

REPORT SUMMARY

LCA Six Conditionally Authorized Projects WRDA 2007 Title VII Section 7006 (e) (3) August 18, 2010

The 2004 Louisiana Coastal Area, Ecosystem Restoration Study (LCA Report) by the United States Army Corps of Engineers (USACE) identified a number of critical projects for implementation in the Louisiana Coastal Area (LCA) to restore ecosystem degradation in Louisiana. This Report Summary includes six conditionally authorized projects included in WRDA 2007.

- Amite River Diversion Canal Modification (Vol. II) - **p.3**
- Convey Atchafalaya River Water to Northern Terrebonne Marshes and
- Multipurpose Operation of the Houma Navigation Lock (Vol. III) - **p.18**
- Small Diversion at Convent/Blind River (Vol. IV) - **p.35**
- Terrebonne Basin Barrier Shoreline Restoration (Vol. V) - **p.49**
- Medium Diversion at White Ditch (Vol. VI) - **p.65**

The project Study Area locations are shown in Figure 1.

Dates:

Feasibility Scoping Meeting:	14 JUL 2009
Alternative Formulation Briefing:	13 – 14 APR 2010
AFB Guidance Memorandum:	21 APR 2010
Draft Report Guidance Memorandum:	04 MAY 2010
Division Engineer Transmittal:	09 SEP 2010
Received at CECW-PC:	05 AUG 2010
CWRB Briefing:	27 AUG 2010
30-Day S&A Review start:	08 OCT 2010
30-Day S&A Review end:	06 NOV 2010
FEIS filed with EPA:	01 OCT 2010

Study Authority. Under the 2007 Water Resources Development Act (WRDA), Section 7006, the LCA Program has authority for feasibility-level reports of six near-term critical restoration features. The excerpt below from WRDA outlines the project authority for the six near-term critical restoration features which are summarized here:

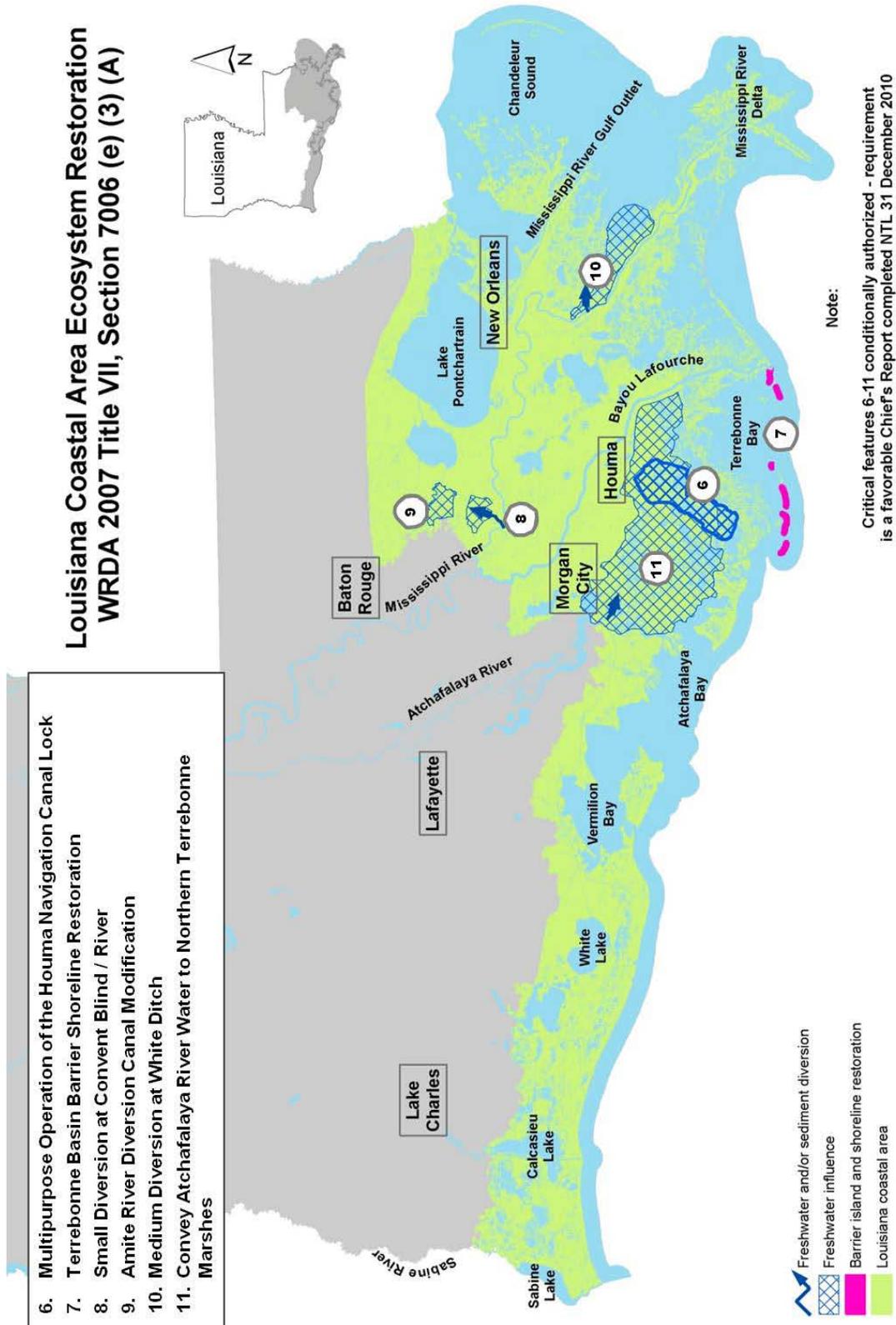


Figure 1: Louisiana Coastal Area - Project Study Areas

SEC. 7006. CONSTRUCTION.**(e) ADDITIONAL PROJECTS****(3) PROJECTS SUBJECT TO REPORTS.—**

(A) FEASIBILITY REPORTS.—Not later than December 31, 2008, the Secretary shall submit to Congress feasibility reports on the following projects referred to in the restoration plan:

- (i) Multipurpose Operation of Houma Navigation Lock at a total cost of \$18,100,000.
- (ii) Terrebonne Basin Barrier Shoreline Restoration at a total cost of \$124,600,000.
- (iii) Small Diversion at Convent/Blind River at a total cost of \$88,000,000.
- (iv) Amite River Diversion Canal Modification at a total cost of \$5,600,000.
- (v) Medium Diversion at White's Ditch at a total cost of \$86,100,000.
- (vi) Convey Atchafalaya River Water to Northern Terrebonne Marshes at a total cost of \$221,200,000.

(B) CONSTRUCTION.—The Secretary may carry out the projects under subparagraph (A) substantially in accordance with the plans and subject to the conditions, recommended in a final report of the Chief of Engineers if a favorable report of the Chief is completed by not later than December 31, 2010.

(4) CONSTRUCTION.—No appropriations shall be made to construct any project under this subsection if the report under paragraph (2) or paragraph (3), as the case may be, has not been approved by resolutions adopted by the Committee on Transportation and Infrastructure of the House of Representatives and the Committee on Environment and Public Works of the Senate.

In the course of initiating the feasibility studies, two elements were determined to be hydrologically intertwined and the planning efforts were combined:

- Convey Atchafalaya River Water to Northern Terrebonne Marshes
- Multipurpose Operation of the Houma Navigation Lock

As a result, the feasibility reports were structured into six primary volumes and a Summary Report which provided the basis for this Report Summary. This Report Summary addresses the following elements:

- Amite River Diversion Canal Modification
- Convey Atchafalaya River Water to Northern Terrebonne Marshes and Multipurpose Operation of the Houma Navigation Lock
- Small Diversion at Convent/Blind River
- Terrebonne Basin Barrier Shoreline Restoration
- Medium Diversion at White Ditch

Study Sponsor. The sponsor for these six conditionally authorized projects is the Louisiana Coastal Protection and Restoration Authority (CPRA) acting for the State of Louisiana.

LCA Amite River Diversion Canal Modification

SPECIFIC STUDY INFORMATION

Study Purpose and Scope. The purpose of the LCA Amite River Diversion Canal (ARDC) Modification Study is to fulfill the need for a feasibility-level report and associated National Environmental Policy Act (NEPA) documentation. This report is a final response to the study authority. The purpose of the LCA ARDC Modification Project is to address the systematic

restoration of bald cypress-tupelo swamp in areas of the Maurepas swamp affected by the Amite River Diversion Canal (ARDC), and consider measures to reduce future bald cypress-tupelo swamp degradation and conversion, restore sheet flow impaired by dredged material bank construction, and protect vital socioeconomic and public resources. This study only addresses ecosystem restoration.

Project Location/Congressional District. The LCA ARDC Modification Study Area is located within the western Maurepas Swamp approximately 28 miles southeast of the City of Baton Rouge and west of Lake Maurepas. The Study Area is within Ascension and Livingston Parishes in Congressional District 6. The Study Area is shown on Figure 2 at the end of the section.

Prior Reports and Existing Water Projects. This study builds upon the following key reports and studies identified in Table 1. Alternative plans for this study were formulated based upon the 2004 LCA Report and the project description contained within that report.

Table 1: Relevance of Prior Reports and Existing Water Projects to the LCA ARDC Modification Integrated FS/SEIS

	Relevance to LCA ARDC Modification				
	Data Source	Consistency	Structural Measures	Non-Structural Measures	Future Without Project Condition
Comprehensive Planning Studies					
Coast 2050 Plan, 1999	X		X	X	
LCA Report, 2004	X	X	X	X	X
Louisiana's Comprehensive Master Plan for a Sustainable Coast, 2007	X	X	X	X	X
LACPR, 2009	X	X	X		
Prior Reports and Water Projects					
Prior Studies and Reports Incorporated by Reference	X		X	X	
Amite River and Bayou Manchac, 1928	X	X			X
Mississippi River & Tributaries (MR&T), 1928	X	X			X
AR&T, 1956	X	X			X
Comite River Diversion	X	X			X
LCA Small Diversion at Hope Canal (1,000 – 5,000 cfs)	X	X	X	X	X
LCA Small Diversion at Convent/Blind River (1,000 – 5,000 cfs)	X	X	X	X	X

	Relevance to LCA ARDC Modification				
	Data Source	Consistency	Structural Measures	Non-Structural Measures	Future Without Project Condition
Hydrologic Restoration in Swamps West of Lake Maurepas	X	X	X	X	X
Bald cypress/Tupelo Coastal Forest, Pontchartrain Basin	X	X	X	X	X
CWPPRA Projects Authorized for Design	X	X	X	X	X

Federal Interest. This project was identified in the 2004 LCA Report completed by USACE as a critical, near-term, ecosystem restoration project. Ecosystem restoration is one of the primary missions of the USACE Civil Works Program with the objective to contribute to national ecosystem restoration (NER).

The Maurepas Swamp complex is significant as the second largest continuous coastal forest in Louisiana, comprising over 190,000 acres of freshwater swamp habitat. The LCA ARDC Modification Study Area is an essential ecosystem since it includes wetland habitats and provides high fish and wildlife value as well as habitat for migratory birds and other aquatic organisms which include threatened or endangered species.

STUDY OBJECTIVES

Problems and Opportunities. The primary problem within the LCA ARDC Modification Study Area is ecosystem degradation of the freshwater swamps adjacent to the ARDC. The natural hydrology within the area was modified by construction of the ARDC (1964) and a railroad grade during the 1800s. During construction of the ARDC, material dredged from the ARDC was deposited along the canal banks. This material is a barrier between the ARDC and the adjacent ecosystems. The presence of the spoil bank and railroad grade impounded the swamp with semi-permanent ponding in areas. Sea level rise (Gornitz et al., 1982) and geological subsidence have compounded the effects of these modifications. The modification of the hydrology within the Study Area has led to hydrologic isolation; impoundment of water including storm surge-related, higher salinity water; and lack of freshwater, sediment and nutrient inputs all of which have contributed to the degradation and conversion of the freshwater swamps to freshwater marsh and open water habitats.

Opportunities identified include:

- Improve the hydrologic processes impaired by dredged material berm construction, including connectivity, sheet flow, and freshwater nutrient inflow and outflow
- Prevent future bald cypress swamp degradation and transition currently predicted to occur
- Improve areas that have been degraded and transitioned to freshwater marsh or open water
- Protect vital socioeconomic and public resources

Planning Objectives. Investigation led to the establishment of the following planning objectives within the Study Area over the 50-year period of analysis:

- Increase hydrologic connectivity between the degraded swamp and bottomland hardwood habitats within the Study Area and the ARDC by increasing the exchange of freshwater, sediments, and nutrients over the 50-year period of analysis.
- Reduce habitat conversion of swamp to open water within the Study Area over the 50-year period of analysis.
- Facilitate natural hydrologic cycle within the Study Area over the 50-year period of analysis by reducing impoundment in degraded swamp and bottomland hardwood habitats adjacent to the ARDC to improve tree productivity and seedling germination.
- Improve fish and wildlife habitat within the Study Area over the 50-year period of analysis.

Planning Constraints. Planning constraints include:

- Flood Control: The ARDC is a component of the AR&T (1956) flood control channel. Project plans must not significantly decrease the performance and original intent of the ARDC and the Amite River and Tributaries (AR&T) project.
- Designated Scenic Rivers: Blind River, located within the study area, is a designated Scenic River. Designated Scenic Rivers are protected by a set of use restrictions including channelization, clearing and snagging, channel realignment, reservoir construction, and commercial cutting or harvesting of trees or timber in violation of the Louisiana Scenic Rivers Act.
- Hydroperiod: Water levels within the ARDC exhibit seasonal high channel flow and low channel flow intervals. The natural variability of the hydroperiod necessitates a project design that allows the project to function as intended under a variety of flow regimes.

ALTERNATIVES

Plan Formulation Rationale. During the first step of the planning process, a list of measures was developed based on the strategies of freshwater reintroduction, channel restoration, and habitat restoration.

Management Measures and Alternative Plans. Many methods to achieve those strategies were explored and the final list included 105 separate measures including structural and non-structural measures. Of the original list of 105 measures, 91 were screened out based on project objectives, constraints, effectiveness and practicality. Project screening is documented in Volume II, Section 3 of the integrated report.

Fourteen measures were retained for further study. The fourteen measures were combined and developed into an initial array of 45 alternatives in addition to the No Action Alternative. These 45 alternatives were screened based on their ability to address project objectives, information from field reconnaissance, effectiveness of the alternative, and any potential adverse impacts.

Final Array of Alternatives. The final array of alternatives included 7 alternatives and the No Action Alternative. Excluding the No Action Alternative, the final array of alternatives are:

- Alternative 33 (Recommended Plan) – Three openings in the north bank of the ARDC in NE-2 with the westernmost cut also extending through the railroad grade into NE-1; bifurcated conveyance channels; sidecasting of dredged material; one cut in the railroad grade located approximately 0.9 miles north of the ARDC in NE-1/NE-2; dredged material berm and swamp floor vegetative plantings
- Alternative 34 – One opening in the south bank of the ARDC in SE-1 west of and within close proximity to the railroad grade that extends east and through the railroad grade between SE-1/SE-2 into SE-2; bifurcated conveyance channels; sidecasting of dredged material; two cuts in the railroad grade located 0.9 and 2 miles south of the ARDC in SE-1/SE-2; dredged material berm and swamp floor vegetative plantings
- Alternative 35 – One opening in the south bank of the ARDC in SE-1; bifurcated conveyance channels; sidecasting of dredged material; dredged material berm plantings
- Alternative 36 – Combination of Alternative 33 and 34
- Alternative 37 – Combination of Alternative 34 and 35
- Alternative 38 – Combination of Alternative 33 and 35
- Alternative 39 (NER)– Combination of Alternative 33, 34, and 35

Comparison of Alternatives. Each alternative within the final array was evaluated for cost-effectiveness through Cost-Effectiveness/ Incremental Cost Analysis (CE/ICA) by utilizing the IWR Planning Suite software. Of the actions considered cost-effective by the CE/ICA analysis, some are given the designation of being considered a Best-Buy, meaning the proposed action provides the greatest increase in output for the least increases in cost. Based on the results of the IWR Planning Suite analysis, no alternatives were eliminated from consideration.

The effects of the alternatives within the final array were evaluated against the No Action Alternative in order to determine their overall impact over the 50-year period of analysis of the project. Alternatives were then compared to each other. This includes environmental impacts to significant resources, Wetland Value Assessment (WVA) benefits, cost and contributions to project goals, planning objectives and constraints, contributions to the Federal objective, and the Principles and Guidelines (P&G)'s four evaluation criteria (completeness, effectiveness, efficiency and acceptability). The Project Development Tea (PDT) then ranked the alternatives based restoration opportunities provided by each alternative and do not take into account the WRDA 2007 authorized funding limit.

Table 2 shows the comparison of the alternatives in the final array in order of decreasing benefits (AAHU). In the PDT ranking, Alternative 33 ranked above Alternative 37 because 33 addressed all of the critical areas while 37 did not address NE-2; otherwise, the PDT ranked the projects as shown on the table.

Table 2: Alternative Costs, Benefits, and IWR-PLAN Results LCA ARDC Modification

Alt.	AAHUs	Total Construction Cost	Annualized Cost*	Annualized Cost/AAHU	Cost-effective (Yes/ No/ Best Buy)
39	1,602	\$7,700,000	\$394,000	\$250	Best Buy
36	1,268	\$6,870,000	\$351,000	\$280	Yes
38	1,013	\$4,550,000	\$236,000	\$230	Best Buy
37	922	\$4,210,000	\$217,000	\$240	Yes
33	679	\$3,780,000	\$197,000	\$290	Yes
34	589	\$3,370,000	\$174,000	\$300	Yes
35	334	\$1,090,000	\$61,000	\$180	Best Buy

*Costs represent preliminary cost estimates used for IWR and planning purposes only and do not represent a fully-funded cost estimate.

Key Assumptions. The following assumptions are key to the success of the project:

- The rainfall-driven conditions of the Amite River watershed will remain unchanged; therefore, the hydrologic cycles within the ARDC will also remain unchanged.
- The net effects of local subsidence and sea level rise will not deviate significantly from the numbers estimated for this study.
- The conveyance channels would be naturally altered over time but would remain functional, eventually reaching a state of hydrologic stability.

Recommended Plan.

Alternative 33, which addresses the most-highly degraded portion of the study area (NE-2) and provides benefits within NE-1, has been chosen as the Recommended Plan. The Recommended Plan would dredge openings in the existing ARDC dredged material berm, construct bifurcated conveyance channels, and establish vegetative tree plantings in the study area.

Alternative 33 was chosen based on the WVA modeling results, IWR Planning Suite analysis, and the impacts on significant resources found within the study area. Alternative 33 is shown in Figure 3 at the end of the section. Table 3 summarizes the project costs and benefits of both the Recommended and NER plan. Risk and uncertainty were evaluated for the Recommended plan,

Alternative 33 (Recommended Plan) would meet the established project objectives by restoring and benefitting 1,602 acres of freshwater swamp habitat; creating a net of 679 AAHUs; creating 5.0 acres of bottomland hardwood habitat; establishing hydrologic connectivity between the ARDC and the western Maurepas Swamp; reducing the likelihood of the swamp being converted to marsh or open water, promoting the germination and survival of the seedlings of bald cypress and other trees; and improving biological productivity and reducing further habitat deterioration.

Alternative 33 addresses the most degraded portion of the Study Area (NE-2). Alternative 33 is an implementable increment of the NER plan, is within the cost and scope of the WRDA 2007 authorization, has stand-alone utility, can be justified based on sustainable ecosystem restoration benefits.

The fully-funded project cost (Micro-Computer Aided Cost Estimating System [MCACES]) estimated for construction of this alternative would be \$8,540,000

National Ecosystem Restoration Plan- Based on the results of the WVA modeling, the IWR Planning Suite analysis, and the impacts of alternative

plans along with comparisons to the future without project condition, Alternative 39 was chosen to be the NER plan. The non-Federal sponsor supports Alternative 39 as the NER plan and believes it represents the long-term restoration need for the area. However, Alternative 39 exceeds the authorized funding limit in WRDA 2007.

Table 3: LCA ARDC Modification Comparison of NER and Recommended Plan

	Alt. 33 (RP)	Alt. 39 (NER)
AAHUs	679	1,602
Cost-effective (Yes/No/Best Buy)	Yes	Best Buy
\$Annualized Cost/AAHU *	\$660	\$480
MCACES Total Project Cost	\$8,540,000	\$15,200,000
Authorized Cost in WRDA Title VII, Section 7006 (e)(3)(A) for the LCA ARDC Modification		\$5,600,000
Maximum Cost Limited by Section 902**		\$10,760,000

*Based on initial cost estimate not the MCACES cost.

**Includes inflation and monitoring and adaptive management costs.

Systems/Watershed Context. The LCA ARDC Modification will improve hydrologic connectivity which would allow nutrients and sediments to be introduced from the ARDC into the adjacent swamp during flood events and from runoff during localized rainfall events. Nutrients and sediment delivered to the swamp would improve biological productivity. Establishment of hydrologic connectivity would reduce the likelihood of the swamp converting to marsh or open water. Reversing this decline will help develop a more sustainable ecosystem which can serve to protect the local environment, economy, and culture.

The Maurepas Swamp has been an area of interest for ecosystem restoration. This project would complement, but is independent of, two other proposed LCA projects (LCA Small Diversion at Hope Canal and LCA Small Diversion at Convent/Blind River) and two proposed Coastal Impact Assistance Program (CIAP) projects (Hydrologic Restoration in Swamps West of Lake Maurepas and Bald Cypress/Tupelo Coastal Forest Protection). The CIAP projects are being proposed by Livingston Parish. Cooperating Federal agencies for this project include NOAA, USFWS, NRCS, and USEPA. **Environmental Operating Principles.** The Environmental Operating Principles (EOP)s inform the plan formulation process. Sustainability, consideration of environmental consequences, building a shared knowledge base to support greater understanding of the environment, and respecting the views of individuals and groups were directly applicable to this project.

Peer Review. Agency Technical Review (ATR) was managed by the Ecosystem Restoration Planning Center of Expertise (ECO-PCX) in MVD. The ATR was performed by a team composed of District staff of the Norfolk District and Baltimore District in NAD, Wilmington District and Jacksonville District in SAD, Rock Island District in MVD and Walla Walla District in NWD. All comments have been addressed and closed and the report has been revised to reflect the comments. ATR certification was received on March 8, 2010.

An Independent External Peer Review (IEPR) was conducted for the project in accordance with procedures described in the Department of the Army, U.S. Army Corps of Engineers, Engineer Circular No. 1165-2-209, Civil Works Review Policy, dated 31 January 2010, and the Office of Management and Budget Final Information Quality Bulletin for Peer Review (16 December 2004). IEPR began on April 27, 2010. The panel submitted their Final IEPR Report on June 23, 2010. The IEPR panel identified 11 final comments. The comments and responses were discussed during a conference call on July 19, 2010 between the USACE PCX, project team, State of Louisiana, the IEPR panel members and Battelle. All comments have been resolved, closed out in Dr Checks and addressed within the report. Battelle provided a pdf printout of the DrChecks project file on August 11, 2010.

EXPECTED PROJECT PERFORMANCE

Table 4 and Table 5 and **Error! Reference source not found.** show the project costs and benefits. Table 6 shows the cost sharing amounts for the Federal government and non-Federal sponsor.

Project Costs.

Table 4: Cost Summary – LCA ARDC Modification

Construction Item		Cost*
Lands & Damages		\$180,000
Elements		
	Relocations	\$0
	Fish & Wildlife	\$2,970,000
	Channel Improvements	\$4,120,000
	Subtotal	\$7,091,000
Preconstruction Engineering & Design (PED)		\$494,000
Construction Management (E&D, S&A)		\$371,000
Total First Cost		\$8,136,000
HTRW Remedial Action**		\$0

*October 2010 Price Levels

**Associated financial costs that are not part of the recommended Federal Project but are a necessary non-Federal responsibility.

E&D = Engineering and Design; S&A = Supervision and Administration

Equivalent Annual Costs and Benefits.

Table 5: Equivalent Annual Benefits and Costs – LCA ARDC Modification

Investment Costs		
	Total Project Construction Costs	\$8,136,000
	Interest During Construction	\$223,000
	Total Investment Cost	\$8,540,000
Average Annual Costs		
	Interest and Amortization of Initial Investment (additional annual costs if applicable)	\$479,000
	OMRR&R	\$10,000
	Total Average Annual Costs	\$489,000
	Net NER Annual Benefits	679 AAHU's

October 2010 Price Level, 50-year Period of Analysis, 4.375 Percent Discount Rate

Cost Sharing.

Table 6: Cost Sharing - LCA ARDC Modification

Item	Federal Cost	Non-Federal Cost	Total Cost
Ecosystem Restoration (ER)	\$ 2,795,000	\$ 1,325,000	\$4,120,000
PED	\$321,000	\$173,000	\$494,000
LERR&D	\$0	\$180,000	\$180,000
S&A	\$241,000	\$130,000	\$371,000
Total Project	\$ 3,357,000(65)	\$ 1,808,000(35)	\$5,165,000
Monitoring	\$1,931,000(65)	\$1,040,000(35)	\$2,970,000
Total with Monitoring Costs	\$ 5,288,000(65)	\$ 2,848,000(35)	\$8,136,000

*October 2010 Price Level

LEER&D = Lands, easements, rights-of-ways, utility of public facility relocations, and disposal areas

Project Implementation. The CPRA, acting for the State of Louisiana, is the non-Federal sponsor. The cost share for the planning, design and construction of the project will be 65% Federal and 35% non-Federal. CPRA must provide all lands, easements, rights-of-way, utility or public facility relocations, and disposal areas (LERRDs) required for the project. Operation, maintenance, repair, replacement and rehabilitation (OMRR&R) of the project would be a 100% CPRA responsibility. A feasibility-level monitoring and adaptive management plan has been developed for the project and is included in the report. The monitoring and adaptive management plan was developed to include the proposed monitoring and to consider and identify any necessary adaptive management activities.

Operation, Maintenance, Repair, Rehabilitation, and Replacements. OMRR&R requirements for Alternative 33 (Recommended Plan) will include a yearly inspection of the bank opening locations and conveyance channels to ensure that there are no flow interruptions, such as from debris or fallen trees. Upon inspection it would be determined if blockage removal or some other appropriate remedial operation is required. It is anticipated that little to no attempt to maintain the depth or shoreline geometry of the conveyance channels would be necessary once they stabilize. The non-Federal sponsor would be required to enforce any restrictions as identified in the easements to ensure that the benefits are retained.

Key Social and Environmental Factors.

Cumulative impacts would be the effects of the recommended plan with the additive combination of impacts and benefits for overall net acres nourished and protected by other Federal, state, local and private restoration efforts. Implementation of Alternative 33 (Recommended Plan) would reverse the conversion of swamp habitat to open water and would improve 1,602 acres of swamp habitat and create 5.0 acres of upland habitat within the Study Area. The project would have environmental impacts with 2.6 acres of soils along ARDC berms and 28.6 acres of existing swamp soils impacted by the construction of conveyance channels. That sediment would be used to construct 5.0 acres of bottomland hardwood islands. There would be 18.6 acres of deepwater water bottoms created from the construction of the conveyance channels. Dissolved organic compounds and detritus from the swamp would increase. The water purification function of the swamp would increase. Water quality and the overall health of the forested swamp would improve. Noise levels would return to preconstruction conditions. Upland habitat would be created and would simulate existing upland and riparian habitat. Wetland creation and nourishment would alter the plankton and benthic community and would result in greater resources for these organisms. This project would have little or no effect on other social factors

in the area. Most of the Study Area is uninhabited. Appealing viewsapes supporting ecotourism as one travels Louisiana's Scenic Byways and remote areas would be maintained. There would be a reduced level of infrastructure damages and relocation compared to the No-Action Alternative.

Environmental easements would be implemented within the areas of impact. The restoration of the forest would result in localized storm surge protection and a decrease in wave heights. Overall, the fishing industry would be more stable near the study area due to a long-term increase in the quality of fisheries habitat.

The project will provide positive ecosystem benefits. Temporary negative impacts will be compensated for by the creation of new bottomland hardwood habitat and restoration of forested freshwater swamps. No mitigation measures are needed.

Stakeholder Perspectives and Differences.

A notice of intent (NOI) to prepare a draft Supplemental Environmental Impact Statement (SEIS) for the LCA ARDC Modification Study was published in the Federal Register in December 2008. A public scoping meeting was held in February 2009. Various other meetings have occurred with local land-owners, the Lake Pontchartrain Basin Foundation, the Coalition to Restore Coastal Louisiana, the Louisiana Conservation Fund, and Ascension and Livingston Parishes. The Draft FS/SEIS was released to the public in May 2010, followed by a 45-day public review period which included a public meeting. Public comments were received during the scoping meeting and Draft FS/SEIS public review and have been incorporated into the report. Meetings and discussions with the public and local, state and federal agencies and the PDT indicate support for the project and did not identify any areas of controversy or unresolved issues.

All public and agency comments are documented in Volume II Appendix G. Specific comments have included:

- The need for more than just hydraulic restoration. There is a need to restore the swamp and ecology of the area including cypress plantings and nutria control to help restore the swamp.
- DEQ favors the project and is excited about the opportunity to go in and restore something that has been slowly degrading
- NGO recommends going beyond authorization and implementing NER versus the recommended plan

Environmental Compliance. The NEPA documentation included with the feasibility report was written to the level of an environmental impact statement (EIS). A draft Record of Decision has been developed and provided for HQUSACE review

State and Agency Review. State and agency review of the final FS/EIS will occur from October 8, 2010, to November 6, 2010.

Certification of Peer and Legal Review. This project has undergone the following reviews and certification or approval was granted in the associated date:

- Agency Technical Review – 3/8/2010
- Legal Adequacy – Pending
- Cost Engineering –Memorandum Received 3/29/2010
- Real Estate – 7/28/2010

Legal review - A status of legal review was included in the report transmittal package. Final legal certification will be completed once formal consultations with the USFWS are complete and their Biological Opinions and recommendations have been integrated in the appropriate project SEIS documents.

Cost certification - The feasibility certification of cost estimate will not be provided for any of the projects addressed in this report due to the lack of specific detailed engineering design data. Cost estimates have been reviewed by the Cost DX and adjusted appropriately for the level of design detail. CEMVN has coordinated the issue with the vertical team. The District, Division and RIT think that the risk of moving forward absent certification is acceptable.

Policy Compliance Review. This project is currently undergoing the policy compliance review process.

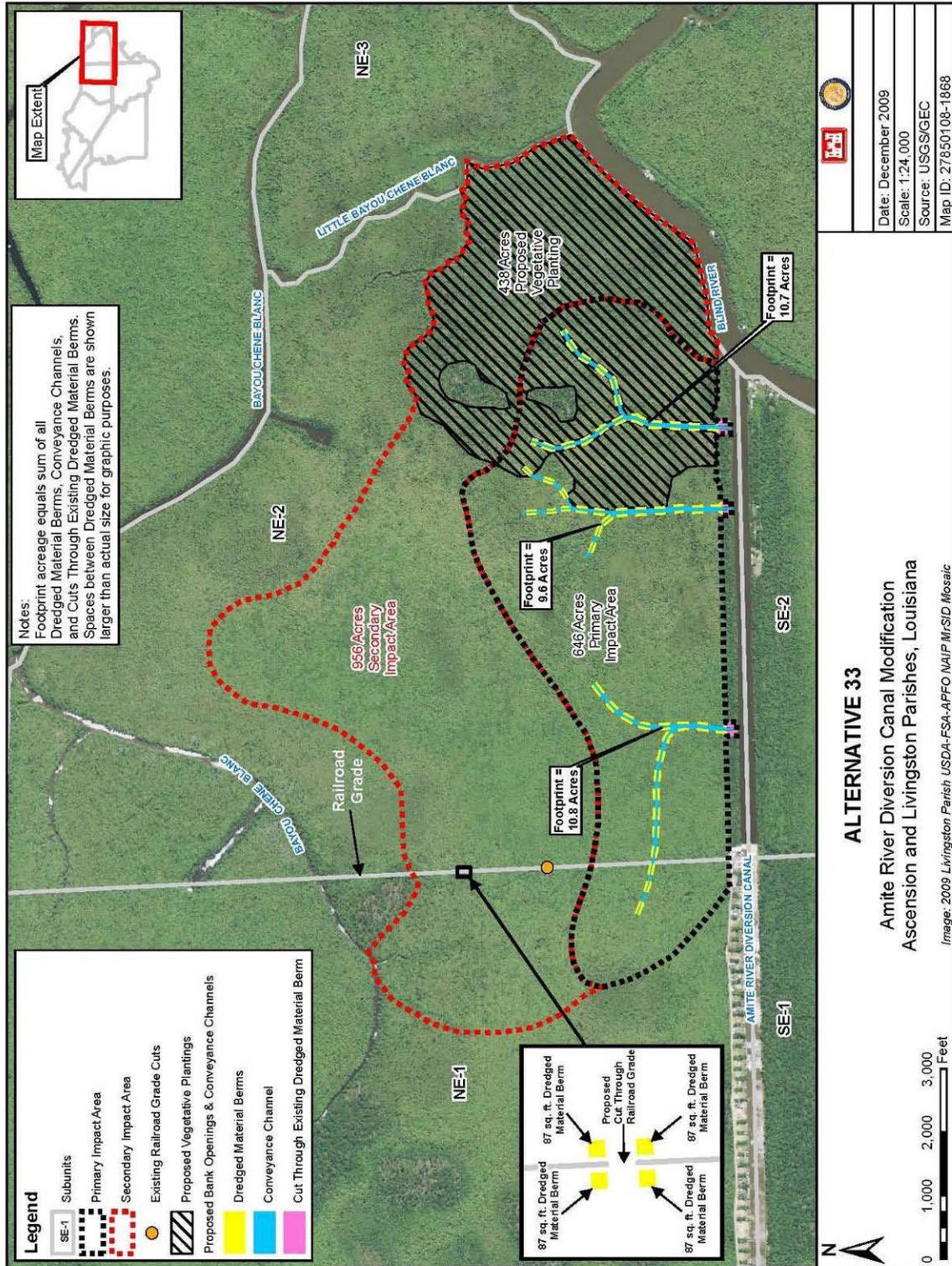


Figure 3: LCA ARDC Modification Recommended Plan (Alternative 33)

LCA Convey Atchafalaya River Water to Northern Terrebonne Marshes and LCA Multipurpose Operation of the Houma Navigation Lock.

Study Purpose and Scope. The purpose of the LCA Convey Atchafalaya River Water to Northern Terrebonne Marshes (ARTM) and Multipurpose Operation of Houma Navigation Lock (MOHNL) Studies are is to fulfill the need for feasibility-level reports and associated NEPA documentation. This report is a final response to the study authority. These two projects were hydrologically intertwined and were consequently combined for analysis; the combined project is referred to as the LCA ARTM Project. The purpose of the LCA ARTM Project is to reduce the current trend of marsh degradation in the Study Area resulting from subsidence, sea level rise, erosion, saltwater intrusion, and lack of sediment and nutrient deposition. The project proposes to accomplish this by utilizing freshwater and nutrients from the Atchafalaya River and the Gulf Intracoastal Waterway (GIWW). This study only addresses ecosystem restoration.

Project Location/Congressional District. The LCA ARTM Study Area is located mostly east of Morgan City, south of Houma, and south of LaRose. The Study Area is within Lafourche, Terrebonne, and St. Mary Parishes in Congressional District 3. The Study Area is shown on Figure 4 at the end of this section.

Prior Reports and Existing Water Projects. This study builds upon the following key reports and studies identified in Table 7. Alternative plans for this study were formulated based upon the 2004 LCA Report and the project description contained within that report.

Table 7: Relevance of Prior Reports and Existing Water Projects to the LCA ARTM Integrated FS/SEIS

	Relevance to LCA ARTM				
	Data Source	Consistency	Structural Measures	Non-Structural Measures	Future Without Project Condition
Comprehensive Planning Studies					
Coast 2050, 1999	X		X	X	
Louisiana's Comprehensive Master Plan for a Sustainable Coast, 2007	X	X	X	X	X
Louisiana Coastal Protection and Restoration (LACPR), 2009	X	X	X	X	
Louisiana Coastal Area (LCA) Near Term Critical Restoration Features	X	X	X	X	X
Prior Reports and Water Projects					
An Environmental- Economic Blueprint for Restoring the Louisianan Coastal Zone: The State Plan for the Wetlands Conservation and Restoration Authority, 1994	X	X			
A White Paper- The State of Louisiana's Policy for Coastal Restoration Activities, 1995	X	X			
Section 905(b) (WRDA 1986) Analysis Louisiana Coastal Area, Louisiana—Ecosystem Restoration		X			
GIWW, 1826 and other dates	X				X
Atchafalaya Basin	X				X
Mississippi River and Tributaries (MR&T), 1928	X				X
Mississippi River Gulf Outlet, September 1956	X				
Morganza to the Gulf	X	X	X	X	X
Donaldsonville, LA to the Gulf of Mexico	X	X	X	X	X
Third Delta	X		X	X	X
Cooperative River Basin Studies	X	X	X	X	X
Watershed Reports	X	X			X
Inner Harbor Navigation Canal Lock Replacement Project, 1956	X				
Lake Pontchartrain and Vicinity, Louisiana, Hurricane Protection Project, 1965	X				
Measures undertaken pursuant to the authorization provided under the heading "Operation and Maintenance" in Title I, Chapter 3 of Division B of Public Law 109-148, as modified	X	X			X

	Relevance to LCA ARTM				
	Data Source	Consistency	Structural Measures	Non-Structural Measures	Future Without Project Condition
by Section 2304 Title II, Chapter 3 of Public Law 109-234, 2006					
Bonnet Carré Spillway	X				
Mississippi and Louisiana Estuarine Areas, 1984	X				X
Louisiana Coastal Area Louisiana, Shore and Barrier Island Erosion, 1984	X				X
Mississippi River Delta Study, 1990	X				X
Louisiana Coastal Area, Louisiana, Water Supply, 1984	X				X
Louisiana Coastal Area, Hurricane Protection, 1989	X				X
Louisiana-Texas Intracoastal Waterway, New Orleans, Louisiana to Corpus Christi, Texas, 1942	X	X			X
Mississippi River, Baton Rouge to the Gulf of Mexico, Louisiana, 1945	X				X
A Report on the Relationship of Agricultural Use of Wetlands to the Conservation of Wetlands in Cameron Parish, Louisiana, 1951	X				
Relationship of Wildlife to Agricultural Drainage and Economic Development of Coastal Marshes in Cameron Parish, Louisiana, 1951	X				
Survey and Report of Vermillion Corporation in Opposition to Project (Freshwater Bayou Canal Project), 1951	X				
Barataria Bay, Louisiana, 1958	X				X
New Orleans to Venice, Louisiana Hurricane Protection, 1962	X				
Larose to Golden Meadow Hurricane Protection Project, 1965	X				
Hydrologic and Geologic Studies of Coastal Louisiana, 1973	X				X
Environmental Atlas and Multi-Use Management Plan for South-Central Louisiana, 1973	X				
Study of Louisiana's Major Estuaries and Adjacent Offshore Waters LDWF, 1978	X				
An Ecological Characterization Study of the Chenier Plain Coastal Ecosystem of Louisiana and	X				

	Relevance to LCA ARTM				
	Data Source	Consistency	Structural Measures	Non-Structural Measures	Future Without Project Condition
Texas, 1979					
Mississippi Deltaic Plain Region Ecological Characterization, 1980	X				X
Grand Isle and Vicinity, Louisiana, Phase II General Design Memorandum, 1980	X				
New Orleans-Baton Rouge Metropolitan Area, Louisiana, 1981	X				
Deep-Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana, 1981	X	X			X
Louisiana's Eroding Coastline: Recommendations for Protection, 1982	X		X		X
Proceedings of the Conference on Coastal Erosion and Wetland Modification in Louisiana: Causes, Consequences, and Options, 1982	X		X	X	X
Louisiana Barrier Shoreline Feasibility Study, 1996	X		X		
Mississippi River Sediment, Nutrient and Freshwater Redistribution Feasibility Study, 2000	X		X		X
Atchafalaya River and Bayous Chene, Boeuf, and Black, Louisiana Feasibility Study	X	X	X	X	X
Old River complex	X	X	X		X
Caernarvon Freshwater Diversion	X		X	X	X
Davis Pond Freshwater Diversion	X	X	X	X	X
CWPPRA Projects Constructed or Under Construction	X	X	X	X	X
CWPPRA Projects Authorized for Construction	X	X	X	X	X
Greater New Orleans Hurricane and Storm Damage Risk Reduction System (HSDRRS)	X	X			X
Inner Harbor Navigation Canal (IHNC) Surge Barrier	X				

Federal Interest. This project was identified in the 2004 LCA Report completed by USACE as a critical, near-term, ecosystem restoration project. Ecosystem restoration is one of the primary missions of the USACE Civil Works Program with the objective to contribute to NER.

Louisiana's coastline represents 90% of the wetlands in the contiguous United States and is currently disappearing at an alarming rate. The Study

Area is declining and imperiled. This unique and scarce habitat has high fish and wildlife values. The Terrebonne Marshes are one of the largest expanses of critical freshwater marsh habitat in Louisiana. The Terrebonne Marshes are also a valuable stopover habitat for migratory birds.

STUDY OBJECTIVES

Problems and Opportunities. Wetlands in the Study Area are deteriorating for several reasons: 1) subsidence and sea level rise, 2) lack of sediment and nutrient deposition, 3) erosion via tidal exchange, 4) channelization, and 5) saltwater intrusion. These activities have resulted in the loss of several thousand acres of solid, vegetated marsh. Deterioration will continue unless preventative measures are taken. With continued deterioration of the marshes, the area landward will be more prone to flood during storm surges and hurricanes, as marshes serve as partial flood barriers. Additionally, the marshes of the Study Area represent an ecosystem of national importance from an environmental standpoint.

Opportunities identified include:

- **Freshwater Supply –** Re-introduction of freshwater supplies is an opportunity to restore a degraded and impaired deltaic forming process. Further, freshwater introduction has the potential to balance the altered salinity regime, improve the viability of freshwater marsh plant life and restore fish and wildlife habitats.
- **Hydraulic Distribution –** Human induced habitat fragmentation (canals) has resulted in a degraded condition whereby the limited existing freshwater supplies are directed through the Terrebonne Marshes and into the Gulf of Mexico. Opportunities exist to improve the internal distribution of freshwater to restore and improve the sustainability of freshwater marsh habitats.
- **Sediment Supply and Distribution –** The lack of marsh forming sediments from riverine environments has accelerated the degradation of all marsh types. Opportunities exist to re-introduce sediments from the Atchafalaya River and several bayous and to use onsite sediments displaced by gulf storm events to create new marsh area.
- **Sustainability –** As marsh degradation has accelerated, seasonal Gulf events have a magnified impact on the remaining marsh areas. Opportunities exist through freshwater supply and distribution and sediment supply and distribution to create a healthier marsh which will be more resistant to the normal range of gulf events.

Planning Objectives. The objective of the study is to formulate a project to provide additional freshwater, nutrients, and fine sediment to the Study Area. The introduction of additional freshwater could facilitate organic sediment deposition, improve biological productivity, and prevent further

deterioration of the marshes. Specific project objectives include, but are not limited to, the following and are applicable to all three sub-unit areas:

- Prevent, reduce, and/or reverse future wetland loss
- Achieve and maintain characteristics of sustainable marsh hydrology
- Reduce salinity levels in Study Area
- Increase sediment and nutrient load to surrounding wetlands
- Increase residence time of freshwater
- Sustain productive fish and wildlife habitat

Planning Constraints. Development and evaluation of restoration alternatives for the proposed project are constrained by a number of factors. These factors are included as either project design constraints or ecosystem constraints and include:

- Design
 - The LCA ARTM project must accomplish its goals while avoiding elevating flood levels at nearby communities.
 - The LCA ARTM project must protect vital socioeconomic resources including cultures, community, infrastructure, business and industry, and flood protection.
 - Some existing infrastructure such as navigation locks and the constrictions of the GIWW could need modification to accommodate flow regimes that support the objectives of the LCA ARTM project. Some of these constrictions and navigation features cannot be modified due to urban development in Houma, the need to maintain the GIWW for navigation, or exorbitant costs of constriction removal.
 - A substantial amount of oil and gas infrastructure exists within the Study Area. Adverse effects to oil and gas infrastructure would be minimized to the extent practicable, consistent with the goals of the project.
 - Drainage Infrastructure. The internal arrangement of small access canals would likely need to be altered to support the goals of the project. This would have to be done in a manner that would allow reasonable access to all prospective users.
- Ecosystem
 - The introduction of water and sediments should not result in the violation of established water quality standards in the Study Area.

ALTERNATIVES

Plan Formulation Rationale. The PDT developed an initial list of 17 measures based on the general strategies of freshwater supply and distribution, sediment supply and distribution, restore/maintain historic geomorphic features, invasive species management, navigation management, and vegetation management.

Management Measures and Alternative Plans. Measures were screened and evaluated on potential benefits to each subunit. From the suites of remaining general measures, 97 specific measures were combined to form eight project alternatives. These alternatives and their specific measures were then evaluated by the interagency PDT. After screening, 35 measures were eliminated because they were beyond the scope of the study authorization, cost prohibitive, environmentally damaging, their benefits could not be determined, or another feature accomplished the same purpose. Project screening is documented in Volume II Section 3 of the main report.

The 8 preliminary alternatives were analyzed in terms of the AAHUs produced, the initial cost calculations for construction and operations and maintenance; an additional alternative was added based on an increment between two other existing alternatives.

Final Array of Alternatives. The final array of alternatives included 7 alternatives and the No Action Alternative. All alternatives analyzed include modification to the operation of the Houma Navigation Canal (HNC) Lock. The final array of alternatives included:

- Alternative 2 – This alternative redistributes existing freshwater to benefit Terrebonne marshes using a variety of measures. GIWW constrictions would be eliminated. Additionally, measures to restrict, increase, and control water are proposed for each of the three subunits.
- Alternative 3 – This alternative increases Atchafalaya River inflows and redistributes existing and increased flows of freshwater. This alternative includes all the measures in Alternative 2 and two additional.
- Alternative 4 – This alternative increases freshwater flows from east of the Study Area and redistributes existing and increased flows of freshwater. This alternative includes all but one of the measures in Alternative 2, and has two additional measures in the East – Grand Bayou Area.
- Alternative 5 – This alternative increases flows from the east and west and redistributes existing and increased flows of freshwater. This alternative is a combination of Alternatives 3 and 4.
- Alternative 6 – This alternative increases Atchafalaya River inflows and improves the passage of freshwater through the GIWW while

- slowing water passage to the Gulf through the HNC. This alternative differs from Alternative 3 because Alternative 6 only includes water management measures along the GIWW. The measures to increase Atchafalaya River inflows are the same as Alternative 3.
- Alternative 7 – This alternative slows the movement of freshwater to the Gulf of Mexico and thus put additional freshwater onto northern Terrebonne marshes. The one measure in this alternative is modified operation of the proposed HNC Lock Complex.
 - Alternative 8 – This alternative redistributes existing freshwater to benefit the most critical areas of the east and central study subunits using a variety of measures. This alternative represents an increment between Alternative 7 and Alternative 2 and contains many of the features of Alternative 2.

Comparison of Alternatives. The effects of the alternatives within the final array were evaluated against the No Action Alternative in order to determine their overall impact over the 50-year period of analysis of the project. Alternatives were then compared to each other. This includes environmental impacts to significant resources, WVA benefits, cost and contributions to project goals, planning objectives and constraints, contributions to the Federal objective, and the P&G's four evaluation criteria (completeness, effectiveness, efficiency and acceptability).

Alternatives 4 and 5 were removed from consideration during the final analysis. At the TSP meeting, it was determined Alternatives 4 and 5 were not sustainable from an efficiency or acceptability standpoint. These alternatives required a large 4,000 cfs pumping station at the confluence of the GIWW and Grand Bayou. The large pump station adversely impacted the isohalines in the Barataria Basin and would have forced salt water intrusion into Bayou Lafourche.

In order to select a TSP, a separate CE/ICA was conducted on the eight alternatives in the final array using the IWR Planning Suite. Overall, the CE/ICA process resulted in Alternatives 7, 2 and 3 being designated as Best Buy plans. The first best buy plan is the most efficient plan from an incremental cost per AAHU perspective. However, if a higher level of output (AAHUs) is desired than that provided by the first best buy plan, the second best buy plan becomes the most efficient plan for producing additional output, and so on. Table 8 shows the comparison of the alternatives remaining in the final array shown in the order of the decreasing AAHU benefit.

Table 8: Alternatives Costs, Benefits, and IWR- PLAN Results, LCA ARTM and MOHNL

Alt.	AAHUs	Total Construction Cost	Annualized Cost*	Annualized Cost/AAHU	Cost-effective (Yes/No/Best Buy)
3	3,325	\$232,041,000	\$11,503,935	\$3,601	Best Buy
2	3,220	\$203,047,200	\$10,066,504	\$3,272	Best Buy
8	1,214	\$86,777,600	\$4,302,187	\$3,910	Yes
7	-5,757	\$42,000	\$2,082	\$1,072	Best Buy

*Costs represent preliminary cost estimates used for IWR and planning purposes only and do not represent a fully-funded cost estimate.

Key Assumptions. Assumptions are:

- Reduction of adverse impacts by following the footprint of the Morganza to the Gulf Risk Reduction Project and existing natural and man-made hydrologic barriers.
- Dredged material disposal will be done in a manner conducive to wetland development, nourishment, or enhancement.
- The GIWW, while lacking a useful sediment load, will deliver nutrients to areas targeted for freshwater distribution.

Recommended Plans.

National Ecosystem Restoration Plan- Alternative 2 was chosen to be the NER plan as well as the Recommended Plan.

Recommended Plan- After analysis, Alternative 2 was determined to be a Best Buy and was chosen as the Recommended Plan. This alternative includes a variety of measures in the 3 subunits and is shown in Figure 5 at the end of the section. Table 9 summarizes the project costs and benefits both by the individual LCA ARTM and LCA MOHNL Projects and by total cost of the combined project. Risk and uncertainty were evaluated for the Recommended plan,

Alternative 2 meets most of the study objectives. The Recommended Plan will decrease the rate of decline of the wetlands to ensure their ability to provide geomorphic and hydrologic form and function for the 50-year period of analysis. Marsh habitat for essential fish and wildlife species will be sustained, mimicking as closely as possible conditions which occur naturally in the area. The alternatives were designed to work with the natural, fluid, soft environment of coastal Louisiana.

The Recommended Plan/ NER plan includes the entire Study Area with the most critical need of restoration and meets the intent of the plan as described

in the 2004 LCA Report. The Recommended Plan would result in a net gain of 9,655 acres of marsh habitat and would yield 3,220 AAHUs. Benefits would include increased freshwater flows and nutrients into the Study Area.

The fully-funded cost estimated for construction of this alternative would be \$305,504,000.

Table 9: LCA ARTM/MOHNL NER and Recommended Plan

			Alt. 2 (RP/NER)
	ARTM	MOHNL	Total
AAHUs	2,977	243	3,220
Cost-effective (Yes/No/Best Buy)			Best Buy
\$Annualized Cost/AAHU ^a			\$3,272
MCACES Total Project Cost	303,900,000	1,600,000	\$305,504,000
Authorized Cost in WRDA Title VII, Section 7006 (e)(3)(A) for LCA ARTM	221,200,000	18,100,000	\$239,300,000
Maximum Cost Limited by Section 902 ^{bc}	325,496,000	24,500,000	\$349,995,500

^aBased on initial cost estimate not the MCACES cost.

^bIncludes inflation and monitoring and adaptive management costs.

^cThis total includes the authorized cost for the ARTM and MOHNL Projects

Systems/Watershed Context. This plan, by increasing the freshwater and nutrient input into a freshwater-deprived system, would let the ecosystem “self-regulate,” letting natural wetland processes take over. The objective of Civil Works ecosystem restoration is to restore degraded significant ecosystem structure, function, and dynamic processes to a less degraded, more natural condition. However, partial restoration may be possible, with significant and valuable improvement made to degraded ecological resources. The Terrebonne Marshes provide important geomorphic, hydrologic, and habitat functions in the Study Area. Loss of these functions would have impacts beyond the project Study Area.

Cooperating Federal agencies for this project include NOAA, USFWS, NRCS, and USEPA.

Environmental Operating Principles. The EOPs inform the plan formulation process and sustainability, consideration of environmental consequences, building a shared knowledge base to support greater understanding of the environment, and respecting the views of individuals and groups were directly applicable to this project.

Peer Review. ATR was managed by the ECO-PCX in MVD. The ATR was performed by a team composed of District staff of the New York District in NAD and the Mobile District in SAD. All comments have been addressed and

closed and the report has been revised to reflect the comments. Final ATR certification was received on May 17, 2010.

An Independent External Peer Review (IEPR) was conducted for the project in accordance with procedures described in the Department of the Army, U.S. Army Corps of Engineers, Engineer Circular No. 1165-2-209, Civil Works Review Policy, dated 31 January 2010, and the Office of Management and Budget Final Information Quality Bulletin for Peer Review (16 December 2004). IEPR began on April 27, 2010. The panel has a deadline of August 24, 2010 to submit their Final IEPR Report. The IEPR panel identified 15 final comments. The comments and responses were discussed during a conference call on July 14, 2010 between the USACE PCX, project team, State of Louisiana, the IEPR panel members and Battelle. All comments have been resolved and addressed with the report.

EXPECTED PROJECT PERFORMANCE

Table 10 and Table 11 **Error! Reference source not found.** show the project costs and benefits. Table 12 shows the cost sharing amounts for the Federal government and non-Federal sponsor.

Project Costs.

Table 10: Cost Summary - LCA ARTM and MOHNL

Construction Item		Cost*
Lands & Damages		\$8,168,000
Elements		
	Relocations	\$2,423,000
	Fish & Wildlife	\$21,302,000
	Roads, Railroads, and Bridges	\$70,305,000
	Channels and Canals	\$92,740,000
	Levees and Floodwalls	\$1,267,000
	Floodway Control & Diversion Structures	\$19,827,000
	Bank Stabilization	\$30,074,000
	Cultural Resources Preservation	\$468,000
	Subtotal	\$238,406,000
Preconstruction Engineering & Design (PED)		\$21,465,000
Construction Management (E&D, S&A)		\$17,172,000
Total First Cost		\$285,030,000
HTRW Remedial Action**		\$0

*October 2010 Price Levels

**Associated financial costs that are not part of the recommended Federal Project but are a necessary non-Federal responsibility.

Equivalent Annual Costs and Benefits.

Table 11: Equivalent Annual Benefits and Costs - LCA ARTM and MOHNL

Investment Costs		
	Total Project Construction Costs	\$285,030,000
	Interest During Construction	\$20,474,000
Total Investment Cost		\$305,504,000
Average Annual Costs		
	Interest and Amortization of Initial Investment (additional annual costs if applicable)	\$15,917,000
	OMRR&R	\$73,000
Total Average Annual Costs		\$15,990,000
NER Annual Benefits		3,220 AAHUs

October 2010 Price Level, 50-year Period of Analysis, 4.375 Percent Discount Rate

Cost Sharing.

Table 12: Cost Sharing - LCA ARTM and MOHNL

Item	Federal Cost	Non-Federal Cost	Total Cost
Ecosystem Restoration (ER)			
PED	\$13,952,000	\$7,513,000	\$21,465,000
LERR&D		\$8,168,000	\$8,168,000
Construction Management	\$11,162,000	\$6,010,000	\$17,172,000
Ecosystem Restoration	\$151,618,000	\$73,473,000	\$225,091,000
Subtotal			
Total Project	\$176,732,000 (65)	\$95,164,000 (35)	\$271,896,000
Associated Costs	\$13,846,000 (65)	\$7,456,000 (35)	\$21,302,000
Total with Associated Costs	\$185,270,000 (65)	\$99,760,000 (35)	\$285,030,000

*October 2010 Price Level

Project Implementation. The CPRA, acting for the State of Louisiana, is the non-Federal sponsor. The cost share for the planning, design, and construction of the project will be 65% Federal and 35% non-Federal. CPRA must provide all LERRDs required for the project. OMRR&R of the project would be a 100% CPRA responsibility. A feasibility-level monitoring and adaptive management plan has been developed for the project and is included in the report. The monitoring and adaptive management plan was developed to include the proposed monitoring and to consider and identify any necessary adaptive management activities.

Operation, Maintenance, Repair, Rehabilitation, and Replacements.

All features for the NER plan were considered for operational cost and maintenance cost. Items that require painting, periodic inspections and debris removal were considered features that will have annual cost to them and have been priced accordingly. Features that consist of dredging or berm type work are considered as having no maintenance cost.

Operation of the HNC lock and sector gate will involve closure of the sector gate year-round. Normal vessel traffic will pass through the lock. A few times each year, large vessels that will not fit in the lock will need to pass through the structure. These vessels will schedule openings of the sector gate portion of the structure. After the vessel passes, the sector gates would be closed.

Sluice gates located within the HNC lock structure will be open year round with the exception of storm event conditions. Requirement for modification of the operational scheme of the sluice gates will be assessed through adaptive management and monitoring. All other structures included in the NER plan were assumed to be open for all conditions during the alternatives analysis. These structures were designed with adaptive management in mind and have various methods of being closed. Using the structures to prevent salinity intrusion was another designed purpose. Operational plans for these structures will be determined during PED.

Key Social and Environmental Factors.

Implementation of Alternative 2 (Recommended Plan) will result in increased freshwater inputs and associated nutrients in the Study Area. Construction of project features would result in 148 acres of swamp, 343 acres of freshwater marsh, 248 acres of intermediate marsh, and 182 acres of brackish marsh being directly converted to open water. Alternative 2 would also result in 23 acres of swamp being converted to upland (levee). Overall, implementation of Alternative 2 would result in the generation of 3,220 AAHUs over the No Action Alternative and would result in a net gain of 9,655 acres of emergent marsh habitat over the 50-year period of analysis.

Navigation on the HNC would be negatively impacted by the modified operation of the lock complex. Stage increases of up to 0.2 feet could be seen in the western portions of the Study Area. Stage increases of up to 0.3 feet could be seen in the central portions of the Study Area. Stage increases of up to 0.1 feet could be seen in the eastern portions of the Study Area. Stage decreases of up to 0.2 feet could be seen on the GIWW at certain times of year. Implementation of Alternative 2 would require the relocation of 13 residential structures.

The project will provide positive ecosystem benefits. Temporary negative impacts will be compensated for by the restoration of marsh over the life of the project. No mitigation measures are needed.

Stakeholder Perspectives and Differences.

A NOI to prepare a draft SEIS for the LCA Convey Atchafalaya River Water to Northern Terrebonne Marshes Restoration Feasibility Study was published in the Federal Register in December 2008. A public scoping meeting was held in February 2009. The Draft FS/SEIS was released to the public in June 2010, followed by a 45-day public review period which included a public meeting. Public comments were received during the scoping meeting and Draft FS/SEIS public review and have been incorporated into the report. Potential areas of controversy include construction of the HNC Lock Complex under a separate authority other than the LCA Program. The Recommended Plan/NER plan relies on the operation of the HNC Lock Complex for environmental purposes after 2025. The impact to the project, in the event the HNC is not constructed, is estimated as a loss of 243 AAHUs.

Relative sea level rise rates higher than the historic rate have the potential to greatly reduce or even eliminate the benefits of this project. Intermediate RSLR would reduce benefits by 66% and high RSLR would eliminate benefits. Determining the risk of higher sea level rise is not possible at this time. The degree to which Study Area marshes will respond to increased freshwater inputs associated with project features is unknown since there are no similar projects in the Study Area to use for verification.

Environmental Compliance. The NEPA documentation included with the feasibility report was written to the level of an EIS.

State and Agency Review. State and agency review of the final FS/EIS will occur from October 8, 2010, to November 6, 2010.

Certification of Peer and Legal Review. This project has undergone the following reviews and certification or approval was granted in the associated date:

- Agency Technical Review – 5/17/2010
- Legal Adequacy – Pending
- Cost Engineering – Memo received 3/29/2010
- Real Estate – Memo received 7/29/2010

Legal review - A status of legal review was included in the report transmittal package. Final legal certification will be completed once formal consultations with the USFWS are complete and their Biological Opinions

and recommendations have been integrated in the appropriate project SEIS documents.

Cost certification - The feasibility certification of cost estimate will not be provided for any of the projects addressed in this report due to the lack of specific detailed engineering design data. Cost estimates have been reviewed by the Cost DX and adjusted appropriately for the level of design detail. CEMVN has coordinated the issue with the vertical team. The District, Division and RIT think that the risk of moving forward absent certification is acceptable.

Policy Compliance Review. This project is currently undergoing the policy compliance review process.

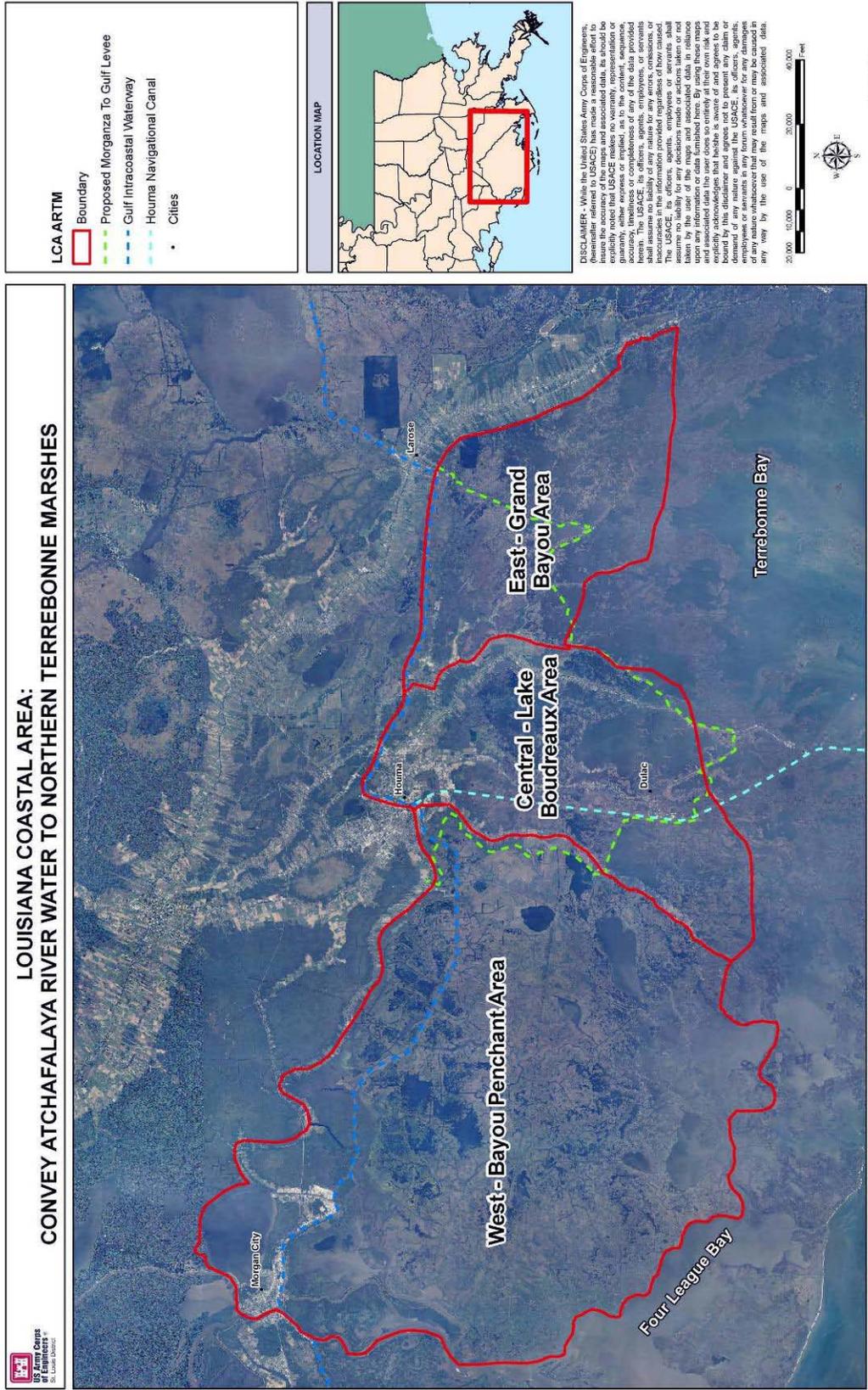


Figure 4: Study Area with Subunits – LCA Convey Atchafalaya River Water to Northern Terrebonne Marshes and Multipurpose Operation of the Houma Navigaiton Lock

LCA Small Diversion at Convent/Blind River

Study Purpose and Scope. The purpose of the LCA Small Diversion at Convent/Blind River Study is to fulfill the need for a feasibility-level report and associated NEPA documentation. This report is a final response to the study authority. The purpose of the LCA Small Diversion at Convent/Blind River Project is facilitate the restoration of a portion of the Maurepas Swamp in the headwaters of the Blind River watershed that is deteriorating due to lack of freshwater, sediments, and nutrients. This study only addresses ecosystem restoration.

Project Location/Congressional District. The LCA Small Diversion at Convent/Blind River Study Area is located in the southern Maurepas Swamp approximately halfway between the Cities of New Orleans and Baton Rouge between the Mississippi River and Lake Maurepas. The Study Area is within Ascension and St. James Parishes in Congressional District 3. The Study Area is shown on Figure 6 at the end of the section.

Prior Reports and Existing Water Projects. This study builds upon the following key reports and studies identified in Table 13. Alternative plans for this study were formulated based upon the 2004 LCA Report and the project description contained within that report.

Table 13: Relevance of Prior Reports and Existing Water Projects to the LCA Small Diversion at Convent/Blind River Integrated FS/SEIS

	Relevance to LCA Small Diversion at Convent/Blind River				
	Data Source	Consistency	Structural Measures	Non-Structural Measures	Future Without Project Condition
Comprehensive Planning Studies					
Coast 2050 Plan, 1999	X	X		X	X
LCA Report, 2004	X	X	X	X	X
Louisiana's Comprehensive Master Plan for a Sustainable Coast, 2007	X	X	X	X	X
LACPR, 2009	X	X	X	X	X
Mississippi River Sediment, Nutrient, and Freshwater Redistribution Study, 2000	X	X	X	X	X
Prior Reports and Water Projects					

	Relevance to LCA Small Diversion at Convent/Blind River				
	Data Source	Consistency	Structural Measures	Non-Structural Measures	Future Without Project Condition
LCA Small Diversion at Hope Canal	X				X
2001 Diversion into Maurepas Swamp	X	X	X	X	X
2003 Potential Nitrate Removal from a Diversion into Wetlands	X	X		X	
2003 Ecosystem Health of the Maurepas Swamp	X	X		X	X
2006 Impacts of Freshwater Diversion on Wildlife and Fisheries	X	X		X	X
2007 Mississippi River Reintroduction into Maurepas Swamp	X	X	X	X	X
2007 Evaluation of Potential Impact of Diversion on Gulf and Pallid Sturgeon	X	X		X	
2007 Cultural Resources Survey of River Reintroduction Corridor	X	X		X	
2002 Amite Gapping	X	X		X	
2010 Amite Feasibility Study	X	X	X	X	X
1996 Diversion and Feasibility of Bonnet Carré Spillway	X	X	X	X	X
2001 Water Quality Analysis	X	X		X	X
2008 Swamp Ecology in a Dynamic Coastal Landscape	X	X		X	
2006 Pontchartrain Basin Research Program	X	X		X	X
2007 Pontchartrain Basin Research Program	X	X		X	X
2002 Hydrologic Modeling to Evaluate MR Diversion into Maurepas Swamp	X	X		X	X
(n.d) Growth and Development of Bald cypress-Tupelo	X	X		X	
1992 Effects of Flooding on Bald cypress	X	X		X	
1972 Effects of Aeration, Water Supply, and Nitrogen on tupelo and Bald cypress	X	X		X	
2004 Through Droughts and Hurricanes: Survival and Productivity of a Coastal Swamp	X	X		X	
1995 Interaction of Flooding and Salinity Stress on Bald cypress	X	X		X	
2005 Comprehensive Habitat Management Plan	X	X		X	X
2008 Interim Feasibility Report: Convent/Blind River	X	X	X	X	X

Federal Interest. This project was identified in the 2004 LCA Report completed by USACE as a critical, near-term, ecosystem restoration project.

Ecosystem restoration is one of the primary missions of the USACE Civil Works Program with the objective to contribute to NER.

The Maurepas Swamp complex is significant as the second largest continuous coastal forest in Louisiana, comprising over 190,000 acres of freshwater swamp habitat. The LCA Small Diversion at Convent/Blind River Study Area is an essential ecosystem since it includes wetland habitats and provides high fish and wildlife value as well as habitat for migratory birds and other aquatic organisms including threatened or endangered species.

STUDY OBJECTIVES

Problems and Opportunities. Construction of the Mississippi River and Tributaries (MR&T) flood control system cut off the Maurepas Swamp (and Blind River) from the natural, periodic, near-annual flooding by the Mississippi River. This has resulted in a degradation/ deterioration process and reduced biological productivity in the swamp due to lack of freshwater, nutrients, and sediment input from the Mississippi River. The swamp is also subsiding due to natural causes and possibly due to man-made activities such as oil, gas, and groundwater withdrawals. The reduced biological productivity combined with the lack of sediment from the river has reduced soil formation (accretion) to a rate less than the subsidence. Other disruptions to the natural drainage patterns have occurred to the hydrology of the area due to construction of logging trails, drainage channels, pipelines and other utilities, and roads through the swamp.

Opportunities identified within the study area over the 50 year period of record include:

- Prevent future cypress swamp degradation and transition currently predicted to occur
- Restore the deltaic process impaired by levee and dredged material berm construction
- Enhance Blind River water by increasing freshwater flow
- Protect vital socioeconomic and public resources, such as the growing eco-tourism industry resident in the Maurepas Swamp and the Maurepas Wildlife Management Area
- Enhance recreational opportunities in the Maurepas Swamp and Blind River

Planning Objectives. The overall objective of the LCA Small Diversion at Convent/Blind River Project is to reverse the trend of deterioration of southeast Maurepas Swamp and Blind River. Planning objectives included:

- Promote water distribution in the southeastern portion of Maurepas Swamp
- Facilitate swamp building

- Establish hydrologic period fluctuation in the swamp
- Improve fish and wildlife habitat in the swamp and in Blind River

Planning Constraints. Planning constraints include:

- Minimize impact on the ability of the MR&T flood control project to continue to fulfill its authorized purposes.
- Minimize impact on the ability of authorized navigation projects to continue to fulfill their purpose.
- Do not violate limitations imposed by the designation of the Blind River as a state scenic river by the LDWF.
- The project will have to be constructed and operated so it would not conflict with the Maurepas Swamp Wildlife Management Area.
- Availability of freshwater, nutrients, and sediments from the Mississippi River is limited. Annual high water (spring) and low water (summer) river cycles will affect the hydraulic design of the diversion structure, transmission channel and swamp distribution system.
- Diversion operation will be constrained by Lake Maurepas tailwater conditions. The Lake Maurepas tailwater is higher than the water level in Maurepas Swamp.
- Do not violate Louisiana water quality standards.

ALTERNATIVES

Plan Formulation Rationale. A list of structural and non-structural measures was developed. Structural measure strategies included water management modifications, distribution systems, transmission systems, diversion systems, methods and locations of crossing the Mississippi River Levee, water quality management methods, and sediment management methods. Non-structural measure strategies included water quality management, vegetation management, recreational access and enhancements, and real estate acquisitions.

Management Measures and Alternative Plans. An initial list of 99 measures was screened and 51 measures were retained. A preliminary array of 12 alternatives and the No Action Alternative were developed from the measures to achieve the overall project goals and objectives. The 12 alternatives were formulated to consider 11 different options for the diversion point, different diversion methods, the transmission system, the distribution system, and the benefit area. The project screening and evaluation process is documented in Volume IV, Section 3 of the main report.

Through iterative screening of the alternatives with respect to their viability to meet project goals, five alternatives including the No Action Alternative were considered for further detailed analysis. Based on the analysis, the

3,000 cfs diversion was determined to be the optimal size to prevent saline backflow and inundation from Lake Maurepas and achieve the overall goal of reversing the trend of degradation in the swamp. The Final Array of Alternatives were based on a 3,000 cfs river water diversion in different locations or delivered by different methods.

Final Array of Alternatives. The final array of alternatives included 4 alternatives and the No Action Alternative. Excluding the No Action Alternative, the final array of alternatives included:

- Alternative 2 (Recommended Plan/NER)– one 3,000 cfs diversion at Romeville via gated culverts
- Alternative 4 – one 3,000 cfs diversion at South Bridge via gated culverts
- Alternative 4B – one 3,000 cfs diversion at South Bridge with split flows via gated culverts
- Alternative 6 – two 1,500 cfs diversions with one at Romeville and one at South Bridge via siphons

All alternatives included conveyance channels and provide some restoration of existing berm cuts and/or creation of additional cuts to improve hydrology.

Comparison of Alternatives. The effects of the alternatives within the final array were evaluated against the No Action Alternative in order to determine their overall impact over the 50-year period of analysis of the project. Alternatives were then compared to each other. This includes environmental impacts to significant resources, WVA benefits, cost and contributions to project goals, planning objectives and constraints, contributions to the Federal objective, and the P&G's four evaluation criteria (completeness, effectiveness, efficiency and acceptability).

Alternative 6 provided the greatest number of environmental benefits in terms of AAHUs. Alternative 2 provided over 90% of the benefits for about 67% of the cost of Alternative 6. The cost per AAHU was much lower for Alternative 2 than for the other alternatives and the incremental cost per habitat unit in going from Alternative 2 to Alternative 4B and/or Alternative 6 was quite high. Alternative 2 would also impact the smallest number of wetland acres. Table 14 shows the comparison of the alternatives in the final array shown in the order of the decreasing AAHU benefit.

Table 14: Alternative Costs, Benefits, and IWR-PLAN Results

Alt.	AAHUs	Total Construction Cost	Annualized First Cost*	Annualized Cost/AAHU	Cost-effective (Yes/ No/ Best Buy)
6*	7,114	\$155,600,000	\$7,720,000	\$4,553	Best Buy
4B*	7,103	\$146,900,000	\$7,280,000	\$339	Best Buy
2*	6,421	\$102,000,000	\$5,060,000	\$880	Best Buy
4*	6,124	\$152,200,000	\$7,550,000	\$1,232	No

*Costs represent preliminary cost estimates used for IWR and planning purposes only and do not represent a fully-funded cost estimate.

Key Assumptions. The following assumptions are key to the success of the project:

- The Mississippi River has sufficient sediment and nutrients to improve the characteristics of the Maurepas Swamp from historic information and within the 50 year life cycle the supply of sediment and nutrients will not change significantly.
- There will be no legal restrictions imposed on withdrawing 3,000 cubic feet per second from the Mississippi River.
- The net effects of local subsidence and sea level rise will not deviate significantly from the numbers estimated for this study.
- The Study Area can receive sediments and nutrients without restrictions from the State agencies controlling the Wildlife Management Area.

Recommended Plans.

National Ecosystem Restoration Plan- Alternative 2 was chosen to be the NER plan since it is the alternative that reasonably maximizes ecosystem restoration benefits compared to costs.

Recommended Plan- Alternative 2, a 3,000 cubic feet per second (cfs) diversion at Romeville, was also identified as the Recommended Plan. The Recommended Plan/NER plan is shown in Figure 7 at the end of the section. Alternative 2, has six major components: a diversion structure, a transmission canal, control structures of various sizes, approximately 30 berm gaps, cross culverts at four locations along U.S. highway 61 and instrumentation to monitor and control the diversion flow rate and the water surface elevations in the diversion, transmission, and distribution system in the swamp. Table 15 summarizes project benefits and costs.

The Recommended Plan/NER plan best meets the screening criteria; would accomplish the planning objectives and goals; would be consistent with the USACE EOPs; and would contribute to reversing the trend of deterioration in

the southeast part of the Maurepas Swamp. The Recommended Plan/NER plan would improve a total of 21,369 acres of bald cypress-tupelo swamp that are in various stages of deterioration and generate 6,421 AAHUs of benefit. Risk and uncertainty were evaluated for the Recommended plan,

**Table 15: LCA Small Diversion at Convent/Blind River
Recommended Plan/NER Plan**

	Alt. 2 (RP/NER)
AAHUs	6,421
Cost-effective (Yes/No/Best Buy)	Best Buy
\$Annualized Cost/AAHU*	\$879
MCACES Total Project Cost	\$123,140,000
Authorized Cost in WRDA Title VII, Section 7006 (e)(3)(A) for the Small Diversion at Convent/Blind River	\$88,000,000
Maximum Cost Limited by Section 902**	\$124,230,000

*Based on initial cost estimate not the MCACES cost.

**Includes inflation and monitoring and adaptive management costs.

Systems/Watershed Context. The Small Diversion at Convent/Blind River will supply freshwater to the upper portion of the Lake Pontchartrain Basin. Several studies have been performed that show the advantages of reintroducing freshwater to the basin to replace the historic Mississippi River overflows that have been stopped by the construction of levees along the Mississippi River. By introducing freshwater through the wetlands in the Maurepas Swamp the water will be filtered for sediment and allow for nutrient uptake that will supply very high quality water to the entire basin that includes the Maurepas Swamp, Lake Maurepas, and Lake Pontchartrain. The Blind River is a designated scenic river that has low dissolved oxygen problems due to lack of freshwater flow. This project will add freshwater flow to the river and greatly improve its water quality as a regional recreational resource.

The Maurepas Swamp has been an area of interest for ecosystem restoration. This project would complement, but is independent of, two other proposed LCA projects (LCA Small Diversion at Hope Canal and LCA ARDC Modification) and two proposed CIAP projects (Hydrologic Restoration in Swamps West of Lake Maurepas and Bald Cypress/Tupelo Coastal Forest Protection). The CIAP projects are being proposed by Livingston Parish.

Cooperating Federal agencies for this project include NOAA, USFWS, NRCS, and USEPA.

Environmental Operating Principles. The EOPs inform the plan formulation process and sustainability, consideration of environmental consequences, building a shared knowledge base to support greater understanding of the environment, and respecting the views of individuals and groups were directly applicable to this project.

Peer Review. ATR was managed by the ECO-PCX in MVD. The ATR was performed by a team composed of District staff of New York and Baltimore District in NAD, Wilmington District in SAD, and Walla Walla District in NWD. All comments have been addressed and closed and the report has been revised to reflect the comments. ATR certification was received on March 5, 2010.

An Independent External Peer Review (IEPR) was conducted for the project in accordance with procedures described in the Department of the Army, U.S. Army Corps of Engineers, Engineer Circular No. 1165-2-209, Civil Works Review Policy, dated 31 January 2010, and the Office of Management and Budget Final Information Quality Bulletin for Peer Review (16 December 2004). IEPR began on April 27, 2010. The panel submitted their Final IEPR Report on June 22, 2010. The IEPR panel identified 14 final comments. The comments and responses were discussed during a conference call on July 16, 2010 between the USACE PCX, project team, State of Louisiana, the IEPR panel members and Battelle. All comments have been resolved, closed out in Dr Checks and addressed within the report. Battelle provided a pdf printout of the DrChecks project file on August 12, 2010.

EXPECTED PROJECT PERFORMANCE

Table 16 and Table 17 show the project costs and benefits. Table 18 shows the cost sharing amounts for the Federal government and non-Federal sponsor.

Project Costs.

Table 16: Cost Summary - LCA Small Diversion at Convent/Blind River

Construction Item		Cost*
Lands & Damages		\$3,920,000
Elements		
	Relocations	\$17,042,000
	Locks	\$0
	Fish & Wildlife	\$6,620,000
	Floodway Control-Diversion Structures	\$73,048,000
	Subtotal	\$96,710,000
Preconstruction Engineering & Design (PED)		\$7,536,000
Construction Management (E&D, S&A)		8,625,000
Total First Cost		\$116,791,000
HTRW Remedial Action**		\$0

*October 2010 Price Levels

**Associated financial costs that are not part of the recommended Federal Project but are a necessary non-Federal responsibility.

Equivalent Annual Costs and Benefits.

**Table 17: Equivalent Annual Benefits and Costs - LCA Small
Diversion at Convent/Blind River**

Investment Costs		
	Total Project Construction Costs	\$116,791,000
	Interest During Construction	\$6,349,000
	Total Investment Cost	\$123,140,000
Average Annual Costs		
	Interest and Amortization of Initial Investment (additional annual costs if applicable)	\$6,105,000
	OMRR&R	\$2,754,000
	Total Average Annual Costs	\$8,859,000
	Net Annual Benefits	6,421 AAHU's

October 2010 Price Level, 50-year Period of Analysis, 4.375 Percent Discount Rate

Cost Sharing.

Table 18: Cost Sharing - LCA Small Diversion at Convent/Blind River

Item	Federal Cost	Non-Federal Cost	Total Cost*
Ecosystem Restoration (ER)			
PED	\$4,898,000	\$2,638,000	\$7,536,000
Construction Management	\$5,606,000	\$3,019,000	\$8,625,000
LERR&D	\$0	\$3,920,000	\$3,920,000
Ecosystem Restoration Subtotal	\$ 61,107,000	\$ 28,983,000	\$90,090,000
Total Project	\$ 71,611,000(65)	\$ 38,560,000(35)	\$110,171,000
Associated Costs	\$4,303,000(65)	\$2,317,000(35)	\$6,620,000
Total with Associated Costs	\$ 75,914,000(65)	\$ 40,877,000(35)	\$116,791,000

*October 2010 Price Level

Project Implementation. The CPRA, acting for the State of Louisiana, is the non-Federal sponsor. The cost share for the planning, design, and construction of the project will be 65% Federal and 35% non-Federal. CPRA must provide all LERRDs required for the project. OMRR&R of the project would be a 100% CPRA responsibility. A feasibility-level monitoring and adaptive management plan has been developed for the project and is included in the report. The monitoring and adaptive management plan was developed to include the proposed monitoring and to consider and identify any necessary adaptive management activities.

Operation, Maintenance, Repair, Rehabilitation, and Replacements. OMRR&R activities will include (but are not limited to) starting and stopping the diversion(s), routine equipment and instrument maintenance, corrective equipment and instrument maintenance, and gap and culvert cleaning. Annual maintenance dredging or de-silting is anticipated to remove sediments deposited in the Transmission Canal during operation of the diversion system. The Mississippi River carries a significant suspended solids load. It is expected that the flow diverted into the diversion operation will have the same characteristics, and will cause a reduction in Transmission Canal volume due to sediment accumulation. Periodically major project components may have to be repaired, rehabilitated, or replaced.

Key Social and Environmental Factors. Implementation of Alternative 2 (Recommended Plan) would reverse the conversion of swamp habitat to open water and would improve a total of 21,369 acres of bald cypress-tupelo swamp. Negative direct impacts will include loss of 53 acres of forested swamp and a small amount of agricultural land due to construction. Potential direct impacts to endangered species would be entrainment of

pallid sturgeon in the diversion structure and displacement of manatees during construction. Reestablishing hydrologic connection would aid in restoring swamp habitat and would decrease the acreage of water bottoms within the swamp. Functional existing water bottoms of Blind River and canals would increase in contribution to downstream trophic webs. The wetlands will benefit the receiving waters by polishing the Mississippi River water prior to discharge to the basin. The impacts would include increases in productivity and sediment accretion that would increase swamp building in the distribution area. Cumulative impacts would have positive synergistic effects when combined with other Federal, state, local and private restoration to restore and protect the Maurepas Swamp to a greater extent than would be expected from the individual efforts. Creation, restoration, and protection of the swamp will lead to increased habitat for wetland-dependent wildlife; decreased competition for resources; localized stabilization or improvement in wetland-dependent wildlife populations. This project would have little or no effect on social factors in the area. Most of the Study Area is uninhabited. The Maurepas Swamp and surrounding area is used for recreational hunting and fishing. This project will enhance the ability of the local community to use these resources to their fullest extent. The swamp has been degrading and the Blind River has been deteriorating due to the lack of freshwater.

The project will provide positive ecosystem benefits. Temporary negative impacts will be compensated for by restoration of forested freshwater swamps. No mitigation measures are needed.

Stakeholder Perspectives and Differences. A NOI to prepare a draft SEIS for the LCA Small Diversion at Convent/Blind River was published in the Federal Register in December 2008. A public scoping meeting was held in February 2009. The Draft FS/SEIS was released to the public in May 2010, followed by a 45-day public review period which included a public meeting. Public comments were received during the scoping meeting and Draft FS/SEIS public review and have been incorporated into the report. Meetings and discussions with the public and local, state and federal agencies and the PDT indicate support for the project and did not identify any areas of controversy or unresolved issues. All public and agency comments are documented in Volume IV Appendix G. Specific comments and views include:

- Need to begin construction as soon as possible
- Given the substantial adverse future impacts to coastal wetlands and their associated fish and wildlife resources that are expected to occur under future-without-project conditions, the U.S. Fish and Wildlife Service strongly supports authorization of the proposed freshwater diversion project, as it would improve environmental conditions by

increasing swamp productivity and reducing the trend of deterioration in the Maurepas Swamp.

Environmental Compliance. The NEPA documentation included with the feasibility report was written to the level of an EIS. Formal consultation with the US Fish and Wildlife Service on Threatened and Endangered Species is underway and will be completed prior to the initiation of State and Agency Review. A draft Record of Decision has been developed and provided for HQUSACE review

State and Agency Review. State and agency review of the final FS/EIS will occur from October 8, 2010, to November 6, 2010.

Certification of Peer and Legal Review. This project has undergone the following reviews and certification or approval was granted in the associated date:

- Agency Technical Review – 3/5/2010
- Legal Adequacy – Pending
- Cost Engineering – Memorandum Received 3/29/2010
- Real Estate – 5/21/2010

Legal review - A status of legal review was included in the report transmittal package. Final legal certification will be completed once formal consultations with the USFWS are complete and their Biological Opinions and recommendations have been integrated in the appropriate project SEIS documents.

Cost certification - The feasibility certification of cost estimate will not be provided for any of the projects addressed in this report due to the lack of specific detailed engineering design data. Cost estimates have been reviewed by the Cost DX and adjusted appropriately for the level of design detail. CEMVN has coordinated the issue with the vertical team. The District, Division and RIT think that the risk of moving forward absent certification is acceptable.

Policy Compliance Review. This project is currently undergoing the policy compliance review process.

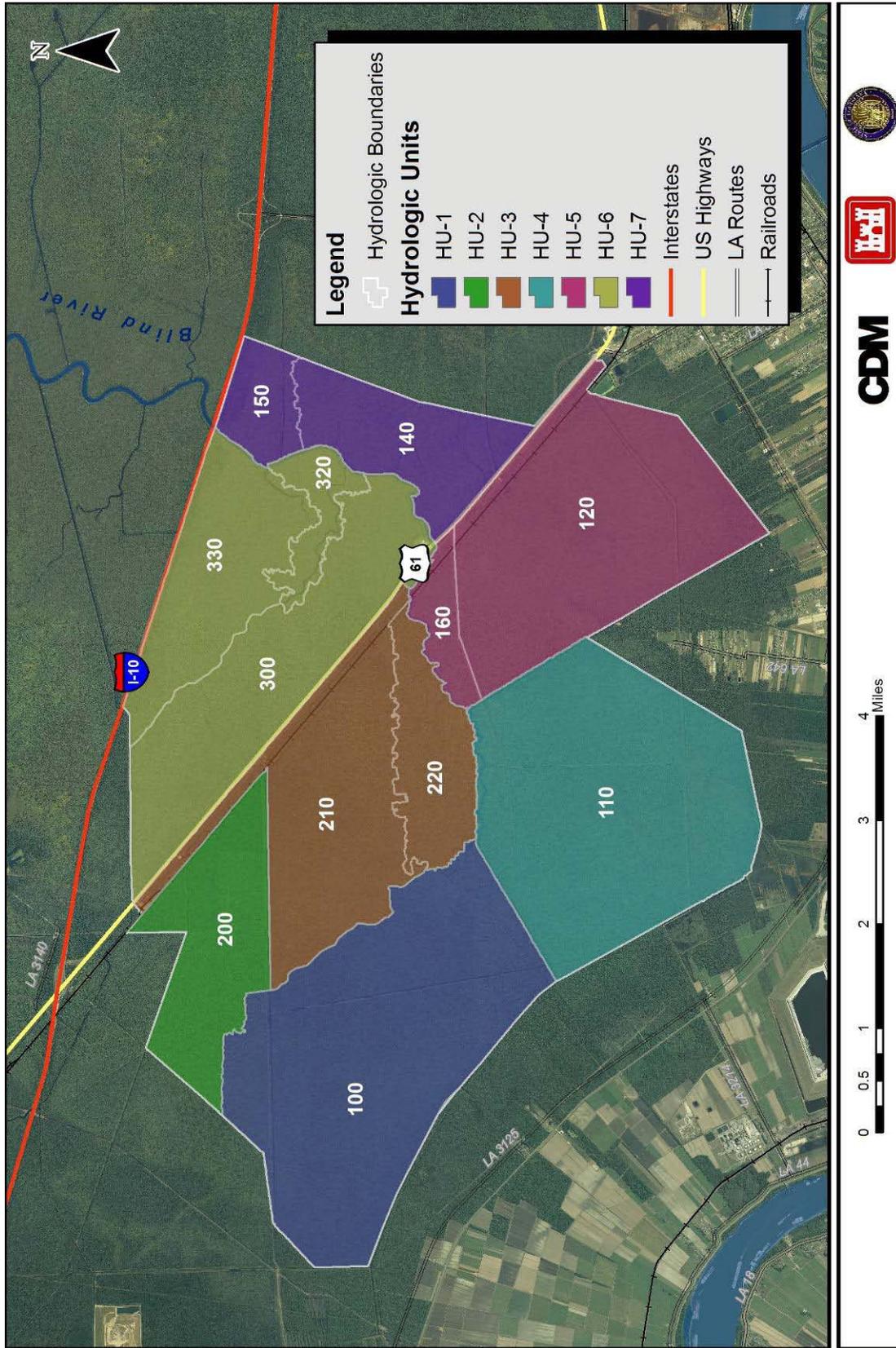


Figure 6: Study Area with Subunits – LCA Small Diversion at Convent / Blind River

LCA Terrebonne Basin Barrier Shoreline Restoration

Study Purpose and Scope. The purpose of the LCA Terrebonne Basin Barrier Shoreline Restoration (TBBSR) Study is to fulfill the need for a feasibility-level report and associated NEPA documentation. This report is a final response to the study authority. The purpose of the LCA TBBSR Project is to address the critical near-term needs for shoreline restoration in Terrebonne Basin through simulation of historical conditions, which will be achieved by enlarging the existing barrier islands (width and dune crest) and reducing the current number of breaches. This study only addresses ecosystem restoration.

Project Location/Congressional District. The LCA TBBSR Study Area is located approximately 36 miles south of Houma, Louisiana, on the Gulf of Mexico within the Isles Dernieres and Timbalier Island chain. The Study Area is within Terrebonne and Lafourche Parishes in Congressional District 3. The Study Area is shown on Figure 8 at the end of this section.

Prior Reports and Existing Water Projects. This study builds upon the following key reports and studies identified in Table 19. Alternative plans for this study were formulated based upon the 2004 LCA Report and the project description contained within that report.

Table 19: Relevance of Prior Reports and Existing Water Projects to the LCA TBBSR Integrated FS/SEIS

	Relevance to LCA TBBSR				
	Data Source	Consistency	Hard-Structural Measures	Soft-Structural Measures	Future Without Project Condition
Comprehensive Planning Studies					
Coast 2050 Plan, 1999	X	X	X	X	
LCA Report, 2004	X	X	X	X	X
Louisiana’s Comprehensive Master Plan for a Sustainable Coast, 2010	X	X	X	X	X
LACPR, 2009	X	X	X		
Ecosystem Restoration and Hurricane Protection in Louisiana (CPRA), 2007	X	X	X	X	X
Barrier Island Plan, Evaluation and	X	X	X	X	X

	Relevance to LCA TBBSR				
	Data Source	Consistency	Hard-Structural Measures	Soft-Structural Measures	Future Without Project Condition
Recommendation of the Barrier Shoreline Feasibility Study, T. Baker Smith, 1997					
Prior Reports and Water Projects					
CWPPRA TE-18, Timbalier Island Planting Demonstration, NRCS, Completed 1996	X	X	X	X	
CWPPRA TE-20, Isles Dernieres Restoration of East Island, EPA, Completed 1999	X	X	X	X	X
CWPPRA TE-24, Isles Dernieres Restoration of Trinity Island, EPA, Completed 1999	X	X	X	X	X
CWPPRA TE-25, East Timbalier Island Sediment Restoration, Phase 1, NMFS, Completed 2000	X	X	X	X	X
CWPPRA TE-30, East Timbalier Island Sediment Restoration, Phase 2, NMFS, Completed 2000	X	X	X	X	X
CWPPRA TE-27, Whiskey Island Restoration, EPA, Completed 2000	X	X		X	X
CWPPRA TE-29, Raccoon Island Breakwater Demonstration, NRCS, Completed 1997	X	X	X		
CWPPRA TE-37, New Cut Dune and Marsh Restoration, EPA, Completed 2007	X	X	X	X	X
CWPPRA TE-40, Timbalier Island Dune and Marsh Creation, EPA, Completed 2004	X	X	X	X	X
CWPPRA TE-47, Ship Shoal – Whiskey West Flank Restoration, EPA, Currently in Engineering & Design	X	X	X	X	X
CWPPRA TE-48, Raccoon Island Shoreline Protection / Marsh Creation, NRCS, Under Construction	X	X	X	X	X
CWPPRA TE-50, Whiskey Island Back-Barrier Marsh Creation, EPA, Construction Funds Awarded	X	X	X	X	X
CWPPRA TE-52, West Belle Pass Barrier Headland Restoration, NMFS/COE, Currently in Engineering & Design	X	X		X	
CWPPRA TE-53, Enhancement of Barrier Island Vegetation Demonstration, EPA,		X		X	
CIAP Nomination – Raccoon Island Breakwaters		X	X		
CIAP Nomination – East Timbalier Island Sediment Restoration		X		X	

	Relevance to LCA TBBSR				
	Data Source	Consistency	Hard-Structural Measures	Soft-Structural Measures	Future Without Project Condition
CIAP Nomination – Ship Shoal: Whiskey West Flank Restoration	X	X	X	X	X
CIAP Nomination – Beach and Back Barrier Marsh Restoration, East and Trinity Islands		X		X	
CIAP Nomination – Wine Island Restoration		X		X	
CIAP Nomination – East Island Beach, Dune & Marsh Restoration		X		X	
CIAP Nomination – East Timbalier Island (Eastern Section) Restoration		X		X	
CIAP Nomination – East Timbalier Island Restoration		X		X	
USACE Navigation Projects – Houma Navigation Canal	X	X		X	
Beneficial Use of Dredged Material (BUDMAT)		X		X	
Scoping Study to Evaluate Deepening of Houma Navigation Channel at Cat Island Pass, Louisiana, USACE, 2008	X	X		X	
Environmental Assessment – Issuance of Non-Competitive Leases for the use of Outer Continental Shelf Sand Resources from Ship Shoal, Offshore Central Louisiana for Coastal and Barrier Island Nourishment and Hurricane Levee Construction, MMS, Draft - 2004	X	X		X	

Federal Interest. This project was identified in the 2004 LCA Report completed by USACE as a critical, near-term, ecosystem restoration project. Ecosystem restoration is one of the primary missions of the USACE Civil Works Program with the objective to contribute to NER.

The Terrebonne Basin barrier islands are significant as critical habitat for the endangered piping plover; valuable nesting, overwintering and migrant bird habitat in an area rarely disturbed by anthropogenic activities or large populations of mammalian predators; and the barrier islands have been shown to be effective at wave height and storm surge mitigation from storms. During the February 2009 NEPA scoping meeting for this report, numerous public responses were received that expressed the importance of the barrier islands and a need for urgency in their restoration.

STUDY OBJECTIVES

Problems and Opportunities. The overarching problem in the Study Area is a lack of sustainability of the coastal ecosystem, primarily due to coastal land loss. Natural processes and human actions, such as the construction of oil field canals and the containment of waterways, have threatened the long-term viability of the Study Area. These processes and activities have caused significant adverse impacts to the Terrebonne Basin barrier island shoreline, resulting in extensive barrier island habitat loss and ecosystem degradation.

Specific problems in the LCA TBBSR Study Area include:

- Land loss due to erosion threatens the geomorphic and hydrologic barrier systems
- Longshore sediments are significantly reduced, limiting the ecosystem's ability to be self-sustaining
- Loss of barrier islands/headlands ecosystem habitat
- Freshwater wetlands are impacted by increased salinity

Opportunities identified include:

- Increase longevity of the barrier island geomorphic function
- Improve habitat value of the barrier islands
- Increase sediment into the long-shore transport process
- Restore diversity of the barrier island habitats

Planning Objectives. Based on the function of these barrier islands and problems identified for the Terrebonne islands during this study, the following planning objectives were developed to assist the development and evaluation of alternative plans.

- Provide an expanded footprint of minimized barrier island section to provide the geomorphic form and ecologic function of the Terrebonne Basin barrier islands, reducing volume loss within the LCA TBBSR Study Area below the historic average (1880 through 2005).
- Restore and improve various barrier island habitats that provide essential habitats for fish, migratory birds, and other terrestrial and aquatic species, mimicking, as closely as possible, conditions which would occur naturally in the area for the 50 year period of analysis.
- Increase sediment input to supplement long-shore sediment transport processes along the gulf shoreline by mechanically introducing compatible sediment, and increasing the ability of the restored area to continue to function and provide habitat for the 50 year period of analysis with minimum continuing intervention.

Planning Constraints. Planning constraints include:

- Natural resources limitations such as lack of suitable sediments for restoration
- Environmental impacts of human activities in the Study Area

- Infrastructure and cultural resources that must be avoided or relocated
- Limitations in the characterization and simulation of environmental processes that determine the effects of alternatives plans

ALTERNATIVES

Plan Formulation Rationale. An initial list of measures was developed including 19 hard structural measures (i.e. revetments, groins, canal plugs, etc.) and 12 soft-structural measures (i.e. dune restoration, marsh creation, herbivore control, etc).

Management Measures and Alternative Plans. . After screening of the initial list of 31 measures, 16 were retained for further analysis based on project objectives, constraints, effectiveness and practicality. Secondary screening of the measures was conducted with combinations of measures to address specific project objectives. As a result of the secondary screening, it was determined that a combination of beach, dune, and marsh restoration measures would be needed to achieve the primary objective of restoring geomorphic form and ecologic function of the barrier islands. Project screening is documented in Volume V Section 3 of the main report.

From the 8 screened measures remaining, 9 alternative plans were developed with strategies to use for each island composed of a mix of beach, dune, marsh, and structures. Five restoration plans, denoted as Plans A through E, were developed as part of plan formulation. The five restoration plans were each applied to the 9 alternative plans to develop the preliminary array of alternatives. The five restoration plans were:

- Plan A – No Action Alternative
- Plan B – Minimum Design Plan
- Plans C –Minimum Design Plan with 5 years of background erosion
- Plan D – Minimum Design Plan with 10 years of background erosion
- Plan E – Minimum Design plan with 15 years of background erosion

For the LCA TBBSR, borrow areas were also located and screened to provide material for the projects. The borrow area map developed by Khali and Cantu (2008) was used as a starting point for the PDT's borrow area search effort. Their tabular compilation included the location of the borrow area, estimated volume of available fill material, volume of material already dredged from the borrow area, and pertinent geotechnical and geophysical references. Seven criteria were used in the initial screening of the borrow areas. Some sites were immediately screened out due to being close to the depth of closure. The borrow areas that were carried forward were outside the depth of closure, had adequate capacity of compatible material, and included cultural survey information.

Final Array of Alternatives. Through an iterative process of plan formulation and screening, ten alternatives were originally recommended for inclusion in the Final Array of Alternatives. Two additional plans (Alternatives 11 and 12) were later added to the final array once it became apparent that there were no alternatives that could be constructed within the maximum project cost as authorized by WRDA 2007 and modified according to section 902 of the WRDA 1986, as amended. For each island, an alternative would include a dune, intertidal (marsh), and supratidal (beach) component. The final array of alternatives included:

- Alternative 2 - Timbalier (Plan E)
- Alternative 3 - Timbalier (Plan E) / Whiskey (Plan C)
- Alternative 4 - Timbalier (Plan E) / Whiskey (Plan C) / Trinity (Plan C)/
- Alternative 5 (NER Plan) – Timbalier (Plan E) / Whiskey (Plan C) / Trinity (Plan C)/ Raccoon with Terminal Groin (Plan E)
- Alternative 6 – Whiskey (Plan B)/ Trinity (Plan B) / Raccoon (Plan B)/
- Alternative 7 – Whiskey (Plan B)/ Trinity (Plan B) / Raccoon with Breakwater (Plan B)/
- Alternative 8 – Whiskey (Plan B) / Trinity (Plan B) / Raccoon with Terminal Groin (Plan B)/
- Alternative 9 – Timbalier (Plan B) / Whiskey (Plan B)/ Raccoon (Plan B)/
- Alternative 10 – Timbalier (Plan B) / Whiskey (Plan B)/ Trinity (Plan B)/ Raccoon (Plan B) / East (Plan B)/ East Timbalier (Plan B)/ Wine (Plan B)
- Alternative 11 (TSP) – Whiskey (Plan C)
- Alternative 12 - Trinity (Plan C)

Comparison of Alternatives. The effects of the alternatives within the final array were evaluated against the No Action Alternative in order to determine their overall impact over the 50-year period of analysis of the project. Alternatives were then compared to each other. This includes environmental impacts to significant resources, WVA benefits, cost and contributions to project goals, planning objectives and constraints, contributions to the Federal objective, and the P&G's four evaluation criteria (completeness, effectiveness, efficiency and acceptability).

Table 20 shows the comparison of the alternatives in the final array shown in order of decreasing benefits.

Table 20: Alternatives Costs, Benefits, and IWR-PLAN Results

Alt.	AAHUs	Total Construction Cost*	Annualized Cost*	Annualized Cost/AAHU	Cost-effective (Yes/ No/ Best Buy)
5	2,063	\$408,000,000	\$20,830,000	\$10,100	Best Buy
10	1,842	\$439,000,000	\$22,420,000	\$12,170	No
4	1,637	\$329,000,000	\$16,820,000	\$10,280	Yes
3	1,250	\$247,000,000	\$12,640,000	\$10,120	Yes
9	890	\$199,000,000	\$10,160,000	\$11,420	Yes
2	871	\$170,000,000	\$8,710,000	\$10,000	Best Buy
7	808	\$182,000,000	\$9,280,000	\$11,490	No
8	801	\$180,000,000	\$9,190,000	\$11,470	No
6	785	\$177,000,000	\$9,040,000	\$11,510	No
12	387	\$81,500,000	\$4,160,000	\$10,749	Yes
11	379	\$76,600,000	\$4,070,000	\$10,738	Yes

*Costs represent preliminary cost estimates used for IWR and planning purposes only and do not represent a fully-funded cost estimate. Benefits are calculated for initial construction.

Key Assumptions. The following assumptions are key to the success of the project:

- A renourishment event will be conducted on Whiskey Island in TY20 and in TY40 in order to maintain the geomorphic form and ecologic function of the island throughout the 50-year period of analysis.
- The net effects of local subsidence and sea level rise will not deviate significantly from the numbers estimated for this study.
- The designated borrow areas will have sufficient sediment and nutrients to support the initial construction of the Recommended Plan which will require 8.3 million cubic yards (mcy) of beach material dredged from Ship Shoal and 0.6 mcy of marsh material dredged from the Whiskey 3 borrow area.
- The review of prehistory and archaeological record of this part of south Louisiana indicate a low probability for significant prehistoric archaeological sites or prehistoric watercraft within the barrier island Area of Potential Effects.
- Erosion rates were taken from Louisiana Barrier Erosion Study's historical data dating back to 1835. It is assumed that erosion rate is a constant and the construction of this alternative will not increase or decrease erosion rates along the barrier island chain.

Recommended Plans.

National Ecosystem Restoration Plan - Analysis of the 9 alternatives and the No Action Plan resulted in Alternative 5 being chosen as the NER Plan. The NER Plan, which consists of Timbalier Plan E, Whiskey Plan C, Trinity

Plan C, and Raccoon Plan E with Terminal Groin, which at the minimum includes dune restoration, marsh creation, and beach restoration, was the most appealing selection for the Recommended Plan because it was a Best Buy that fulfills the planning objectives of the project. This proposed action provides 2,883 AAHUs, with renourishment, for the impact areas with a total estimated cost for construction of \$689,030,000. However, this plan exceeds the WRDA 2007 authorization.

Beach renourishment events would be needed at staggered intervals for the different islands over the 50-year period of analysis to maintain the benefits. The cost of Alternative 5 exceeds the authorization for this project, however, additional authority for implementation of the NER plan is recommended.

Recommended Plan (TSP) - Analysis of the individual islands included in Alternative 5 resulted in Whiskey Island Plan C (Alternative 11) being chosen as the Recommended Plan. It also includes at the minimum: dune restoration, marsh creation, and beach restoration. The total project cost of Whiskey Plan C is \$119,320,000. Whiskey Plan C (Alternative 11) is shown in Figure 9 at the end of the section.

Table 21 summarizes project benefits and costs.

Whiskey Island Plan C would restore 895 acres of beach /dunes and 377 acres of marsh for a total of 1,272 acres. The plan was designed to create 678 AAHUs, with renourishment, at a fully-funded cost of approximately \$119,320,000. The plan represents an implementable increment of the NER plan, is cost-effective, and is within the cost and scope of the authorization. Renourishment events will be needed for Whiskey Island in target year (TY) 20 and TY 40 to maintain the benefits. The non-Federal sponsor fully supports Alternative 11 as the Recommended Plan under the current authorization.

Table 21: LCA TBBSR Comparison of NER and Recommended Plan

	Alt. 11 (RP)	Alt. 5 (NER)
AAHUs *	379	2,063
Cost-effective (Yes/No/Best Buy)	Yes	Best Buy
\$Annualized Cost/AAHU **	\$210,121	\$197,704
MCACES Total Project Cost	\$119,320,000	\$689,030,000
Authorized Cost in WRDA Title VII, Section 7006 (e)(3)(A) for the LCA TBBSR		\$124,600,000
Maximum Cost Limited by Section 902***		\$180,900,000

*Benefits calculation based on initial construction

**Based on initial cost estimate not MCACES cost.

***Includes inflation and monitoring and adaptive management costs.

Systems/Watershed Context. The barrier islands function within the larger ecosystem as fish and wildlife habitat, protection for fragile wetlands from higher energy marine coastal processes, and mitigation for storm surge. The CPRA is a partner in this study and is the non-Federal sponsor.

Eleven Coastal Wetland Planning and Protection Act (CWPPRA) Projects have been completed on the Terrebonne Basin barrier islands. An additional 3 projects are planned. Another 8 projects have been nominated under the CIAP Program. Construction of the Recommended Plan will help preserve the investments in some previous restoration projects. The high degree of interest in restoring these islands underscores their importance. The CIAP projects are being proposed by Livingston Parish. Cooperating Federal agencies for this project include NOAA, USFWS, NRCS, and USEPA.

Environmental Operating Principles. The EOPs inform the plan formulation process and sustainability, consideration of environmental consequences, building a shared knowledge base to support greater understanding of the environment, and respecting the views of individuals and groups were directly applicable to this project.

Peer Review. ATR was managed by the ECO-PCX in MVD. The ATR was performed by a team composed of District staff of the Norfolk District and Baltimore District in NAD, Wilmington District and Jacksonville District in SAD, Rock Island District in MVD and Walla Walla District in NWD. All comments have been addressed and closed and the report has been revised to reflect the comments. ATR certification was received on March 19, 2010.

An Independent External Peer Review (IEPR) was conducted for the project in accordance with procedures described in the Department of the Army, U.S. Army Corps of Engineers, Engineer Circular No. 1165-2-209, Civil Works Review Policy, dated 31 January 2010, and the Office of Management and Budget Final Information Quality Bulletin for Peer Review (16 December 2004). IEPR began on April 27, 2010. The panel submitted their Final IEPR Report on June 25, 2010. The IEPR panel identified 16 final comments. The comments and responses were discussed during a conference call on July 26, 2010 between the USACE PCX, project team, State of Louisiana, the IEPR panel members and Battelle. All comments have been resolved, closed out in Dr Checks and addressed within the report. Battelle provided a pdf printout of the DrChecks project file on August 11, 2010.

EXPECTED PROJECT PERFORMANCE

Table 22, Table 23, Table 24, and **Error! Reference source not found.** show the project costs and benefits. Table 25 and Table 26 show the cost sharing

amounts for the Federal government and non-Federal sponsor for both the NER plan and the Recommended Plan.

Project Costs.

Table 22: Cost Summary for NER - LCA TBBSR

Construction Item		Cost
Lands & Damages		\$692,000
Elements		
	Fish and Wildlife	\$5,820,000
	Beach Replenishment	\$582,201,000
	Subtotal	\$588,021,000
Preconstruction Engineering & Design (PED)		\$29,108,000
Construction Management (E&D, S&A)		\$29,110,000
Total First Cost		\$646,931,000
HTRW Remedial Action*		\$0

*October 2010 Price Levels

**Associated financial costs that are not part of the recommended Federal Project but are a necessary non-Federal responsibility.

Table 23: Cost Summary for Recommended Plan - LCA TBBSR

Construction Item		Cost
Lands & Damages		\$65,000
Elements		
	Fish and Wildlife	\$5,820,000
	Beach Replenishment	\$97,770,000
	Subtotal	\$103,590,000
Preconstruction Engineering & Design (PED)		\$4,891,000
Construction Management (E&D, S&A)		\$4,888,000
Total First Cost		\$113,434,000
HTRW Remedial Action*		\$0

*October 2010 Price Levels

**Associated financial costs that are not part of the recommended Federal Project but are a necessary non-Federal responsibility.

Equivalent Annual Costs and Benefits.**Table 24: Equivalent Annual Benefits and Costs – LCA TBBSR Full Recommended Plan (NER)**

Investment Costs		
	Total Project Construction Costs	\$646,931,000
	Interest During Construction	\$42,099,000
	Total Investment Cost	\$689,030,000
Average Annual Costs		
	Interest and Amortization of Initial Investment (additional annual costs if applicable)	\$15,100,000
	OMRR&R	\$11,300,000
	Total Average Annual Costs	\$26,400,000
	Net NER Annual Benefits*	2,883 AAHU

October 2010 Price Level, 50-year Period of Analysis, 4.375 Percent Discount Rate

* Includes AAHUs created by renourishment cycles

Cost Sharing.**Table 25: Cost Sharing - NER for LCA TBBSR**

Item	Federal Cost	Non-Federal Cost	Total Cost*
Ecosystem Restoration (ER)			
PED 1	\$18,920,000	\$10,188,000	\$29,108,000
Construction Management	\$18,922,000	\$10,188,000	\$29,110,000
Adaptive Management	\$3,783,000	\$2,037,000	\$5,820,000
LERR&D	\$0	\$692,000	\$692,000
Construction	\$378,880,000	\$203,321,000	\$582,201,000
Total Project	\$ 420,505,000(65)	\$ 226,426,000(35)	\$646,931,000
Associated Costs	\$0	\$0	\$0
Total with Associated Costs	\$ 420,505,000(65)	\$ 226,426,000(35)	\$646,931,000

*October 2010 Price Level

Table 26: Cost Sharing – Recommended Plan for LCA TBBSR

Item	Federal Cost	Non-Federal Cost	Total Cost*
Ecosystem Restoration (ER)			
PED 1	\$3,179,000	\$1,712,000	\$4,891,000
Construction Management	\$3,177,000	\$1,711,000	\$4,888,000
Adaptive Management	\$3,783,000	\$2,037,000	\$5,820,000
LERR&D	\$0	\$65,000	\$65,000
Construction	\$63,593,000	\$34,177,000	\$97,770,000
Total Project	\$ 73,732,000(65)	\$ 39,702,000(35)	\$113,434,000
Associated Costs	\$0	\$0	\$0
Total with Associated Costs	\$ 73,732,000(65)	\$ 39,702,000(35)	\$113,434,000

*October 2010 Price Level

Project Implementation. The CPRA, acting for the State of Louisiana, is the non-Federal sponsor. The cost share for the planning, design and construction of the project will be 65% Federal and 35% non-Federal. CPRA must provide all LERRDs required for the project. OMRR&R of the project would be a 100% CPRA responsibility. For the LCA TBBSR, the cost of renourishment events will be included in the OMRR&R which is a 100% non-Federal responsibility. A feasibility-level monitoring and adaptive management plan has been developed for the project and is included in the report. The monitoring and adaptive management plan was developed to include the proposed monitoring and to consider and identify any necessary adaptive management activities.

Operation, Maintenance, Repair, Rehabilitation, and Replacements. OMRR&R requirements for Alternative 11 (Recommended Plan) will include renourishment. The first event in TY 20 would involve the addition of sediment to the dune and supratidal habitat equivalent to Plan C. The second event would occur in TY 40 and would include sediment added to the dune and supratidal habitat in an amount equivalent to Plan B.

Key Social and Environmental Factors.

Environmental factors associated with implementation of Alternative 11 include restoration of Whiskey Island and improvement of a total of 1,306 acres. A total of 11,756,638 cy of borrow material would be required for implementing Alternative 11. This could directly impact approximately 608 acres of water bottoms including 560 acres at Ship Shoal and 48 acres at Whiskey Area 3a. Renourishment at TY20 would require 10,829,280 cy of material and impact 560 acres of water bottoms at Ship Shoal. Approximately 477 acres of beach and dune habitat would be covered. Renourishment at TY40 would require 7,186,415 CY of material and impact 428 acres of water bottoms at Ship Shoal. Approximately 360 acres of beach and dune would be covered. Whiskey Island is within the critical habitat of

the piping plover, however, the proposed action is not likely to destroy or adversely modify piping plover critical habitat.

The Terrebonne Basin barrier islands are uninhabited so there are few social factors. The project could potentially affect navigation during construction. The project will also provide additional protection for the oil and gas infrastructure in the area and potentially prevent that infrastructure from becoming exposed and vulnerable to damage in storms. Cumulative impacts of implementing the TSP would be the synergistic interaction of the effects of implementing the Whiskey Island restoration plan with a net benefit of 469 acres at TY1 with the additive combination of impacts and benefits for net acres restored by other Federal, state, local, and private restoration. Though efforts to increase sediment supply to the coastal marshes will contribute to their stability, unequivocally, barrier islands serve to absorb wave energy during storms and fair-weather conditions, thereby mitigating the wave field in adjacent bays along fringed marshes (G.W. Stone, 2005). The construction of these islands will provide storm surge protection for the interior marshes within the basin, which will decrease erosion rates substantially. More information regarding the effects of the Recommended Plan on significant resources can be found in Volume V Section 5 of the main report.

The project will provide positive ecosystem benefits. Temporary negative impacts will be compensated for by creation of new bottomland hardwood habitat and restoration of forested freshwater swamps. No mitigation measures are needed.

Stakeholder Perspectives and Differences. A NOI to prepare a draft SEIS for the LCA Terrebonne Basin Barrier Shoreline Restoration Project was published in the Federal Register in December 2008. A public scoping meeting was held in February 2009. The Draft FS/SEIS was released to the public in June 2010, followed by a 45-day public review period which included a public meeting. Public comments were received during the scoping meeting and Draft FS/SEIS public review and have been incorporated into the report. All public and agency comments are documented in Volume V Appendix G.

An area of controversy that exists is the cost-effectiveness of hardened structures, most notably, rock breakwaters and revetments, in achieving the project goals. These measures are supported by the local Parish Government as well as groups and individuals in the scientific community. Analysis for this project indicated renourishment was a more effective method for addressing the erosion on most of the islands and a terminal groin was only considered cost-effective for Raccoon Island.

Environmental Compliance. The NEPA documentation included with the feasibility report was written to the level of an environmental impact statement (EIS). A draft Record of Decision has been developed and provided for HQUSACE

State and Agency Review. State and agency review of the final FS/EIS will occur from October 5, 2010, to November 4, 2010.

Certification of Peer and Legal Review. This project has undergone the following reviews and certification or approval was granted in the associated date:

- Agency Technical Review – 3/19/2010
- Legal Adequacy – Pending
- Cost Engineering – Memorandum Received 5/11/2010
- Real Estate – 7/30/2010

Legal review - A status of legal review was included in the report transmittal package. Final legal certification will be completed once formal consultations with the USFWS are complete and their Biological Opinions and recommendations have been integrated in the appropriate project SEIS documents.

Cost certification - The feasibility certification of cost estimate will not be provided for any of the projects addressed in this report due to the lack of specific detailed engineering design data. Cost estimates have been reviewed by the Cost DX and adjusted appropriately for the level of design detail. CEMVN has coordinated the issue with the vertical team. The District, Division and RIT think that the risk of moving forward absent certification is acceptable.

Policy Compliance Review. This project is currently undergoing the policy compliance review process.

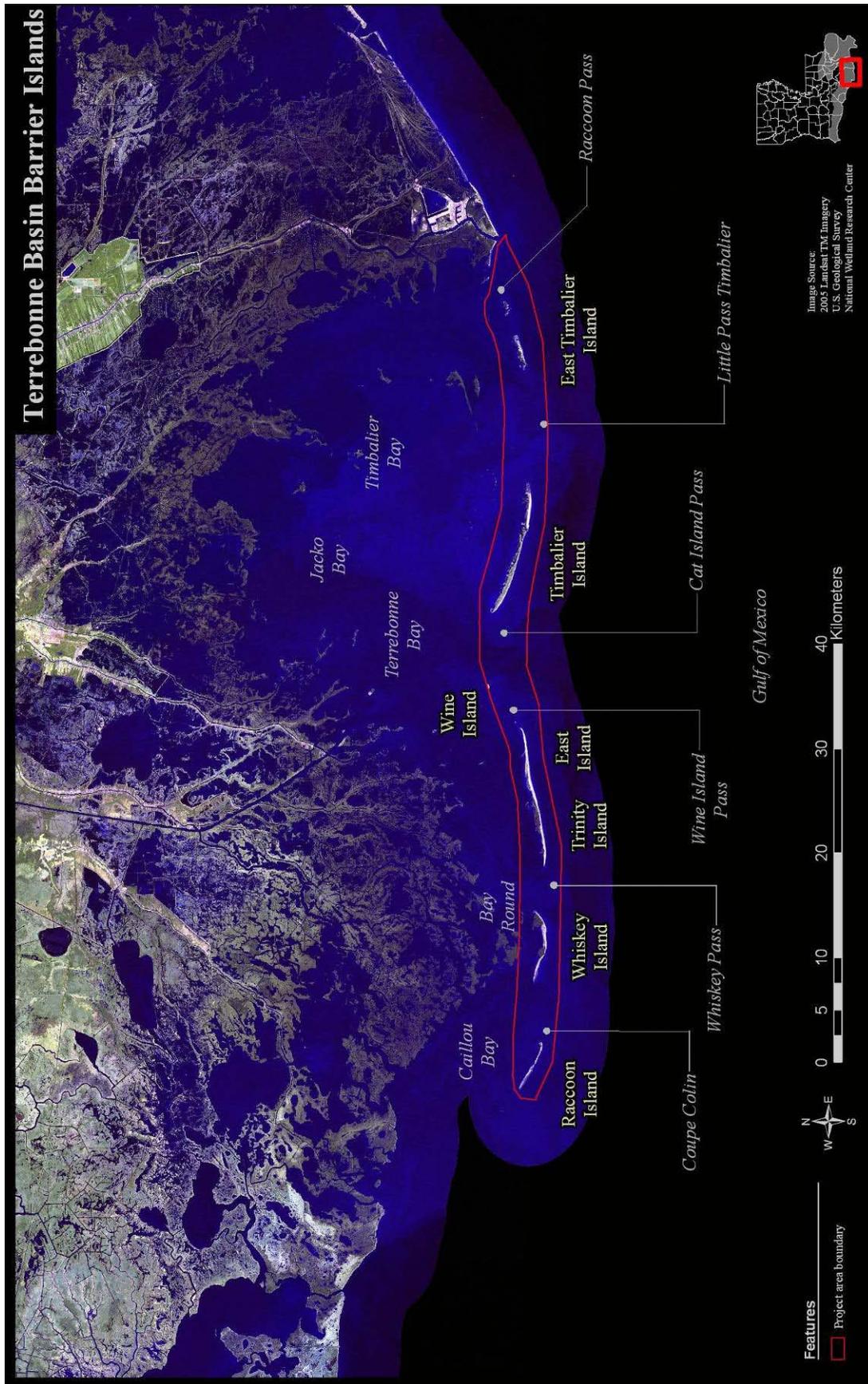


Figure 8: Study Area – LCA Terrebonne Basin Barrier Shoreline Restoration



LCA Medium Diversion at White Ditch

Study Purpose and Scope.

The purpose of the LCA Medium Diversion at White Ditch (MDWD) Study is to fulfill the need for a feasibility-level report and associated NEPA documentation. This report is a final response to the study authority. The purpose of the MDWD Study Project is to evaluate a medium sized (5,000 to 15,000 cfs) diversion structure from the Mississippi River and into the Breton Sound area to reintroduce freshwater, nutrients, and sediment into the Breton Sound Area. This study only addresses ecosystem restoration.

Project Location/Congressional District. The LCA MDWD Study Area is located approximately 23 miles south-southeast of the City of New Orleans along the Mississippi River and includes the Breton Sound area. The MDWD project Study Area is located within Plaquemines Parish in Congressional District 3. The Study Area is shown on Figure 10 at the end of the section.

Prior Reports and Existing Water Projects. This study builds upon the following key reports and studies identified in Table 27. Alternative plans for this study were formulated based upon the 2004 LCA Report and the project description contained within that report.

Table 27: Relevance of Prior Reports and Existing Water Projects to the LCA MDWD Integrated FS/SEIS

	Relevance to LCA MDWD				
	Data Source	Consistency	Structural Measurements	Non-Structural Measures	Future Without Project Condition
Mississippi River and Tributaries (MR&T), 1928	X	X	X		
New Orleans to Venice, Louisiana Hurricane Protection, 1962	X	X	X		
Hydrologic and Geologic Studies of Coastal Louisiana, LSU 1973	X				X
Deep-Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana, 1981		X			
Louisiana's Eroding Coastline: Recommendations for Protection, EPA 1982	X	X	X	X	X
Mississippi Deltaic Plain Region Ecological Characterization, USFWS 1982	X				X

	Relevance to LCA MDWD				
	Data Source	Consistency	Structural Measurements	Non-Structural Measures	Future Without Project Condition
Proceedings of the Conference on Coastal Erosion and Wetland Modification in Louisiana: Causes, Consequences, and Options, 1982	X				X
Mississippi and Louisiana Estuarine Areas, 1984	X				X
Louisiana Coastal Area, Hurricane Protection, 1988 (Draft)	X	X			
Louisiana Coastal Wetlands Conservation, Restoration and Management Act, Act 6 1989	X	X			X
The Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA), 1990	X	X	X	X	X
White's Ditch Diversion Siphon – Outfall Management Plan Feasibility Report (1992)	X		X	X	X
An Environmental- Economic Blueprint for Restoring the Louisianan Coastal Zone: The State Plan for the Wetlands Conservation and Restoration Authority, 1994	X	X	X	X	X
A White Paper- The State of Louisiana's Policy for Coastal Restoration Activities, 1995	X	X			X
Coast 2050, 1999	X	X	X	X	X
Mississippi River Sediment, Nutrient and Freshwater Redistribution Feasibility Study, 2000	X				X
LCA Ecosystem Restoration Study, 2004	X	X	X	X	X
Act 8 of the First Extraordinary Session of 2005		X			
Drawing Louisiana's New Map: Addressing Land Loss in Coastal Louisiana, 2006	X				X
Louisiana's Comprehensive Master Plan for a Sustainable Coast, 2007	X	X	X	X	X

Federal Interest. This project was identified in the 2004 LCA Report completed by USACE as a critical, near-term, ecosystem restoration project. Ecosystem restoration is one of the primary missions of the USACE Civil Works Program with the objective to contribute to NER.

Louisiana contains one of the largest expanses of coastal wetlands in the contiguous United States and accounts for 90 percent of the total coastal marsh loss occurring in the Nation. The MDWD Study Area is an essential ecosystem since it includes wetland habitats, essential fish habitat, and has high fish and wildlife values. These ecosystems provide habitat for migratory

birds, wildlife, finfish, shellfish, and other aquatic organisms including threatened or endangered species.

STUDY OBJECTIVES

Problems and Opportunities. Following construction of the federal flood control and navigation measures such as the MR&T flood control system, the absence of a supply of freshwater, sediment, and nutrients from the Mississippi River floods combined with the ongoing pressures of wind and wave action, storm surges, and human activities have eroded marsh soils and reduced the ability of the Study Area to maintain a balance of emergent wetland and shallow water.

The altered supply and distribution of freshwater, lack of sediments, marsh subsistence, and human development in the White Ditch area have resulted in degraded and unbalanced distribution of freshwater, brackish, and saltwater marsh habitats. Degradation of the existing marshes has made them more vulnerable to Gulf storm events; extreme and seasonal, resulting in accelerated degradation, altered hydrology, and changed salinity regimes. The overarching project goal is to restore and maintain ecological integrity, including habitats, communities, and populations of native species, and the processes that sustain them by reversing the trend of degradation and deterioration to the area between the Mississippi River and the River aux Chenes ridges, so as to contribute towards achieving and sustaining a larger coastal ecosystem that can support and protect the environment, economy, and culture of southern Louisiana and thus contribute to the economy and well-being of the Nation.

Opportunities identified include:

- Naturalize the distribution of freshwater and sediments
- Improve hydrologic distribution of freshwater
- Improve topographic diversity
- Reduce the negative impacts of Gulf storm events and inhibit invasive species

Planning Objectives. Specific project objectives include:

- Maintain the current area of marsh habitat, of all types (41,206 acres), that provide life requisite habitat conditions for native coastal marsh fish and wildlife
- Restore adequate freshwater and nutrient inputs into the Study Area such that sustainable areas of fresh, intermediate, brackish and saline marsh are present and existing areas of marsh acres are maintained
- Restore sediment inputs into the Study Area equivalent to an average of approximately 1,300,000 cubic yards of sediment per year

Planning Constraints. Planning constraints include:

Design constraints

- The current authorization identifies a 5,000–15,000 cfs diversion.
- The MDWD restoration measures must accomplish their goals while avoiding and/or minimizing significant impacts to the existing level of flood protection.
- The project should permit reasonable access to the local waterways for all prospective users.
- Adverse effects to the existing infrastructure will be minimized to the extent practicable. Numerous gas and oil pipelines exist that are not mapped and may limit the design or restrict the use of some potential restoration measures. The risk and uncertainty associated with any project feature must be evaluated as it relates to buried utilities.
- Potential impacts such as induced shoaling or increased Operations and Maintenance of the authorized Mississippi River Navigation Project should be avoided but, if necessary, mitigation measures and costs will be evaluated and included as part of the recommended plan.

Ecosystem Constraints

- Restoration of marsh habitats may still not occur fast enough to compensate for the losses due to Gulf storm events and potential sea level rise.
- Restoration measures cannot introduce water, nutrient or sediment flows that would violate established state water quality standards.
- At this time it is not known if pallid sturgeons are in the lower river near the MDWD Study Area. Monitoring will need to be done to determine its presence and if so this will need to be coordinated closely with USFWS.
- River aux Chenes, while disconnected from the Mississippi River, still conveys flows from the Breton Sound Basin to the Gulf.
- Overtopping of the natural levees or banks of the River aux Chenes from a diversion could potentially result in loss of those diversion flows to the Gulf. This effect serves as an upper constraint on the size of flows that can be diverted.
- Diversion features need to be designed to allow the continuance of ecologically important exchanges of water, nutrients, food sources and fish between the Study Area and River aux Chenes, as well as navigation access, while achieving project objectives for marsh restoration.

ALTERNATIVES

Plan Formulation Rationale. An initial list of 22 measures was developed based on strategies for freshwater supply, hydraulic distribution, sediment

supply and distribution, protection and sustainability, and invasive species management.

Management Measures and Alternative Plans. After screening, 8 measures were carried forward and those measures were used to develop 5 alternative plans. The 5 alternatives included river diversions which ranged in size from 15,000 cfs to 100,000 cfs. After additional analysis, diversions of 45,000 cfs and larger were screened due to modeling results from the similar Myrtle Grove Project indicating significant impacts to the levee system related to larger diversion scales. Additionally, projected water levels could exceed the natural levee height of River aux Chenes resulting in nutrients and sediment discharging into the Gulf instead of being retained. Additional analysis and investigation resulted in a group of diversions ranging from 5 to 35,000 cfs carried forward for further analysis. Project screening criteria are documented in Volume IV, Section 3.2.4.

Five potential locations for diversions of the various sizes were considered. Based on screening criteria, two locations were included for the final array. The remaining location options and the diversion sizes were combined to develop the preliminary alternative plans. After an initial cost analysis was completed on the preliminary array of alternatives, it was determined that all of the alternatives at location 2 were not cost-effective while the 5, 10, 15, and 35 thousand cfs diversions at location 3 were found to be cost-effective.

Final Array of Alternatives. The final array of alternatives included 4 alternatives at location 3 and the No Action Alternative. Excluding the No Action Alternative, the final array of alternatives included:

- Alternative 1 – 5,000 cfs diversion
- Alternative 2 – 10,000 cfs diversion
- Alternative 3 – 15,000 cfs diversion
- Alternative 4 (Recommended Plan/NER) – 35,000 cfs diversion

All alternative plans include conveyance channels and associated marsh creation.

Comparison of Alternatives. The effects of the alternatives within the final array were evaluated against the No Action Alternative in order to determine their overall impact over the 50-year period of analysis of the project. Alternatives were then compared to each other. This includes environmental impacts to significant resources, WVA benefits, cost and contributions to project goals, planning objectives and constraints, contributions to the Federal objective, and the P&G's four evaluation criteria (completeness, effectiveness, efficiency and acceptability). Table 28 shows the comparison of the final array shown in order of decreasing benefit.

Table 28: Alternatives Costs, Benefits, and IWR-PLAN Results

Alt.	AAHUs	Total Construction Cost	Annualized Cost*	Annualized Cost/AAHU	Cost-effective (Yes/ No/ Best Buy)
4	13,355	\$329,300,000	\$17,793,596	\$1,332	Best Buy
3	7,742	\$241,700,000	\$13,311,845	\$1,694	Yes
2	5,936	\$174,200,000	\$9,507,805	\$1,602	Yes
1	5,197	\$152,900,000	\$8,362,152	\$1,609	Yes

*Costs represent preliminary cost estimates used for IWR and planning purposes only and do not represent a fully-funded cost estimate.

Key Assumptions. The following assumptions are key to the success of the project:

- The Mississippi River has sufficient sediment and nutrients to rebuild marsh in the Breton Sound Basin and that within the 50 year life cycle the supply of sediment and nutrients will not change significantly.
- Benefits and marsh accretion to the Study Area will match what ERDC-SAND2 modeling predicted.
- The net effects of relative sea level rise will not deviate significantly from the numbers estimated for this study.
- The recommended structure location on the Mississippi River is a good spot for capturing sediments.
- The recommended pulsing operation will be implemented.

Recommended Plans.

National Ecosystem Restoration Plan - Alternative 4 Location 3 – 35,000 cfs was chosen as the NER plan. However, Alternative 4 exceeds the authorized funding limit in WRDA 2007. Due to the nature of a river diversion, an implementable element of the NER plan could not be identified.

Recommended Plan - Alternative 4 was also chosen as the Recommended Plan and is shown in Figure 11 at the end of the section. **Table** summarizes the project costs and benefits.

The Recommended Plan has been determined to reasonably maximize ecosystem restoration benefits compared to costs, consistent with the Federal objective. However, the Recommended Plan cost exceeds the authorization for this project in WRDA 2007. The District Commander recommends seeking additional authorization in order to construct the Recommended Plan. Table 29 summarizes project costs and benefits for the Recommended Plan.

Alternative 4 will deliver freshwater, sediment, and nutrients and improve habitat function by 13,355 AAHUs by creating and nourishing approximately 41,206 acres of fresh, intermediate, brackish, and saline wetlands.

Alternative 4 will generate 13,355 AAHUs of benefit at a fully-funded cost of \$387,620,000. This alternative best meets the study objectives, is the most flexible, and has the most robust sustainable capability against relative sea level rise over the length of the 50-year planning horizon. Risk and uncertainty were evaluated for the Recommended plan,

Table29: LCA MDWD Recommended Plan

	Alt. 4 (RP/NER)
AAHUs	13,355
Cost-effective (Yes/No/Best Buy)	Best Buy
\$Annualized Cost/AAHU*	\$1,332
MCACES Total Project Cost	\$387,620,000
Authorized Cost in WRDA Title VII, Section 7006 (e)(3)(A) for the LCA MDWD	\$86,100,000
Maximum Cost Limited by Section 902**	\$126,686,400

*Based on initial cost estimate not the MCACES cost.

**Includes inflation and monitoring and adaptive management costs.

Systems/Watershed Context. This plan will restore sediment, adequate freshwater, and nutrient inputs into the Study Area such that sustainable areas of fresh, intermediate, brackish and saline marsh are present and existing areas of marsh acres are maintained. The objective of Civil Works ecosystem restoration is to restore degraded significant ecosystem structure, function, and dynamic processes to a less degraded, more natural condition. This project will restore degraded significant ecosystem structure, function, and dynamic processes. It has potential to build net acres of marsh and restore marsh acreage to historic levels. The LCA MDWD Study Area provides extremely important geomorphic, hydrologic, and habitat functions. The creation of new marsh through implementation of the Recommended Plan would likely have profound beneficial effects on the Study Area and beyond.

Cooperating Federal agencies for this project include USFWS, NRCS, and USEPA.

Environmental Operating Principles. The EOPs inform the plan formulation process and sustainability, consideration of environmental consequences, building a shared knowledge base to support greater

understanding of the environment, and respecting the views of individuals and groups were directly applicable to this project.

Peer Review. ATR was managed by the ECO-PCX in MVD. The ATR was performed by a team composed of staff in the Norfolk District in NAD, Wilmington District and Jacksonville District in SAD, Rock Island District in MVD and Walla Walla District in NWD. All comments have been addressed and closed and the report has been revised to reflect the comments. ATR certification was received on March 16, 2010.

An IEPR was conducted for the project in accordance with procedures described in the Department of the Army, U.S. Army Corps of Engineers, Engineer Circular No. 1165-2-209, Civil Works Review Policy, dated 31 January 2010, and the Office of Management and Budget Final Information Quality Bulletin for Peer Review (16 December 2004). IEPR began on April 27, 2010. The panel submitted their Final IEPR Report on June 23, 2010. The IEPR panel identified 11 final comments. The comments and responses were discussed during a conference call on July 8, 2010 between the USACE PCX, project team, State of Louisiana, the IEPR panel members and Battelle. All comments have been resolved, closed out in Dr Checks and addressed within the report. Battelle provided a pdf printout of the DrChecks project file on August 11, 2010.

EXPECTED PROJECT PERFORMANCE

Table 29, and Table 30, **Error! Reference source not found.** show the project costs and benefits. Table shows the cost sharing amounts for the Federal government and non-Federal sponsor.

Project Costs.

Table 29: Cost Summary - LCA MDWD

Construction Item		Cost*
Lands & Damages		\$494,000
Elements		
	Relocations	\$196,000
	Fish & Wildlife	\$11,143,000
	Floodway Control & Diversion Structures	\$289,611,000
	Subtotal	\$300,950,000
Preconstruction Engineering & Design (PED)		\$34,777,000
Construction Management (E&D, S&A)		\$28,981,000
Total First Cost		\$365,201,000
HTRW Remedial Action**		\$0

*October 2010 Price Levels

**Associated financial costs that are not part of the recommended Federal Project but are a necessary non-Federal responsibility.

Equivalent Annual Costs and Benefits.

Table 30: Equivalent Annual Benefits and Costs - LCA MDWD

Investment Costs		
	Total Project Construction Costs	\$365,201,000
	Interest During Construction	\$22,419,000
Total Investment Cost		\$387,620,000
Average Annual Costs		
	Interest and Amortization of Initial Investment (additional annual costs if applicable)	\$19,769,000
	OMRR&R	\$1,468,000
Total Average Annual Costs		\$21,237,000
Net NER Annual Benefits		13,355 AAHU's

October 2010 Price Level, 50-year Period of Analysis, 4.375 Percent Discount Rate

Cost Sharing.

Table 2: Cost Sharing - LCA MDWD

Item	Federal Cost	Non-Federal Cost	Total Cost*
Ecosystem Restoration (ER)			
PED ¹	\$22,605,000	\$12,172,000	\$34,777,000
LERR&D		\$494,000	\$494,000
Ecosystem Restoration Subtotal	\$207,533,000	\$111,254,000	\$318,787,000
ER Subtotal			
Total Project	\$ 230,138,000(65)	\$ 123,920(35)	\$354,058,000
Associated Costs (Monitoring and Adaptive Management)	\$7,243,000(65)	\$3,900,000(35)	\$11,143,000
Total with Associated Costs	\$237,381,000(65)	\$ 127,820,000(35)	\$365,201,000

*October 2010 Price Level

Project Implementation. The CPRA is the non-Federal sponsor. The cost share for the planning, design, and construction of the project will be 65% Federal and 35% non-Federal. CPRA must provide all LERRDs required for the project. OMRR&R of the project would be a 100% CPRA responsibility. A feasibility-level monitoring and adaptive management plan has been developed for the project and is included in the report. The monitoring and adaptive management plan was developed to include the proposed monitoring and to consider and identify any necessary adaptive management activities.

Operation, Maintenance, Repair, Rehabilitation, and Replacements.

OMRR&R requirements for Alternative 4 (Recommended Plan) assumed that the diversion would operate at maximum capacity during March–April with a 1,000 cfs “maintenance” flow for the remainder of the year. With the proposed diversion there will be needs for channel maintenance dredging and sluice gate maintenance. It is estimated that there will need to be significant channel dredging every 10 years on the proposed channel enhancement features. It is also assumed that there will be annual maintenance and lubrication for the sluice gates.

Key Social and Environmental Factors.

Implementation of Alternative 4 (Recommended Plan) will result in the creation or nourishment of 41,206 acres of fresh, intermediate, brackish, and saline marsh through restoration of deltaic processes within the Study Area. This project will have some environmental impacts. Impacts to 640 acres (marsh and open water) will occur to enlarge the outfall canal. This material will be placed to create ridge and marsh habitat adjacent to the canal. While the endangered pallid sturgeon could potentially be entrained in the diversion during operation, the proposed project is not considered likely to jeopardize the continued existence of the pallid sturgeon in the lower Mississippi River.

While this project is unlikely to affect many social factors in the Study Area, there could be potential impacts to commercial fisheries in the area as a result of changing populations of fish and shellfish species based on salinity tolerance. Oyster leases in the area could be indirectly impacted with increased mortality and decreased productivity resulting in loss of revenue for commercial oyster harvesters. A commercial seafood processing facility in the area could be negatively affected due to changes in the fisheries. Impacts to navigation were considered during planning and this project is unlikely to substantially increase the potential for sedimentation and shoaling in the Mississippi River downstream of the diversion or to require additional dredging over the 50-year planning horizon.

The project will provide positive ecosystem benefits. Temporary negative impacts will be compensated for by creation of new marsh and by reduction in the rate of marsh loss. Efforts to avoid and minimize negative impacts to marsh habitat will be evaluated during PED. No mitigation measures are needed. .

Stakeholder Perspectives and Differences. An NOI to prepare a draft SEIS for the LCA Medium Diversion at White Ditch was published in the

Federal Register in December 2008. A public scoping meeting was held in February 2009. The Draft FS/SEIS was released to the public in May 2010, followed by a 45-day public review period which included a public meeting. Public comments were received during the scoping meeting and Draft FS/SEIS public review and have been incorporated into the report.

During the scoping meeting and throughout the alternative identification and evaluation a number of issues have been raised regarding diversions in general and those under consideration in the Study Area.

Every effort has been made to address these concerns and clearly identify the impacts, both beneficial and detrimental of the alternatives considered. Through public review of the document most of these issues have been clarified and resolved. They are summarized as follows:

- Potential negative impacts to oysters from over-freshening of the basin
- Converting the estuary to fresh/intermediate marsh
- Creating 'flotant' marsh that is not anchored and provides no surge protection
- Direct sediment delivery with dredging from the river
- Impacts to pallid sturgeon
- Creating access and/or land use problems for private landowners
- Optimizing project location for sediment capture
- Effects of Relative Sea-Level Rise

Induced shoaling effects and other effects to the navigation/shipping industry There is general support for the project from the public as long as the recommended operating scheme is followed. Concerns from the public outlined above continue to be expressed, most vocally regarding affects to oysters. Agency support for the project is strong. Similar concerns such as from the public have been expressed but support for a large-scale diversion project, especially as it focuses on capturing as much sediment as possible, is consistent. The MDWD study is currently in Formal Consultation with USFWS to determine effects of the project on the endangered pallid sturgeon. All public and agency comments are documented in Volume VI Appendix G.

The Recommended Plan for this project exceeds the cost authorization for this project. The District Commander recommends seeking additional authorization in order to construct the Recommended Plan, however, the need to request additional authorization has the potential to impact the project construction schedule.

Environmental Compliance. The NEPA documentation included with the feasibility report was written to the level of an EIS. A draft Record of Decision has been developed and provided for HQUSACE review

State and Agency Review. State and agency review of the final FS/EIS will occur from October 8, 2010, to November 6, 2010.

Certification of Peer and Legal Review. This project has undergone the following reviews and certification or approval was granted in the associated date:

- Agency Technical Review – 3/16/2010
- Legal Adequacy – Pending
- Cost Engineering – Memo received 3/29/2010
- Real Estate – 7/30/2010

Legal review - A status of legal review was included in the report transmittal package. Final legal certification will be completed once formal consultations with the USFWS are complete and their Biological Opinions and recommendations have been integrated in the appropriate project SEIS documents.

Cost certification - The feasibility certification of cost estimate will not be provided for any of the projects addressed in this report due to the lack of specific detailed engineering design data. Cost estimates have been reviewed by the Cost DX and adjusted appropriately for the level of design detail. CEMVN has coordinated the issue with the vertical team. The District, Division and RIT think that the risk of moving forward absent certification is acceptable.

Policy Compliance Review. This project is currently undergoing the policy compliance review process.

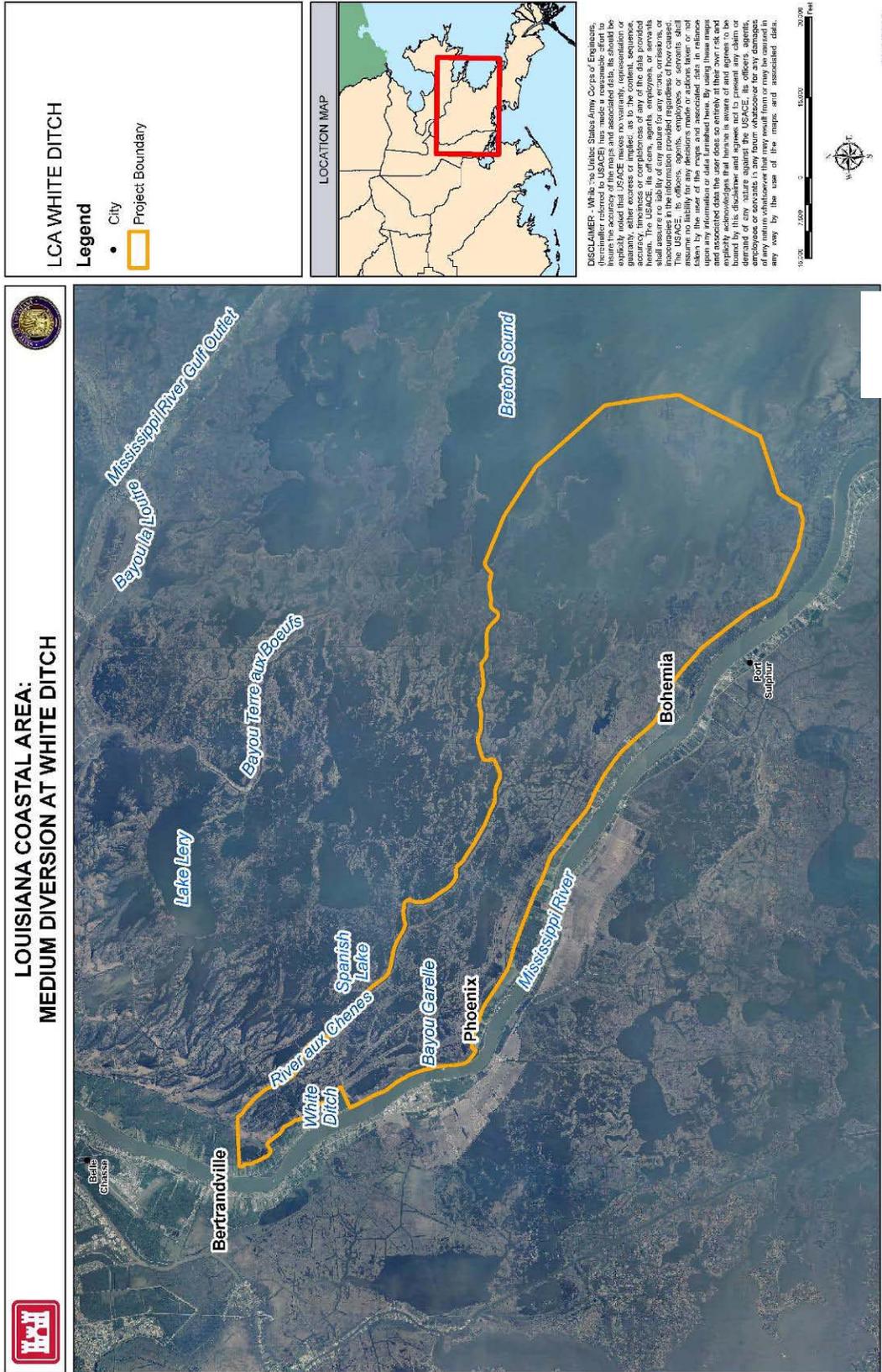


Figure 10: Study Area – LCA Medium Diversion at White Ditch

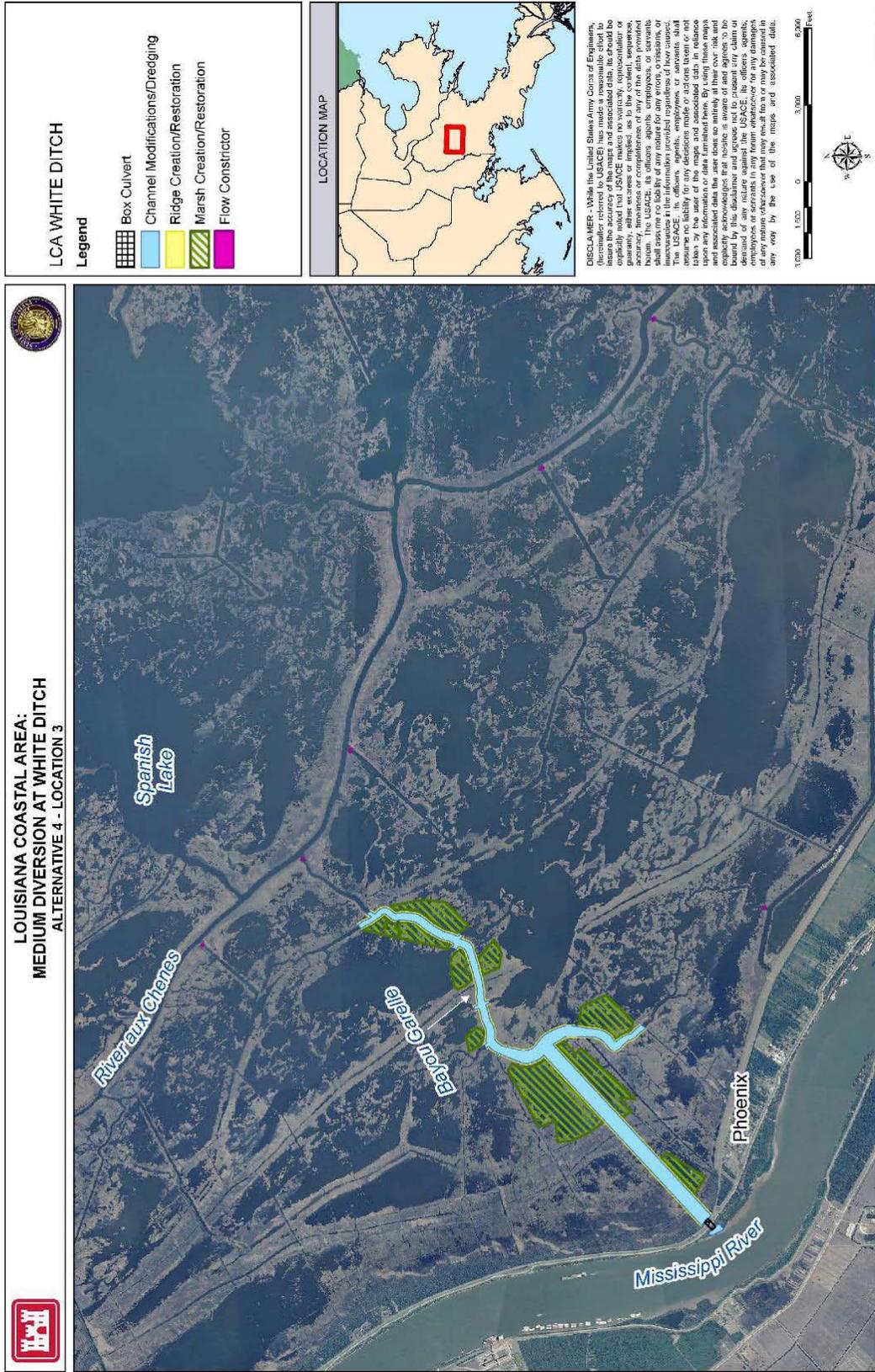


Figure 11: LCA MDWD Recommended Plan Features (Alternative 4)

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