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Final Independent External Peer Review Report for the Integrated Feasibility Study and Environmental Impact Statement for the Convey Atchafalaya River Water to Northern Terrebonne Marshes, Lafourche Terrebonne, St. Mary Parish, Louisiana

Prepared by
Battelle Memorial Institute

Prepared for
Department of the Army
U.S. Army Corps of Engineers
Ecosystem Restoration Planning Center of Expertise
Rock Island Division

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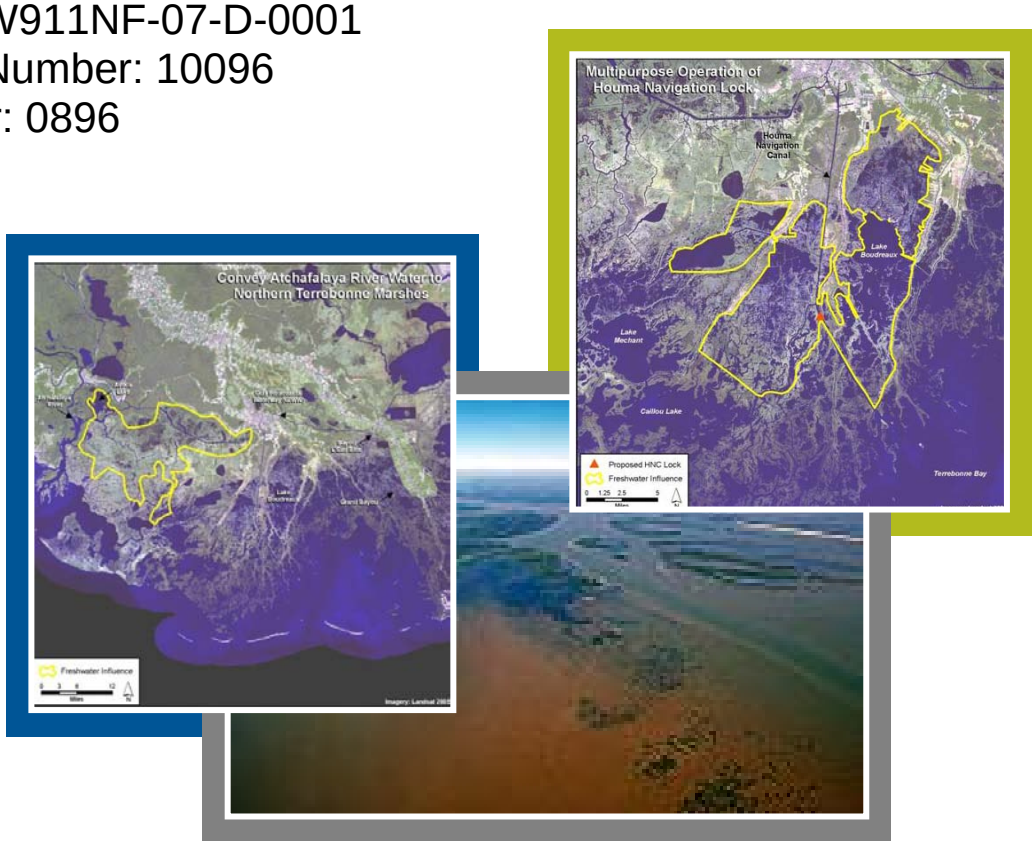

SHORT-TERM ANALYSIS SERVICE (STAS)

on

Final Independent External Peer Review Report for the Integrated Feasibility Study and Environmental Impact Statement for the Convey Atchafalaya River Water to Northern Terrebonne Marshes, Lafourche Terrebonne, St. Mary Parish, Louisiana

by

Battelle
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for

Department of the Army
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Scientific Services Program

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FINAL
INDEPENDENT EXTERNAL PEER REVIEW REPORT
for the
Integrated Feasibility Study and Environmental Impact Statement for the Convey Atchafalaya River Water to Northern Terrebonne Marshes, Lafourche Terrebonne, St. Mary Parish, Louisiana

EXECUTIVE SUMMARY

The Louisiana Coastal Area (LCA) Convey Atchafalaya River Water to Northern Terrebonne Marshes and Multipurpose Operation of Houma Navigation Lock (Atchafalaya project) study area comprises approximately 1,100 square miles in Southern Louisiana in the vicinity of the City of Houma and Terrebonne Parish. The proposed Atchafalaya project is located in the Deltaic Plain within Subprovince 3, one of the four subprovinces identified in the LCA study area.

The overall study area is bounded on the west by the Lower Atchafalaya River. The area to the east is bounded by the Bayou Lafourche ridge. The area to the north is bounded by the Bayou Black ridge, from the Lower Atchafalaya River to the City of Houma, and by the Gulf Intracoastal Waterway from the City of Houma to the Bayou Lafourche ridge. The southern boundary of the project was based on a delineation conducted in 2007 of coastal Louisiana vegetation types. The boundary roughly follows the transition between saline and brackish marsh types.

The U.S. Army Corps of Engineers (USACE) is simultaneously conducting five[1] individual Independent External Peer Reviews (IEPRs) under one project (LCA 6 project) to review six elements of the LCA Ecosystem Restoration Project. As part of the LCA 6 project, an IEPR was conducted for the Integrated Feasibility Study and Environmental Impact Statement for the Convey Atchafalaya River Water to Northern Terrebonne Marshes, Lafourche Terrebonne, St. Mary Parish, Louisiana (hereinafter referred to as the Atchafalaya report). Battelle, as a 501(c)(3) non-profit science and technology organization with experience in establishing and administering peer review panels for USACE, was engaged to coordinate the IEPR of the Atchafalaya report. Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analyses. The IEPR was external to the agency and conducted following USACE and Office of Management and Budget (OMB) guidance described in USACE (2010), USACE (2007), and OMB (2004). This final report describes the IEPR process, describes the panel members and their selection, and summarizes the Final Panel Comments of the IEPR Panel (the Panel).

Five panel members were selected for the IEPR from more than 90 identified candidates for the five LCA 6 project IEPR panels. Based on the technical content of the Atchafalaya report and the overall scope of the project, the final panel members were selected for their technical

[1] Two of the six elements were reviewed under one independent external peer review.

expertise in the following key areas: civil design/construction cost engineering, Civil Works planning, wetland ecology, hydrology and hydraulics engineering, and economics.

The Panel received electronic versions of the Atchafalaya report documents, along with a charge that solicited comments on specific sections of the documents to be reviewed. The USACE Project Delivery Team briefed the Panel and Battelle during a kick-off meeting held via teleconference prior to the start of the review. Other than this teleconference, there was no direct communication between the Panel and USACE during the peer review process. The Panel produced more than 300 individual comments in response to the 125 charge questions.

IEPR panel members reviewed the Atchafalaya report documents individually. The panel members then met via teleconference with Battelle to review key technical comments, discuss charge questions for which there were conflicting responses, and reach agreement on the Final Panel Comments to be provided to USACE. Each Final Panel Comment was documented using a four-part format consisting of: (1) a comment statement; (2) the basis for the comment; (3) the significance of the comment (high, medium, or low); and (4) recommendations on how to resolve the comment. Overall, 15 Final Panel Comments were identified and documented. Of these, 5 were identified as having high significance, 9 had medium significance, and 1 had low significance.

Table ES-1 summarizes the Final Panel Comments by level of significance. Detailed information on each comment is contained in Appendix A of this report.

Table ES-1. Overview of 15 Final Comments Identified by the Atchafalaya Report IEPR Panel

Significance – High	
1	More details on the proposed Morganza to the Gulf levee project and Houma Navigation Canal (HNC) lock are needed to understand how these major structural features affect the future without project (FWOP) conditions, can be operated to complement the Atchafalaya project, and influence the timing of benefits from the Atchafalaya project.
2	Documentation on the Wetland Value Assessment (WVA) model needs to be added to Appendix M to demonstrate that the model is being appropriately applied and projected benefits accurately met.
3	The use of the SAND2 model to model nutrients instead of a more complex model is not sufficiently justified to warrant its use for this project.
4	Some relative sea level rise (RSLR) calculations do not appear to be consistent with EC 1165-2-211, and the analyses of results do not appear to fully comply with all of the EC 1165-2-211 requirements thus the risks to the project are not understood.
5	Given the large amount of dredging and disposal, the dredged material's physical properties, quantities, and disposal methods are too general and need more detail.
Significance – Medium	
6	Hydrology and hydraulics (H&H) modeling, including RMA-2 and RMA-11 2-D water surface modeling and modeling of salinity, needs to be better related to key estuarine species and their specific habitat requirements.

7	Sediment transport modeling was not performed to support statements that the project will distribute sediments to the study area, and conflicting/misleading statements regarding sediment delivery must be addressed.
8	Impacts to navigation, shoaling, and harmful algal blooms (HABs) are not described in sufficient detail under Environmental Consequences (Section 5.0).
9	The impacts to navigation at the HNC and lock from the project are unclear, making it difficult to assess the potential impacts.
10	The assumptions and data used to develop the cost estimates for the commercial fisheries are needed to justify the potential impacts to this industry.
11	The design of West Weir #2, specifically the sheet pile cell installation, is questionable because of the depth of water, the length of sheets, and the driving distance.
12	There is a discrepancy in the final cost analysis, which uses a 39% contingency rather than the 34% contingency determined in the risk analysis.
13	The Adaptive Management Plan (AMP) needs to be revised to provide more detail, including identifying critical management trigger points for project reassessment (or realignment) purposes.
14	The source and reliability of the assumptions used to estimate the Atchafalaya project costs, especially construction costs, do not include sufficient detail to make a determination regarding accuracy.
Significance – Low	
15	Additional documentation on the public involvement process is needed.

The Panel agreed on its "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (USACE, 2010; p. D-4) in the Atchafalaya report. The following statements summarize the Panel's findings, which are described in more detail in the Final Panel Comments (see Appendix A).

Plan Formulation: The Atchafalaya report follows conventional protocol and presents a logical sequence of identifying project objectives, alternatives considered, and the use of incremental cost analysis to identify the Tentatively Selected Plan (TSP) (i.e., Alternative 2). The planning effort and process used by USACE in this project was orderly, was very broad, and required substantial data acquisition and analysis. USACE personnel did an admirable job in its development of this ambitious plan in a very short time. The details necessary to produce this plan were challenging and the final product reflects a solid effort. The overall plan formulation is to be commended.

Plan formulation was well structured; however, the Panel strongly recommends that more information be provided on some details of the analysis, such as (a) the potential interaction of the alternatives with other projects planned for the study region, (b) the scientific justification for the modeling assumptions and methods used to estimate wetland restoration benefits, (c) the relationship between critical monitoring parameters and potential trigger points in the development and execution of the Adaptive Management Plan, and (d) indirect and cumulative impacts resulting from dredging, changes in hydrological flows, and operation of the Houma Navigation Canal lock for environmental purposes.

Economics: The cost-effectiveness and incremental cost analyses are correctly applied to determine the 'best buy" plan. A noticeable shortcoming is that details about the Wetland Value Assessment (WVA) methodology and development of average annual habitat units as the measure of benefits are not described in detail. Concerns about the hydrological and environmental impacts of other planned projects and how these would influence the 'future without project' conditions were noted. Cost estimates are not always well documented, particularly for dredging and site-specific projects.

Engineering: While the hydraulic modeling that was used to compare the project alternatives was capable of showing differences in water flows, water levels, and salinity within the defined study area and subareas, it appears that neither sediments nor nutrients have been hydraulically modeled. Given that nutrients are the primary source of biomass production, and that organic sediment deposition is recognized as an effective means to restore wetlands, the Panel is concerned that the analysis does not sufficiently support the projected wetlands creation and wetlands nourishment benefits. There is no discussion of success rates for similar wetland restoration projects within the LCA. Impacts of changes in salinity gradients on estuarine species due to project impacts and potential relative sea level rise (RSLR) were not adequately evaluated.

Environmental: The overall document follows National Environmental Policy Act guidelines and is fairly comprehensive. The scientific basis for wetland creation through enhanced freshwater and nutrient flow without sediments is not well documented. The WVA model has been developed for applications within the LCA, but there is no discussion of post-project assessments to evaluate model validity. There is considerable uncertainty about project benefits given the wetland restoration approach, ongoing subsidence, and possible rates of RSLR. Potential detrimental effects from harmful algal blooms and hypoxic conditions should be more fully assessed.

TABLE OF CONTENTS

EXECUTIVE SUMMARY i

1. INTRODUCTION 1

2. PURPOSE OF THE IEPR 2

3. METHODS 2
   - 3.1 Planning and Schedule 3
   - 3.2 Identification and Selection of IEPR Panel Members 4
   - 3.3 Preparation of the Charge and Conduct of the IEPR 7
   - 3.4 Review of Individual Comments 7
   - 3.5 IEPR Panel Teleconference 8
   - 3.6 Preparation of Final Panel Comments 8

4. PANEL DESCRIPTION 9

5. SUMMARY OF FINAL PANEL COMMENTS 16

6. REFERENCES 19

Appendix A. Final Panel Comments on the Integrated Feasibility Study and Environmental Impact Statement for the Convey Atchafalaya River Water to Northern Terrebonne Marshes, Lafourche Terrebonne, St. Mary Parish, Louisiana

Appendix B. Final Charge to the Integrated Feasibility Study and Environmental Impact Statement for the Convey Atchafalaya River Water to Northern Terrebonne Marshes, Lafourche Terrebonne, St. Mary Parish, Louisiana

LIST OF TABLES

Table ES-1. Overview of 15 Final Comments Identified by the Atchafalaya Report IEPR Panel ii

Table 1. Atchafalaya Report IEPR Schedule 3

Table 2. Atchafalaya IEPR Panel: Technical Criteria and Areas of Expertise 10

Table 3. Overview of 15 Final Panel Comments Identified by Atchafalaya report IEPR Panel 18

LIST OF ACRONYMS

AAHU	Average Annual Habitat Unit
AMP	Adaptive Management Plan
AR	Atchafalaya River
ARTM	Atchafalaya River Terrebonne Marshes
ATR	Agency Technical Review
CE/ICA	Cost Effectiveness/Incremental Cost Analysis
CERP	Comprehensive Everglades Restoration Plan
CPRA	Coastal Protection and Restoration Act
CWPPRA	Coastal Wetlands Planning, Protection, and Restoration Act
DrChecks	Design Review and Checking System
EFH	Essential Fish Habitat
ERDC	Engineer Research and Development Center
ft	Foot
FWOP	Future Without Project
FWP	Future With Project
GIWW	Gulf Intercoastal Waterway
GMSL	Global Mean Sea Level
H&H	Hydrology and Hydraulics
HAB	Harmful Algal Bloom
HNC	Houma Navigation Canal
IEPR	Independent External Peer Review
IWR	Institute for Water Resources
LCA	Louisiana Coastal Area
mm/yr	millimeters per year
NEPA	National Environmental Policy Act of 1969
NER	National Ecosystem Restoration
NTP	Notice to Proceed
O&M	Operations and Maintenance
OMB	Office of Management and Budget
PDT	Project Delivery Team
RMA	Resource Modeling Associates
RSLR	Relative Sea Level Rise
SAV	Submerged Aquatic Vegetation
SI	Suitability Index
SOW	Scope of Work
TSP	Tentatively Selected Plan
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
WVA	Wetland Value Assessment

1. INTRODUCTION

The Water Resources Development Act of 2007 authorized the Louisiana Coastal Area (LCA) program to restore wetland ecosystems along the coast of Louisiana. Specifically, Section 7006(e)(3) requires the Secretary of the Army to submit one feasibility report to Congress on the following six elements of the project (hereinafter referred to as LCA 6 project):

1) Terrebonne Basin Barrier Shoreline Restoration,
2) Small Diversion at Convent/Blind River,
3) Amite River Diversion Canal Modification,
4) Medium Diversion at White Ditch,
5) Convey Atchafalaya River Water to Northern Terrebonne Marshes, and
6) Multipurpose Operation of Houma Navigation Lock.

The Congressional language further authorizes construction of these six elements contingent upon submittal of a favorable report of the Chief of Engineers no later than December 31, 2010. The U.S. Army Corps of Engineers (USACE) is the Federal sponsor for the projects and the non-Federal sponsor is Louisiana's Coastal Protection and Restoration Authority (CPRA).

Five[2] individual Independent External Peer Reviews (IEPRs) are being conducted simultaneously under one project (LCA 6 project) to review the six elements of the LCA Ecosystem Restoration Project. As part of the LCA 6 project, an IEPR was conducted for the Convey Atchafalaya River Water to Northern Terrebonne Marshes and Multipurpose Operation of Houma Navigation Lock project (hereinafter referred to as the Atchafalaya project). The Atchafalaya project study area comprises approximately 1,100 square miles in Southern Louisiana in the vicinity of the City of Houma and Terrebonne Parish. The proposed Atchafalaya project is located in the Deltaic Plain within Subprovince 3, one of the four subprovinces identified in the LCA study area.

The overall study area is bounded on the west by the Lower Atchafalaya River. The area to the east is bounded by the Bayou Lafourche ridge. The area to the north is bounded by the Bayou Black ridge, from the Lower Atchafalaya River to the City of Houma, and by the Gulf Intracoastal Waterway from the City of Houma to the Bayou Lafourche ridge. The southern boundary of the project was based on a delineation conducted in 2007 of coastal Louisiana vegetation types. The boundary roughly follows the transition between saline and brackish marsh types.

Due to the magnitude of the Atchafalaya project area, the area was divided into three subunits. The three subunits have been separated by a combination of natural, physical, and geographic features, and the limits of the subunits were developed during an interagency Project Delivery Team (PDT) meeting conducted on April 1, 2010. The separation of the project area allowed the PDT to evaluate specific needs relative to each subunit.

[2] Two of the six elements were reviewed under one independent external peer review.

The objective of the work described here was to conduct an IEPR of the Integrated Feasibility Study and Environmental Impact Statement for the Convey Atchafalaya River Water to Northern Terrebonne Marshes, Lafourche Terrebonne, St. Mary Parish, Louisiana (hereinafter referred to as the Atchafalaya report) in accordance with procedures described in the Department of the Army, USACE Engineer Circular *Civil Works Review Policy* (EC No. 1165-2-209) (USACE, 2010), USACE CECW-CP memorandum *Peer Review Process* (USACE, 2007), and Office of Management and Budget (OMB) bulletin *Final Information Quality Bulletin for Peer Review* (OMB, 2004). Battelle, as a 501(c)(3) non-profit science and technology organization with experience in establishing and administering peer review panels, was engaged to coordinate the IEPR of the Atchafalaya report. Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analyses.

This final report details the IEPR process, describes the IEPR panel members and their selection, and summarizes the Final Panel Comments of the IEPR Panel on the existing environmental, economic, and engineering analyses contained in the Atchafalaya report. Detailed information on the Final Panel Comments is provided in Appendix A.

2. PURPOSE OF THE IEPR

To ensure that USACE documents are supported by the best scientific and technical information, USACE has implemented a peer review process that uses IEPR to complement the Agency Technical Review (ATR), as described in USACE (2010) and USACE (2007).

In general, the purpose of peer review is to strengthen the quality and credibility of the USACE decision documents in support of its Civil Works program. IEPR provides an independent assessment of the economic, engineering, and environmental analysis of the project study. In particular, the IEPR addresses the technical soundness of the project study's assumptions, methods, analyses, and calculations and identifies the need for additional data or analyses to make a good decision regarding implementation of alternatives and recommendations.

In this case, the IEPR of the Atchafalaya report was conducted and managed using contract support from Battelle, which is an Outside Eligible Organization under Section 501(c)(3) of the U.S. Internal Revenue Code with experience conducting IEPRs for USACE.

3. METHODS

This section describes the method followed in selecting the members for the IEPR Panel (the Panel) and in planning and conducting the IEPR. The IEPR was conducted following procedures described by USACE (2010) and in accordance with USACE (2007) and OMB (2004) guidance. Supplemental guidance on evaluation for conflicts of interest was obtained from the *Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports* (The National Academies, 2003).

3.1 Planning and Schedule

After receiving the notice to proceed (NTP), Battelle held a kick-off meeting on the entire LCA 6 project with USACE to review the preliminary/suggested schedule for each of the five reviews, discuss the IEPR process, and address any questions regarding the scope (e.g., clarify expertise areas needed for panel members). Any revisions to the schedule were submitted as part of the final Work Plan.

Table 1 outlines the tasks conducted under this project and defines the schedule followed in executing the Atchafalaya report IEPR. Tasks 1 through 4 were conducted concurrently for all five IEPRs being conducted under the LCA 6 project. For instance, one work plan applicable to all five reviews was prepared and submitted. Table 1 is based on receipt of approval from the USACE Contracting Officer to begin initial work on the project (i.e., Pre-award funding approval) on March 12, 2010. The actual meeting dates and receipt of the Atchafalaya report are specific for this review. Note that the work items listed in Task 8 occur after the submission of this report. Battelle will enter the 15 Final Panel Comments developed by the Panel into USACE's Design Review and Checking System (DrChecks), a Web-based software system for documenting and sharing comments on reports and design documents, so that USACE can review and respond to them. USACE will provide responses (Evaluator Responses) to the Final Panel Comments, and the Panel will respond (Backcheck Responses) to the Evaluator Responses. All USACE and Panel responses will be documented by Battelle.

Table 1. Atchafalaya Report IEPR Schedule

TASK	ACTION	DUE DATE
1	Pre-award funding approval[a]	March 12, 2010
	NTP/review documents available	March 24, 2010
	Battelle prepares draft Work Plan[b]	April 9, 2010
	USACE provides comments on draft Work Plan	April 14, 2010
2	Battelle recruits and screens up to 30 potential panel members; prepares summary information[a]	April 7, 2010
3	Battelle submits draft charge[b]	April 9, 2010
	USACE provides comments on draft charge	April 14, 2010
	Battelle submits final Work Plan, including final charge[b]	April 19, 2010
	USACE approves final Work Plan, including final charge	April 20, 2010
4	Battelle selects no more than 25 panel members	April 7, 2010
	Battelle submits list of selected panel members	April 7, 2010
	USACE provides comments on list of panel members	April 9, 2010
	Battelle completes subcontracts for panel members	April 27, 2010
5	Kick-off meeting convened with USACE and Battelle	March 26, 2010
	Kick-off meeting convened with Battelle and IEPR Panel	April 26, 2010
	Kick-off meeting convened with USACE, Battelle, and IEPR Panel	April 29, 2010
6	Battelle sends review documents and charge to IEPR Panel	May 4, 2010
	IEPR Panel completes review and provides comments to Battelle	May 20, 2010

TASK	ACTION	DUE DATE
	Battelle consolidates comments from IEPR Panel	May 26, 2010
	Consensus teleconference convened with IEPR Panel and Battelle	May 26, 2010
7	IEPR Panel provides draft Final Panel Comments to Battelle	June 9, 2010
	Battelle submits final IEPR Report to USACE[b]	June 25, 2010
8[c]	Battelle inputs Final Panel Comments to DrChecks	June 29, 2010
	USACE provides draft Evaluator Responses via e-mail (Word document)	July 13, 2010
	Teleconference convened with USACE, Battelle, and IEPR Panel to discuss Final Panel Comments	July 28, 2010
	USACE inputs final Evaluator Responses to Final Panel Comments in DrChecks	August 9, 2010
	IEPR Panel responds to USACE Evaluator Responses (Backcheck Responses)	August 23, 2010
	Battelle submits pdf of DrChecks file and closes out DrChecks[b]	August 24, 2010
	Project Closeout	October 21, 2010

[a] Requested to start on recruitment to meet the aggressive schedule

[b] Deliverable

[c] Task occurs after the submission of this report.

3.2 Identification and Selection of IEPR Panel Members

Each of the five LCA IEPRs required experts with identical areas of expertise corresponding to the technical content of the LCA projects: civil design/construction cost engineering, Civil Works planning, wetland ecology, hydrology and hydraulics (H&H) engineering, and economics. Therefore, efforts were consolidated to identify and recruit experts.

Battelle initially identified 90 candidates for the five LCA 6 project IEPR panels, evaluated their technical expertise, and inquired about potential conflicts of interest. Of these, Battelle chose 29 of the most qualified candidates and confirmed their interest and availability. Of the 29 candidates, 25 were proposed for the final LCA panels (5 experts per panel) and 4 were proposed as backup panel members for individual areas of expertise (the civil design/construction cost engineering panel was presented without a backup). The backup panel members were the same for each of the five LCA IEPRs and would be able to serve on any panel that required their participation. The remaining candidates were not proposed for a variety of reasons, including lack of availability, disclosed conflicts of interest, or lack of the precise technical expertise required. The five primary and four backup panel members chosen for the Atchafalaya report IEPR are described in Section 4.0 of this report.

The candidates were screened for the following potential exclusion criteria or conflicts of interest.[3] Participation in previous USACE technical peer review committees and other technical review panel experience was also considered.

- Involvement by you or your firm[4] in **any** part of the LCA program, particularly the following six elements:
  - Multipurpose Operation of Houma Navigation Lock
  - Terrebonne Basin Barrier Shoreline Restoration
  - Small Diversion at Convent/Blind River
  - Amite River Diversion Canal Modification
  - Medium Diversion at White Ditch
  - Convey Atchafalaya River Water to Northern Terrebonne Marshes
- Involvement by you or your firm[4] in any work related to the Louisiana CPRA.
- Involvement by you or your firm[4] in ecosystem restoration, flood risk management, coastal storm damage reduction, or shoreline restoration projects in coastal Louisiana or Mississippi.
- Involvement by you or your firm[4] in the conceptual or actual design, construction, or operations and maintenance (O&M) of any projects for the LCA program, particularly the six elements listed in #1 above.
- Current employment by USACE.
- Involvement with paid or unpaid expert testimony related to the LCA program, particularly the six elements listed in the LCA projects above.
- Current or previous employment or affiliation with the non-Federal sponsors or any of the following cooperating Federal, State, County, local and regional agencies, environmental organizations, and interested groups: Louisiana CPRA, Louisiana Office of Coastal Protection and Restoration, National Oceanic and Atmospheric Administration, U.S. Fish and Wildlife Service, Natural Resources Conservation Service, U.S. Environmental Protection Agency (USEPA), Minerals Management Service, and U.S. Geological Survey and currently working on LCA-related projects (for pay or pro bono).
- Past, current, pending, or future interests (financial or otherwise) by you, your spouse, or children related to the LCA program, particularly the six elements listed in #1 above, including interest in LCA-related contracts or awards from USACE.

[3] Battelle evaluated whether scientists in universities and consulting firms that are receiving USACE-funding have sufficient independence from USACE to be appropriate peer reviewers. See OMB (2004, p. 18), "….when a scientist is awarded a government research grant through an investigator-initiated, peer-reviewed competition, there generally should be no question as to that scientist's ability to offer independent scientific advice to the agency on other projects. This contrasts, for example, to a situation in which a scientist has a consulting or contractual arrangement with the agency or office sponsoring a peer review. Likewise, when the agency and a researcher work together (e.g., through a cooperative agreement) to design or implement a study, there is less independence from the agency. Furthermore, if a scientist has repeatedly served as a reviewer for the same agency, some may question whether that scientist is sufficiently independent from the agency to be employed as a peer reviewer on agency-sponsored projects."

[4] Note: Includes any joint ventures in which your firm is involved.

- Current personal involvement with other USACE projects, including authoring any manuals or guidance documents for USACE. If yes, provide titles of documents or description of project, dates, and location (USACE district, division, Headquarters, Engineer Research and Development Center [ERDC], etc.), and position/role. Please highlight and discuss in greater detail any projects that are specifically with the New Orleans District.
- Current firm[4] involvement with other USACE projects, specifically those projects/contracts that are with the New Orleans District. If yes, provide title/description, dates, and location (USACE district, division, Headquarters, ERDC, etc.), and position/role.
- Any previous employment by the USACE as a direct employee or contractor (either as an individual or through your firm[4]) within the last 10 years, notably if those projects/contracts are with the New Orleans District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.
- Previous experience conducting technical peer reviews. If yes, please highlight and discuss any technical reviews concerning:
    - shoreline restoration projects
    - hydrologic diversion projects
    - lock operation projects,

  and include the client/agency and duration of review (approximate dates).
- A significant portion (i.e., greater than 50%) of personal or firm[4] revenues within the last 3 years came from USACE contracts.
- Participation in relevant prior Federal studies/programs relevant to this project, such as:
    - Coast 2050 Plan
    - LCA Ecosystem Restoration Study, 2004
    - Integrated Ecosystem Restoration and Hurricane Protection: Louisiana's Comprehensive Master Plan for a Sustainable Coast, 2007
    - Louisiana Coastal Protection and Restoration Technical Report, 2009
    - LCA Near-term Restoration Plan, 2004
- Participation in relevant prior non-Federal studies/programs relevant to this project.
- Any publicly documented statement (including, for example, advocating for or discouraging against) related to the LCA program, particularly the six elements listed in LCA projects above.
- Is there any past, present or future activity, relationship or interest (financial or otherwise) that could make it appear that you would be unable to provide unbiased services on this project? If so, please describe:

In selecting the final 29 members for the five panels from the list of candidates, Battelle chose experts who best fit the expertise areas and had no conflicts of interest. Then, to assign each selected panel member to a specific IEPR, Battelle evaluated his or her background and expertise in more detail for experience that may be most appropriate for the individual LCA projects. For

example, if a panel member had experience with coastal restoration, Battelle assigned him or her to the Terrebonne Basin Barrier Shoreline Restoration Project IEPR. In addition, Battelle made every effort to have at least one expert on each panel who had previously served on another IEPR panel managed by Battelle. This ensured that panel members unfamiliar with the process would have someone, in addition to Battelle, who had experience and could provide guidance.

Once the five panel members for the Atchafalaya report IEPR were chosen from the larger pool of candidates, Battelle established their subcontracts in which they indicated their willingness to participate and confirmed the absence of conflicts of interest through a signed Conflict of Interest form. Section 4.0 of this report provides names and biographical information of the Atchafalaya IEPR panel members.

Prior to beginning their review and within 2 days of their subcontracts being finalized, all members of the Panel attended a kick-off meeting via teleconference that was planned and facilitated by Battelle in order to review the IEPR process, the schedule, communication, and other pertinent information with the Panel.

3.3 Preparation of the Charge and Conduct of the IEPR

Battelle drafted a preliminary charge document for the Atchafalaya report IEPR to assist USACE with the development of the charge questions to guide the peer review, according to guidance provided in USACE (2010) and OMB (2004). The draft charge was submitted to USACE for evaluation as part of the draft Work Plan. USACE provided comments and revisions to the draft charge, which were used to produce the final charge. The final charge was submitted to USACE for approval. In addition to a list of 125 charge questions/discussion points developed for the Atchafalaya IEPR, the final charge included general guidance for the Panel on the conduct of the peer review (provided in Appendix B of this final report). After the charge was reviewed and approved by USACE, it was sent to the Panel to guide the review of the Atchafalaya report.

To begin the review, Battelle planned and facilitated kick-off meetings via teleconference during which USACE presented project details to the Panel. Two teleconference meetings were conducted for each of the five IEPRs; the first allowed USACE to provide an overview of the LCA Ecosystem Restoration Project as a whole, and the second allowed USACE to brief the individual panels on the specific project that they would be reviewing. Before the meeting, the IEPR Panel received an electronic version of the Atchafalaya documents and the final charge. A full list of the documents reviewed by the Panel is provided in Appendix B of this report. The Panel was instructed to address the charge questions/discussion points within a comment-response form provided by Battelle.

All IEPR activities conducted - from the review of the documents through the Final Panel Comment Backcheck process (described below) - were conducted solely by the Atchafalaya IEPR panel members and not in conjunction with the other four panels participating under the LCA 6 project.

3.4 Review of Individual Comments

The Atchafalaya Panel produced approximately 330 individual comments in response to the charge questions/discussion points. The individual comments were merged into a single table to

facilitate the review of the five sets of comments received on the Atchafalaya report. Battelle reviewed the comments to identify overall recurring themes, areas of potential conflict, and other overall impressions. As a result of the review, Battelle was able to summarize the 330 comments into a preliminary list of 26 overall comments and discussion points. Each panel member's individual comments were shared with the full Panel in a merged individual comments table.

3.5 IEPR Panel Teleconference

Battelle facilitated a 4.5-hour teleconference with the Panel so that the panel experts, many of whom are from diverse scientific backgrounds, could exchange technical information. The main goal of the teleconference was to identify which issues should be carried forward as Final Panel Comments in the IEPR report and decide which panel member would serve as the lead author for the development of each Final Panel Comment. This information exchange ensured that the final IEPR report would accurately represent the Panel's assessment of the project, including any conflicting opinions. The Panel engaged in a thorough discussion of the overall positive and negative comments, added any missing issues of high-level importance to the findings, and merged any related individual comments. In addition, Battelle confirmed each Final Panel Comment's level of significance to the Panel.

The Panel also discussed responses to 10 specific charge questions where there appeared to be disagreement among panel members. The conflicting comments were resolved based on the professional judgment of the Panel, and all sets of comments were determined not to be conflicting. Each comment was either incorporated into a Final Panel Comment, determined to be consistent with other Final Panel Comments already developed, or determined to be a non-significant issue.

At the end of these discussions, the Panel identified 15 comments and discussion points that should be brought forward as Final Panel Comments.

3.6 Preparation of Final Panel Comments

Following the teleconference, Battelle prepared a summary memorandum for the Panel documenting each Final Panel Comment (organized by level of significance). The memorandum provided the following detailed guidance on the approach and format to be used to develop the Final Panel Comments for the Atchafalaya Final IEPR Report:

- Lead Responsibility: For each Final Panel Comment, one Panel member was identified as the lead author responsible for coordinating the development of the Final Panel Comment and submitting it to Battelle. Battelle modified lead assignments at the direction of the Panel. To assist each lead in the development of the Final Panel Comments, Battelle distributed the merged individual comments table, a summary detailing each draft final comment statement, an example Final Panel Comment following the four-part structure described below, and templates for the preparation of each Final Panel Comment.
- Directive to the Lead: Each lead was encouraged to communicate directly with other IEPR Panel members as needed and to contribute to a particular Final Panel Comment. If a significant comment was identified that was not covered by one of the original Final

Panel Comments, the appropriate lead was instructed to draft a new Final Panel Comment.

- Format for Final Comments: Each Final Panel Comment was presented as part of a four-part structure:
  1. Comment Statement (succinct summary statement of concern)
  2. Basis for Comment (details regarding the concern)
  3. Significance (high, medium, low; see description below)
  4. Recommendation(s) for Resolution (see description below).
- Criteria for Significance: The following were used as criteria for assigning a significance level to each Final Panel Comment:
  1. High: Describes a fundamental problem with the project that could affect the recommendation or justification of the project
  2. Medium: Affects the completeness or understanding of the reports/project
  3. Low: Affects the technical quality of the reports but will not affect the recommendation of the project.
- Guidance for Developing the Recommendation: The recommendation was to include specific actions that the USACE should consider to resolve the Final Panel Comment (e.g., suggestions on how and where to incorporate data into the analysis, how and where to address insufficiencies, areas where additional documentation is needed).

At the end of this process, 15 Final Panel Comments were prepared and assembled. Battelle reviewed and edited the Final Panel Comments for clarity, consistency with the comment statement, and adherence to guidance on the Panel's overall charge, which included ensuring that there were no comments regarding either the appropriateness of the selected alternative or USACE policy. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The Final Panel Comments are presented in Appendix A of this report.

4. PANEL DESCRIPTION

Candidates for the Panel were identified using Battelle's Peer Reviewer Database, targeted Internet searches using key words (e.g., technical area, geographic region), searches of websites of universities or other compiled expert sites, and referrals. Battelle prepared a draft list of primary and backup candidate panel members (which were screened for availability, technical background, and conflicts of interest), provided it to USACE, and Battelle made the final selection of panel members.

An overview of the credentials of the final five primary members of the Atchafalaya IEPR panel and their qualifications in relation to the technical evaluation criteria is presented in Table 2. More detailed biographical information regarding each panel member and his or her area of technical expertise is presented in the text that follows the table.

Table 2. Atchafalaya IEPR Panel: Technical Criteria and Areas of Expertise

	Barbato	Casavant	Bottone	Avery	Milon
Civil Design/Construction Cost Engineering (one expert needed)	**X**				
Minimum of 10 years demonstrated experience	X				
Familiar with large, complex Civil Works projects with high public and interagency interests	X				
Degree(s) in civil engineering	X				
Demonstrated experience in performing cost engineering/construction management for all phases of ecosystem restoration, flood risk management, or related projects	X				
Familiar with similar projects across the United States and related cost engineering. Experience in associated contracting procedures, total cost growth analysis and related cost-risk analysis is desired	X				
Familiar with construction industry and practices used in wetland restoration, flood damage/coastal storm damage reduction in the Gulf of Mexico coast	Waiver requested, see Note (1)				
Civil Works Planner (one expert needed)		**X**			
At least 10 years of demonstrated experience in Civil Works planning		X			
Familiar with large, complex Civil Works projects with high public and interagency interests		X			
Degree in planning or related field		X			
Experience with the plan formulation process		X			
Familiar with evaluation of alternative plans for ecosystem restoration projects		X			
Familiar with USACE standards and procedures		X			

	Barbato	Casavant	Bottone	Avery	Milon
Wetland Ecology (one expert needed)			**X**		
At least 10 years of demonstrated experience in wetland ecology			X		
Familiar with the ecology of coastal wetlands and estuarine environments and restoration of coastal wetland and estuarine environments in the Gulf of Mexico			X		
Masters degree in ecology or biology			Waiver requested, see Note (2)		
Hydrology and Hydraulics Engineering (one expert needed)				**X**	
Minimum 10 years experience with engineering analyses related to wetland restoration in coastal areas				X	
Minimum 10 years experience with engineering analyses related to flood/coastal storm damage reduction				X	
Familiar with standard USACE hydrologic and hydraulic computer models				X	
Familiar with large, complex Civil Works projects with high public and interagency interests				X	
Registered professional engineer				X	
Minimum of an M.S. degree in civil engineering or H&H				X	
Economics (one expert needed)					**X**
Minimum 10 years experience evaluating the appropriateness of cost effectiveness and incremental cost analysis (CE/ICA), as applied to dollar costs and ecosystem restoration benefits					X
Familiar with USACE CE/ICA tool: Institute for Water Resources (IWR)-Planning Suite (per 3/26/10 kickoff, this is not required expertise for this IEPR)					X
Experience with cost-effectiveness and cost-benefit analysis in general[a]					X
Familiar with large, complex Civil Works projects with high public and interagency interests					X

[a] As clarified during the March 26, 2010, kickoff teleconference, if a panel member does not have specific experience with IWR-Planning Suite, he or she needs to have experience with cost-effectiveness and cost-benefit analysis in general.

Note(1): The Scope of Work (SOW) requests that the panel member should be familiar with construction industry and practices used in wetland restoration and flood damage/coastal storm damage reduction in the Gulf of Mexico; Mr. Barbato is a licensed engineer in Alabama with 45 years of direct experience in cost estimating, management, and construction of large Civil Works projects related to flood control. Battelle has discussed this issue with Mr. Barbato, and he is confident that his skill set is more than adequate to serve as an expert on this panel. Additionally, the other

panel members for the Atchafalaya IEPR have extensive Gulf of Mexico experience. Accordingly, it is Battelle's opinion that Mr. Barbato is qualified to serve as Civil Design and Cost Construction Engineer for this IEPR.

Note(2): The SOW requests a minimum of M.S. or higher in ecology or biology; Mr. Bottone has a B.S. in biology plus 26 years of experience with wetland and upland ecological restoration and studies, habitat restoration and mitigation design, watershed and land management planning, wetland delineation, and impact assessment. Battelle's opinion is that Mr. Bottone's B.S. and years of experience are equivalent to a Master's degree.

George Barbato

Role: Civil Design/Construction Cost
Affiliation: Independent Consultant

Mr. George Barbato is currently an independent consultant specializing in construction cost engineering and management. He earned an M.S. in civil engineering from Stanford University in 1966 and is a licensed Professional Engineer in Alabama and Minnesota. Mr. Barbato has over 45 years of experience in cost estimating and construction management of large Civil Works projects. Mr. Barbato has worked on numerous large scale projects located in or adjacent to complex riverine systems, such as the Ford Lock and Dam Rehabilitation on the Mississippi River, Minnesota, and the Gainesville Spillway on the Tombigbee River, Alabama. Many of these projects have included the construction of flood control features such as river diversions, river channel reconstruction, cofferdams, and dikes. Through his experience as a cost estimator and construction manager on Lock and Dam #9 on the Arkansas River, Arkansas, and the St. Cloud Hydroelectric Dam, Minnesota, Mr. Barbato is familiar with estimating and construction of all project phases, including all environmental regulations related to large-scale flood control projects. He is also familiar with projects involving extensive underwater excavation, hydraulic dredging, slope protection, bank stabilization as a means for controlling erosion, and restoration of the river banks at the completion of the construction. As a cost engineering consultant, Mr. Barbato was regularly responsible for developing quantity take-offs, completing cost estimates for competitive bidding, and issuing supply and subcontracts. He is well practiced in analyzing total cost growth and risk, developing construction schedules, planning the construction means and methods, determining staffing requirements, and supervising the actual project construction. Throughout his career, he has participated in the bidding of many USACE projects and is familiar with USACE plans and specifications. Mr. Barbato has served as a peer reviewer for numerous construction engineering projects, including the Grand Forks, North Dakota, and Breckenridge, Minnesota, River Diversion projects for USACE. Additionally, Mr. Barbato has served as an arbitrator of construction disputes for the American Arbitration Association for 12 years and is a member of the Minnesota Concrete Council.

Ken Casavant

Role: Civil Works Planner
Affiliation: Independent Consultant and Washington State University

Dr. Ken Casavant is currently a Professor and Agricultural Economist at the School of Economic Sciences at Washington State University and also serves as an Adjunct Professor at the Upper Great Plains Transportation Institute, North Dakota State University, since 2002, specializing in Agricultural Transportation Economics and Policy, Agricultural Marketing, and Agricultural Economics and Management. He earned his Ph.D. in economics from Washington State University in 1971. Dr. Casavant has more than 40 years of experience as an economist, with expertise in transportation economics and planning. He has served as an economic consultant detailing the tradeoffs necessary on several public works projects, most recently on studies of the deep draft national and international maritime industry. Dr. Casavant also has over 10 years experience in plan formulation, evaluation and comparison of alternative plans for numerous ecosystem restoration projects, navigation studies, and feasibility studies, including his

technical reviews of the Port of Iberia Channel Deepening Project, the Lower Columbia River Channel Deepening Project, and the Upper Mississippi and Illinois Navigation Study. These USACE projects were large-scale Civil Works projects with significant public and interagency interests. He is familiar with USACE standards and procedures as well as knowledge of the Institute for Water Resources (IWR)-Planning Suite methodologies, with a focus on ecological output per dollar of relevant expenditure for alternative project formulations. His expertise has been sought out by the Federal government (including Senate and House testimonies), State governments, regional institutes, universities, commodity organizations, railroad/truck/marine firms, and legal institutions/firms on issues regarding the needs and policy alternatives for agricultural and system transportation, ranging from development of intelligent transportation systems' applications to logistical designs for port physical distribution systems, and competitive impacts from investments in infrastructure and regulatory changes. He is a member of numerous professional associations, including the Transportation Research Board - National Research Council, Transportation Research Forum, International Agricultural Economics Association, and Logistics and Physical Distribution Association. Recently, he served as a plan formulation specialist and economist for Battelle on the IEPR for USACE's *Sabine-Neches Waterway (SNWW) Channel Improvement Plan (CIP) Draft Feasibility Report, Draft Environmental Impact Statement, and Supporting Documentation*.

Peter Bottone

Role: Wetland Ecologist
Affiliation: King Engineering Associates, Inc.

Mr. Peter Bottone is a project manager/lead ecologist for King Engineering Associates, Inc., in Tampa, Florida, specializing in restoration of coastal wetlands, wetland ecology, coastal resource management, habitat restoration planning, and restoration and enhancement. He earned his B.A. in biology from the University of South Florida in 1982. Mr. Bottone has over 26 years of experience serving as project manager/lead ecologist for more than 30 habitat restoration and stormwater retrofit projects, as well as a General Environmental Consultant responsible for preparation of National Environmental Policy Act of 1969 (NEPA) documentation for numerous, large Florida Department of Transportation//Federal Highway Administration highway/bridge projects. His area of expertise focuses on wetland and upland ecological restoration and studies, seagrass/submerged aquatic vegetation, habitat restoration and mitigation design, watershed and land management planning, wetland delineation and impact assessment, Florida's Uniform Mitigation Assessment Method analysis, and Developments of Regional Impact/Wildlife studies. Mr. Bottone has been involved with numerous large Civil Works projects throughout the Southeastern United States and the Gulf Coast region. These projects included the Coral Creek Ecosystem Restoration program, a 2,600-acre restoration project incorporating habitat assessment, hydrological analyses, ecosystem restoration design, and multi-agency coordination with critical project elements, including the analysis of hydraulics and salinity effects related to removal of dam structures and the diversion of flows to restore historic site hydrology.
Mr. Bottone was the senior project ecologist responsible for the Wolf Creek habitat restoration project, a 1,000-acre Environmental Lands Acquisition Protection Program property, targeting the creation of oligohaline marshes and fishery habitats, wetland/upland enhancement, wetland restoration design, conceptual plan development, and agency coordination. He was also the project ecologist for the Tampa Bay Habitat Restoration projects in Southwest Florida,

responsible for over 16 major habitat restoration projects, including 9 award-winning designs throughout the Tampa Bay region. His responsibilities included habitat quality assessment, wetland delineation, mapping, restoration design, plan preparation, and permitting. Mr. Bottone has received nine restoration awards, including the 2008 Environmental Excellence Award for Habitat Restoration for the Newman Branch Creek Restoration, 2010 Environmental Planning Future of the Region Award for the Robinson Preserve Restoration Project, and 1998 Coastal America Program's Partnership Award for the Cockroach Bay Habitat Restoration Project. He is a member of the Lower St. Johns River Technical Advisory Committee and served as the chairman of the Comprehensive Everglades Restoration Plan (CERP) Everglades Agricultural Area socioeconomic sub-committee tasked with developing USACE alternative plan evaluation screening criteria and performance measures.

Ken Avery

Role: Hydrology and Hydraulics Engineer
Affiliation: Bergmann Associates, Inc.

Mr. Ken Avery is the Water Resources Business Segment Leader with Bergmann Associates, Inc. He earned his M.S. in water resources engineering from Clarkson University in 1977 and is a registered Professional Engineer in six states (Florida, Michigan, Minnesota, Montana, New York, and Wisconsin), a certified American Academy of Water Resources Engineers Diplomate water resources engineer, and a Certified Floodplain Manager. He has 32 years of experience in water resources, environmental, and civil engineering, specializing in surface water hydrology, open and closed channel hydraulics, and sediment transport. Mr. Avery has used steady and unsteady flow hydraulic models, including the HEC and NWS software, LIQT, DYNLET, SWMM, and KYPIPES. His experience with wetlands restoration includes serving as the project manager and senior hydraulic engineer for the Fall Brook Acid Mine Drainage Section 206 Ecosystem Restoration Project, Pennsylvania, for which he led the development of the HEC-RAS model for existing and improved conditions, assessed existing drainage structures, and determined the impacts of the proposed floodplain improvements. He has also led large Civil Works projects that included the planning, design, and construction services on over a dozen riverbank restoration projects within Cuyahoga Valley National Park, for which he evaluated existing streambank repairs, conducted condition surveys of new repair areas, developed alternative bioengineering restoration techniques, conducted hydrologic and hydraulic evaluations, sized riprap, and developed cost estimates. Mr. Avery's experience with flood/coastal storm damage reduction includes serving as the project manager for the Stage II Bridge Scour Evaluation Program for the New Jersey Department of Transportation. For that project, he developed a method for establishing tidal boundary conditions for normal high/low tide conditions and storm conditions, measured storm surge stages at various gages in Delaware Bay and along the Atlantic coastline, and used DYNLET (tidal) or HEC-2 and WSPRO (riverine) programs to perform detailed hydraulic and scour evaluations. Mr. Avery was also the project manager for the Suwannee River Management District's Emergency Watershed Protection Program, for which he was responsible for on-site storm damage evaluations, development of repair approaches, and quality reviews of the design packages presenting remedial measures for rehabilitating streambank erosion and hurricane damage at 14 locations in Florida.

Wally Milon
Role: Economics
Affiliation: Independent Consultant and University of Central Florida

Dr. Wally Milon is the Department Chair and the Provost's Distinguished Research Professor in the Economics Department at the University of Central Florida's College of Business Administration, where he teaches graduate-level courses in benefit cost and social impact analyses, economic theory, environmental regulation, and nonmarket goods valuation. He earned a Ph.D. in economics from Florida State University in 1978 and has 30 years of experience in natural resource and environmental economics, marine resources, and applied microeconomics. Dr. Milon's experience with cost effectiveness and incremental cost analyses (CE/ICA) includes conducting CE/ICA studies as a member of the Everglades Restudy Technical Assistance Committee in conjunction with USACE, Jacksonville District; serving as a technical consultant for USACE, Vicksburg District for the development of CE/ICA for environmental projects; and serving as a technical consultant for USEPA in the development of CE/ICA evaluation guidelines for ecosystem services projects. He has received numerous grants, including a USEPA grant to develop a consistent framework for the valuation of wetland ecosystem services using discrete choice methods and a U.S. Department of Agriculture/U.S. Fish and Wildlife Service grant to research the public preferences and economic valuation for alternative ecological endpoints from restoration of south Florida coastal ecosystems. He conducted an economic assessment of reducing hypoxia in the northern Gulf of Mexico and served as an expert reviewer for USACE's report *Monetary Measurement of Environmental Goods and Services: Framework and Summary of Techniques for Corps Planners*. Dr. Milon has annually reviewed IWR-Plan and CE/ICA procedures as part of undergraduate and graduate courses taught at University of Florida and University of Central Florida. Recently, he served as the economist for Battelle on the IEPR for USACE's *C-111 Spreader Canal Project Implementation Report*. Dr. Milon's experience with large, complex Civil Works projects includes many years of work on CERP projects.

5. SUMMARY OF FINAL PANEL COMMENTS

The Panel agreed on its "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (USACE, 2010; p. D-4) in the Atchafalaya report. The following statements summarize the Panel's findings, which are described in more detail in the Final Panel Comments (see Appendix A).

Plan Formulation: The Atchafalaya report follows conventional protocol and presents a logical sequence of identifying project objectives, alternatives considered, and the use of incremental cost analysis to identify the Tentatively Selected Plan (TSP) (i.e., Alternative 2). The planning effort and process used by USACE in this project was orderly, was very broad, and required substantial data acquisition and analysis. USACE personnel did a admirable job in its development of this ambitious plan in a very short time. The details necessary to produce this plan were challenging and the final product reflects a solid effort. The overall plan formulation is to be commended.

Plan formulation was well structured; however, the Panel strongly recommends that more information be provided on some details of the analysis, such as (a) the potential interaction of the alternatives with other projects planned for the study region, (b) the scientific justification for the modeling assumptions and methods used to estimate wetland restoration benefits, (c) the relationship between critical monitoring parameters and potential trigger points in the development and execution of the Adaptive Management Plan (AMP), and (d) indirect and cumulative impacts resulting from dredging, changes in hydrological flows, and operation of the Houma Navigation Canal (HNC) lock for environmental purposes.

Economics: The CE/ICA are correctly applied to determine the 'best buy" plan. A noticeable shortcoming is that details about the Wetland Value Assessment (WVA) methodology and development of average annual habitat units as the measure of benefits are not described in detail. Concerns about the hydrological and environmental impacts of other planned projects and how these would influence the 'future without project' conditions were noted. Cost estimates are not always well documented, particularly for dredging and site-specific projects.

Engineering: While the hydraulic modeling that was used to compare the project alternatives was capable of showing differences in water flows, water levels, and salinity within the defined study area and subareas, it appears that neither sediments nor nutrients have been hydraulically modeled. Given that nutrients are the primary source of biomass production, and that organic sediment deposition is recognized as an effective means to restore wetlands, the Panel is concerned that the analysis does not sufficiently support the projected wetlands creation and wetlands nourishment benefits. There is no discussion of success rates for similar wetland restoration projects within the LCA. Impacts of changes in salinity gradients on estuarine species due to project impacts and potential relative sea level rise (RSLR) were not adequately evaluated.

Environmental: The overall document follows NEPA guidelines and is fairly comprehensive. The scientific basis for wetland creation through enhanced freshwater and nutrient flow without sediments is not well documented. The WVA model has been developed for applications within the LCA, but there is no discussion of post-project assessments to evaluate model validity. There is considerable uncertainty about project benefits given the wetland restoration approach, ongoing subsidence, and possible rates of RSLR. Potential detrimental effects from harmful algal blooms (HABs) and hypoxic conditions should be more fully assessed.

Table 3 lists the 15 Final Panel Comment statements by level of significance.

Table 3. Overview of 15 Final Panel Comments Identified by Atchafalaya Report IEPR Panel

Significance – High	
1	More details on the proposed Morganza to the Gulf levee project and Houma Navigation Canal (HNC) lock are needed to understand how these major structural features affect the future without project (FWOP) conditions, can be operated to complement the Atchafalaya project, and influence the timing of benefits from the Atchafalaya project.
2	Documentation on the Wetland Value Assessment (WVA) model needs to be added to Appendix M to demonstrate that the model is being appropriately applied and projected benefits accurately met.
3	The use of the SAND2 model to model nutrients instead of a more complex model is not sufficiently justified to warrant its use for this project.
4	Some relative sea level rise (RSLR) calculations do not appear to be consistent with EC 1165-2-211, and the analyses of results do not appear to fully comply with all of the EC 1165-2-211 requirements thus the risks to the project are not understood.
5	Given the large amount of dredging and disposal, the dredged material's physical properties, quantities, and disposal methods are too general and need more detail.
Significance – Medium	
6	Hydrology and hydraulics (H&H) modeling, including RMA-2 and RMA-11 2-D water surface modeling and modeling of salinity, needs to be better related to key estuarine species and their specific habitat requirements.
7	Sediment transport modeling was not performed to support statements that the project will distribute sediments to the study area, and conflicting/misleading statements regarding sediment delivery must be addressed.
8	Impacts to navigation, shoaling, and harmful algal blooms (HABs) are not described in sufficient detail under Environmental Consequences (Section 5.0).
9	The impacts to navigation at the HNC and lock from the project are unclear, making it difficult to assess the potential impacts.
10	The assumptions and data used to develop the cost estimates for the commercial fisheries are needed to justify the potential impacts to this industry.
11	The design of West Weir #2, specifically the sheet pile cell installation, is questionable because of the depth of water, the length of sheets, and the driving distance.
12	There is a discrepancy in the final cost analysis, which uses a 39% contingency rather than the 34% contingency determined in the risk analysis.
13	The Adaptive Management Plan (AMP) needs to be revised to provide more detail, including identifying critical management trigger points for project reassessment (or realignment) purposes.
14	The source and reliability of the assumptions used to estimate the Atchafalaya project costs, especially construction costs, do not include sufficient detail to make a determination regarding accuracy.
Significance – Low	
15	Additional documentation on the public involvement process is needed.

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APPENDIX A

Final Panel Comments

on the

Integrated Feasibility Study and Environmental Impact Statement for the Convey Atchafalaya River Water to Northern Terrebonne Marshes, Lafourche Terrebonne, St. Mary Parish, Louisiana

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Comment 1:
More details on the proposed Morganza to the Gulf levee project and Houma Navigation Canal (HNC) lock are needed to understand how these major structural features affect the future without project (FWOP) conditions, can be operated to complement the Atchafalaya project, and influence the timing of benefits from the Atchafalaya project.
Basis for Comment:
Two critical components of the FWOP conditions are the Morganza to the Gulf levee and the HNC lock. A description of the proposed levee and lock is provided on p. 1-16 of the Atchafalaya report, and it is suggested that these features are included in the FWOP conditions (p. 3-19). The description of the levee system indicates an extensive network of levees, gated structures, floodgates, and the lock that do not exist now in the study area (p. 4-82). It is not clear, however, how these structures and features have been incorporated into the FWOP conditions and their interaction with the proposed alternatives. The hydrological modeling described in Appendix L, Annex 2, is based on existing conditions in the study area and does not include the levee system and flood gates. It is stated "…storm surges were not to be modeled…" (p. L2-5) in the hydrological models. This leaves several deficiencies in the modeling: (1) the analysis does not indicate whether gated structures through the Morganza to the Gulf levee were tested in the modeling to determine if they could be operated in a manner similar to the HNC lock to retain freshwater behind the levee system and prevent some saltwater intrusion, (2) the analysis does not indicate how the levees themselves would help to retain freshwater and prevent saltwater intrusion, (3) the analysis does not describe what the operational schedule would be for the HNC lock and how this schedule influences the hydrological results, and (4) there is no explicit analysis of the primary purpose for the HNC lock to mitigate storm surge and how it would impact the FWOP conditions. Given the lack of operational details and environmental impacts of the levee system and lock, it is not possible to determine how each of the proposed alternatives would interact with these structural features. The placement and operation of floodgates within the levee would be expected to favor some alternatives and not others, but there is no analysis of this interaction. The lack of information about these interactions raises doubts about the benefits estimated for each alternative. Finally, uncertainty about the timing of the proposed levee system and lock raises concerns about the realization of benefits from the Atchafalaya project. The Atchafalaya report is clear that the HNC lock is expected to be completed by 2025, and this is discussed as part of the hydrological modeling (Appendix L, Annex 2). However, there is no sensitivity analysis to determine how the results would change if the lock were constructed after 2025 or not at all. The analysis should consider whether the project's benefits would accrue if the lock is not completed or if the levee system is delayed or not completed.

Significance – High:
Measuring the potential “with project” and “without project” impacts of the Atchafalaya project alternatives depends on understanding the relationships between Atchafalaya project components and other regional projects, and whether the effects of operating the other regional projects to improve freshwater retention and reduce saltwater intrusion could improve performance of the Atchafalaya project.
Recommendation(s) for Resolution:
To resolve these concerns, the report would need to be expanded as follows: 1. A more complete description and discussion of the expected Morganza to the Gulf levee system and the HNC lock should be included as part of Section 1 and the FWOP presentation in Section 3. 2. Assumptions about the effects of the levee system and HNC lock on wetlands protection, salinity balances, and storm surge protection should be clearly defined and analyzed for the FWOP conditions, and these assumptions should be explicitly incorporated into the hydrological modeling and Wetland Value Assessment (WVA) for the alternatives. 3. More sensitivity analysis should be conducted to determine the impacts of alternative completion schedules for the levee system and HNC lock on each alternative. 4. Modeling of the Morganza to the Gulf levee system embankments and the other gated structures in the Morganza to Gulf levee system in a manner similar to the proposed operation of the HNC lock should be performed to determine whether such operation could improve habitat benefits.

Comment 2:
Documentation on the Wetland Value Assessment (WVA) model needs to be added to Appendix M to demonstrate that the model is being appropriately applied and projected benefits accurately met.
Basis for Comment:
The WVA model was used as the primary basis for determining project benefits and cost-effectiveness related to meeting overall project goals and objectives, culminating in the selection of the Tentatively Selected Plan (TSP). Information, documentation, and rationale used for modeling assumptions and verification, including best professional judgment, are not sufficiently presented in the Atchafalaya report and specifically in Appendix M, to allow independent review of the WVA model, results, and therefore project benefits. The following concerns were identified by the Panel: • The benefits claimed by the WVA are based in part on nutrient additions. However, freshwater introduction benefits attributable to total nitrogen were not modeled as part of the hydraulic analysis in Appendix L, Annex2. • It was unclear how the results of the salinity modeling performed using Resource Modeling Associates-11 (RMA-11) were calculated in the WVA model from the Suitability Index (SI) graphs, since only net salinity changes were presented. • The hydrological models are discussed in detail in Appendix L, Annex 2, but there is little discussion of how these results were coupled with the WVA model (Appendix M). Section 5.6 presents the basic results but does not describe the methodology. In addition, Appendix M presents some details on the spreadsheet algorithms used to estimate marsh increments and decrements but does not link the calculations to the WVA model. • Results of the WVA/SANDS2 modeling, including estimation of net average annual habitat units (AAHUs) and emergent marsh habitat acreage gains, are not fully supported. First, it is unclear in the scientific literature cited in the report whether significant, sustainable marsh creation can be achieved solely through the introduction of freshwater flows in the absence of suspended sediments (mineral soils). Another earlier Louisiana Coastal Area (LCA) project, Atchafalaya Sediment Delivery constructed in 1998, did not achieve the projected benefits utilizing a restorative design approach to re-establish sediment and water flow delivery to provide a net increase emergent marsh. In this case, the WVA projected a net increase of 230 acres of emergent marsh creation, but to date, only 78 acres of forested/shrub habitat have been created (Babin, 2008). Second, the uncertainty of the outputs, particularly regarding "the accuracy of predicted freshwater introduction benefits" (#M-10) and how this aspect was applied to the WVA to achieve project benefit acres, was not fully described. Previous studies indicate that the potential for reducing wetland loss by freshwater diversion would typically result in only 1 to 3 square kilometers per year (km^2/yr) (Day and Craig, 1982). • Regarding Shoreline Protection Benefits, Chapter 3, line 3044 states, "*Bank and Shoreline Protection* - Where high quality marsh exists, bank protection could be

provided to diminish wave wash effects from vessels and/or to reduce marsh degradation due to storm surge." The WVA (Appendix M, pp. M-7 through M-9) claims benefits from Shoreline Protection Projects. Neither Appendix M nor other places in the report clearly indicate what specific measures or features provide those benefits, how the acreage associated with the benefits are calculated, whether these measures are located within or beyond the line of protection of the Morganza to the Gulf project, why the bank and shoreline protection is maintained for only 25 years, or why sea level rise does not affect the shoreline protection.

- No scientific basis was provided to justify why a 50% loss rate for created marshlands until 10 inches of subsidence plus sea level rise had occurred was used. Similar rationale was lacking regarding marsh nourishment loss rates.
- There was no complete definition on what constituted marsh nourishment projects to allow evaluation relative to WVA outputs.
- Collaborative scientific data obtained from constructed projects via post-project monitoring/studies could help in assessing the accuracy of the pre-project WVA outputs in predicting the post-project benefits, particularly with regard to net marsh acres gained from freshwater diversion; such data have not been provided. More than 74 Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA) projects have been implemented since 1990 (U.S. Government Accountability Office, 2007).
- The net wetland benefits of marsh creation projects (discussed in Appendix M, Section 2.0) do not describe in sufficient detail what measures are associated with the wetlands creation, where the created wetlands are located, and whether they are within or outside of the line of protection of the Morganza to the Gulf project.

Significance – High:

Uncertainties in the WVA model application and analysis could affect the recommendation or justification of the TSP.

Recommendation(s) for Resolution:

To resolve these concerns, the report would need to be expanded to include the following:

1. A more thorough discussion of the rationale, assumptions, and professional judgment used in applying the WVA model to the Atchafalaya project to result in marshland creation, marshland nourishment, and shoreline protection benefits. This should include model verification/calibration from prior projects or studies that were successful based only on the introduction of fresh water flows (nutrients) to better assess project risk and uncertainty.
2. More detail on how the WVA model interfaces with the hydrology and hydraulics (H&H) / SAND2 modeling results in determining project benefit acres and AAHUs associated with freshwater flows (nutrients). Calculations, spreadsheet summaries, scientific literature, etc., need to be included to support the stated project benefits.

Literature Cited:

Babin, B.J. (2008). Biennial Inspection Report for the Atchafalaya Sediment Delivery, July 21, 2008, St. Mary's Parish. CPRA Office of Coastal Protection and Restoration. 47 pp.

Day, J.W., Jr. and N.J. Craig (1982). Comparison of the effectiveness of management options for wetland loss in the coastal zone of Louisiana. Proceedings of a conference on coastal erosion and wetland modification in Louisiana: causes, consequences, and options. USFWS/OBS-82/59. 256 pp.

U.S. Government Accountability Office (2007). Coastal Wetlands: Lessons Learned from Past Efforts in Louisiana Could Help Guide Future Restoration and Protection. Report to Congressional Addressees. GAO-08-130. December. 57 pp.

Comment 3:
The use of the SAND2 model to model nutrients instead of a more complex model is not sufficiently justified to warrant its use for this project.
Basis for Comment:
The Atchafalaya report and appendices state that the project alternatives are capable of delivering nutrients via freshwater diversions. The WVA claims three types of benefits, one of which (marsh nourishment) would directly relate to the introduction of nutrients to the system. Statements in Appendix M, Section 5.0, indicate that the decision was made to use the SAND2 model to model nutrients solely because of the short study schedule, and not on the merits of the model as compared to other models. Although RMA-11, which was used for salinity studies (see Appendix L-2), can model nutrient inputs, the SAND2 model, a spreadsheet model with far less modeling capability, was used, and insufficient justification for the use of this model is provided. The modeling of nutrients in a freshwater system is complex and involves both processes (e.g., transport, respiration, decay, growth, death, grazing loss, and selling) and matter (e.g., algae, benthic algae, dissolved oxygen, organic matter, biological oxygen demand, ammonia/nitrogen, and phosphate). The complexity of this actual process is not emphasized, and the approaches that could be used to model the phenomenon are not discussed. In addition, insufficient explanation of the calculations and of the justification for the values used for several input variables is provided. These include the following: • The discussion of net discharge calculation on p. M-11 involving negative discharges is confusing. The study needs to show that a mass balance is achieved. • Nutrient concentrations are based on monitoring data from existing monitoring sites. No discussion relative to changes in nutrient concentrations that could occur as a result of the project is provided. The analysis assumes that average monthly concentrations of total nitrogen with and without the project would be the same, and no explanation is provided. • Productivity values of plants were set to be equal to productivity of FWOP marsh type, and no explanation is provided. • Percent constituent nitrogen of emergent vegetation is based on FWOP habitat type. A literature-based constant denitrification rate was used throughout the analysis. • Under Marsh Creation acreage, the text states that “Because a model flaw was discovered in the computation of some FWOP acreages the resulting net acreages would not be correct. Therefore, instead of using the output net acres, the future with project (FWP) acres were used and compared to the FWOP acres generated from the linear trend lines as discussed earlier.” This statement raises concerns as to whether the discharges have been properly accounted for.

Significance – High:
Insufficient justification is provided for using the SAND2 spreadsheet model vs. a more complex model, literature values, existing conditions, and FWOP conditions, which could affect the project benefits and the justification of the TSP.
Recommendation(s) for Resolution:
To resolve these concerns, the report would need to be expanded to include the following: 1. Use of a water quality model (RMA-11, CE-QUAL-W2 or other) that accounts for the many complexities that exist in nutrient processes and which are essential to the success of the project; or 2. Justification of the sufficiency of the SAND2 model for modeling complex nutrient processes, additional refinement of the model variables based on actual data from the study area or nearby projects that utilized a SAND2 calibrated data set, calibration of this study area model to a data set (as was performed for RMA-2), and sensitivity analysis to assess the effects on the model results using a range of possible independent variables.

Comment 4:
Some relative sea level rise (RSLR) calculations do not appear to be consistent with EC 1165-2-211, and the analyses of results do not appear to fully comply with all of the EC 1165-2-211 requirements thus the risks to the project are not understood.
Basis for Comment:
U.S. Army Corps of Engineers (USACE) Circular No. EC 1165-2-211 (USACE, 2009) provides specific instructions by which Civil Works projects are required to be evaluated to determine the effects of RSLR on projects. Although EC 1165-2-211 was utilized in the calculation of low, medium, and high sea level rise, not all of the calculations appear consistent with EC 1165-2-211. In addition, small differences between the RSLR estimates used in Appendix L-2 and Appendix M are not explained in the Atchafalaya report. Appendix L2 determined a regional mean sea level baseline trend of 2.28 millimeters per year (mm/yr) using the average of five stations "in the vertically stable geologic platform identified in the EC," but no details were provided on which five stations and which values were used. EC 1165-2-211 provides a value of 1.70 mm/yr for global mean sea level (GMSL) rise. Appendix L-2 states that the study team averaged the values of the two stations closest to the study area (Grand Isle and Eugene Island), which have documented values of RSLR of 9.24 and 9.65 mm/yr, to arrive at a subsidence value of 7.165 mm/yr, which excludes the GMSL value of 2.28 mm/yr. The subsidence value of 7.165 mm/yr is extended into the future at a constant rate, and the sea level rise is extended into the future at low, intermediate, and high rates. The analysis and reasoning for extending the sea level rise at varying rates, but keeping the subsidence rate constant, is not explained well in the report. Appendix L-2 (lines 892-895) states "For the high scenario, the 2065 run was not needed as it had been determined in previous studies that full marsh collapse would happen before 2065." More discussion of the risk and consequences of the high scenario on the project economics is needed. Appendix M, Section 6.0, cites a static sea level rise of 1.7 mm/yr, a value which agrees with EC 1165-2-211 (p. B-10). However, the 1.7 mm/yr is a GMSL change value. The Appendix M discussion states that the baseline (year 2004) RSLR equals 11.15 mm/yr, which was reduced by the average back-marsh accretion value of 10.2 mm/yr to calculate a baseline accretion-adjusted RSLR rate of 0.95 mm/yr. No explanation for the basis of the accretion estimate is provided, or how accretion can be occurring when little sediment is being conveyed to the project area, and storm surges from recent hurricanes are all acting to increase land loss. Appendix M states that to calculate future wetland loss rates under the medium and high sea level rise scenarios, the baseline wetland loss rate, in acres lost per year, was multiplied by the analysis year submergence rate ratio. The discussion explains SAND2's limitations on loss rates (only three different loss rates can be specified) and further explains that the limitation was accounted for by increasing the baseline average water level 0.5 foot (ft) for the medium scenario, and 1.0 ft for the high scenario for the year 2065. No supporting explanation was provided for these estimates. Finally, it is not clear that the following statements from EC 1165-2-211 were fully complied with in Appendices L-2 and M:

- Evaluate alternatives using “low,” “intermediate,” and “high” rates of future sea-level change for both “with” and “without” project conditions.
- Determine how sensitive alternative plans and designs are to these rates of future local mean sea-level change, how this sensitivity affects calculated risk, and what design or operations and maintenance (O&M) measures could be implemented to minimize adverse consequences while maximizing beneficial effects.

Since the project life is 50 years, and under the medium and high scenarios the benefits are lost sooner than the end of the 50-year planning horizon, the risk of losing benefits should be known. If one could assume that the sum of the low, medium, and high RSLR scenarios is equal to 1.0 (the universe of all solutions), and that a probability of each scenario could be estimated such that the sum of the three was equal to 1.0, then risk of loss of benefits of each project measure could be calculated. This would significantly improve the understanding of RSLR risks on the effectiveness of the TSP.

Significance – High

The calculation and effects of RSLR on project benefits and risks have not been completely considered, and changes to the design, operations, and maintenance of the project to minimize adverse effects of RSLR have not been fully evaluated in accordance with EC 1165-2-211, which could impact the success of the project.

Recommendation(s) for Resolution:

To resolve these concerns, the report would need to be expanded to include the following:

1. Resolution of the apparent differences between Appendix L-2 and Appendix M in how the low, medium, and high RSLR rates and values were determined and how the requirements of EC 1165-2-211 were met.
2. Resolution of how the subsidence value is justified and how it can be projected at a linear rate into the future.
3. Incorporation of the resolved RSLR results into the WVA and SAND2 models, so that the future year conditions correctly represent the EC 1165-2-211 determined changes.
4. Discussion and evaluation of changes to the design, operations, and maintenance of the project that are necessary to minimize the adverse consequences of RSLR (e.g., under intermediate and high scenarios, how would freshwater inflows from the Atchafalaya River (AR) to the Gulf Intercoastal Waterway (GIWW) change; how would the project design, operations, or maintenance need to change as a result; and what is the effect under the intermediate and high scenarios of the loss of project benefits in the future years).
5. Provision of a risk analysis so that the effects of low, moderate, and high RSLR on the project’s benefits could be understood, similar to the manner in which the risk analysis was performed for the project’s cost estimates.

Literature Cited:

USACE (2009). Water Resource Policies and Authorities Incorporating Sea-Level Change Considerations in Civil Works Programs. Department of the Army, U.S. Army Corps of Engineers, Washington, DC. Circular No. EC 1165-2-211. July 1.

Comment 5:
Given the large amount of dredging and disposal, the dredged material's physical properties, quantities, and disposal methods are too general and need more detail.
Basis for Comment:
The Atchafalaya report states that dredged materials from the project will be placed in adjacent spoil areas and used to nourish swamps and marshes. This description is too general for the estimated 21 million cubic yards of dredging and disposal that is expected to be conducted within this sensitive coastal environment. The removal quantities of various swamp and marsh types are denoted, but the report is not clear on the quantities for beneficial use. It would seem that all of the dredged material could serve as beneficial material because RSLR is estimated to change all the swamps and marshlands to open water under the high RSLR scenario. In addition, the impacts to adjacent habitats that will be incurred by marsh berm or disposal site construction, including potential construction impacts associated with equipment access or "flotation channels," have not been analyzed. More detail would clarify the impact on the surrounding environment and, in turn, the environmental consequences as discussed in other sections of the report. Geotechnical and engineering analysis of the subject materials, beyond in-situ swamp/marsh soils, appears warranted as it relates to slope stability, compaction (berm construction) potential for chronic turbidity due to suspension of fines, etc. In addition, there is a potential for the dredged material to contain hazardous compounds, which has not been addressed. Not properly investigating the physical properties of the dredged material can lead to major problems with the project. For instance, the Panel is aware that problems encountered with unsuitable spoil material during construction of several similar projects in the LCA program led to their abandonment mid-construction (U.S. Government Accountability Office, 2007).
Significance – High:
It is not possible to accurately forecast the cost of the project without knowing both the physical properties of the dredged material and how it will be used.
Recommendation(s) for Resolution:
To resolve these concerns, the report would need to be expanded to include the following: 1. More information on the physical properties of the dredged material and how the material will be used. 2. A backup plan for disposing of unsuitable dredged materials, including additional costs involved. Address the possibility that the dredged material may contain hazardous waste.

3. An analysis of the environmental impacts to adjacent habitats from the disposal of the dredged material.

Literature Cited:

U.S. Government Accountability Office (2007). Coastal Wetlands: Lessons Learned from Past Efforts in Louisiana Could Help Guide Future Restoration and Protection. Report to Congressional Addressees. GAO-08-130. December. 57 pp.

Comment 6:
Hydrology and hydraulics (H&H) modeling, including RMA-2 and RMA-11 2-D water surface modeling and modeling of salinity, needs to be better related to key estuarine species and their specific habitat requirements.
Basis for Comment:
Little data in the Atchafalaya report directly connect the RMA-11 salinity modeling results with perceived benefits of the freshwater flows on commercially important estuarine nekton species such as the brown and white shrimp, oysters, and juvenile fishes. Principally, these benefits were simply related to the "community"-based WVA model outputs using SI curves based on average annual salinities and net changes in average annual salinity within the study area. As a result, the project impacts to these species related to salinity changes were not adequately assessed. The assessment is therefore insufficient for identifying potential opportunities for enhancing the project design (e.g., structure locations, sizes, and operating design) during final engineering or for assessment via the Adaptive Management Plan (AMP) process. Because many species require specific salinity regimes during various portions of their life cycles, the spatial extent of average, seasonal salinity gradients (isohaline maps) based on known data and modeled outputs would provide a better basis for quantifying these effects within the project study area as compared to the reported net change in the annual average. For instance, it is unclear whether the projected net salinity decrease of 3.0 parts per trillion (ppt) predicted in the Lost Lake area (p. 5-143 of the Atchafalaya report) results in inflows to the oyster and oyster seeding grounds falling below optimal salinity thresholds of 10 ppt, which can result in significant mortality even for a period as brief as 2 weeks (Estevez, 2006). This potential impact is acknowledged (line 11453) but is not quantified. Similarly, salinity tolerance range relationships exist for Penaeid shrimp species, which can be impacted by freshwater diversions (Alber, 2002; Barrett and Gillespie, 1973; Rozas et al., 2005). For these important reasons, salinity impacts associated with freshwater diversions are currently being evaluated and developed for integration with H&H models (Mason, 2010) to better predict these effects and improve the project benefits for these species.
Significance – Medium:
The impacts of the project on salinity gradients for key estuarine species were not completely presented.
Recommendation(s) for Resolution:
To resolve these concerns, the report would need to be expanded as follows: 1. Average wet season-dry season isohaline maps for both FWOP and FWP conditions should be developed and included in the document and related directly to key estuarine species salinity tolerances. This would allow both beneficial and detrimental effects to these species to be quantified, would assist in National Environmental Policy Act (NEPA) / essential fish habitat

(EFH) evaluations, and would aid in developing final project design and adaptive management strategies.

Literature Cited:

Alber, M. (2002). A conceptual model of estuarine freshwater inflow management. Estuaries Coasts, 25: 1246-1261.

Barrett, B.B., and M.C. Gillespie (1973). Primary factors which influence commercial shrimp production in coastal Louisiana. Louisiana Wildlife Fisheries Commission Technical Bulletin No. 9. New Orleans, LA. 28 pp.

Estevez, E.D. (2006). Salinity Targets for Watershed Management in Dona and Roberts Bays and their Tributaries. Final Report to Sarasota County Environmental Services. Mote Marine Laboratory, Sarasota FL. Technical Report No. 1114. 24 pp.+ 7 pp. appendix.

Mason, D.A. (2010). Temperature and Salinity Effects on the Growth and Survival of Juvenile Penaeid Shrimps: Implications for the Influence of River Diversions on Production. National Oceanic and Atmospheric Administration (NOAA). Great Lakes Environmental Research Laboratory.

Rozas, L.P., T.J. Minello, I. Munyera-Fernandez, B. Fry, and B. Wissel (2005). Macrofaunal distributions and habitat change following winter-spring releases of freshwater into Brenton Sound Estuary, LA. Estuarine Coastal Shelf Sci., 65:319-336.

Comment 7:
Sediment transport modeling was not performed to support statements that the project will distribute sediments to the study area, and conflicting/misleading statements regarding sediment delivery must be addressed.
Basis for Comment:
The Atchafalaya report and appendices waver between indicating that the project is capable of delivering sediments and stating that the project alternatives cannot deliver sediments to the study area. Appendix L-2 (Detailed Hydraulic Modeling Studies) summarizes only the RMA-2 (flows and levels) and RMA-11 (salinity) studies; therefore, unless sediment transport modeling was conducted, there is no basis for statements or inferences that suspended or bed sediment transport will occur with any of the alternatives. Examples of conflicting and/or misleading statements are the following: • Lines 87-91 state "The purpose of the proposed action is to reverse the current trend of marsh degradation in the project area resulting from….and lack of sediment and nutrient deposition. The project proposes to accomplish this by utilizing…sediments…from the AR and GIWW." • Lines 1479 – 1483 state "The purpose of the proposed action is to reverse the current trend of marsh degradation in the study area resulting from…and lack of sediment…deposition. The study proposes to accomplish this by utilizing….sediments…from within the study area, the AR and GIWW." • Line 2781 under 2.4.2 Objectives, provides a bullet stating "Increase sediment and nutrient load to surrounding wetlands". • Lines 2819 – 2822: "Adequate sediment exists in the AR to benefit marshes in the central and eastern study areas; however, the existing and potential future sediment transport capacity of the GIWW precludes adequate delivery of sediments to achieve project goals and objectives." • Lines 2832 – 2835: "Water Quality – Planning objectives of the proposed project include the introduction of water and sediments from the AR. The introduction of water and sediments should not result in the violation of established water quality standards in the study area." • Lines 2306 – 2318: These lines clearly support the statements provided at the kickoff meeting that sediment delivery capability has been so anthropogenically altered that this project does not seek to try and reverse that trend. • Table 3.3 includes the statement "sediment delivery from distant sources" as a potential strategy, but none of the alternatives indicate that they are capable of providing sediment delivery, which indicates that the project does not claim to improve sediment delivery.

• Lines 3755 – 3760 concede that "…the plan is effective although it does not address one of the project objectives of restoring deltaic processes by means of sediment input."
Significance – Medium:
Statements indicating that the project aims to introduce additional sediments into the study area when not supported by modeling are misleading.
Recommendation(s) for Resolution:
To resolve these concerns, the report would need to be expanded to include the following: 1. Removal of any statements or indications that any of the study alternatives will provide an increase in sediments introduced to the system (in the case that project objectives can be accomplished without increasing sediment delivery to the study area); or 2. Modeling of sediments and the effects of the project on providing sediment delivery from the AR and/or GIWW.

Comment 8:
Impacts to navigation, shoaling, and harmful algal blooms (HABs) are not described in sufficient detail under Environmental Consequences (Section 5.0).
Basis for Comment:
The magnitude of the Atchafalaya project would suggest that beneficial and adverse impacts will likely occur. While both types of impacts are generally discussed in Environmental Consequences (Section 5.0), it appears that a disproportionate effort was put forth in assessing potential beneficial effects when compared to detrimental effects (e.g., less discussion on detrimental impacts), particularly when evaluating indirect and cumulative impacts associated with the TSP. These concerns include the following: • Due to the extensive network of excavated waterways, canals, and berms either present or proposed in the Atchafalaya basins and the increases in freshwater discharges from the diverted flows, turbulence is expected to increase in some reaches. As a result, secondary erosion is anticipated to occur along the marsh/waterway banks and berms, which could lead to localized detrimental impacts to navigation such as shoaling (Babin, 2008) and water quality (e.g., turbidity). • Text on p. 5-113 states "Navigation on the HNC would be negatively impacted by the modified operation of the lock complex" (Line 10385). Yet this negative impact related to commercial, recreational, and project costs is not described in sufficient detail (e.g., simply stating "Use of the lock would increase transportation costs…"(Line 10389). • Due to higher turbidity introduced by the diversions and erosion during high water events (Line 9541) and increased nutrient/agrochemical loads, water quality may be expected to be degraded, causing: o Increased potential for HABs and hypoxia (LUMCON, 2009) o Impacts to sensitive, floating maidencane marshes, submerged aquatic vegetation (SAV), and EFH habitats (Swarzenski et al., 2008); o Impacts to existing 303(d) Impaired Waters such as Bayou Penchant (Table 4.1) from increases to total suspended solids and turbidity discharges that may be non-compliant with the Clean Water Act. Furthermore, there was no discussion concerning cumulative impacts of the project relative to water quality, other than impacts related to salinity (Table 5.7). • Construction impacts (access routes and "flotation channels") and impacts associated with long-term requirements to maintain berms, marsh terraces, structures, and canals (dredging) are not clearly described or assessed. • Indirect impacts to oysters from changes in salinity "may increase mortality, affect reproduction and spat settlement" (Line 11453) and result in the "spatial shift in production" (Line 11454). No quantitative evaluation of the spatial extent of this area or the economic loss is presented.

- The cumulative impact discussion (Section 5.2.1.2.3) does not specify that other projects will affect water level or flows, or to what extent.
- Other LCA projects such as Davis Pond Freshwater Diversion, Small Bayou LaFourche Reintroduction and Atchafalaya Sediment Delivery were referenced throughout the report. In some cases, they were discussed as synergenic with the Atchafalaya project, while others were implicated as potentially countering the effects (i.e., the Maintain Land Bridge Caillou Lake and Gulf of Mexico Project could affect salinity levels in the LCA-Atchafalaya study area; Line 1856). These features were not described in the cumulative impacts sections.

Significance – Medium:

The limited assessment of potential detrimental effects, including detrimental indirect/cumulative impacts as presented in the report, affects the completeness and understanding of the project relative to NEPA compliance and the National Ecosystem Restoration output.

Recommendation(s) for Resolution:

To resolve these concerns, the report would need to be expanded as follows:

1. More detailed discussion (or as appropriate, references to other portions of the document where this information can be found) on the detrimental effects associated with indirect/cumulative impacts for each of the Atchafalaya project alternatives should be added under Environmental Consequences (Section 5.0 of the report).
2. A better summary should be provided that describes how the Atchafalaya project interfaces or is affected by other future actions or projects (including other LCA projects); the summary should specify and describe beneficial and detrimental effects. A tabular summary would assist in this presentation.

Literature Cited:

Babin, B.J. (2008). Biennial Inspection Report for the Atchafalaya Sediment Delivery. July 21, 2008, St. Mary's Parish. CPRA Office of Coastal Protection and Restoration. 47 pp.

LUMCON (2009). Hypoxia in the Northern Gulf of Mexico. Louisiana Universities Marine Consortium (LUMCON) website at www.gulfhypoxia.net.

Swarzenski, C.M., T.W. Doyle, B. Fry, and T.G. Hargis (2008). Biogeochemical response of organic-rich freshwater marshes in the Louisiana delta plain to chronic river influx. Biogeochemistry, 90: 49-63. August.

Comment 9:
The impacts to navigation at the HNC and lock from the project are unclear, making it difficult to assess the potential impacts.
Basis for Comment:
The Atchafalaya report needs additional information regarding impacts to navigation from this project and interactions with the Morganza to the Gulf project, especially with respect to the HNC lock. The method of operating the lock does not seem to have been finalized, and this method could have an impact on the studies contained within the plan. As in all areas where navigation is discussed, detailed data-driven analysis is lacking. It is not sufficient to state that **"**navigation will be delayed" without specific cost or damage estimates. There is a good general discussion of the different alternatives, but data are needed to support the analysis and assertions. The life cycle tables are not clear and require explanation, especially regarding the minimum and maximum impacts to navigation. Clarification of these impacts would allow better determination of relative cost-effectiveness in comparing alternatives.
Significance – Medium:
The confidence in the overall calculation of costs would be increased significantly if the navigation impacts could be ascertained and quantified.
Recommendation(s) for Resolution:
To resolve these concerns, the report would need to be expanded as follows: 1. Specific information on the form and extent of navigation impacts, especially details on the extent and value of delays, should be presented. 2. A detailed explanation of the operating methods of the current system and the new lock should be provided. The specific structure and timing of the lock operation from the Coastal Impact Assistance Program Application of May 22, 2006, should be added. 3. Though there is a good general discussion of the different project alternatives, data and discussions are needed to support the analysis and assertions relative to the navigation cost impacts. The cost of $35,000 per year for navigation delay costs should be supported in the discussion.

Comment 10:
The assumptions and data used to develop the cost estimates for the commercial fisheries are needed to justify the potential impacts to this industry.
Basis for Comment:
The discussion of potential impacts on commercial fisheries is general and parallels the basic description of hydrological impacts. No estimates of changes in total catch or fishery composition are provided for the alternatives. In addition, the Atchafalaya report lacks underlying assumptions or real-time data relating to the cost estimates for the commercial fisheries. Data on the fisheries' species types, volumes, and values of catch would be helpful. Market values of the fisheries and changes due to the project would be helpful as well. The navigational restrictions to commercial interests affect the commercial cost impacts from the project.
Significance – Medium:
The completeness of the report would be improved if the additional cost data are presented and analyzed.
Recommendation(s) for Resolution:
To resolve these concerns, the report would need to be expanded to include the following: 1. A graphic depicting the locations where draft restrictions occur or are affected by the project, if any. This would be helpful in assessing effects of project implementation for all navigational interests, whether recreational or commercial. 2. A perspective on the anticipated draft and passage restrictions for various project features (p. 5-138; e.g., Feature EP7 would restrict vessels with a draft greater than 5 ft). It would be helpful to relate that to average vessel size and attendant cost impacts. 3. A more comprehensive description of how the costs were determined, thus bolstering confidence in the impacts estimation.

Comment 11:
The design of West Weir #2, specifically the sheet pile cell installation, is questionable because of the depth of water, the length of sheets, and the driving distance.
Basis for Comment:
The details of West Weir #2 are shown on drawing S-220. The weir is made up of 20 sheet pile cells that act as a dam. It is questionable that the cells can be built as shown. The longest sheets, which are 88 ft long, are set in 65 ft of water and driven up to 40 ft. Generally, straight sheets should not be driven over 15 to 20 ft, even under conditions that allow easy driving. Pre-excavation to minimize the driving distance is possible. The Panel notes that sheets 88 ft long are difficult to handle and, with a template setting in 65 ft of water, the installation will be extremely difficult. The construction of the sheet pile cells will be extremely difficult, if not impossible. An alternate design may be required at a much greater cost.
Significance – Medium:
The cost of the project could be significantly increased if the sheet pile design is not feasible.
Recommendation(s) for Resolution:
To resolve these concerns, the report would need to be expanded to include the following: 1. An analysis of the constructability of the cells based on other similar installations 2. Review of the borings and driving distance 3. An alternate design and cost estimate for comparison

Comment 12:
There is a discrepancy in the final cost analysis, which uses a 39% contingency rather than the 34% contingency determined in the risk analysis.
Basis for Comment:
The risk analysis shown in Appendix P is very thorough and appears to include all items. This analysis developed a 34% contingency, but 39% was used in the final cost analysis. This discrepancy is not explained.
Significance – Medium:
A difference of 5% contingency has an overall impact of more than $15 million in total costs and would affect the cost-benefit ratio.
Recommendation(s) for Resolution:
To resolve these concerns, the report would need to be expanded as follows: 1. Explain the 5% difference in the contingencies, or the final costs would need to be corrected by using the contingency developed in the risk analysis.

Comment 13:
The Adaptive Management Plan (AMP) needs to be revised to provide more detail, including identifying critical management trigger points for project reassessment (or realignment) purposes.
Basis for Comment:
Pursuant to the Water Resources Development Act of 2007 and as stated in the Chief of Engineers' Report dated January 31, 2005, p. 1 "…the feasibility level documents will identify…adaptive management measures…will optimize features and outputs necessary to achieve restoration objectives….and must be a critical element of the LCA projects" (USACE, 2005). While the Atchafalaya report succeeds in providing a framework and general outline of the AMP, more detail is needed to better meet the LCA directives given numerous project uncertainties. On p. I-9, Appendix I, it was stated that data collection (e.g., water levels, salinities) will be used to inform adaptive management actions, but it is unclear how that will be accomplished. It is difficult to judge the relevance of the proposed attributes, targets, and measures without knowing (1) who will make the key management decisions, (2) what kind of specific data or information will they require, and (3) what aspects of the Atchafalaya project can be altered to ensure that these goals are met. Though project project performance criteria, variances and success were discussed briefly (p. I-16), specifically defined targets and success criteria, including acceptable thresholds (i.e., magnitude of variances from the desired or expected (modeled) results, for a particular metric) or key monitoring intervals (e.g., post 2-year, 5-year trend analysis r) should be developed. As an example, setting an actual target for salinity such as a 10 ppt isohaline average with a tolerance level of ±1.0 ppt over a 5-year period for a given reach of the project as a performance measure versus "reduce salinity levels" and "maintain a range" (as stated in Objective 3) would provide a definitive threshold, which if not met, would initiate a project reassessment. This will provide clear trigger points that would enable the Project Delivery Team (PDT) to make critical project AMP decisions. Development of a clear decision frame-work represents one of the three main components of an effective AMP (Thom, 2000). Furthermore, the Atchafalaya project relies in many ways on best professional judgment, including outputs from the WVA/SANDS2 and RMA-11 models that extends further to some of the system-level objectives to be monitored as well (e.g., Objective 2 "Achieve and maintain characteristics of a sustainable marsh hydrology"; p. I-13). The role of attribute targets based on best professional judgment in management decision-making should be limited, and they should never take precedence over those attributes based on data. While various marsh hydrology characteristics are inferred from the WVA model, they are not specified in the AMP. Therefore, the identification of specific targets and success criteria to be assessed by the monitoring program to determine if the project is meeting goals and objectives should be included as a critical component of the AMP.

Finally, a sound basis for developing an effective AMP lies in "Lessons Learned" (U.S. Government Accountability Office, 2007). There is a history in the CWPPRA and LCA Program suggesting that, to some degree, this has been done (Babin, 2008; Raynie and Visser, 2002). The degree to which the knowledge obtained from the lessons learned were incorporated into the AMP is not altogether clear and should be appropriately discussed and summarized to address how the Atchafalaya project will use best available science to adjust to these project uncertainties.
Significance – Medium:
The AMP will be improved by stating how the best available science will be integrated with adaptive management to achieve overall project optimization and cost-effectiveness to achieve project goals and objectives.
Recommendation(s) for Resolution:
To resolve these concerns, the report would need to be expanded as follows: 1. The AMP discussion should be revised to provide a clearer framework on the specific roles and responsibilities for achieving effective adaptive management for this project. This may include possible revision to Figure 3, Appendix I, to be less generic. Similar AMPs prepared under the Comprehensive Everglades Restoration Plan (CERP) program have utilized a "Roles and Responsibilities Matrix" that provides more detail (South Florida Water Management District, 2007). 2. The Atchafalaya project AMP should fully describe how management strategies will be altered and tested through modeling when new data and analysis are obtained from monitoring, including definable trigger points. To assist with this, consideration should be given to creating a decision/summary matrix, with pre-established performance criteria and targets along with allowable variances that will allow for effective post-assessment of the project results relative to meeting the stated project goals/objectives. 3. The discussion should identify water quality models to be used in the AMP that are capable of integrating monitoring data obtained from the project for use in testing system responses and therefore assisting in implementation of alternative adaptive management strategies in response to the project's performance.

Literature Cited:

Babin, B.J. (2008). Biennial Inspection Report for the Atchafalaya Sediment Delivery, July 21, 2008, St. Mary's Parish. CPRA Office of Coastal Protection and Restoration. 47 pp.

Raynie, R.C., and J.M. Visser (2002). CWPPRA Adaptive Management Review Final Report. Prepared for the CWPPRA Planning and Evaluation Subcommittee, Technical Committee, and Task Force. December 20, 2002. 47pp.

South Florida Water Management District (2007). South Florida Environmental Report, Appendix 7B-1: Comprehensive Everglades Restoration Plan Adaptive Management Strategy.

Thom, R.M. (2000). Adaptive management of coastal ecosystem restoration projects. Ecol. Eng., 15:365-372.

USACE (2005). Louisiana Coastal Area, Louisiana, Ecosystem Restoration [Letter Report to the Secretary of the Army] Office of the Chief of Engineers. Washington D.C. January 31. 14 pp.

U.S. Government Accountability Office (2007). Coastal Wetlands: Lessons Learned from Past Efforts in Louisiana Could Help Guide Future Restoration and Protection. Report to Congressional Addressees. GAO-08-130. December. 57 pp.

Comment 14:

The source and reliability of the assumptions used to estimate the Atchafalaya project costs, especially construction costs, do not include sufficient detail to make a determination regarding accuracy.

Basis for Comment:

Construction costs are a significant portion of the costs of alternatives being considered. To fully evaluate alternative project configurations, the construction costs need to be accurate and well developed. Such information is necessary to have confidence in the cost estimates.

The following are examples of discrepancies and missing information in relation to the costs:

- Appendix D lists the quantities of dredged material for the three subunits as being approximately 21 million cubic yards, whereas the cost estimates shown in Appendix L Annex 1 Construction Costs price only 13 million cubic yards. The largest discrepancy is in the east section, where 17 million cubic yards are estimated and only 9,152,050 cubic yards are priced. In addition, for preliminary cost estimates, it is neither justifiable nor necessary to price quantities to this degree of exactness.
- Appendix D states that the dredged material will be placed in adjacent areas or used to nourish swamps and marshes. There is no detailed analysis for the stated quantity of 21 million cubic yards of dredged material. The cost estimates for dredging vary from $1.57 to $22.08 per cubic yard. This indicates that some analysis has been made of the differences in the 12 cost estimates for the various areas, but no description is included. Furthermore, there is no description of the analysis for the estimated quantity of 21 million cubic yards of dredged material. A more detailed analysis of disposal should be made.
- These costs cannot be considered final until the operational schedule of the lock is completely known.
- The detailed numbers in Appendix P do not include sourcing, timing, or detail on the cost estimates

The information in Appendix K is primarily a short summary of information described elsewhere in the Atchafalaya report and other appendices. Many of the critical components for the benefit assessment and incremental cost analysis are not clearly described in the main report, so the information presented in Appendix K adds no new costing information.

Significance – Medium:

The requested changes would improve the quality and completeness of the report.

Recommendation(s) for Resolution:
To resolve these concerns, the report would need to be expanded to include the following: 1. Sourcing and more details on the cost estimates in the cost Appendix P. 2. Some treatment of the costs relative to the operation of the lock, under the expected scheduling. If unknown, the uncertainty of cost estimation should be acknowledged. 3. The issues identified above in Appendix D and Appendix K should be examined and the inconsistencies cleared up. The report should indicate whether the adaptive management costs are included as annual costs. 4. The cost estimate portion of the report should indicate the quantity of excavated material that will be used to create the acres of marshlands claimed in the WVA benefits analysis.

Comment 15:
Additional documentation on the public involvement process is needed.
Basis for Comment:
The Atchafalaya report's public involvement section provides minimal information on the process used to elicit the concerns of the public. More detail on meeting dates, attendance (institutional and public), and issues raised in testimony or comment sessions would be useful. Succinct summary text would be helpful here. For instance, the process by which the five public concerns, stated in the report, were identified needs more documentation. While the public involvement aspects required through the NEPA scoping and public meeting requirements were adequately conducted, the report would be enhanced by a full identification of the extent and detail of the individual responders' concerns. Currently, the report provides only a minimum discussion by response type.
Significance – Low:
A full discussion of the public involvement process would enhance the quality of the report.
Recommendation(s) for Resolution:
To resolve these concerns, the report would need to be expanded as follows: 1. An abstract of the public involvement process described in Appendix G should be prepared and provided in the main report. 2. A more detailed discussion, aided by a succinct matrix/table summary of questions and responses, would allow a more comprehensive review by the reader.

APPENDIX B

Final Charge to the Independent External Peer Review Panel

on the

Integrated Feasibility Study and Environmental Impact Statement for the Convey Atchafalaya River Water to Northern Terrebonne Marshes, Lafourche Terrebonne, St. Mary Parish, Louisiana

as

Submitted to USACE on April 23, 2010

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Charge Guidance and Questions to the Peer Reviewers
for the
Convey Atchafalaya River Water to Northern Terrebonne Marshes
Lafourche, Terrebonne, St. Mary Parish, Louisiana

BACKGROUND

The Water Resources Development Act of 2007 authorized the Louisiana Coastal Area (LCA) program. Specifically, Section 7006(e)(3) requires the Secretary of the Army to submit one feasibility report to Congress on six elements by December 31, 2008. The six elements are

1) Terrebonne Basin Barrier Shoreline Restoration,
2) Small Diversion at Convent/Blind River,
3) Amite River Diversion Canal Modification,
4) Medium Diversion at Whites Ditch,
5) Convey Atchafalaya River Water to Northern Terrebonne Marshes, and
6) Multipurpose Operation of Houma Navigation Lock.

The Congressional language further authorizes construction of these six elements contingent upon submittal of a favorable report of the Chief of Engineers no later than December 31, 2010. The U.S. Army Corps of Engineers (USACE) is the Federal sponsor for the projects and the non-Federal sponsor is Louisiana's Coastal Protection and Restoration Authority (CPRA).

This Independent External Peer Review (IEPR) will review the Convey Atchafalaya River Water to Northern Terrebonne Marshes and Multipurpose Operation of Houma Navigation Lock project.

The Louisiana Coastal Area Convey Atchafalaya River Water to Northern Terrebonne Marshes and Multipurpose Operation of Houma Navigation Lock (Atchafalaya project) Study Area comprises approximately 1100 square miles in Southern Louisiana in the vicinity of the City of Houma and Terrebonne Parish. The proposed Atchafalaya project is located in the Deltaic Plain within Subprovince 3, one of the four Subprovinces identified in the LCA Study Area.

The overall study area is bound to the west by the Lower Atchafalaya River. The area to the east is bound by the Bayou Lafourche ridge. The area to the north is bound by the Bayou Black ridge, from the Lower Atchafalaya River to the City of Houma, and by the Gulf Intracoastal Waterway from the City of Houma to the Bayou Lafourche ridge. The southern boundary of the project was based on a delineation conducted in 2007 of coastal Louisiana vegetation types. The boundary roughly follows the transition between saline and brackish marsh types.

Due to the magnitude of the project area, the entire Atchafalaya project area was divided into three subunits. The three subunits have been separated by a combination of natural, physical, and geographic features, and the limits of the subunits were developed during an interagency Project Delivery Team (PDT) meeting conducted on April 1, 2010. The separation of the whole project area allowed the PDT to evaluate specific needs relative to each subunit.

OBJECTIVES

The objective of this work is to conduct an independent external peer review (IEPR) of the Convey Atchafalaya River Water to Northern Terrebonne Marshes and Multipurpose Operation of Houma Navigation Lock Integrated Feasibility Study and Environmental Impact Statement (Atchafalaya report) in accordance with the Department of the Army, U.S. Army Corps of Engineers, Water Resources Policies and Authorities' *Civil Works Review Policy* (EC 1165-2-209) dated January 31, 2010 and the Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* released December 16, 2004.

Peer review is one of the important procedures used to ensure that the quality of published information meets the standards of the scientific and technical community. Peer review typically evaluates the clarity of hypotheses, validity of the research design, quality of data collection procedures, robustness of the methods employed, appropriateness of the methods for the hypotheses being tested, extent to which the conclusions follow from the analysis, and strengths and limitations of the overall product.

This purpose of the IEPR is to assess the adequacy and acceptability of economic, engineering, and environmental methods, models, and analyses used for the Atchafalaya report. The IEPR will be limited to technical review and will not involve policy review. The IEPR will be conducted by subject matter experts (i.e., IEPR panel members) with extensive experience in engineering, economics, and environmental issues relevant to the project. They should also have experience applying their subject matter expertise to ecosystem restoration.

The panel members will be "charged" with responding to specific technical questions as well as providing a broad technical evaluation of the overall project. Per EC 1165-2-209, Appendix D, reviews should identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods. Review panels should be able to evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable. Reviews should focus on assumptions, data, methods, and models. The panel may offer their opinions as to whether there are sufficient analyses upon which to base a recommendation.

DOCUMENTS PROVIDED

The following is a list of documents and reference materials that will be provided for the review. **The documents and files presented in bold font are those which are to be reviewed**. All other documents are provided for reference.

- **Integrated Feasibility Study and Environmental Impact Statement for the Convey Atchafalaya River Water to Northern Terrebonne Marshes, Lafourche Terrebonne, St. Mary Parish, Louisiana**

  Environmental Reports
  - **Appendix A: Biological Assessment**
  - **Appendix B: U.S. Fish and Wildlife Service Coordination Letter and Report**

- **Appendix C: NOAA Fisheries Service Coordination Letter**
- **Appendix D: 404(b)(1) Water Quality Report**
- **Appendix E: Louisiana Coastal Resources Program Consistency Determination**
- **Appendix F: State Historic Preservation Officer Coordination Letter**
- **Appendix G: (Reserved)**
- **Appendix H: Responses to Comments**

Feasibility Reports

- **Appendix I: Value Engineering Report**
- **Appendix J: Adaptive Management/Monitoring Plan**
- **Appendix K: Real Estate Plan**
- **Appendix L: Phase I Environmental Site Assessment**
- **Appendix M: Wetland Value Assessment (WVA) Model Report**
- **Appendix N: Benefit/Cost – Incremental Cost Analysis**
- **Appendix O: Micro-Computer Aided Cost Estimating System (MCACES) Model Report/ MCACES 2nd Generation (MII)**
- **Appendix P: Total Project Cost Summary**
- **Appendix Q: Project Costs and Schedule Risk Analysis Report**
- **Appendix R: Engineering**

- USACE guidance *Civil Works Review Policy* (EC 1165-2-209) dated January 31, 2010
- CECW-CP Memorandum dated March 31, 2007
- Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* released December 16, 2004.
- Evaluation of Environmental Investments Procedures Manual Interim: Cost Effectiveness and Incremental Cost Analysis[5]
- IWR Planning Suite, the cost effectiveness-incremental cost analyses software used by USACE on ecosystem restoration projects and mitigation of ecosystem impacts (accessible from http://www.pmcl.com/iwrplan/)[1]

[5] Provided to Economics Panel Member Only

SCHEDULE

TASK	ACTION	DUE DATE
Conduct Peer Review	Review documents sent to panel members	5/4/2010
	Battelle/panel Kick-off Meeting	4/27/2010
	USACE/Battelle/panel Kick-off Meeting with panel members	4/27/2010
	External panel members complete their review	5/20/2010
Prepare Final Panel Comments and Final IEPR Report	Battelle provides panel members merged individual comments and talking points for panel review teleconference	5/27/2010
	Convene panel review teleconference	6/1/2010
	Battelle provides final panel comment directive to panel	6/2/2010
	External panel members provide draft final panel comments to Battelle	6/9/2010
	Battelle provides feedback to panel members on draft final panel comments; panel provides revised draft final panel comments per Battelle feedback	Not Applicable
	Final Panel Comments finalized	6/16/2010
	Battelle provides Final IEPR report to panel for review	6/18/2010
	Panel provides comments on Final IEPR report	6/21/2010
	*Submit Final IEPR Report	6/30/2010
Comment/ Response Process	Input final panel comments to DrChecks Battelle provides final panel comment response template to USACE	7/2/2010
	USACE PDT provides draft Evaluator responses and clarifying questions to Battelle	7/13/2010
	Battelle provides panel members the draft Evaluator responses and clarifying questions	7/15/2010
	Panel members provide Battelle with draft BackCheck responses	7/20/2010
	Teleconference with Battelle and panel members to discuss panel's draft Backcheck responses	7/22/2010
	Final Panel Comment Teleconference between Battelle, IEPR team, and PDT to discuss final panel comments, draft responses and clarifying questions	7/22/2010
	USACE inputs final Evaluator responses in DrChecks	8/3/2010
	Battelle provides Evaluator responses to panel members	8/6/2010
	Panel members provide Battelle with BackCheck responses	8/17/2010
	Battelle inputs BackCheck responses in DrChecks	8/17/2010
	*Battelle submits pdf printout of DrChecks project file	8/18/2010

CHARGE FOR PEER REVIEW

Members of this peer review panel are asked to determine whether the technical approach and scientific rationale presented in the Atchafalaya report are credible and whether the conclusions are valid. The reviewers are asked to determine whether the technical work is adequate, competently performed, properly documented, satisfies established quality requirements, and yields scientifically credible conclusions. The panel is being asked to provide feedback on the economic, engineering, environmental resources, and plan formulation. The reviewers are not being asked whether they would have conducted the work in a similar manner.

Specific questions for the panel members (by report section or Appendix) are included in the general charge guidance, which is provided below.

General Charge Guidance

Please answer the scientific and technical questions listed below and conduct a broad overview of the Atchafalaya report. Please focus on your areas of expertise and technical knowledge. Even though there are some sections with no questions associated with them, that does not mean that you cannot comment on them. Please feel free to make any relevant and appropriate comment on any of the sections and appendices you were asked to review. In addition, please note the following guidance. Note that the panel will be asked to provide an overall statement related to 2 and 3 below per USACE guidance (EC 1165-2-209; Appendix D).

1. Your response to the charge questions should not be limited to a “yes” or “no.” Please provide complete answers to fully explain your response.
2. Assess the adequacy and acceptability of the economic and environmental assumptions and projections, project evaluation data, and any biological opinions of the project study.
3. Assess the adequacy and acceptability of the economic analyses, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating risk and uncertainty, and models used in evaluation of economic or environmental impacts of the proposed project.
4. If appropriate, offer opinions as to whether there are sufficient analyses upon which to base a recommendation.
5. Identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods.
6. Evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable
7. Please focus the review on assumptions, data, methods, and models.

Please **do not** make recommendations on whether a particular alternative should be implemented, or whether you would have conducted the work in a similar manner. Also please **do not** comment on or make recommendations on policy issues and decision making. Comments should be provided based on your professional judgment, **not** the legality of the document.

- If desired, panel members can contact one another. However, panel members **should not** contact anyone who is or was involved in the project, prepared the subject documents, or was part of the USACE Independent Technical Review.
- Please contact the Battelle deputy project manager (Lynn McLeod, mcleod@battelle.org) or project manager (Karen Johnson-Young, johnson-youngk@battelle.org) for requests or additional information.
- In case of media contact, notify the Battelle project manager immediately.
- Your name will appear as one of the panelists in the peer review. Your comments will be included in the Final IEPR Report, but will remain anonymous.

Please submit your comments in electronic form to Lynn McLeod, mcleod@battelle.org no later than May 13, 2010, 10 pm EDT.

Independent External Peer Review

Convey Atchafalaya River Water to Northern Terrebonne Marshes
Lafourche, Terrebonne, St. Mary Parish, Louisiana

Final Charge Questions

General Questions

1. To what extent has it been shown that the project is technically sound, environmentally acceptable and economically justified?

2. Are the assumptions that underlie the economic, engineering and environmental analyses sound?

3. Are the economic, engineering, and environmental methods, models, and analyses used adequate and acceptable?

4. In general terms, are the planning methods sound?

5. Are the interpretations of analysis and conclusions based on the analysis reasonable?

6. Will the proposed restoration (with O&M described in report) produce significant measurable benefits or is additional O&M or are additional restoration activities required for production of significant measurable benefits over the period of analysis? Consider the same question for production of significant measurable benefits beyond the period of analysis.

SECTION 1.0 Study Information

1.1 Study Authority

No questions

1.2 Purpose and Scope

No questions

1.3 Study Area

No questions

1.4 History of Investigation

No questions

1.5 Prior Reports and Existing Projects

7. Have all critically important prior studies performed relative to the study area been described?

1.6 Planning Process and Report Organization

No questions

1.7 USACE Campaign Plan

No questions

SECTION 2.0 – Need for and Objectives of Action

2.1 National Objectives

8. Are the objectives complete and clearly defined?

9. After reviewing the document in its entirety, comment on whether the Convey Atchafalaya River Water to Northern Terrebonne Marshes (ARTM) Project as proposed will contribute to national ecosystem restoration (NER) output.

2.2 Public Concerns

10. Have the public concerns been identified?

2.3 Problems, Needs, and Opportunities

11. Is the project need clearly stated?

12. Are the problems facing the ARTM area accurately described?

13. Are the study area opportunities to improve habitat conditions and address the problems accurately described?

2.4 Planning Objectives

14. Are the project goals and objectives clearly defined?

15. Comment on whether the LCA-ARTM Project as proposed will meet the planning objectives as described.

2.5 Planning Constraints

16. Are the planning and design constraints comprehensive?

17. Comment on whether the LCA-ARTM Project as proposed will fully consider and account for the planning constraints as described.

SECTION 3.0 – Alternatives

3.1 Plan Formulation Rationale

18. Is the rationale for developing the plan clear and complete?

19. Are the criteria for developing the plan comprehensive?

3.2 Management Measures

20. Are the management measures thorough and accurate?

21. Assess the development and grouping of the management measures.

22. Is the methodology to develop the screening criteria appropriate?

23. Is the screening process of the management measures appropriate and adequate?

24. Is the elimination of some of the management measures from further study clearly described?

3.3 Preliminary Alternative Plans

25. Assess the screening process of the potential alternative plans.

26. Was the elimination of some of the alternative plans from further study clearly described?

3.4 Final Array of Alternatives (Alternatives Studied in Detail)

27. Are each of the different alternative plans clearly described?

28. Assess the screening process used to arrive at the final array of alternatives.

3.5 Comparison of Alternative Plans

29. Are the processes used to compare the Alternative Plans clear and reasonable?

30. Evaluate the cost estimates for the various habitat improvement measures.

3.6 NER Plan

No questions

3.7 Locally-Preferred Plan

No questions

3.8 Environmentally Preferable Alternative

31. Does the information provided support the selection of the Environmentally Preferable Alternative?

3.9 Plan Selection-Tentatively Selected Plan

32. Is the description of the components of the Tentatively Selected Plan clear?

33. Does the Tentatively Selected Plan give adequate consideration to ongoing or planned projects within the project area?

34. Have impacts to existing and future infrastructure, such as navigation locks, flood gates, oil and gas infrastructure, and bridges, been adequately addressed?

35. Was adequate consideration given to reduce flooding impacts to adjacent communities?

36. Does the plan address all real estate interests (private and public) and requirements resulting from the proposed project features?

37. What, if any, consideration should be given to operations and maintenance conditions at this phase of the study?

38. Is the monitoring plan clearly described? (Also consider information in Appendix I)

39. Is adaptive management addressed? (Also consider information in Appendix I)

40. Is the discussion of fulfilling goals and objectives complete?

41. Is the discussion of fulfilling environmental operating principles complete?

42. Have mitigation measures been addressed?

3.10 Risk and Uncertainty

43. Are the descriptions of the risk and uncertainties associated with the development, selection, and construction of the Tentatively Selected Plan sufficiently comprehensive?

3.11 Implementation Requirements

44. Have all assumptions, regulations, and stipulations regarding cost sharing, including in-kind work, been clearly described?

45. How complete is the action plan outlined in the financial requirements?

SECTION 4.0 – Affected Environment

4.1 Environmental Setting of Study Area

46. Is the general description of the proposed project area accurate and comprehensive?

47. Is the description of the climate in the study area sufficiently detailed and accurate?

48. Is the description of the geomorphological conditions in the study area sufficiently detailed and accurate?

4.2 Significant Resources

49. Does the description of existing conditions provide for a sufficient understanding of the presence and distribution of soils and waterbottoms in the study area?

50. Is the hydrology discussion sufficient to allow for an evaluation of the effects of implementation of the proposed plan compared to current baseline conditions?

51. How complete is the discussion on the relationship between subsurface hydrology and the hydrodynamics of the project area?

52. How complete is the discussion of fresh water inflow in the study area? Has the significance of this issue been adequately evaluated?

53. Are the effects of changes in sediment distribution on the study area adequately discussed?

54. Is the description of the historical and existing water quality conditions in the study area complete and accurate?

55. Is the description of the historical and existing vegetative invasive species in the study area complete and accurate?

56. Is the description of the historical and existing wetland vegetation resources in the study area complete and accurate?

57. Is the description of wildlife and wildlife habitat in the study area complete and accurate?

58. Is the description of aquatic resources in the project area complete and accurate?

59. Is the description of the historical and existing fishery resources in the study area complete and accurate?

60. Is the shrimp, crab, and oyster discussion sufficient to allow for an evaluation of the effects of implementation of the proposed plan compared to current baseline conditions?

61. Is the information on the threatened and endangered species that may utilize the habitat located within the project area adequate? (Also consider information in Appendix A)

62. Is the description of the historical and existing recreational resources in the study area complete and accurate?

63. Does this section accurately describe the historic and existing demographic, aesthetic, commercial, recreational, etc., resources of the parishes in the study area/region?

64. Is the methodology/approach presented to address any/all environmental justice concerns in the project area appropriate?

65. Water use and supply, natural resources, agriculture and forestry are of major importance to the population in the study area. Have the existing and historic conditions been characterized properly?

SECTION 5.0 – Environmental Consequences

66. Are the scope and detail of the potential adverse effects that may arise as a result of project implementation sufficiently described and comprehensive?

5.1 Soils and Waterbottoms

67. Are the environmental effects of changes to soils and waterbottoms in the project area, based on each alternative, adequately described?

68. Are the environment effects of changes to nearshore sedimentation and erosion the alternatives reasonable and factually supported?

69. Are assumptions related to accretion and subsidence rates valid? Will with-project conditions slow degradation, stabilize, or result in marsh building?

5.2 Hydrology

70. Are environmental effects of changes to flow and water levels from the alternatives reasonable and factually supported?

71. Are environmental effects of changes to groundwater resources from the alternatives reasonable and factually supported?

72. Are the environmental effects of changes to nearshore hydrology from the alternatives reasonable and factually supported?

73. Are the basin-specific stage impacts described in the alternatives adequately evaluated?

74. Is the evaluation of direct impacts of resulting sediment distribution predictions in the alternatives thorough and factually supported?

5.3 Water Quality and Salinity

75. Are the forecasted changes in habitat units associated with each alternative sufficiently detailed and supported?

76. Are the forecasted changes in annual salinity throughout the area sufficiently detailed and supported?

77. Have all appropriate and necessary variables been incorporated into the water quality prediction of the project area under each alternative?

5.4 Air Quality

78. Are the predicted impacts of each alternative on the air quality of the project area sufficiently described and supported?

5.5 Noise

No questions

5.6 Vegetation Resources

79. Are environmental effects of changes to vegetation resources from the alternatives reasonable and factually supported?

80. Are environmental effects of changes to vegetative invasive species conditions from the alternatives reasonable and factually supported?

5.7 Wildlife and Habitat

81. Is the description of the predicted impacts of each alternative on the wildlife and wildlife habitat in the project area sufficiently described and supported?

5.8 Aquatic Resources

82. Is the description of projected impacts to the aquatic resources for each of the alternatives complete and accurate?

5.9 Fisheries

83. Is the description of projected impacts to fisheries for each of the alternatives complete and accurate?

84. Are assumptions related to impacts to fisheries valid?

5.10 Essential Fish Habitat

85. Is the description of projected impacts to essential fish habitat for each of the alternatives complete and accurate?

5.11 Threatened and Endangered Species

86. Is the description of projected impacts to threatened and endangered species for each of the alternatives complete and accurate? (Also consider information in Appendix A)

5.12 Cultural and Historic Resources

87. To what extent have the potential impacts of the alternatives on cultural resources been addressed and supported? (Also consider information in Appendix F)

5.13 Aesthetics

88. To what extent have the potential impacts of the alternatives on aesthetics been addressed and supported?

5.14 Recreation

89. To what extent have the potential impacts of the alternatives on recreation been addressed and supported?

5.15 Socioeconomic and Human Resources

90. To what extent is the impact of the alternatives on employment and income addressed and supported?

91. To what extent is the impact of the alternatives on navigation addressed and supported?

92. To what extent is the impact of the alternatives on commercial fisheries addressed and supported?

93. To what extent is the impact of the alternatives on oyster leases addressed and supported?

5.16 Hazardous, Toxic, and Radioactive Waste

94. Are the predicted impacts of each alternative on the future contamination levels within the project area sufficiently described and supported?

5.17 Unavoidable Adverse Impacts

95. Is the description of unavoidable adverse effects resulting from the implementation of the alternatives adequate?

5.18 Relationship of Short-term Uses and Long-Term Productivity

96. Is the description of the relationship between short-term uses and long-term productivity adequate?

5.19 Irreversible and Irretrievable Commitment of Resources

97. Was the evaluation of the permanent and irreversible features of the proposed project comprehensive? Should any additional information be added?

5.20 Mitigation

No questions

5.21 Cumulative Impacts Summary

98. Have the cumulative impacts of the project and other previous and future projects in the area been accurately described? Should any additional information be included?

SECTION 6.0 – Public Involvement

99. Based on your experience with similar projects, has adequate public, stakeholder, and agency involvement occurred to determine all issues of interest and to ensure that the issues have been adequately addressed to the satisfaction of those interested parties? Should any additional public outreach and coordination activities be conducted?

SECTION 7.0 –Coordination and Compliance

No questions

SECTION 8.0 – Conclusions and Determinations

No questions

SECTION 9.0 – Distribution List and Other

No questions

Appendix A: Biological Assessment

No questions

Appendix B: U.S. Fish and Wildlife Service Coordination Letter and Report

No questions

Appendix C: NOAA Fisheries Service Coordination Letter

No questions

Appendix D: 404(b)(1) Water Quality Report

100. Are the general characteristics of the dredged and fill material accurate and adequately described?

101. Is the quantity of the dredged and fill material adequate and factually supported?

102. Is the description of the disposal method sufficiently detailed and comprehensive?

103. Are the suspended particulate/turbidity determinations appropriate?

104. Are the proposed disposal site determinations appropriate?

Appendix E: Louisiana Coastal Resources Program Consistency Determination

No questions

Appendix F: State Historic Preservation Officer Coordination Letter

No questions

Appendix G: (Reserved)

No questions

Appendix H: Responses to Comments

No questions

Appendix I: Value Engineering Report

105. Are the value engineering process and recommendations outlined in the report adequate?

106. Were the three basic value engineering (VE) principles (project function, cost, and ways of constructing the project at the same or a reduced cost) considered during the VE process?

Appendix J: Adaptive Management/Monitoring Plan

107. Are the performance measures, desired outcomes, and monitoring designs for each of the project objectives adequate?

108. Are the proposed monitoring procedures appropriate?

109. Is the monitoring program assessment process sufficiently detailed and comprehensive?

110. Are the costs for administering a monitoring and assessment program reasonable?

Appendix K: Real Estate Plan

111. Is the methodology used to estimate the real estate costs presented in this plan appropriate and adequate?

112. Does the plan adequately address all real estate interests (public and private) and requirements allowing for appropriate comparisons across all alternatives?

113. Does the real estate plan address and plan for the potential concerns of landowners in the project area?

Appendix L: Phase I Environmental Site Assessment

No questions

Appendix M: Wetland Value Assessment (WVA) Model Report

114. Are the WVA ecosystem output models reasonable and appropriate for evaluating project benefits/impacts?

115. Is the way in which the models were applied for evaluating project alternatives appropriate?

    a. If there are any modifications to the models, are they appropriate?

    b. Is weighting of variable or habitat types appropriate?

    c. If not, why?

116. Comment on the model reviewers' assessment of the technical quality, system quality, and usability of the WVA models.

117. Are the models used for the evaluation appropriate regarding:

    a. SI values assigned to variables

    b. The number of target years selected

    c. How AAHUs are calculated (i.e., estimating the sum rather than the arithmetic mean)

    d. How sea level change is incorporated into the models

e. Whether policy or science is a more important driver for assigning an index value to model variables

f. Whether calculations in the spreadsheets are correct and easy to use

g. How risk and uncertainty is handled

h. Whether the best data sources are used

i. Justification for why the geometric mean or arithmetic mean is used to calculate HSIs

Appendix N: Benefit/Cost - Incremental Cost Analysis

118. To what extent were significant project design and construction costs been adequately identified and described?

119. Was the methodology used to conduct the incremental cost analysis adequate and valid?

Appendix O: Micro-Computer Aided Cost Estimating System (MCACES Model Report/MCACES 2nd Generation (MII)

No questions

Appendix P: Total Project Cost Summary

No questions

Appendix Q: Project Costs and Schedule Risk Analysis Report

120. Are the key assumptions used to complete the risk analysis adequate? Is anything missing?

121. In your expert opinion, do the major findings of the risk analysis provide adequate support for scheduling, budgeting, and project control purposes?

Appendix R: Engineering

122. Is the 2-D Resource Modeling Associates (RMA) finite element model to develop hydrographs for monthly average flows and salinity levels adequate? Are the model's capabilities and limitations clearly defined?

123. Is the development of the model mesh to predict flow, stage, and salinity of the channel and marsh areas sufficiently detailed?

124. Is the methodology used to conduct the model sensitivity analysis complete and valid?

125. Were the technical assumptions used to determine the proposed alignment and preliminary cross sections shown in Annex 4 of Appendix R valid? What other assumptions should be included in the Preliminary Alternative Plans discussion to justify the typical cross sections?