Aquatic Plants | Introduction of Non-native Organisms | IRC 4b | |
| 040404 | FWP | Dissolved Oxygen | On-site Treatment Systems | IRC 5 | L |
| | | Non-Native Aquatic Plants | Introduction of Non-native Organisms | IRC 4b | |
| | PCR | Fecal Coliform | On-site Treatment Systems | IRC 5 | H |
| 040602 | FWP | Non-Native Aquatic Plants | Introduction of Non-native Organisms | IRC 4b | |

Both historical 305(b) assessments and current 303(d) lists suggest primary study area water quality problems relate to hypoxia. As a further to this suggestion, as mentioned earlier, in 2011 a TMDL report was prepared for the lower Amite River watershed (located just north of subsegments partially included in the study area) to address organic enrichment and low dissolved oxygen.

### 1.3.3 LPDES Permitted Discharges

Figure 1.3 depicts locations of point source discharges permitted under the LPDES. There are a total of 123 LPDES permitted discharges in the study area, nearly all of which are located along the Mississippi River corridor. It is likely that most of these permitted discharges occur in the Mississippi River, which is currently only connected to the study area (its easternmost extent) when the Bonnet Carré Spillway is opened during flood stages on the river. There are a total of 26 toxic release inventory (TRI) permitted discharges in the study area, most (except for two) are also LPDES permitted discharges. Again, it is likely most of these permitted discharges go into the Mississippi River. Permitted discharges more relevant to the study are more likely to occur in major tributaries of the Pontchartrain Basin that feed into Lake Maurepas, such as the Amite and Rivers.

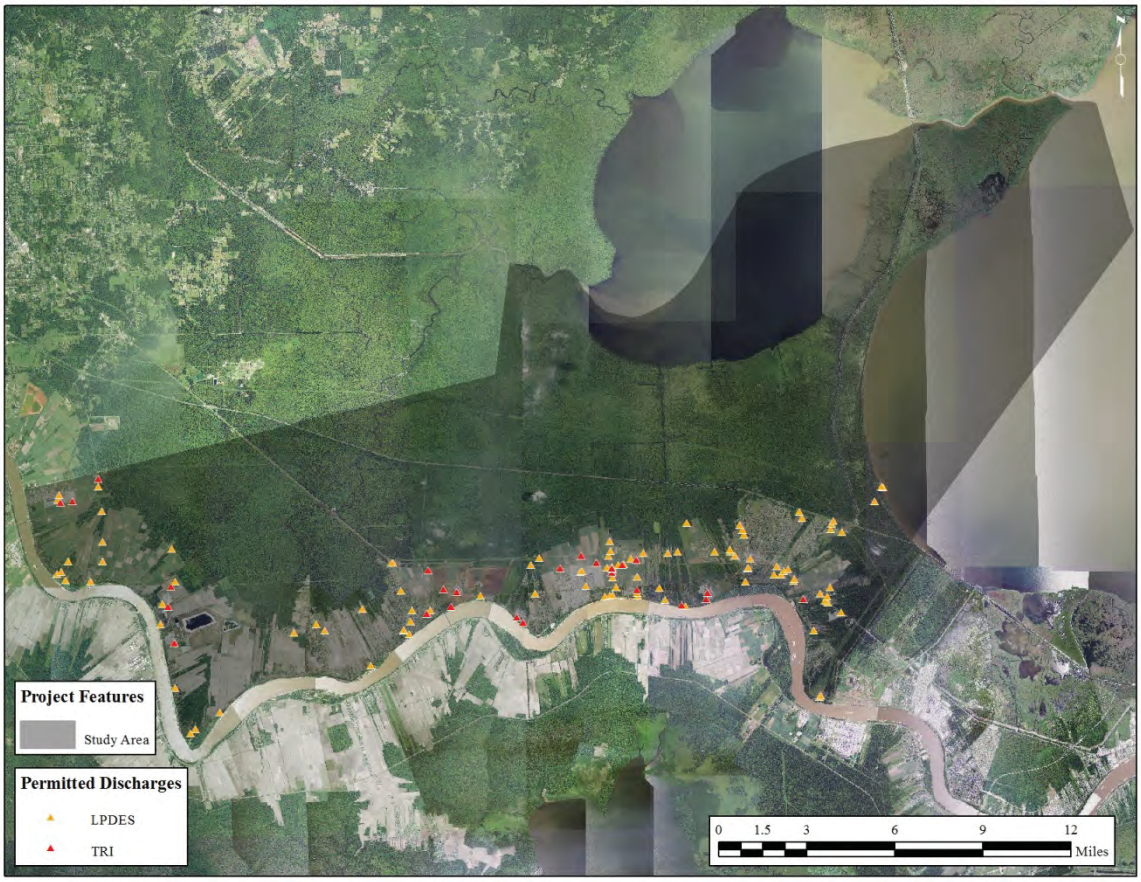


**Figure 1.3. Study area LPDES permitted discharges**

1.3.4 Water Quality Monitoring

1.3.4.1 Introduction

Long-term water quality monitoring in the study area has been conducted by the Louisiana Department of Environmental Quality (LDEQ). Table 1.5 and Figure 1.4 depict monitoring station locations and monitoring time periods, while Appendix Table A.3 includes monitoring metadata for each station.

**Table 1.5. Long-term water quality monitoring station information**

| Station ID | Station Description | Subsegment | Latitude | Longitude | Monitoring Period | |
|---|---|---|---|---|---|---|
| | | | | | Begin | End |
| 36 | Pass Manchac at Manchac, Louisiana | 040601 | 30.281389 | -90.400278 | 1978 | 2011 |
| 117 | Blind River near Gramercy, Louisiana | 040403 | 30.100000 | -90.735278 | 1978 | 1998 |
| 155 | Mississippi Bayou north of Reserve, Louisiana | 040602 | 30.123889 | -90.582500 | 1991 | 1998 |
| 1102 | Blind River near confluence with Lake Maurepas | 040401 | 30.217222 | -90.599444 | 2001 | 2010 |

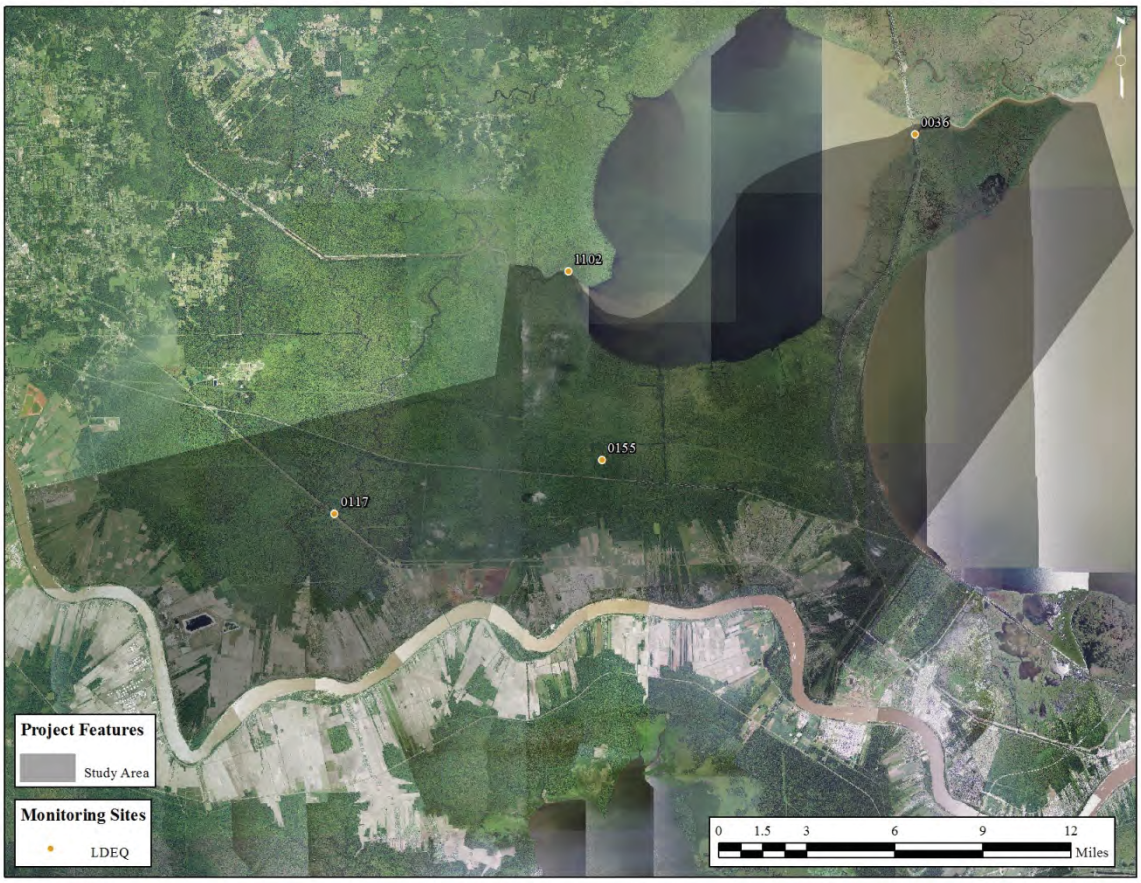


**Figure 1.4. Study area long-term water quality monitoring station locations**

1.3.4.2 Summary of Water Quality Monitoring Data

Monitoring parameters selected for data summary are listed in Table 1.6; more detailed information concerning these parameters is available in Appendix Table A.4. Parameters were selected for summary based on the need for a general depiction of study area water quality (i.e., conventional parameters), frequency of citation as a suspected cause of impairment in the study area, water quality concerns in the study area highlighted in available literature discussed elsewhere in this assessment, and robustness of dataset.

**Table 1.6 – Monitoring parameters selected for data summary**

| Chemical Class | Parameter |
|---|---|
| Inorganic/General Chemistry | Alkalinity |
| | Carbon, Total Organic |
| | Chloride, Ion Chromatograph |
| | Conductivity |
| | Dissolved Oxygen |
| | Dissolved Oxygen, Percent Saturation |
| | Dissolved Solids, Total |
| | Nitrogen, Nitrate + Nitrite |
| | Oxygen Demand, Chemical |
| | pH |
| | Turbidity |
| Metals | Nickel |
| N/A | Fecal Coliform |
| | Suspended Solids, Total |

For each long-term monitoring station in the study area, data was summarized by means of boxplots (overall and seasonal), quantile plots, and trend analysis (Appendix Figures A.1-A.42). Data summary in the final water quality assessment will include nonparametric trend analysis, which may be more appropriate for the skewed (not normally distributed) data included in the monitoring dataset.

Overall boxplots (Appendix Figures A.1-A.14) reveal the differences between the monitoring stations based on salinity gradient and habitat. For example, stations 117 and 155, located in the Maurepas swamps, generally contain higher alkalinity, fecal coliform, and dissolved nickel, and lower dissolved oxygen, while station 36 contains elevated chloride, conductivity, and total dissolved solids relative to all other stations. The most notable characteristics of the boxplots were the high alkalinity and low dissolved oxygen at swamp sites, along with the high chloride and conductivity concentrations for the Pass Manchac station relative to other stations. For stations 117 and 155, the lower and upper quartiles of dissolved oxygen concentrations were below the state water quality criteria for freshwater of 5 mg/L.

Seasonal boxplots (Appendix Figures A.15-A.28) reveal trends for several parameters. Highest alkalinity values for stations 117 and 155 occur in summer, while highest total organic carbon concentrations for these stations follow in the fall. For dissolved oxygen, at all sites summer concentrations were lowest, while winter concentrations were highest. Chloride, conductivity, and total dissolved solids follow similar seasonal patterns at all sites, which includes generally increasing concentrations from winter to fall (winter<spring<summer<fall). For stations 117 and 155 and all seasons except winter, and station 1102 in summer, both the lower and upper quartiles of dissolved oxygen concentrations were below the state water quality criteria for freshwater of 5 mg/L.

In general, quantile plots (Appendix Figures A.28-A.42) for all parameters and stations have high correlation coefficients (note: for some parameters, data was log transformed to improve correlation coefficients). Of the 45 regression curves, 45 had a correlation coefficient greater than 0.9, and 32 had a coefficient greater than 0.95. Particularly for parameters where a large proportion of the data was below reporting limits (e.g., Fecal Coliform, nitrate plus nitrite, nickel), correlation coefficients were low, and data was skewed, suggesting nonparametric methods of trend analysis (e.g., Kendall's Tau) may be more appropriate.

Trend analysis using linear regression may be most meaningful for parameters with a normal data distribution and longer/larger data record (including alkalinity, total organic carbon, chloride, chondictivity, dissolved oxygen, total dissolved solids, turbidity, and total suspended solids, for stations 36 and 117). Several parameters, including alkalinity, chloride, pH, turbidity, and total suspended solids, suggest decadal-scale cycling of water quality. Overall, correlation coefficients were very low (less than 0.05) for the larger data record stations, with the exception of alkalinity (0.0563, negative regression slope) and chloride (0.056, positive regression slope) for station 36, suggesting increasing marine influence in the Pass Manchac area between 1978 and 2011.

## 2.0 Environmental Consequences

### 2.1 No Action Alternative (Future without Project Conditions)

*Direct Impacts:* There would be no direct impacts from implementing the No Action Alternative.

*Indirect Impacts:* Water quality trends in the study area are expected to continue without the proposed project. In particular, existing dissolved oxygen trends, as well as existing trends in salinity gradients, would be expected to continue. Additionally, without the proposed project, there would be an increased risk of flooding of the Mississippi River corridor in the study area, and drainage of floodwaters into waterbodies connected to the Maurepas Swamp and Lake Maurepas is a possibility. If this were to occur, a large volume of diluted urban runoff characterized by elevated nutrients, metals, and organics could be introduced into the Maurepas Swamps and Lake Maurepas, similar to the introduction of urban floodwaters from New Orleans into Lake Pontchartrain following Hurricanes Katrina and Rita in 2005 (Farris et al. 2007) .

Without the proposed project, study area would still be affected by the following:
**Restoration Efforts**. In particular, several Mississippi River diversion projects described and referred to in Paragraph 2.2.1 of the Report as the LCA Convent Blind River and the Maurepas Swamp Diversion projects. These projects have the potential to locally reduce salinity stress and temporarily improve dissolved oxygen levels; however, concurrently they have the potential to generate significant changes in wetlands biogeochemistry, some of which may negatively affect wetland plant community resiliency (e.g., see Swarzenski et. al 2005). Additionally, the recent MRGO closure may influence study area water quality by reducing slightly area salinities during salinity intrusion events (e.g., during a drought).

**Federal and state water quality management programs.** Programs such as those described in this assessment would continue under the pretext of improving water quality and reducing the frequency of impairment of study area waterbodies. Programs to address land use practices in the Mississippi River watershed and associated river water quality impacts may be particularly important in determining study area water quality, because of the multiple Mississippi River diversion projects that would affect the study area (Broussard 2008).

**Coastal deltaic processes.** The study area would continue to be impacted by coastal deltaic processes associated with a transgressive delta, such as subsidence, erosion, and habitat conversion. The Maurepas Swamp area is anticipated to continue in its decline while converting to marsh and open water, in turn affecting local water quality conditions.

**Development.** Including oil and gas development within the study area; the continued increasing development of the Amite River watershed and other watersheds which influence study area water quality; existing and future Federal, state, and municipal flood-damage reduction projects; and continued agricultural and forestry activities and associated management practices. The trend of decreasing dissolved oxygen in the lower Amite River, which has been linked to development in the watershed, mining of waterbottoms within the river, and hydromodification in the lower river, is expected to continue.

**Climate.** Future changes in atmospheric temperature are anticipated to impact sea-level, and may also impact frequencies of tropical activity (Mousavi et. al 2011), with anticipated impacts to water quality (e.g., increased frequency of salinity intrusion events).

*Cumulative Impacts*: Cumulative impacts would be the incremental direct and indirect impacts described above of not implementing and operating the proposed hurricane and flood risk reduction system in addition to the direct and indirect impacts to water quality and salinity attributable to other hurricane and flood risk reduction systems which have not and would not be implemented within the Pontchartrain Basin, Louisiana, and the Nation (see Section 4.1.1 Soils and Water bottoms Alternative C (TSP) Cumulative Impacts).

## 2.2 Future with Project Conditions

### 2.2.1 Alternative C

*Direct Impacts:* The proposed project entails construction of approximately 21 miles of levee, some of which includes wetlands and open water, and would directly impact the area within the proposed footprint which currently consists of wetlands and open water. These areas would be converted into upland habitat, and would no longer provide for surface water quality. As coastal wetlands are known to benefit water quality, for example, as a source or sink for constituents, these benefits would no longer exist within the proposed levee footprint.

Direct impacts to water quality associated with the proposed alternative would also be related to construction activities, including the placement of fill and construction materials for project construction, and runoff from construction areas. Because fill material and construction materials are anticipated to be free of contaminants, discharge of these materials into existing adjacent surface waters and wetlands is not anticipated to lead to significant adverse effects on aquatic organisms present at the construction sites.

Construction activities are expected to result in localized increases in turbidity associated with runoff of construction materials. To minimize construction-related impacts, a Stormwater Pollution Prevention Plan (SWPPP) will be implemented for construction activities. SWPPPs will be prepared in accordance with good engineering practices emphasizing storm water Best Management Practices and complying with Best Available Technology Economically Achievable and Best Conventional Pollutant Control Technology. The SWPPP will identify potential sources of pollution which may reasonably be expected to affect storm water discharges associated with the construction activity. In addition, the SWPPP will describe and ensure the implementation of practices which are to be used to reduce pollutants in storm water discharges associated with the construction activity and to assure compliance with the terms and conditions of this permit (USEPA 2012).

*Indirect Impacts:* The proposed hurricane protection project would indirectly impact study area

water quality. Although environmental water control structures are being incorporated into project design to minimize changes in flow and water level between the flood and protected side of the proposed levee alignment , and although the proposed alignment largely follows existing hydrologic features, water exchange between the flood and protected side may be modified, leading to localized areas of stagnation and reduced salinities behind the levee alignment, along with local areas of increased salinity on the flood side of the alignment. Moreover, the potential expansion of development in the area could lead to additional point and nonpoint discharges within the hurricane and storm damage risk reduction system, which would further degrade water quality on the protected side of the proposed alignment. Also, as sea-level rise increases water levels in the study area, the frequency with which environmental water control structures are closed would be expected to increase, causing further stagnation for waters on the protected side of the proposed levee alignment.

Hydrology plays a major role in biogeochemical cycling in wetlands (Mitsch and Gosselink 2000), which in turn can affect water quality. Operation of these structures is expected to have a significant impact on biogeochemical cycling for wetlands in the study area, particularly on the protected side of the proposed levee alignment. This could be beneficial or detrimental, depending on the operation of gates and tidal exchange structures and impediment of flow caused by the proposed project.

A major potential benefit of the project is that it would provide for the protection of wetlands enclosed by the proposed levee alignment, potentially extending the lifespan of these wetlands and their water quality functions. However, the wetlands just outside of the proposed levee alignment are expected to be subjected to an increase in wave energy and salinity as a result of the proposed project, particularly during tropical activity in the study area, which could ultimately lead to the accelerated loss of unprotected wetlands.

The proposed project, combined with other coastal activities (such as those included in the discussion of future without project conditions), would cumulatively impact study area water quality, both beneficially and detrimentally. For example, it is foreseeable that the proposed project may impact the attainment of state water quality standards in the study area, leading to changes in regulation of point and nonpoint source discharges within the area, particularly on the protected side of the proposed alignment. This is an issue that needs to be addressed by MVN and LDEQ, so as to avoid impacting the attainment of State water quality standards in the future.

Additionally, the combination of the proposed project, the LCA CBRD project and the Maurepas Swamp Diversion projects in the study area could complicate water quality and hydrology, particularly for the protected side of the proposed alignment. Both an increase in water input from the Mississippi River and decrease in drainage for the protected side of the proposed alignment could lead to significant impacts to the biogeochemistry of the wetlands of the Maurepas Swamp.

*Cumulative Impacts:* Cumulative impacts would be the incremental direct and indirect impacts of implementing and operating the proposed hurricane and storm damage risk reduction system described above, in addition to the direct and indirect impacts to on water quality and salinity attributable to other existing and authorized for construction hurricanestorm damagerisk reduction systems and flood risk reduction systems within the Pontchartrain Basin, Louisiana, and the Nation (see Section 4.1.1 Soils and Water bottoms Alternative C (TSP) Cumulative Impacts).

2.2.1 Alternative A

*Direct, Indirect, and Cumulative Impacts:* Because the alignment of this alternative minimizes the further impoundment of study area wetlands , the water quality impacts under this alternative would be expected to be similar in nature but less than impacts associated with Alternative C.

2.2.1 Alternative D

*Direct, Indirect, and Cumulative Impacts:* Because this alternative encloses the largest area of wetlands by a significant margin while also having the greatest amount of new levee construction, water quality impacts associated with this alternative would be expected to be similar in nature but greater than impacts associated with Alternative C.

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# WEST SHORE LAKE PONTCHARTRAIN
# HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY
# INTEGRATED DRAFT FEASIBILITY REPORT
# AND
# ENVIRONMENTAL IMPACT STATEMENT

**Tables and Figures**

## List of Figures



## List of Tables

## Table A.1. Count of suspected causes of impairment, 1998-2012

| Suspected Cause of Impairment | Count |
|---|---|
| Non-Native Aquatic Plants | 24 |
| Dissolved Oxygen | 21 |
| Mercury | 20 |
| Fecal Coliform | 12 |
| Total Phosphorus | 10 |
| Sedimentation/Siltation | 10 |
| Turbidity | 9 |
| Copper | 7 |
| Pathogen Indicators | 6 |
| Metals | 5 |
| Flow Alteration | 4 |
| Nitrate/Nitrite | 4 |
| Chloride | 4 |
| Total Dissolved Solids | 4 |
| Total Nitrogen | 3 |
| Nutrients | 2 |
| Sulfates | 2 |
| Other Habitat Alterations | 2 |
| Pesticides | 2 |
| Oil and Grease | 2 |
| Water Temperature | 1 |

## Table A.2. Count of suspected sources of impairment, 1998-2012

| Suspected Source of Impairment | Count |
|---|---|
| Source Unknown | 30 |
| Atmospheric Deposition | 18 |
| Introduction of Non-native Organisms | 16 |
| On-site Treatment Systems | 10 |
| Wetland Habitat Modification | 9 |
| Site Clearance for Land Development/Redevelopment | 9 |
| Urban Runoff | 4 |
| Agriculture | 4 |
| Natural Sources | 4 |
| Recreational Activities | 4 |
| Flow Alteration | 3 |
| Groundwater Loadings | 3 |
| Land Disposal | 2 |
| Petroleum/Natural Gas Activities | 2 |
| Industrial Point Source Discharges | 2 |
| Municipal Point Source Discharges | 2 |
| Animal Feeding Operations | 2 |
| Construction | 1 |
| Upstream Sources | 1 |

## Table A.3. Long-term water quality monitoring parameters

| Chemical Class | Parameter | Station ID | | | |
|---|---|---|---|---|---|
| | | 36 | 117 | 155 | 1102 |
| Inorganic/General Chemistry | Alkalinity | X | X | X | X |
| | Carbon, Total Organic | X | X | X | X |
| | Chloride, Ion Chromatograph | X | X | X | X |
| | Chlorophyll-a | | | | X |
| | Color | X | X | X | X |
| | Conductivity | X | X | X | X |
| | Dissolved Oxygen | X | X | X | X |
| | Dissolved Oxygen, Percent Saturation | X | X | | X |
| | Dissolved Solids, Total | X | X | X | X |
| | Hardness, as CaCO3 | X | X | X | X |
| | Nitrogen, Ammonia | X | | | X |
| | Nitrogen, Kjeldahl | X | X | X | X |
| | Nitrogen, Nitrate + Nitrite | X | X | X | X |
| | Oxygen Demand, Chemical | X | X | | |
| | pH | X | X | X | X |
| | Phosphorus, Total | X | X | X | X |
| | Salinity | X | X | X | X |
| | Sodium | X | | | X |
| | Sulfate | X | X | X | X |
| | Temperature, Water | X | X | X | X |
| | Turbidity | X | X | X | X |
| Metals | Arsenic | X | X | X | X |
| | Cadmium | X | X | X | X |
| | Chromium | X | X | X | X |
| | Copper | X | X | X | X |
| | Lead | X | X | X | X |
| | Mercury | X | X | X | |
| | Nickel | X | X | X | X |
| | Zinc | X | | | X |
| N/A | Fecal Coliform | X | X | X | X |
| | Secchi Depth | X | X | X | X |
| | Solids, Total Percent of Wet Sample | X | X | | |
| | Stream Depth | | | | X |
| | Suspended Solids, Total | X | X | X | X |
| | Total Coliform | X | X | | |
| Semi-Volatile Organic Compounds | Dichlorobenzene, 1,2- | X | | | X |
| | Dichlorobenzene, 1,3- | X | | | X |
| | Dichlorobenzene, 1,4- | X | | | X |
| | Dichloroethene, 1,1- | X | X | X | X |
| | Trichlorobenzene, 1,2,3- | | | | X |
| Volatile Organic Compounds | Benzene | X | X | X | X |
| | Bromoform | X | X | X | X |
| | Bromomethane | X | X | X | X |
| | Carbon Tetrachloride | X | X | X | X |
| | Chlorobenzene | X | X | X | X |
| | Chlorodibromomethane | X | X | X | X |
| | Chloroethane | X | X | X | X |
| | Chloroethyl Vinyl Ether, 2- | X | X | X | |
| | Chloroform | X | X | X | X |
| | Chloromethane | X | X | X | X |
| | Dichlorobromomethane | X | X | X | X |
| | Dichloroethane, 1,1- | X | X | X | X |
| | Dichloroethane, 1,2- | X | X | X | X |
| | Dichloroethylene, trans-1,2- | X | X | X | X |
| | Dichloropropane, 1,2- | X | X | X | X |
| | Dichloropropene, cis-1,3- | X | X | X | X |
| | Dichloropropene, trans-1,3- | X | X | X | X |
| | Ethylbenzene | X | X | X | X |
| | Methyl Tertiary Butyl Ether (MTBE) | X | | | X |
| | Methylene Chloride | X | X | X | X |
| | Tetrachloroethane, 1,1,2,2- | X | X | X | X |
| | Tetrachloroethylene | X | X | X | X |
| | Toluene | X | X | X | X |
| | Trichloroethane, 1,1,1- | X | X | X | X |
| | Trichloroethane, 1,1,2- | X | X | X | X |
| | Trichloroethylene | X | X | X | X |
| | Trichlorofluoromethane | X | X | X | X |
| | Vinyl Chloride | X | X | X | X |
| | Xylene, o- | | | | X |
| | Xylenes, m- and p- | | | | X |

## Table A.4. Long-term water quality monitoring metadata for selected parameters

| Chemical Class | Parameter | Station ID | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 36 | | | 117 | | | 155 | | | 1102 | | |
| | | n | Begin | End | n | Begin | End | n | Begin | End | n | Begin | End |
| Inorganic/General Chemistry | Alkalinity | 270 | 1978 | 2011 | 156 | 1978 | 1998 | 45 | 1991 | 1998 | 36 | 2001 | 2010 |
| | Carbon, Total Organic | 237 | 1978 | 2001 | 174 | 1978 | 1998 | 44 | 1991 | 1998 | 18 | 2001 | 2006 |
| | Chloride, Ion Chromatograph | 272 | 1978 | 2011 | 179 | 1978 | 1998 | 45 | 1991 | 1998 | 36 | 2001 | 2010 |
| | Conductivity | 403 | 1978 | 2011 | 258 | 1978 | 1998 | 87 | 1991 | 1998 | 69 | 2001 | 2010 |
| | Dissolved Oxygen | 275 | 1978 | 2011 | 195 | 1978 | 1998 | 45 | 1991 | 1998 | 37 | 2001 | 2010 |
| | Dissolved Oxygen, Percent Saturation | 78 | 1978 | 2011 | 120 | 1978 | 1989 | | | | 25 | 2006 | 2010 |
| | Dissolved Solids, Total | 269 | 1978 | 2011 | 171 | 1978 | 1998 | 45 | 1991 | 1998 | 36 | 2001 | 2010 |
| | Nitrogen, Nitrate + Nitrite | 276 | 1978 | 2011 | 194 | 1978 | 1998 | 45 | 1991 | 1998 | 36 | 2001 | 2010 |
| | Oxygen Demand, Chemical | 143 | 1978 | 1990 | 127 | 1978 | 1990 | | | | | | |
| | pH | 352 | 1978 | 2011 | 240 | 1978 | 1998 | 45 | 1991 | 1998 | 37 | 2001 | 2010 |
| | Turbidity | 273 | 1978 | 2011 | 186 | 1978 | 1998 | 45 | 1991 | 1998 | 36 | 2001 | 2010 |
| Metals | Nickel | 98 | 1991 | 2011 | 43 | 1991 | 1998 | 45 | 1991 | 1998 | 11 | 2001 | 2010 |
| N/A | Fecal Coliform | 258 | 1978 | 2011 | 172 | 1978 | 1998 | 43 | 1991 | 1998 | 36 | 2001 | 2010 |
| | Suspended Solids, Total | 268 | 1978 | 2011 | 173 | 1978 | 1998 | 45 | 1991 | 1998 | 36 | 2001 | 2010 |

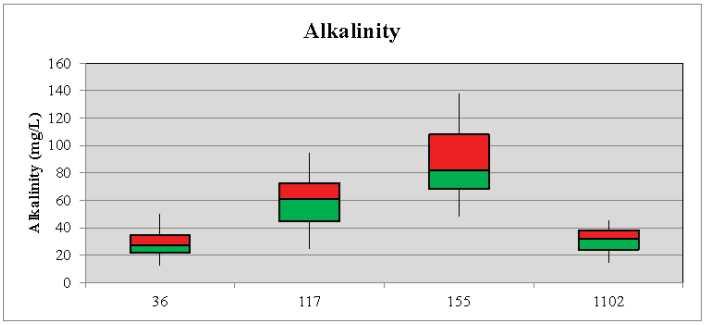


**Figure A.1. Alkalinity boxplot**

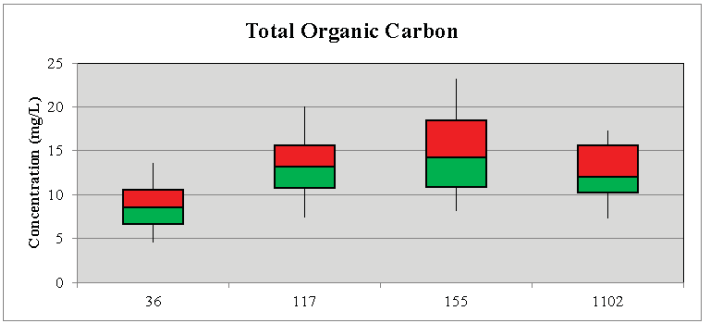


**Figure A.2. Total Organic Carbon boxplot**

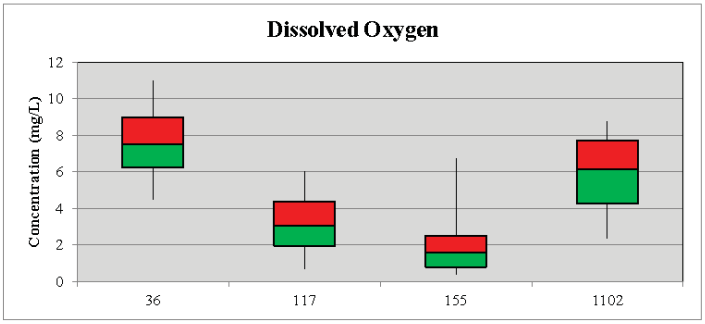


**Figure A.5. Dissolved oxygen boxplot**

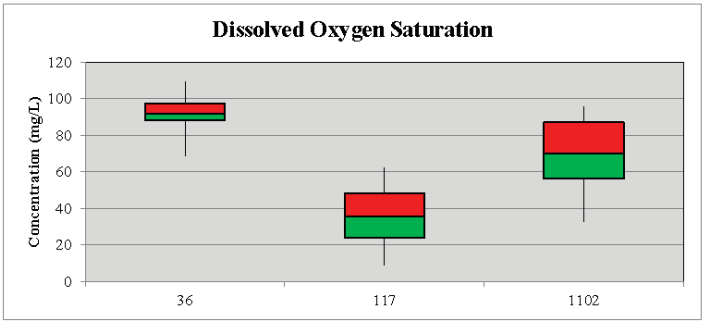


**Figure A.6. Dissolved oxygen saturation boxplot**

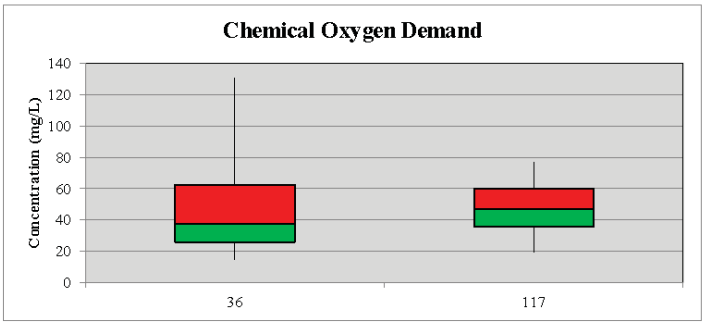


**Figure A.9. Chemical oxygen demand boxplot**

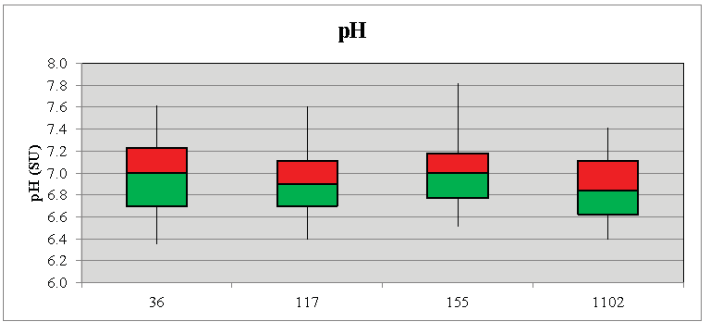


**Figure A.10. pH boxplot**

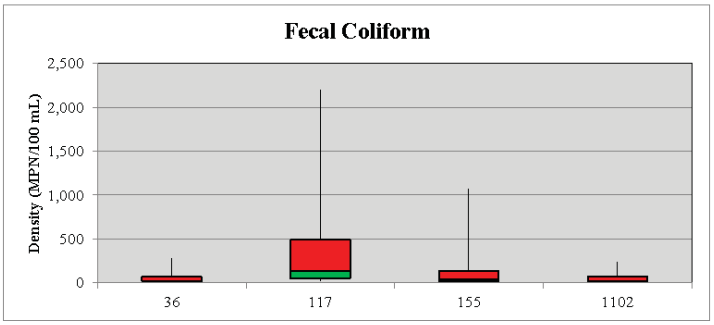


**Figure A.13. Fecal Coliform boxplot**

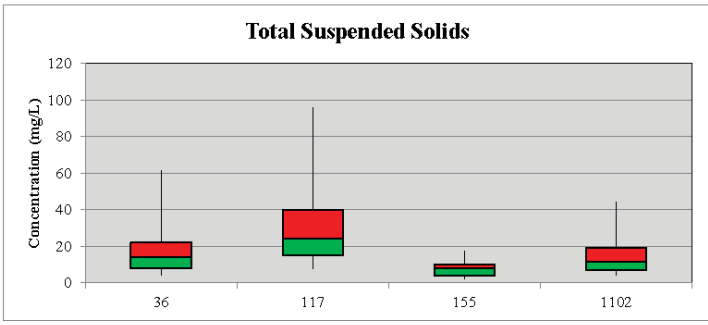


**Figure A.14. Total suspended solids boxplot**

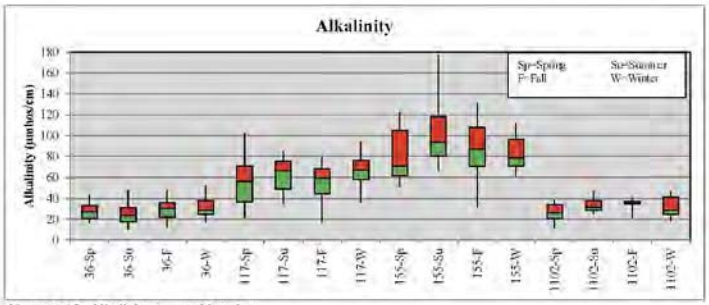


Figure A.15. Alkalinity seasonal boxplot

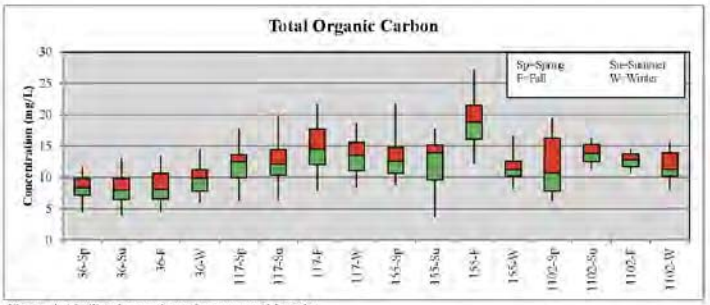


Figure A.16. Total organic carbon seasonal boxplot

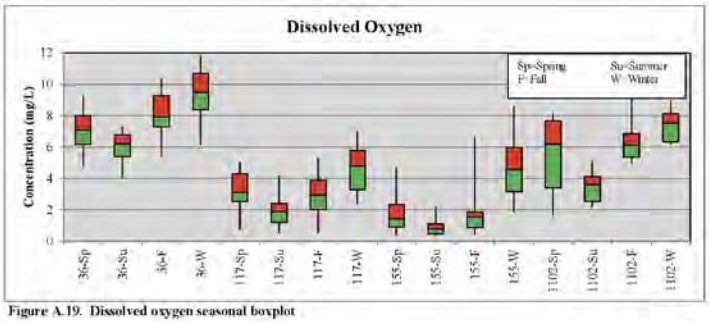


Figure A.19. Dissolved oxygen seasonal boxplot

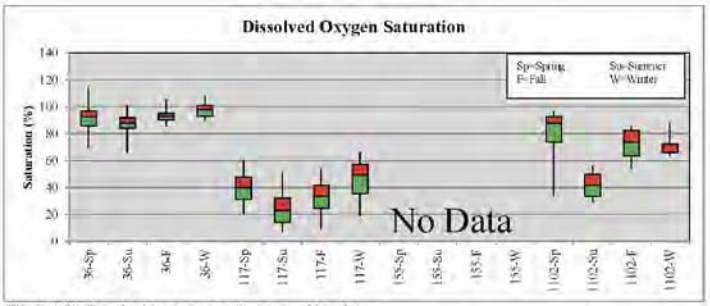


Figure A.20. Dissolved oxygen saturation seasonal boxplot

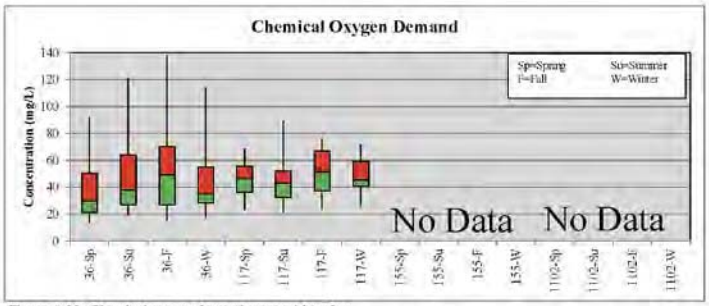


Figure A.23. Chemical oxygen demand seasonal boxplot

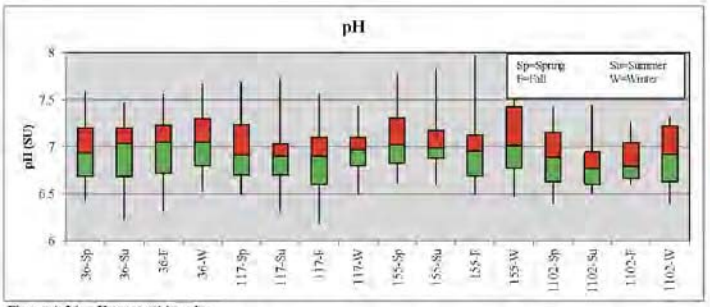


Figure A.24. pH seasonal boxplot

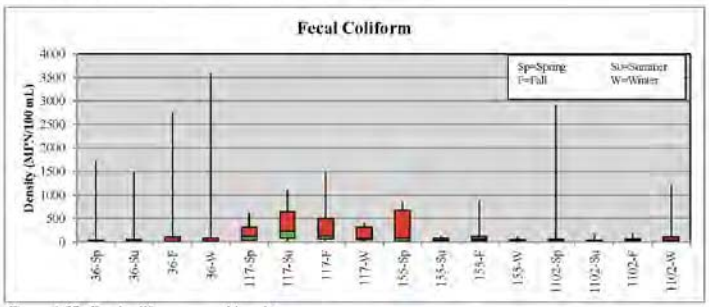


Figure A.27. Fecal coliform seasonal boxplot

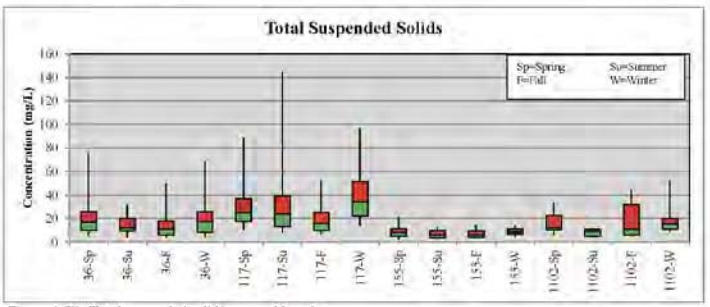


Figure A.28. Total suspended solids seasonal boxplot

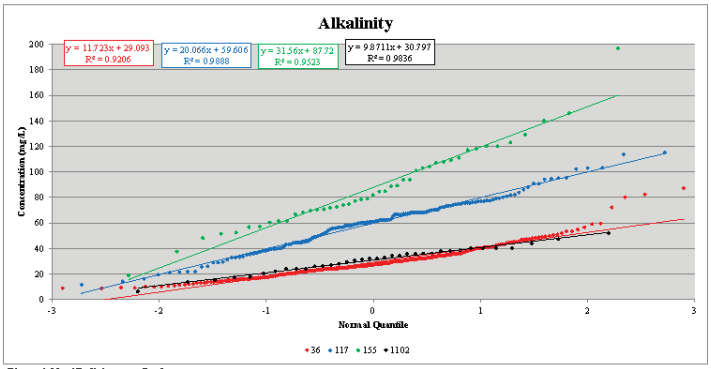


Figure A.29. Alkalinity quantile plot

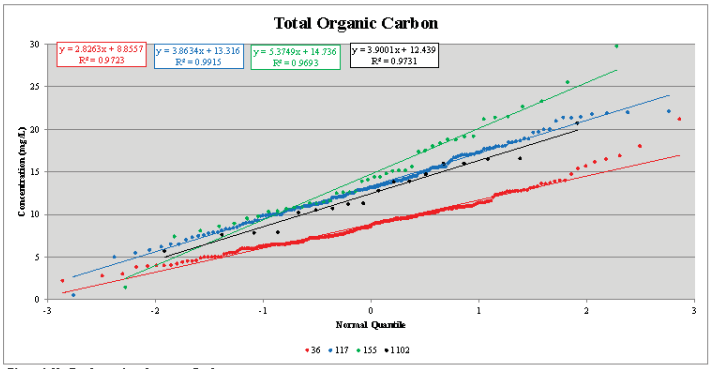


Figure A.30. Total organic carbon quantile plot

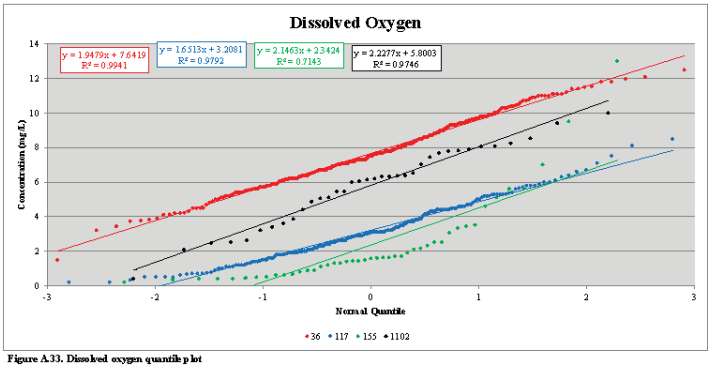


Figure A.33. Dissolved oxygen quantile plot

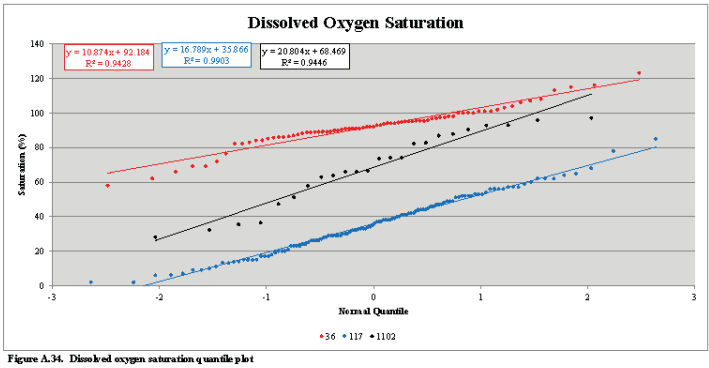


Figure A.34. Dissolved oxygen saturation quantile plot

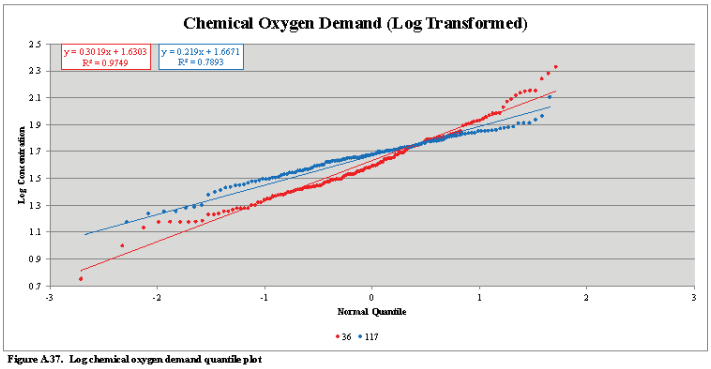


Figure A.37. Log chemical oxygen demand quantile plot

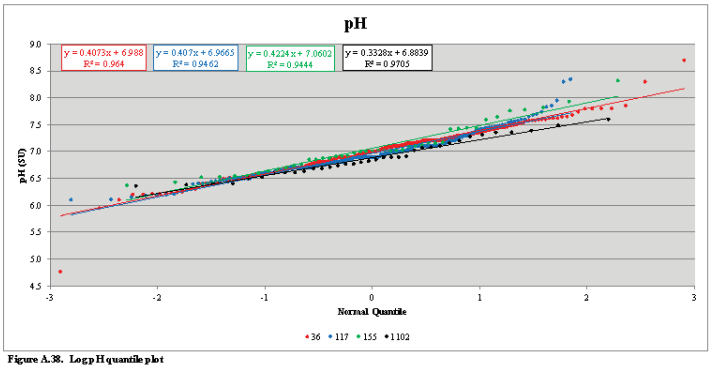


Figure A.38. Log pH quantile plot

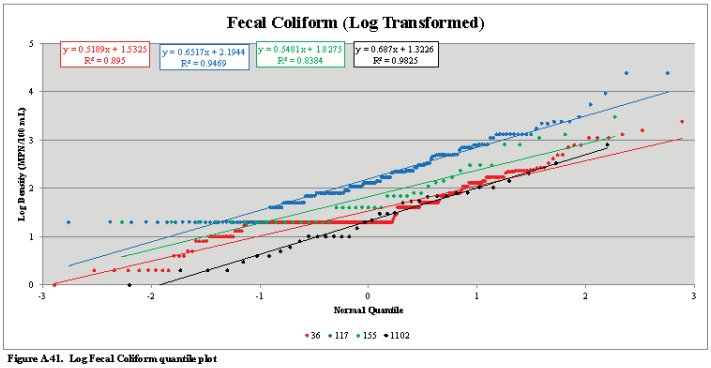


Figure A.41. Log Fecal Coliform quantile plot

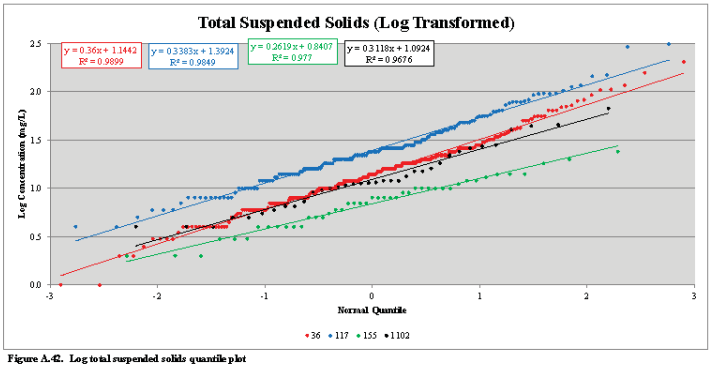


Figure A.42. Log total suspended solids quantile plot

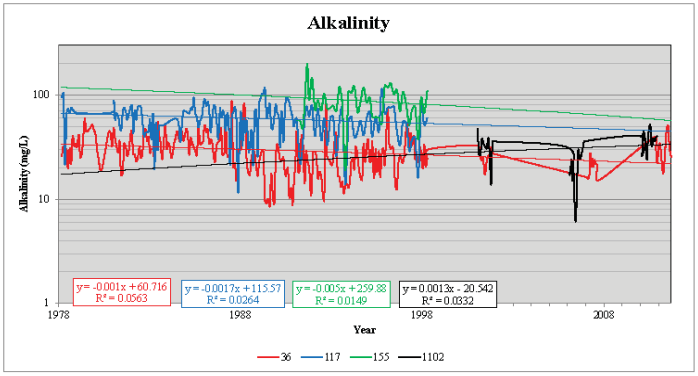


Figure A.43. Alkalinity trend

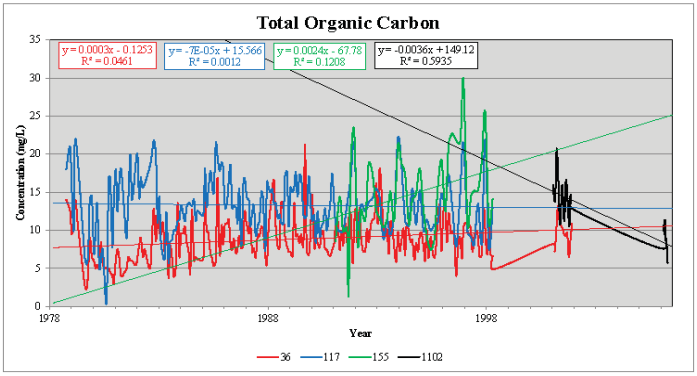


Figure A.44. Total organic carbon trend

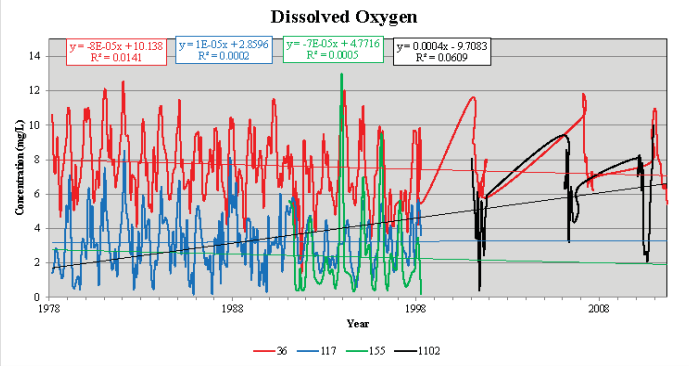


Figure A.47. Dissolved oxygen trend

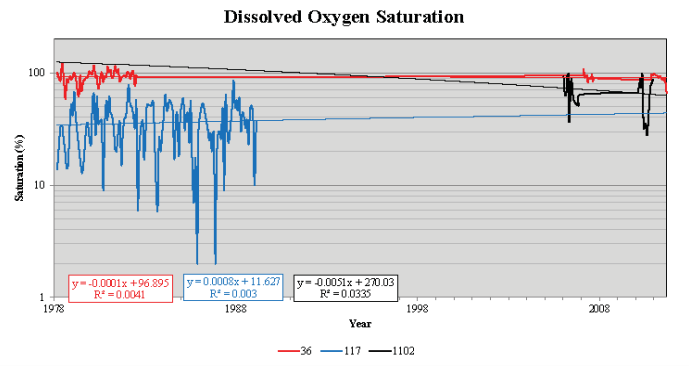


Figure A.48. Dissolved oxygen saturation trend

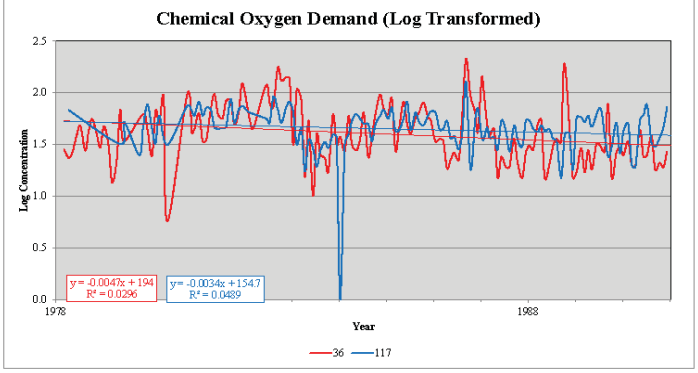


Figure A.51. Log chemical oxygen demand trend

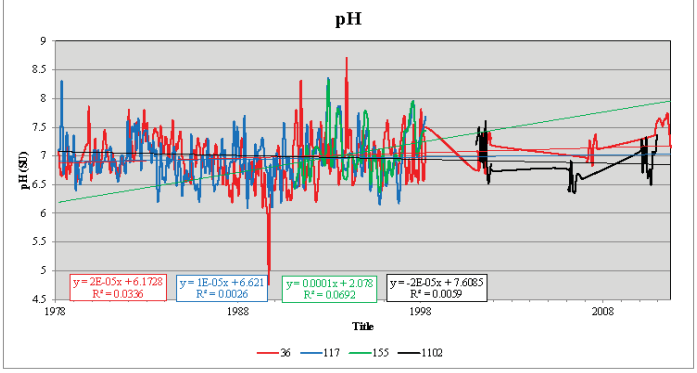


Figure A.52. pH trend

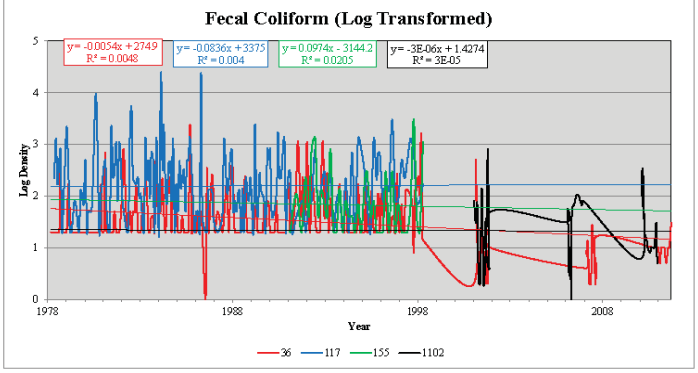


Figure A.55. Log fecal coliform trend

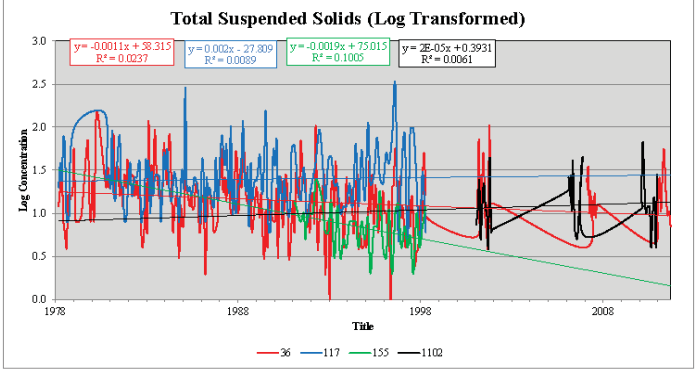


Figure A.56. Log total suspended solids trend