# Final Independent External Peer Review Report Barataria Basin Barrier Shoreline (BBBS) Restoration Draft Construction Report and Draft Environmental Impact Statement (EIS)

Prepared by
Battelle Memorial Institute

Prepared for
Department of the Army
U.S. Army Corps of Engineers
Ecosystem Restoration Planning Center of Expertise
Baltimore District

Contract No. W911NF-11-D-0001
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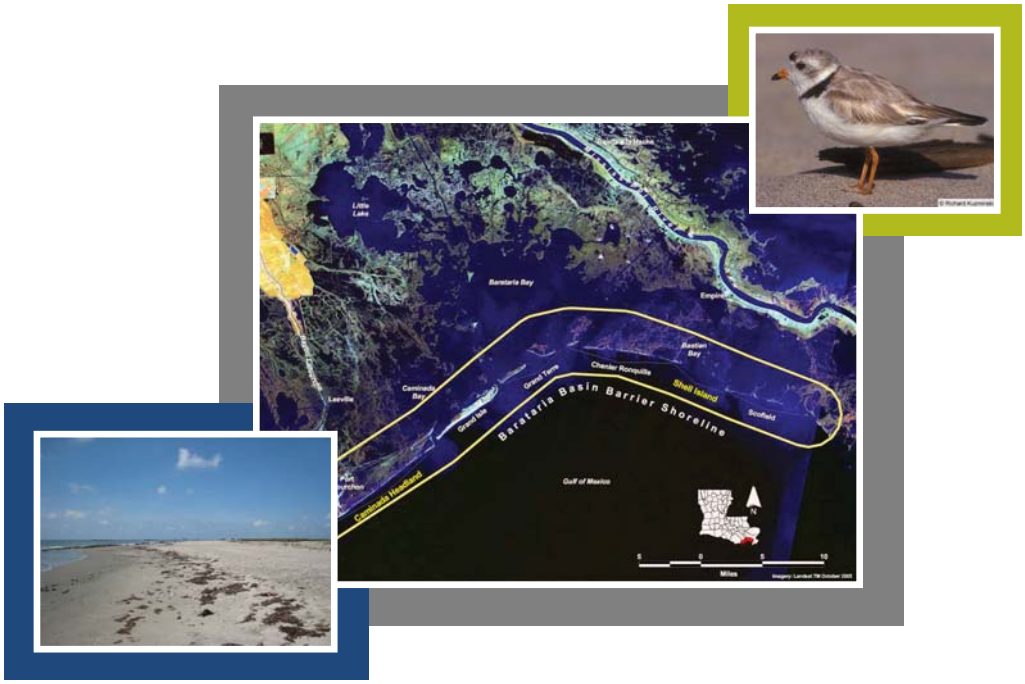

**SHORT-TERM ANALYSIS SERVICE (STAS)**

**on**

# Final Independent External Peer Review Report
# Barataria Basin Barrier Shoreline (BBBS) Restoration
# Draft Construction Report and Draft Environmental Impact Statement (EIS)

**by**

**Battelle**
**505 King Avenue**
**Columbus, OH 43201**

**for**

**Department of the Army**
**U.S. Army Corps of Engineers**
**Ecosystem Restoration Planning Center of Expertise**
**Baltimore District**

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**Scientific Services Program**

The views, opinions, and/or findings contained in this report are those of the author and should not be construed as an official Department of the Army position, policy, or decision, unless so designated by other documentation.

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# FINAL
# INDEPENDENT EXTERNAL PEER REVIEW REPORT
# for the
# Barataria Basin Barrier Shoreline (BBBS) Restoration Draft Construction Report and Draft Environmental Impact Statement (EIS)

## EXECUTIVE SUMMARY

### Project Background and Purpose

The Barataria Basin Barrier Shoreline (BBBS) Restoration Study was identified as a critical near-term restoration project in the Louisiana Coastal Area, Louisiana Ecosystem Restoration Study Report (2004). As a component of this report, the project was recommended for conditional authorization by the Chief of Engineers on January 31, 2005. The Assistant Secretary of the Army for Civil Works (ASA-CW), after obtaining the concurrence of the Office of Management and Budget (OMB), provided his report on the Louisiana Coastal Area (LCA) to Congress on November 18, 2005. Title VII of the Water Resources Development Act (WRDA) of 2007, P.L. 110-114, Section 7006(c)(1)(C) authorizes construction of the BBBS Restoration project in accordance with the restoration plan as outlined in the Report of the Chief of Engineers, contingent on completion of a construction report documenting any modifications to the Chief's report and approval of the Secretary of the Army.

The BBBS is a regional segment of the Gulf Coast of Louisiana that is situated between the west bank of the Mississippi River at the active delta and the eastern shore of Terrebonne Bay. This restoration project would reconstruct coastal landforms of the barrier shoreline in the Barataria Basin to restore the barrier shoreline ecosystem and significantly reduce the loss of estuarine and freshwater wetlands. The BBBS is divided into six reaches. Initial study efforts considered shoreline restoration for five of these reaches in the BBBS. Several ecosystem restoration projects along the BBBS have been constructed, or are in the planning and construction phases under other authorities. The LCA Report identified restoration of Caminada Headland and Shell Island Reaches as a critical near-term project for the BBBS.

The proposed action evaluated in this report is the restoration of the Caminada Headland and Shell Island through shoreline and marsh restoration. The purpose of the proposed action is to restore the geomorphic form and function of the barrier shoreline. Restoration of the shoreline and coastal marshes of Caminada Headland and Shell Island would restore critical habitat, form and function, and long-term sustainability of the barrier shoreline. The proposed action would help restore the diversity and sustainability of coastal habitats. These barrier landforms, along with their related hydrologic and biological processes, provide unique habitats that are crucial to the viability of migratory birds, Federally-listed endangered species, commercial and recreational fisheries, and a great variety of terrestrial and aquatic species.

The project location for the BBBS study is divided into two reaches. The Caminada Headland, forming the western portion of the Barataria Basin barrier system, has experienced some of the highest rates of shoreline retreat on the Louisiana or Gulf Coast. Caminada Headland is defined

as the area south of Louisiana Highway 1 between Belle Pass and Caminada Pass. The headland is separated from East Timbalier Island to the west by Belle Pass and from Grand Isle to the east by Caminada Pass. Spits have formed at either end of the headland. The 13-mile long shoreline is narrow and has numerous storm overwashes.

Shell Island used to enclose both Bastian Bay and Shell Island Bay but has since disintegrated into several smaller islands and shoals. Currently, there are a few remaining islands and shoal remnants. The island now consists primarily of open water with little beach or saline marsh habitat. Due to the continuing and extensive land loss, Shell Island is gradually converting to a series of interconnecting bays directly connected to the Gulf of Mexico. The Shell Island Reach stretches approximately 2.5 miles, from Grand Bayou Pass to the Empire Waterway.

**Independent External Peer Review Process**

The U.S. Army Corps of Engineers (USACE) is conducting an Independent External Peer Review (IEPR) of the BBBS Restoration Draft Construction Report and Draft Environmental Impact Statement (EIS) (hereinafter BBBS CR/DEIS). As a 501(c)(3) non-profit science and technology organization, Battelle is independent, is free from conflicts of interest (COIs), and meets the requirements for an Outside Eligible Organization (OEO) per guidance described in USACE (2010). Battelle has experience in establishing and administering peer review panels for USACE and was engaged to coordinate the IEPR for the BBBS CR/DEIS. The IEPR was external to the agency and conducted following USACE and 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 technical experts were selected to serve on the Panel based on the technical content of the BBBS CR/DEIS and the overall scope of the project. The panel members were selected for their technical expertise in the following key areas: Civil Works planning, wetland ecology/biology, coastal engineering, hydrology/hydraulics engineering, and coastal geomorphology. The first four technical areas of expertise listed above are among those previously identified for Louisiana Water Resources Council (LWRC, as defined in WRDA 2007, Section 7009) Primary Panel Members (economics is one of the LWRC Primary Panel expertise areas that was not required for this IEPR). Battelle consulted with four of the LWRC Primary Panel Members and confirmed that, for three of them, their expertise and schedule commitments made them suitable to serve on the Panel. The LWRC Primary Panel Member for hydrology/hydraulics engineering did not have familiarity with the SBEACH model and therefore did not have the expertise requirements to be on the Panel. Battelle inquired with hydrology/hydraulics engineers in the LWRC Candidate Pool and found an engineer with previous IEPR experience who was available and qualified. The last technical area of expertise listed above (coastal geomorphology) was not among those previously specified for the LWRC Primary Panel or the Candidate Pool. This additional area of expertise was required to address technical aspects of the BBBS project not covered by the LWRC Primary Panel. Battelle identified and recruited a coastal geomorphologist to serve in this role. USACE was given the list of candidate panel members, but Battelle made the final selection of the Panel.

The Panel received electronic versions of the BBBS CR/DEIS documents, totaling more than 2,300 pages, along with a charge that solicited comments on specific sections of the documents to be reviewed. The charge was prepared by USACE according to guidance provided in USACE (2010) and OMB (2004). Charge questions were provided by USACE and included in the draft and final Work Plans.

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 600 individual comments in response to the 143 charge questions.

IEPR panel members reviewed the BBBS CR/DEIS 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, 16 Final Panel Comments were identified and documented. Of these, 15 were identified as having medium significance, and 1 had low significance. None of the Final Panel Comments had high significance.

**Results of the Independent External Peer Review**

The panel members agreed among one another on their "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (USACE, 2010; p. D-4) in the BBBS CR/DEIS document. Table ES-1 lists the Final Panel Comments statements by level of significance. The full text of the Final Panel Comments is presented in Appendix A of this report. The following statements summarize the Panel's findings.

**Civil Works Planning:** The plan formulation is well presented in the CR/DEIS. Traditional plan elements are well structured, but the plan suffers from a lack of a detailed monitoring and adaptive management plan. Such a plan is extremely important in this type and length of a project. Some specific technical issues internal to the plan are not well covered, as described in the Final Panel Comments.

**Engineering:** The project represents an important and feasible contribution to the broader LCA restoration program. The project plan appears to generally include appropriate types of measures for achieving the specified objectives. However, the Panel finds the approach to the preliminary engineering design of the beach fill and dune, as presented in the draft report, to be incomplete in its application and interpretation of models and in providing clear rationales for important design decisions. This makes it difficult to assess the adequacy of the designs and to clearly discern differences in likely performance among alternatives. There are a number of issues that must be resolved and documented in the report. In addition, the preliminary design must be refined during the design phase with the inclusion of additional data. The project cost estimate and the Cost and Schedule Risk Analysis are satisfactory.

**Environmental:** The Panel agrees that the site characterization is incomplete and out-of-date, so the Panel was unable to evaluate future with and without project conditions. Additional assessment and evaluation of existing hydrology, nearshore hydrodynamics, habitat quality and quantity, and barrier geomorphology are needed. The Panel is also concerned about competition with other projects for borrow material from Ship Shoal and other borrow sites, and potential adverse effects to fisheries and wave attenuation benefits caused by removal of material from Ship Shoal. The monitoring and adaptation plan is not sufficient to assess future project stability, and whether and how the project may adversely affect the surrounding environment.

**Table ES-1. Overview of 16 Final Panel Comments Identified by the BBBS CR/DEIS IEPR Panel**

| | |
|---|---|
| **Significance – Medium** | |
| 1 | The limitations of the models for characterizing system behavior are not discussed and the implications of those limitations are not applied to the design. |
| 2 | The models are not calibrated using site-specific data which results in substantial uncertainty of project performance. |
| 3 | Key design decisions and the different methodologies used to model and evaluate alternative designs are not clearly explained and are incongruent between the two islands. |
| 4 | Site characterization was neither detailed nor contemporary. |
| 5 | The WVA approach, results, and some of the critical assumptions (e.g., retreat rates) underlying the analysis are not documented. |
| 6 | While this project provides important opportunities for adaptive management, the review documents do not describe a cogent monitoring and management plan and do not provide contingencies for potential impacts. |
| 7 | A complete survey of the proposed borrow areas has not been performed and is necessary to refine the design and construction plans. |
| 8 | The assessment of borrow material availability at Ship Shoal and in designated Mississippi River locations does not account for potential competition for borrow material with other Louisiana restoration projects. |
| 9 | The ecological and wave attenuation impacts of removing borrow material from Ship Shoal are not analyzed in enough detail to adequately assess the environmental effects. |
| 10 | The descriptions of mechanisms by which the renourishment material will resupply the dune are not well defined and create uncertainty as to whether the renourishment would meet goals. |
| 11 | The use of construction sequencing to minimize potential effects to piping plovers and their critical habitat has not been discussed in depth in the CR/DEIS. |
| 12 | The risk and uncertainty in the methods used in the analysis and design are not sufficiently acknowledged. |
| 13 | Some of the proposed project elements may degrade backbarrier habitat through a change in hydrology and the analysis does not provide the detail to assess the impacts on existing habitat. |
| 14 | A description of protection activities in response to the Deepwater Horizon oil spill is not provided. |
| 15 | The engineering design does not reference USACE's experience with similar projects. |
| **Significance – Low** | |
| 16 | Strategies for mitigating the risk of turtle and dredger conflicts have not been fully developed and could affect project schedule and cost. |

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## LIST OF ACRONYMS

| | |
|---|---|
| ASA-CW | Assistant Secretary of the Army for Civil Works |
| ATR | Agency Technical Review |
| BA | Biological Assessment |
| BBBS | Barataria Basin Barrier Shoreline |
| COI | Conflict of Interest |
| CR/DEIS | Construction Report and Draft Environmental Impact Statement (EIS) (hereinafter |
| DrChecks | Design Review and Checking System |
| ESA | Endangered Species Act |
| GENESIS | GENEralized Model for SImulating Shoreline Change |
| IEPR | Independent External Peer Review |
| LCA | Louisiana Coastal Area |
| LWRC | Louisiana Water Resources Council |
| NCDENR | North Carolina Department of Environmental and Natural Resources |
| NTP | Notice to Proceed |
| OEO | Outside Eligible Organization |
| OMB | Office of Management and Budget |
| RSLR | relative sea level rise |
| SBEACH | Storm-induced BEAch CHange Model |
| TSP | tentatively selected plan |
| USACE | United States Army Corps of Engineers |
| USEPA | United States Environmental Protection Agency |
| WRDA | Water Resources Development Act |
| WVA | Wetland Value Assessment |

# 1. INTRODUCTION

The Barataria Basin Barrier Shoreline (BBBS) Restoration Study was identified as a critical near-term restoration project in the Louisiana Coastal Area, Louisiana Ecosystem Restoration Study Report (2004). As a component of this report, the project was recommended for conditional authorization by the Chief of Engineers on January 31, 2005. The Assistant Secretary of the Army for Civil Works (ASA-CW), after obtaining the concurrence of the Office of Management and Budget (OMB), provided his report on the Louisiana Coastal Area (LCA) to Congress on November 18, 2005. Title VII of the Water Resources Development Act (WRDA) of 2007, P.L. 110-114, Section 7006(c)(1)(C) authorizes construction of the BBBS Restoration project in accordance with the restoration plan as outlined in the Report of the Chief of Engineers, contingent on completion of a construction report documenting any modifications to the Chief's report and approval of the Secretary of the Army.

The BBBS is a regional segment of the Gulf Coast of Louisiana that is situated between the west bank of the Mississippi River at the active delta and the eastern shore of Terrebonne Bay. This restoration project would reconstruct coastal landforms of the barrier shoreline in the Barataria Basin to restore the barrier shoreline ecosystem and significantly reduce the loss of estuarine and freshwater wetlands. The BBBS is divided into six reaches. Initial study efforts considered shoreline restoration for five of these reaches in the BBBS. Several ecosystem restoration projects along the BBBS have been constructed, or are in the planning and construction phases under other authorities. The LCA Report identified restoration of Caminada Headland and Shell Island Reaches as a critical near-term project for the BBBS.

The proposed action evaluated in this report is the restoration of the Caminada Headland and Shell Island through shoreline and marsh restoration. The purpose of the proposed action is to restore the geomorphic form and function of the barrier shoreline. Restoration of the shoreline and coastal marshes of Caminada Headland and Shell Island would restore critical habitat, form and function, and long-term sustainability of the barrier shoreline. The proposed action would help restore the diversity and sustainability of coastal habitats. These barrier landforms, along with their related hydrologic and biological processes, provide unique habitats that are crucial to the viability of migratory birds, Federally-listed endangered species, commercial and recreational fisheries, and a great variety of terrestrial and aquatic species.

The project location for the BBBS study is divided into two reaches. The Caminada Headland, forming the western portion of the Barataria Basin barrier system, has experienced some of the highest rates of shoreline retreat on the Louisiana or Gulf Coast. Caminada Headland is defined as the area south of Louisiana Highway 1 between Belle Pass and Caminada Pass. The headland is separated from East Timbalier Island to the west by Belle Pass and from Grand Isle to the east by Caminada Pass. Spits have formed at either end of the headland. The 13-mile long shoreline is narrow and has numerous storm overwashes.

Shell Island used to enclose both Bastian Bay and Shell Island Bay but has since disintegrated into several smaller islands and shoals. Currently, there are a few remaining islands and shoal remnants. The island now consists primarily of open water with little beach or saline marsh

habitat. Due to the continuing and extensive land loss, Shell Island is gradually converting to a series of interconnecting bays directly connected to the Gulf of Mexico. The Shell Island Reach stretches approximately 2.5 miles, from Grand Bayou Pass to the Empire Waterway.

The objective of the work described here was to conduct an Independent External Peer Review (IEPR) of the BBBS Draft Construction Report and Draft Environmental Impact Statement (EIS) (hereinafter BBBS CR/DEIS) in accordance with procedures described in the Department of the Army, U.S. Army Corps of Engineers (USACE) Engineer Circular *Civil Works Review Policy* (EC No. 1165-2-209) (USACE, 2010), USACE CECW-CP memorandum *Peer Review Process* (USACE, 2007), and OMB bulletin *Final Information Quality Bulletin for Peer Review* (OMB, 2004). Battelle was engaged to coordinate the IEPR of the BBBS CR/DEIS. As a 501(c)(3) non-profit science and technology organization, Battelle is independent, free from conflicts of interest, and meets the requirements for an Outside Eligible Organization per guidance described in USACE (2010). 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 BBBS CR/DEIS. The full text of the Final Panel Comments is presented 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 BBBS CR/DEIS was conducted and managed using contract support from Battelle, which is an Outside Eligible Organization (OEO) (as defined by EC No. 1165-2-209) 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 (COIs) 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 with USACE to review the preliminary/suggested schedule, 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 presents the schedule followed in executing the IEPR. 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 August 18, 2011. Note that the work items listed in Task 6 occur after the submission of this report. USACE's Design Review and Checking System (DrChecks) will not be used for this IEPR; this Final IEPR Report is Battelle's submission to USACE of the 16 Final Panel Comments developed by the Panel. 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. BBBS CR/DEIS IEPR Schedule**

| TASK | ACTION | DUE DATE |
|---|---|---|
| 1 | Pre-award funding approval[a] | August 18, 2011 |
| | Review documents available | August 18, 2011 |
| | Notice to Proceed (NTP) | August 29, 2011 |
| | Battelle submits draft Work Plan[b] | September 1, 2011 |
| | USACE provides comments on draft Work Plan | September 7, 2011 |
| | Battelle submits final Work Plan[b] | September 13, 2011 |
| 2 | Battelle requests input from USACE on the conflict of interest (COI) questionnaire | August 19, 2011 |
| | USACE provides comments on COI questionnaire | August 23, 2011 |
| | Battelle completes subcontracts for panel members | August 29, 2011 |
| 3 | USACE/Battelle hold kick-off meeting | August 29, 2011 |
| | Battelle sends review documents to IEPR Panel | August 29, 2011 |
| | USACE/Battelle/Panel hold kick-off meeting | September 1, 2011 |
| 4 | Battelle convenes mid-review teleconference for Panel to ask clarifying questions of USACE | Cancelled |
| | Panel members complete their individual reviews and provide comments to Battelle | September 9, 2011 |
| | Battelle convenes Panel Review Teleconference | September 14, 2011 |
| 5 | **Battelle submits Final IEPR Report to USACE[b]** | **October 3, 2011** |
| 6[c] | Battelle convenes teleconference with USACE to review the Comment Response Process | October 5, 2011 |
| | USACE provides draft Evaluator Responses to Battelle | October 11, 2011 |
| | Battelle convenes teleconference with Panel and USACE to discuss Final Panel Comments, and draft responses | October 24, 2011 |

| TASK | ACTION | DUE DATE |
|---|---|---|
| | USACE provides final Evaluator Responses to Battelle | October 28, 2011 |
| | Panel members provide Battelle with final BackCheck Responses | November 1, 2011 |
| | Battelle submits Comment-Response report to USACE [b] | November 2, 2011 |
| | Project Closeout | January 11, 2012 |

[a] Request submitted to and approved by the ARO Contracting Officer to meet the aggressive schedule.

[b] Deliverable.

[c] Task 6 occurs after the submission of this report.

## 3.2 Identification and Selection of IEPR Panel Members

The candidates for the Panel were evaluated based on their technical expertise in the following key areas: Civil Works planning, wetland ecology/biology, coastal engineering, hydrology/ hydraulics engineering, and coastal geomorphology. These areas correspond to the technical content of the BBBS CR/DEIS and overall scope of the BBBS project.

The first four technical areas of expertise are among those previously identified for Louisiana Water Resources Council (LWRC, as defined in WRDA 2007, Section 7009) Primary Panel Members (economics is one of the LWRC Primary Panel expertise areas that was not required for this IEPR). Battelle consulted with four of the LWRC Primary Panel Members and confirmed that, for three of them, their expertise and schedule commitments made them suitable to serve on the Panel. The LWRC Primary Panel Member for hydrology/hydraulics engineering did not have familiarity with the SBEACH model and therefore did not have the expertise requirements to be on the Panel. Battelle inquired with hydrology/hydraulics engineers in the LWRC Candidate Pool and found an engineer with previous IEPR experience who was available and qualified.

The last technical area of expertise listed above (coastal geomorphology) was not among those previously specified for the LWRC Primary Panel or the Candidate Pool. This additional area of expertise was required to address technical aspects of the BBBS project not covered by the LWRC Primary Panel. To identify candidate panel members for this role, Battelle reviewed the credentials of the experts in Battelle's Peer Reviewer Database, sought recommendations from colleagues, contacted former panel members, and conducted targeted Internet searches.

Battelle made the final selection of panel members according to the selection criteria described in the Work Plan. The final Panel was composed of five expert reviewers, with three experts coming from the LWRC Primary Panel, one expert coming from the LWRC Candidate Pool, and one expert recruited for an additional role specified by the scope of the BBBS project.

The candidates were screened for the following potential exclusion criteria or COIs.[1] These COI questions were intended to serve as a means of disclosure and to better characterize a candidate's employment history and background. Providing a positive response to a COI screening question did not automatically preclude a candidate from serving on the Panel. For example, participation in previous USACE technical peer review committees and other technical review panel experience was included as a COI screening question. A positive response to this question could be considered a benefit.

- Previous and/or current involvement by you or your firm[1] in the Barataria Basin Barrier Shoreline (BBBS) Restoration Draft Construction Report and Draft Environmental Impact Statement (EIS) and technical appendices.
- Previous and/or current involvement by you or your firm[1] in ecosystem restoration projects in coastal Louisiana.
- Previous and/or current involvement by you or your firm[1] in any work related to the BBBS, including Caminada Headland or Shell Island.
- Previous and/or current involvement by you or your firm[1] in BBBS-related projects, that is, shoreline habitat restoration projects within the Mississippi River delta system.
- Current employment by the U.S. Army Corps of Engineers (USACE).
- Previous and/or current involvement with paid or unpaid expert testimony related to the BBBS.
- 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 Coastal Wetlands Conservation and Restoration Task Force; the State of Louisiana; U.S. Environmental Protection Agency; U.S. Fish and Wildlife Service; Natural Resources Conservation Service; National Oceanic and Atmospheric Administration; or the National Marine Fisheries Service.(for pay or pro bono).
- Past, current, or future interests or involvements (financial or otherwise) related to the BBBS area by you, your spouse, or your children.
- Current personal involvement with other USACE projects, including whether involvement was to author any manuals or guidance documents for USACE. If yes, provide titles of documents or description of project, dates, and location (USACE district, division, Headquarters, ERDC, etc.), and position/role. Please highlight and discuss in greater detail any projects that are specifically with the New Orleans District.
- Current firm[1] involvement with other USACE projects, specifically those projects/contracts that are with the New Orleans District. If yes, provide title/description,

[1] 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."

dates, and location (USACE district, division, Headquarters, ERDC, etc.), and position/role.

- Any previous employment by USACE as a direct employee or contractor (either as an individual or through your firm[1]) 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 ecosystem restoration and include the client/agency and duration of review (approximate dates).
- Pending, current, or future financial interests in BBBS-related contracts/awards from USACE.
- A significant portion (i.e., greater than 50%) of personal or firm[1] revenues within the last three years came from USACE contracts.
- Any publicly documented statement (including, for example, advocating for or discouraging against) related to the BBBS.
- Participation in prior Federal studies relevant to this project:
    - East Grand Terre Island Restoration
    - Pelican Island and Pass La Mer to Chaland Pass Restoration
    - West Belle Pass Headland Restoration
    - Pass Chaland to Grand Bayou Pass Barrier Shoreline Restoration
    - Riverine Sand Mining/Scofield Island Restoration
    - Barataria Bay Waterway Wetland Restoration
    - Mississippi River Reintroduction Into Bayou Lafourche
    - Little Lake Shoreline Protection/Dedicated Dredging near Round Lake
    - Vegetative Plantings of a Dredged Material Disposal Site on Grand Terre Island
    - Flood Control, Mississippi River and Tributaries, Donaldsonville, LA, to the Gulf of Mexico Hurricane Protection Project
    - Larose to Golden Meadow, Louisiana, Hurricane Protection Project
    - New Orleans to Venice, Louisiana, Hurricane Protection Project
    - West Bank and Vicinity, New Orleans, Louisiana, Hurricane Protection Project
    - Barataria Bay Waterway.
- Previous and/or current participation in prior non-Federal studies relevant to this project.
- 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 members of the Panel from the list of candidates, Battelle chose experts who best fit the expertise areas and had no COIs. The five final reviewers were either affiliated with academic institutions or consulting companies. Battelle established subcontracts with the

panel members when they indicated their willingness to participate and confirmed the absence of COIs through a signed COI form. Section 4 of this report provides names and biographical information on the panel members.

Prior to beginning their review and within 3 days of their subcontracts being finalized, all members of the Panel attended a kick-off meeting via teleconference planned and facilitated by Battelle in order to review the IEPR process, the schedule, communication procedures, and other pertinent information for the Panel.

## 3.3 Preparation of the Charge and Conduct of the IEPR

Charge questions were provided by USACE and included in the draft and final Work Plans. In addition to a list of 143 charge questions/discussion points, the final charge included general guidance for the Panel on the conduct of the peer review (provided in Appendix B of this final report).

Battelle planned and facilitated a final kick-off meeting via teleconference during which USACE presented project details to the Panel. Before the meeting, the IEPR Panel received an electronic version of the final charge as well as the BBBS CR/DEIS documents and reference materials listed below. The documents and files in bold font were provided for review; the other documents were provided for reference or supplemental information only.

- **LCA BBBS Draft Construction Report and Draft EIS (CR/DEIS)**
    - **Appendix A: Engineering**
    - **Appendix B: Economics**
    - **Appendix C: Real Estate Plan**
    - **Appendix D: Environmental**
- **Public Comments on the BBBS Draft CR/DEIS**
- USACE guidance *Civil Works Review Policy* (EC 1165-2-209) dated January 31, 2010
- CECW-CP Memorandum dated March 30, 2007
- Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* released December 16, 2004.

## 3.4 Review of Individual Comments

The Panel was instructed to address the charge questions/discussion points within a comment-response form provided by Battelle. At the end of the review period, the Panel produced approximately 600 individual comments in response to the charge questions/discussion points. Battelle reviewed the comments to identify overall recurring themes, areas of potential conflict, and other overall impressions. As a result of the review, Battelle summarized the 600 comments into a preliminary list of 34 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-hour teleconference with the Panel so that the panel members, 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 Final 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 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 13 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 developed 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 16 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 BBBS CR/DEIS:

- 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 Panel 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, success, or justification of the project. Comments rated as high indicate that the Panel analyzed or assessed the methods, models, and/or analyses and determined that there is a "showstopper" issue.
  2. Medium: Affects the completeness of the report in describing the project, but will not affect the recommendation or justification of the project. Comments rated as medium indicate that the Panel does not have sufficient information to analyze or assess the methods, models, or analyses.
  3. Low: Affects the understanding or accuracy of the project as described in the report, but will not affect the recommendation or justification of the project. Comments rated as low indicate that the Panel identified information (tables, figures, equations, discussions) that was mislabeled or incorrect or data or report sections that were not clearly described or presented.
- Guidance for Developing Recommendations: The recommendation section was to include specific actions that 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, 16 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 from the LWRC Primary Panel, the LWRC Candidate Pool and by 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.

An overview of the credentials of the final five primary members of the 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. BBBS CR/DEIS IEPR Panel: Technical Criteria and Areas of Expertise**

| | Casavant | Crouch | Ellis | Bledsoe | Houser |
|---|---|---|---|---|---|
| **Civil Works Planning (one expert needed)** | **X** | | | | |
| Minimum 10 years demonstrated experience in public works planning | X | | | | |
| Very familiar with USACE plan formulation process, procedures, and standards | X | | | | |
| Familiar with the evaluation of alternative plans for ecosystem restoration | X | | | | |
| Familiar with USACE standards and procedures | X | | | | |
| Familiar with the USACE planning process, guidance, and economic evaluation techniques including cost-effectiveness-incremental cost analyses and procedures associated with identifying the National Ecosystem Restoration plan | X | | | | |
| **Wetland Ecology/Biology (one expert needed)** | | **X** | | | |
| Minimum ten years experience directly related to water resource environmental evaluation or review and NEPA compliance | | X | | | |
| Extensive experience working with coastal and estuarine ecosystems | | X | | | |
| Familiar with USACE calculation and application of environmental impacts and benefits | | X | | | |
| Experience in the Gulf of Mexico coastal region | | X | | | |
| Minimum M.S. degree in a related field | | X | | | |
| **Coastal Engineering (one expert needed)** | | | **X** | | |
| Minimum of 10 years experience in civil engineering | | | X | | |
| Demonstrated experience in performing cost engineering/ construction management for all phases of ecosystem restoration, flood risk management, coastal storm damage reduction, or related projects | | | X | | |
| Wetland restoration/creation experience related to the dredging and placement of slurry materials for beneficial use | | | X | | |
| Familiarity with practices used in wetland restoration, flood/coastal storm damage reduction in the Gulf of Mexico coastal region | | | X | | |
| Capable of addressing the USACE Safety Assurance Review | | | X | | |

| | Casavant | Crouch | Ellis | Bledsoe | Houser |
|---|---|---|---|---|---|
| aspects of all projects | | | | | |
| Registered professional engineer | | | X | | |
| **Hydrology/Hydraulics Engineering (one expert needed)** | | | | **X** | |
| Expert in hydraulic and hydrologic modeling related to wetland restoration in coastal areas as well as flood damage reduction | | | | X | |
| Registered professional engineer | | | | X | |
| Minimum of 10 years experience in hydrologic and hydraulic engineering as professor from academia with extensive background in hydrologic and hydraulic theory and practice | | | | X | |
| Familiar with the cross-shore sediment transport model: Storm-induced Beach Change (SBEACH) | | | | X | |
| Minimum M.S. degree in engineering | | | | X | |
| **Coastal Geomorphology (one expert needed)** | | | | | **X** |
| Minimum ten years experience directly related to geologic processes in coastal environments | | | | | X |
| Extensive experience working with geomorphic processes in coastal wetlands and estuarine ecosystems | | | | | X |
| Experience in the Gulf of Mexico coastal region | | | | | X |
| Minimum M.S. degree in a related field | | | | | X |

### *Ken Casavant, Ph.D.*

**Role:** This panel member was chosen primarily for his Civil Works planning experience and expertise.
**Affiliation:** Washington State University

**Ken Casavant, Ph.D.** is a Professor and Economist in the School of Economic Sciences at Washington State University, having also served as an Adjunct Professor at the Upper Great Plains Transportation Institute, North Dakota State University specializing in transportation economics and policy, marketing, 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 more than 10 years' experience in plan formulation, evaluation and comparison of alternative plans for numerous ecosystem restoration projects, navigation studies, and feasibility studies including technical reviews of 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 and the IWR-Planning Suite methodologies, with a focus on ecological output per dollar of relevant expenditure for alternative project formulations. Dr. Casavant was a member of the National Science Foundation (NSF) committee that reviewed the Mississippi-Ohio River navigation alternatives, as well as a member of the Pacific North West Power Planning Council, which addressed salmon restoration, the Endangered Species Act, power generation, and navigation.

Risk analysis and risk models are critical to many of his projects, including ecosystem restoration projects that included a methodological review of flood risk management. His expertise on the needs and policy alternatives for agricultural and system transportation, ranging from development of intelligent transportation system applications to logistical designs for port physical distribution systems, and competitive impacts from investments in infrastructure and regulatory changes has been sought out by public and private organizations, state governments, railroad/ truck/marine firms, and legal institutions.

He is a member of numerous professional associations including the Transportation Research Board - National Research Council, the International Agricultural Economics Association, and the Logistics and Physical Distribution Association. Dr. Casavant has served on numerous IEPRs as either economist or as Civil Works planner, including Freeport Harbor, Texas Draft Feasibility Report and Environmental Impact Statement and Houma Navigation Canal Navigation Improvement Project Draft Feasibility Report.

### *Kay Crouch*

**Role:** This panel member was chosen primarily for her wetland ecology/biology experience and expertise.
**Affiliation:** Crouch Environmental Services, Inc.

**Kay Crouch** is president of Crouch Environmental Services, Inc., a company specializing in National Environmental Policy Act (NEPA) analysis, wetland delineation, permitting, and wetlands mitigation design/construction, environmental site assessment, and public involvement for projects with high public and interagency interests. She earned an M.S. in biology/ecology in 1978 from Steven F. Austin State University, and has received additional academic training in the NEPA process from the Duke University Nicholas School of Environmental and Earth Sciences (2004-05). Ms. Crouch has more than 33 years of nationwide experience conducting wetlands delineation, permitting and mitigation, environmental site assessments, and NEPA impact assessments for complex multi-objective public works projects with competing trade-offs. She has performed numerous environmental evaluations throughout the coastal ecosystems of Louisiana and Texas in support of Federal Energy Regulatory Commission filings and NEPA documentation. In the mid-1990s, Crouch Environmental Services Inc. designed and constructed the Baytown Nature Center in Baytown, Texas. This project is a large coastal marsh creation for which the company received the 1998 Award of Excellence from the National Association of Landscape Architects.

For the first 10 years of her consulting career (1980s) Ms. Crouch worked predominately in Louisiana performing NEPA analyses for oil and gas pipelines crossing the Louisiana Coastal Zone. Ms. Crouch is familiar with USACE calculations and application of environmental impacts and benefits, and routinely performs cumulative effects analyses on high visibility public works projects as part of her extensive NEPA practice. She has substantial experience working with USACE including NEPA analyses and flood damage reduction projects. Specific NEPA projects she has worked on are the EIS for the Bayport Container Terminal, the EA for reconstruction of the Addicks and Barker Dams, and public involvement for the Sabine Neches Waterway and Clear Creek Flood Damage Reduction Projects. Recently, Ms. Crouch planned, organized, and executed a public outreach plan for the Addicks and Barker Dam Safety Program (Houston, Texas). This effort was declared a "Best Practice" by USACE, for which Ms. Crouch and her staff received a written commendation from the Commander of the Galveston District. She previously served as an environmental expert on four IEPRs of USACE projects.

Ms. Crouch is a member of the Society of Wetland Scientists and founder and president of fundmyresearch.org. She is Chairman of the Board for the Houston Chapter of HeartGift (www.heartgift.org).

### *Ralph Ellis, Ph.D., P.E.*

**Role:** This panel member was chosen primarily for his coastal engineering experience and expertise.
**Affiliation:** University of Florida

**Ralph Ellis, Ph.D., P.E.,** is an Associate Professor in the Department of Civil Engineering at the University of Florida specializing in the areas of engineering management, construction engineering, and the legal aspects of construction. He earned a Ph.D. in civil engineering from the University of Florida in 1989, and is a licensed professional engineer in Florida. Dr. Ellis has more than 30 years of construction engineering and management experience, and has worked on large-scale civil engineering projects both regionally and internationally. Prior to joining the University of Florida, he was president of the Hammer Corporation construction firm and

Director of Projects for the FMI Hammer Joint Venture where he was responsible for estimating and delivering all construction projects, including numerous projects for USACE, U. S. Navy, and the Panama Canal Company. Many of these projects were located in South Florida and Central America and involved the construction of large-scale earthworks, some directly associated with flood control projects. He is familiar with all aspects required for the construction of pump station structures in South Florida, which typically required setting up complex dewatering operations. He has also directed the construction of temporary and permanent sheet pile walls for flood control purposes. Dr. Ellis is familiar with construction practices commonly required for Everglades Restoration projects in South Florida, as well as those used on the Gulf Coast projects. Through his background and project experience Dr. Ellis has an understanding of the USACE Safety Assurance design and analysis processes with regard to civil structures such as those constructed for flood control purposes.

Dr. Ellis's professional construction experience has included projects with marine operations including dredging. Dr. Ellis is fully knowledgeable with regard to current practices and the engineering considerations associated with dredging, including the transport and placement of dredged materials by hydraulic slurry methods for beneficial uses. Environmental restoration has become a key area in the construction engineering curriculum. He is familiar with incorporating environmental protection planning into project operations, and has been teaching earthwork construction methods and environmental protection planning to engineering students for more than 20 years.

Dr. Ellis has authored more than 55 construction-related research publications, and has performed more than 48 research projects focusing on construction management and construction technical issues. He has served as a construction cost engineering expert for the IEPRs of the Tamiami Trail Limited Re-evaluation Report, and the Integrated Feasibility Study and EIS for the Louisiana Coastal Area Restoration Small Diversion at Convent/Blind River (St. James Parish, Louisiana). Through his participation on these reviews he has gained a working knowledge of coastal storm damage reduction design, cost, and construction considerations.

### *Brian Bledsoe, Ph.D., P.E.*

**Role:** This panel member was chosen primarily for his hydrology/hydraulics engineering experience and expertise.
**Affiliation:** Colorado State University

**Brian Bledsoe, Ph.D., P.E.** is currently an associate professor in the Civil and Environmental Engineering department at Colorado State University (CSU). He earned his Ph.D. in civil engineering and river mechanics from CSU in 1999 and is a registered professional engineer in Colorado and North Carolina. Dr. Bledsoe has more than 24 years of experience as an engineer and environmental scientist in the private and public sectors. Dr. Bledsoe has been conducting engineering analyses and wetland restoration-related research in coastal areas since 1991. His research and teaching interests are focused on the interface between hydraulic engineering and ecology with an emphasis on the development of effective and ecologically based stream, river, wetland, and watershed restoration practices.

Dr. Bledsoe served as a wetland restoration specialist for the North Carolina Department of Environment and Natural Resources' (NCDENR) Divisions of Coastal Management and Water Quality, during which he conducted research on the hydrology, hydraulics, water quality, and ecology of wetlands to determine design criteria for wetland/riparian restoration projects. He later served as the State's lead engineer in the development, implementation, and retrofitting of best management practices and ecosystem rehabilitation measures designed to restore water quality to impaired water bodies, including the Albermarle-Pamilico estuary. While with NCDENR, Dr. Bledsoe conducted engineering analyses related to flood and coastal storm damage reduction.

Dr. Bledsoe is very familiar with HEC-RAS, HEC-2, HEC-1, HEC-6T, HEC-HMS, RMA-2, and SBEACH, and he has taught HEC-RAS short courses at CSU and introduces several of these models in the engineering courses he teaches, including Environmental River Mechanics, Stream Rehabilitation Design, and Nonpoint Source Pollution. He has experience with large complex Civil Works projects, having worked on the New Bern Bypass project (North Carolina Department of Transportation); Potash Corp. of Saskatchewan Phosphate Mine Expansion (in Edward, North Carolina); and the Northern Integrated Supply Project (Larimer County, Colorado). In addition, he was selected to participate in the IEPRs for the Biscayne Bay Coastal Wetlands Project Implementation Report and the Amite River Diversion Canal Modification Study. Dr. Bledsoe's M.S. research at North Carolina State University focused on coastal wetland ecology and hydrology, and since then he has authored more than 100 publications related to wetlands, stream and watershed processes, restoration and water quality.

### *Chris Houser, Ph.D.*

**Role:** This panel member was chosen primarily for his coastal geomorphology experience and expertise.
**Affiliation:** Texas A&M University

**Chris Houser, Ph.D.,** is an assistant professor in the Department of Geography at Texas A&M University, with 10 years' experience in coastal geomorphology. He earned his Ph.D. in geography from the University of Toronto in 2004, where he conducted his dissertation research on feedback mechanisms in the morphodynamics of multiple-barred nearshores. His coastal geomorphology research has focused on nearshore and estuarine sediment transport and the role of aquatic vegetation in wave and current attenuation.

Since 1999, Dr. Houser has been conducting field research in process geomorphology with a focus on coastal geomorphology, which has led to 32 peer-reviewed journal publications related to coastal geomorphology/geology since 2004, and invitations to numerous national conferences (including those of the Geological Society of America and American Geophysical Union). He has taught undergraduate and graduate courses in coastal geomorphology and process geomorphology at Texas A&M and the University of West Florida.

His current research projects include salt marsh erosion by vessel-generated wakes, wave attenuation through seagrass beds, geomorphological controls on barrier island response to hurricanes and their recovery, the geologic framework of barrier islands in northwest Florida, and sediment transport and hydrodynamics of the swash zone. Dr. Houser has been working

almost exclusively in the Gulf of Mexico since 2004, with funding from the National Science Foundation and the National Park Service to examine barrier island response and recovery from extreme storms.

# 5. SUMMARY OF FINAL PANEL COMMENTS

The panel members agreed among one another on their "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (USACE, 2010; p. D-4) in the BBBS CR/DEIS document. Table ES-1 lists the Final Panel Comments statements by level of significance. The full text of the Final Panel Comments is presented in Appendix A of this report. The following statements summarize the Panel's findings.

**Civil Works Planning:** The plan formulation is well presented in the CR/DEIS. Traditional plan elements are well structured, but the plan suffers from a lack of a detailed monitoring and adaptive management plan. Such a plan is extremely important in this type and length of a project. Some specific technical issues internal to the plan are not well covered, as described in the Final Panel Comments.

**Engineering:** The project represents an important and feasible contribution to the broader LCA restoration program. The project plan appears to generally include appropriate types of measures for achieving the specified objectives. However, the Panel finds the approach to the preliminary engineering design of the beach fill and dune, as presented in the draft report, to be incomplete in its application and interpretation of models and in providing clear rationales for important design decisions. This makes it difficult to assess the adequacy of the designs and to clearly discern differences in likely performance among alternatives. There are a number of issues that must be resolved and documented in the report. In addition, the preliminary design must be refined during the design phase with the inclusion of additional data. The project cost estimate and the Cost and Schedule Risk Analysis are satisfactory.

**Environmental:** The Panel agrees that the site characterization is incomplete and out-of-date, so the Panel was unable to evaluate future with and without project conditions. Additional assessment and evaluation of existing hydrology, nearshore hydrodynamics, habitat quality and quantity, and barrier geomorphology are needed. The Panel is also concerned about competition with other projects for borrow material from Ship Shoal and other borrow sites, and potential adverse effects to fisheries and wave attenuation benefits caused by removal of material from Ship Shoal. The monitoring and adaptation plan is not sufficient to assess future project stability, and whether and how the project may adversely affect the surrounding environment.

**Table 3. Overview of 16 Final Panel Comments Identified by the BBBS CR/DEIS IEPR Panel**

| | |
|---|---|
| **Significance – Medium** | |
| 1 | The limitations of the models for characterizing system behavior are not discussed and the implications of those limitations are not applied to the design. |
| 2 | The models are not calibrated using site-specific data which results in substantial uncertainty of project performance. |
| 3 | Key design decisions and the different methodologies used to model and evaluate alternative designs are not clearly explained and are incongruent between the two islands. |
| 4 | Site characterization was neither detailed nor contemporary. |
| 5 | The WVA approach, results, and some of the critical assumptions (e.g., retreat rates) underlying the analysis are not documented. |
| 6 | While this project provides important opportunities for adaptive management, the review documents do not describe a cogent monitoring and management plan and do not provide contingencies for potential impacts. |
| 7 | A complete survey of the proposed borrow areas has not been performed and is necessary to refine the design and construction plans. |
| 8 | The assessment of borrow material availability at Ship Shoal and in designated Mississippi River locations does not account for potential competition for borrow material with other Louisiana restoration projects. |
| 9 | The ecological and wave attenuation impacts of removing borrow material from Ship Shoal are not analyzed in enough detail to adequately assess the environmental effects. |
| 10 | The descriptions of mechanisms by which the renourishment material will resupply the dune are not well defined and create uncertainty as to whether the renourishment would meet goals. |
| 11 | The use of construction sequencing to minimize potential effects to piping plovers and their critical habitat has not been discussed in depth in the CR/DEIS. |
| 12 | The risk and uncertainty in the methods used in the analysis and design are not sufficiently acknowledged. |
| 13 | Some of the proposed project elements may degrade backbarrier habitat through a change in hydrology and the analysis does not provide the detail to assess the impacts on existing habitat. |
| 14 | A description of protection activities in response to the Deepwater Horizon oil spill is not provided. |
| 15 | The engineering design does not reference USACE's experience with similar projects. |
| **Significance – Low** | |
| 16 | Strategies for mitigating the risk of turtle and dredger conflicts have not been fully developed and could affect project schedule and cost. |

# 6. REFERENCES

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# APPENDIX A

## Final Panel Comments

## on the

## BBBS CR/DEIS

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**Final Panel Comment 1:**

**The limitations of the models for characterizing system behavior are not discussed, and the implications of those limitations are not applied to the design.**

**Basis for Comment:**

An accurate assessment of storm impacts and longshore and cross-shore transport is critical to estimates of change with and without the proposed project. The selection of the tentatively selected plan (TSP) is dependent on the accuracy of the SBEACH and GENESIS models, which are widely accepted in the literature. The simplicity of these models is attractive, but without documentation of key inputs and calibration results and a discussion of assumptions, it is not clear if the underlying assumptions of the models are appropriate for describing the future with and without the project, and in the selection between alternatives. Specific model-related issues raised by the Panel include, but are not limited to:

- Single dimension of SBEACH: Unless wave and surge forcing and the geologic framework of the islands are truly uniform alongshore, then it is reasonable to expect alongshore variation in dune scarping, overwash, and breaching. However, SBEACH is a one-dimensional model and does not consider alongshore variation. Weak points in an otherwise uniform dune form can laterally erode adjacent dunes, leading to an unstable dune line.
- Simple and selective dune profiles: The SBEACH results are presented for select and apparently representative dune profiles. It is not clear how representative these profiles actually are and how storm impact will vary alongshore. The model also uses a simple and flat backbarrier profile that ignores the potential influence of the backbarrier pools and swales on storm response and dune stability.
- Appropriate modeling tools: The modeling tools employed in the project are not designed to resolve the complex flow patterns that will be altered in response to the proposed project. As such, it is not clear how salinity gradients can serve as a meaningful metric in the Wetland Value Assessment (WVA) analysis.
- Empire Jetties: There seems to be an implicit assumption that the sediment budgeting and GENESIS modeling of Shell Island in its historical position relative to the Empire Jetties can be extrapolated to the more landward position of the proposed project. This assumption and the lack of information about complex changes in hydrodynamic patterns if Coupe Bob is closed result in substantial uncertainty about the effects of the Empire Jetties on erosion processes along eastern Shell Island
- Appropriate range of forcing: The SBEACH modeling for Caminada only considers individual storm events with wave heights not exceeding the 5-7 year height, but it is not clear if this is sufficient for evaluating the likely performance of the dune design. For example, multiple small storms could significantly destabilize the dune ahead of a larger storm that would otherwise have had little impact on the constructed dune form.

Use of more robust models (such as Delft3D or Mike21) would provide greater model resolution as well as greater confidence in the modeled futures with and without project, if appropriate data are available for calibration. Regardless of the model used, a sensitivity analysis would still need to be completed to demonstrate how the results of the model are dependent on inherent inaccuracies in the input parameters and variables.

**Significance – Medium:**

| |
|---|
| The limitations of the models used to forecast storm impacts and sediment transport create uncertainty in the predicted change to Caminada Headland and Shell Island with and without project. |
| **Recommendations for Resolution:** |
| 1. Evaluate and document the SBEACH and GENESIS model assumptions<br>2. Demonstrate that model assumptions are reasonable<br>3. Compare model results to field observations<br>4. Conduct model assessments based on a wider range and combination of forcing<br>5. Evaluate whether the assumed impact of the Empire Jetties is appropriate for the more landward position of Shell Island<br>6. Evaluate and implement new and more robust modeling approaches and tools to address both limitations of existing models and changes in circulation and salinity at Shell Island<br>7. Re-evaluate the alternatives and tentatively selected projects if the revised modeling results differ sufficiently from the results presented in the CR/EIS |

| **Final Panel Comment 2:** |
|---|
| **The models are not calibrated using site-specific data, which results in substantial uncertainty in project performance.** |
| **Basis for Comment:** |
| Accurate predictions from the models used to characterize storm erosion and shoreline changes depend on input parameters and data that demonstrably represent site-specific conditions. The SBEACH models were extrapolated from nearby locations to Caminada Headlands and Shell Island to estimate storm-induced beach erosion. A calibrated numerical model for estimating retreat rates among alternatives was not developed for Caminada Headlands. In contrast, the Shell Island GENESIS model was calibrated with the 1956-1973 sand transport rates estimated from sediment budgeting, and tested against shoreline changes from a previous historical period that may not be representative of existing conditions. This appears to be the only documented case in which there was an effort to calibrate and test the numerical models with site-specific data.<br><br>Sensitivity analyses were performed for the Shell Island models that were calibrated for other locations. However, it does not appear that the results of the sensitivity analyses were used to interpret the broader implications for plan selection, preliminary design, and estimation of projected benefits over time. Additional interpretation and discussion is needed of the broader implications of the uncertainty that arises because the models were extrapolated from other locations and not calibrated to recent site-specific conditions. This information would improve understanding of the range of potential shoreline changes and benefits that may occur. |
| **Significance – Medium:** |
| Without calibration, the accuracy and utility of the model results are not known, resulting in substantial uncertainty in project performance and estimation of project benefits. |
| **Recommendations for Resolution:** |
| 1. Interpret the output from the beach erosion and shoreline change models in the context of calibration and verification.<br>2. Explain why site-specific calibration was not performed for most models.<br>3. Discuss the implications of the resulting uncertainty in model outputs, and how that uncertainty affects the evaluation of project performance and alternatives.<br>4. Refine the beach erosion and shoreline change models with calibration and verification during the final design phase to improve the accuracy of estimated re-nourishment requirements. |

| **Final Panel Comment 3:** |
| --- |
| **Key design decisions and the different methodologies used to model and evaluate alternative designs are not clearly explained and are incongruent between the two islands.** |
| **Basis for Comment:** |
| There does not appear to be a clear description of how the preliminary designs were chosen and if there was some objective analysis completed to make these decisions. Unless more consistent support from analysis and modeling is provided, these decisions could be perceived as somewhat subjective. In particular, the rationales for specific dune templates and renourishment intervals are not well developed in the documents. Examples include:<br>• choice of dune morphology for each alternative (how different seaward vs. landward fills, heights, widths, and slopes were selected);<br>• minimum allowable post-storm dune elevation;<br>• Shell Island location and shape; and<br>• timing and amounts of nourishment.<br>Selection of the dune template and renourishment designs that are varied among alternatives should be based on consistent modeling and evaluation criteria that demonstrate the relative effectiveness of the designs. It is not clear how the designs were initially defined and if there was systematic testing of sequences of storms against an appropriate range of plausible dune height and width combinations to assess which preliminary designs fulfill the project objectives. For example, erosion and overtopping predictions from the SBEACH modeling analysis are portrayed as primary considerations in designing the dune templates that vary among alternatives. However, the specific dune templates used in Caminada alternatives 5-10 (including the TSP version) were not evaluated with SBEACH modeling of design storm sequences and breaching analysis like the Shell Island designs. If there was no storm sequence testing, then the selected design is not necessarily the most stable, resilient, and environmentally appropriate. The documents allude to tradeoffs between greater dune heights for resistance to overtopping versus lower dune heights for maintaining ecological processes and habitat; however, these competing constraints and how the TSP addresses them are not clearly articulated. This leads to uncertainty that the proposed designs are the most appropriate in meeting the project goals.<br>In addition, the rationales for some of the key decisions in the preliminary design process are incongruent between the two islands. For Shell Island, the SBEACH modeling examined a sequence of 20 and 50-year design storms, verified that the 20-year surge did not overtop, adjusted for profile equilibrium and relative sea level rise (RSLR) in SBEACH, and performed sensitivity analyses of multiple models. The analysis also included a design performance assessment based on breaching potential. A GENESIS model was calibrated to past conditions and used to apply variable retreat rates by alternative. Secondary effects of the borrow area on wave attenuation were also considered. In contrast, the Caminada Headlands analysis examined individual events with wave heights of approximately 5-7 year return period without a similar accounting for profile equilibrium and RSLR. The Caminada analyses appear to have not included a breaching analysis, a calibrated GENESIS model, sensitivity analysis, nor an |

analysis of secondary effects of the borrow area. The erosion events modeled for Caminada are not representative of the range of events that are likely to occur within the project lifetime.

Different design approaches may still result in valid designs. However, a comparison of the disparate approaches between islands would suggest that the Shell Island study appears more complete in terms of clearly defined and testable design objectives, considering sequences of design storms under RSLR, overtopping analysis, variable retreat rates among alternatives, secondary effects of borrow areas, and sensitivity analysis. Additional discussion of the appropriateness of the designs would improve confidence in the validity of both approaches. Given that SBEACH modeling was not specifically performed for the design template proposed for the Caminada Headlands portion of the TSP, additional consideration of beach erosion and breaching potential would be appropriate for the preliminary design of the C5 "preferred" dune which is described as maximizing acreage and longevity. For example, Caminada Alt. 3 has a ~100-200ft more seaward position than landward templates after the erosion of the most severe hurricane considered (Juan). This could also be perceived as maximizing acreage. Without greater documentation of the analysis modeling results for all the competing designs, it is difficult to follow the logic behind why Caminada Alt 5 is the "preferred dune" from an erosion (and perhaps habitat) standpoint.

Additional analysis of a range of storm sequences could prove valuable in supporting decisions about dune morphology and balancing erosion concerns with environmental considerations around habitats formed by dune overwash processes.

**Significance – Medium:**

A clear description of how the various preliminary designs were developed and systematically refined through modeling and analysis is necessary for understanding differences in project performance among the alternatives.

**Recommendations for Resolution:**

1. Document how the diverse design approaches were evaluated and document how the final design alternatives were selected.
2. Provide further explanation of the rationales for variations in height, width, slope, landward vs. seaward fill amounts, and nourishment in the preliminary designs.
3. Explain and support the adequacy and appropriateness of the disparate approaches to modeling and engineering design between Caminada Headlands and Shell Island.
4. Provide additional support for assertions about the relative longevity of the preliminary designs (especially the Caminada "preferred" dune template) with modeling, analysis, experience, and clear explanations of the engineering judgments that were made.
5. Ensure that models were equally applied against all project alternatives and document how the TSP is the preferred design relative to the project alternatives.
6. Re-evaluate the TSP if the revised modeling and discussion differ sufficiently from the results presented in the FS/EIS.

| **Final Panel Comment 4:** |
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| **Site characterization data are neither detailed nor contemporary.** |
| **Basis for Comment:** |
| The results of the SBEACH and GENESIS models and the WVA analysis are only as good as the field data used as input. The lack of locally collected field data creates great uncertainty about the future with and without project, and the differences between alternatives. The Panel identified several characteristics about both Caminada Headland and Shell Island that are not sufficiently detailed:<br>• Circulation and salinity: The proposed Shell Island project is expected to affect circulation in the backbarrier bay and re-establish salinity gradients. There appears to be no field data to describe the contemporary or past currents and salinity gradients to determine if the project is successful and meets the restoration goals. As this point it is not clear how salinity gradients can serve as a meaningful metric in the WVA analysis.<br>• Alongshore variation in storm damage and breaching: A preliminary assessment of past storm damage at Caminada Headland focused on only island width as a control on breaching. While width is important, it also reasonable to expect that offshore bathymetry, and backbarrier swales and pools will be additional controls.<br>• Existing habitat: Neither a detailed field-based assessment of existing habitat quality and quantity nor a direct assessment of available habitat for species of concern was made.<br>• Bathymetry and topography: The bathymetry and topography data appear to have been collected prior to Hurricane Katrina in 2005 and are not necessarily representative of the existing site conditions. Contemporary aerial and satellite imagery suggest that the site has changed considerably since those first surveys.<br>• Hydrology: While a potential hydrologic connection between Chenier Plain and Gulf of Mexico is recognized, there is insufficient data to describe this flow and the implications for marsh health and resiliency with and without the proposed project.<br>• Wave field: There are no measurements of the wave field in either the backbarrier bay or along the Gulf shoreline. These are needed to assess whether the TSP will meet the goal of reducing wave energy and erosion in the vicinity of Shell Island.<br>• Recent changes: There is no description of the hard structures (HESCO baskets, tiger dams, and earthen berms) used to protect the site from the Deepwater Horizon Spill. |
| **Significance – Medium:** |
| The lack of detailed and contemporary data makes it difficult to evaluate the future with and without project, to differentiate between project alternatives, and to assess the accuracy and appropriateness of the models to describe local processes and change. |
| **Recommendations for Resolution:** |
| 1. Complete site characterization of existing habitat, hydrology, nearshore and coastal hydrodynamics, and historical changes in storm impact.<br>2. Collect field data as input to the SBEACH and GENESIS models, and the WVA analysis.<br>3. Re-evaluate model results based on new and contemporary site characterization. |

| **Final Panel Comment 5:** |
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| **The WVA approach, results, and some of the critical assumptions (e.g., retreat rates) underlying the analysis are not documented.** |
| **Basis for Comment:** |
| WVA is an accepted tool that is appropriate for this application; however, detailed descriptions of the WVA analyses and results are not included in Appendix D. The IEPR Panel identified several important aspects of the WVA analysis that are not documented:<br>• The constructed habitats are not described relative to the characteristics and valuation of existing habitats, including washover fans/breaches, and the marshes that currently occupy the Chenier Plain.<br>• It is not clear whether field surveys and assessments of existing habitats were completed. Without a ground-based assessment, it is difficult to determine existing community structure, health, and stability in the future with and without project scenarios.<br>• It is not clear how dune habitat is valued through the WVA, and if the benefits of dune construction are properly integrated into the marsh valuation.<br>• It is not clear how the WVA model accounts for periodic natural events. Assumptions about the timing of major erosion events relative to planned renourishment activities are not clearly described.<br>• Shoreline retreat rates appear to be uniformly applied for all Caminada Headlands alternatives in the calculation of AAHUs, and therefore do not appear to account for potential differences in erosion response among alternatives.<br>• It is unclear how the post-storm profile positions of various alternatives were used in conjunction with retreat rates to estimate the areal extents of benefits over time among alternatives. For example, Template 3 at Caminada Headlands with seaward fill has a post-storm position that is approximately 200 feet seaward of other templates (SBEACH modeling report, Appendix A, Annex 1, Table 9, p. 30).<br>• The WVA analysis makes adjustments for RSLR in estimating the future extent of habitats, but the methodology is not clearly explained.<br>• It is unclear how some of the WVA performance metrics (e.g., salinity, marsh stress) were evaluated, given that baseline conditions do not appear to be well-understood or characterized. |
| **Significance – Medium:** |
| Without documentation of the points above, the overall methodology, and the WVA output, it is not possible to understand how future system states and benefits were predicted. Such understanding is essential for a meaningful comparison of alternatives and costs.. |
| **Recommendations for Resolution:** |
| 1. Include the WVA methodology and results in Appendix D as stated in the main report.<br>2. Describe and support the key assumptions made in the WVA analysis. In particular, clarify assumptions about the value of existing habitats, and how initial erosion profiles and retreat rates are combined to estimate the areal extents of benefits over time among the alternatives.<br>3. Explain how existing habitats were assessed and state whether a ground-based |

assessment of vegetation was conducted.

4. Describe how the characterization of baseline conditions is used to estimate changes in performance metrics as affected by the various alternatives.

| **Final Panel Comment 6:** |
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| **While this project provides important opportunities for adaptive management, the review documents do not describe a cogent monitoring and management plan and do not provide contingencies for potential impacts.** |
| **Basis for Comment:** |
| Monitoring and adaptive management plans have many goals. One is to address, to the extent possible, the risk and uncertainty of the original analysis leading to the TSP and with the uncertainty inherent as the plan is implemented. Such uncertainty is evident in this BBBS project, arising from diverse areas, including borrow locations and availability, relative sea level changes, severity and timing of storms, vegetation response, funding constraints and scheduling delays, cost overruns, and lack of field calibration. Another goal of monitoring and adaptive management plans is to test the reasonableness of model assumptions (such as those made for WVA or SBEACH) as the plan undergoes implementation and to react to the reality of those assumptions if they appear incorrect.<br><br>What is missing in this study is an adaptive management plan with clear thresholds in which the project success, in stages and levels of development, is frequently assessed. A dynamic adaptive management plan builds on the findings over time and suggests strategies to improve the outcome of the project, based on performance measures of relevance to the project goals. For example, there is no mechanism to determine if the beach and dune are eroding faster than nourishment sediment is being applied to the beach. In addition, the triggers for action relative to the performance measures need detailing; that is, how will managers address such things as major events when immediate nourishment may be required, topographic surveys, vegetation mortality, and sand fence performance.<br><br>The monitoring procedures anticipate three data collection surveys during the life of the project; however, the timing and objectives of these surveys are not appear linked to key uncertainties in how the project will perform. The proposed monitoring procedures are appropriate, but there are no clear thresholds of change in performance measures that will implement remediation. For example, with respect to several of the performance measures:<br><br>• Areal extent: An evaluation is needed on the percentage change in magnitude of the project that is undesirable because, over time, it poses a threat to the project.<br>• Habitat composition: The percentage change in habitat composition and the extent of the project that is to be tolerated needs to be measured.<br>• Island elevation change I: Dune erosion is rarely uniform alongshore. Whether the elevation threshold is an average (which allows for local points below that elevation) or is locally assessed must be determined. If the latter, the areal extent of lower elevation needing to be tolerated must be determined.<br>• Island elevation change II: This performance measure assumes that the dunes are over washed. If surge levels are within the collision regime, then there will be no change in elevation, but dune scarping and landward translation will be seen. This change in areal extent is not necessarily visible in aerial photographs.<br><br>Given the inherent uncertainties in coastal projects of this nature, a well-conceived monitoring and adaptive management plan improves the likelihood of project success. A monitoring plan focused on the key uncertainties would also enhance learning from this project so that |

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| knowledge could be applied to future projects. |
| **Significance – Medium:** |
| The monitoring procedures appear appropriate, but the plan would be improved by detailed assessment of the performance measures leading to adaptive management and management changes |
| **Recommendations for Resolution:** |
| 1. Summarize, using sensitivity analysis, major and specific sources of risk and uncertainty.<br>2. Specify performance measures to be monitored and evaluated, including measures focused on the key uncertainties.<br>3. Identify in the plan clear thresholds from which project success or progress can be measured.<br>4. Outline contingencies of action when measures and goals are deemed to have fallen short of expected model results. |

| **Final Panel Comment 7:** |
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| **A complete survey of the proposed borrow areas has not been performed and is necessary to refine the design and construction plans.** |
| **Basis for Comment:** |
| The core of this project involves dredging, transport, and beach and dune fill operations. Engineering design, construction planning, and related cost and time estimates are directly influenced by estimates of borrow material properties and locations. The preliminary survey information of the off shore and riverine sources is sufficient to confirm the adequacy of the proposed borrow areas; however, a more complete survey of the borrow areas is needed to confirm the engineering properties of the borrow materials and the spatial distribution of those properties within the borrow areas. For example, 19 samples were taken in the South Pelto Blocks 12 and 13 of the Ship Shoal area, with the sample locations appearing to be several thousand feet apart. Given the spacing of the samples, unknown variations in material properties may exist between sample locations.<br><br>Beach and Dune Fill Issues were identified by the Project Cost and Schedule Risk Analysis Report as a leading contributor to possible project cost and schedule variance. More precise borrow site information will permit a more optimum and specific selection of materials within the borrow areas and contribute to design refinement. Selective dredging analysis may be beneficial in providing more compatible matches of borrow to native beach and dune materials.<br><br>Additional sampling and testing may also provide improved estimates of dredge-to-fill ratios, a key component of project cost and schedule estimates.<br><br>Since obstructions were found in the proposed borrow sites during the preliminary surveys, these borrow sites should be surveyed to identify and map any obstructions. An unexpected encounter with an obstruction during dredging operations may delay the project. |
| **Significance – Medium:** |
| Additional borrow site information will permit design refinement, help produce more precise estimates of cost and time, and reduce risks. |
| **Recommendations for Resolution:** |
| 1. Conduct additional material sampling in borrow areas and more specifically define borrow locations.<br>2. Refine design, based upon analysis of sample information.<br>3. Conduct field surveys to determine existing obstructions in selected borrow locations. |

| **Final Panel Comment 8:** |
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| **The assessment of borrow material availability at Ship Shoal and in designated Mississippi River locations does not account for potential competition for borrow material with other Louisiana restoration projects.** |
| **Basis for Comment:** |
| Section 5 of the CR/DEIS lists numerous Louisiana ecosystem restoration projects representing potential synergies with the BBBS and states that approximately 642,000 acres of Louisiana coastal restoration is in various stages of development. Some of these projects are already being implemented and many others are in the planning stages, with reclamation of land loss the primary goal. Such an extensive area of restoration will require the availability of a large amount of material to rebuild lost features and habitats.<br><br>The document does not make clear which of the other proposed projects, if any, expect to use the same borrow sites as the BBBS project (Ship Shoal and the Mississippi River), and whether competition for this material will become a limiting factor in completing the BBBS project or any of the other planned restorations. |
| **Significance – Medium:** |
| A more complete discussion of the potential competition for suitable borrow material is necessary to assess whether the needs of other projects represent risk or uncertainty to the BBBS. |
| **Recommendations for Resolution:** |
| 1. Provide additional descriptions of other planned restoration projects in the CR/DEIS, including the projected amount and source of borrow material for these projects.<br>2. Evaluate and discuss in the CR/DEIS whether other planned projects will compete for borrow material at the same sources selected for the BBBS project.<br>3. Explore and discuss whether required borrow material from the identified sites may be reserved for the BBBS project. |

| **Final Panel Comment 9:** |
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| **The ecological and wave attenuation impacts of removing borrow material from Ship Shoal are not analyzed in enough detail to adequately assess the environmental effects.** |
| **Basis for Comment:** |
| Information is presented in the CR/DEIS indicating that Ship Shoal serves to attenuate storm waves and protect nearby shorelines (p. 5-39). Ship Shoal is the primary borrow location for dune and beach reconstruction, and removal of sediment from the shoal may increase shoreline erosion during storms.<br><br>The effects on the benthic community at Ship Shoal are not fully described, with Section 5 stating only that benthic organisms will recolonize borrow sites after 1.5 years or more. The effects on the balance of the food chain (fisheries) affected during this time are not fully characterized.<br><br>Ship Shoal, according to the National Marine Fisheries Service (NMFS) (letter dated August 3, 2011 provided in Appendix D), is a significant habitat for blue crabs; other species also use this area. The CR/DEIS does not discuss in enough detail the potential effects on blue crab and other fisheries of mining Ship Shoal for borrow material. |
| **Significance – Medium:** |
| The lack of information on how wave action and benthic communities/fisheries will be impacted by mining Ship Shoal for borrow material prevents a complete assessment of the environmental effects of the dredging. |
| **Recommendations for Resolution:** |
| 1. Describe existing wave attenuation features of Ship Shoal and its relative importance to shoreline protection in more detail.<br>2. Elaborate on the effects of sediment removal on the benthic community in borrow areas.<br>3. Evaluate and discuss effects of sediment removal not only on the benthic communities inhabiting borrow locations but on the fisheries depending on them.<br>4. Discuss in the cumulative effects analysis the combined impact of the BBBS project, along with the other planned projects and routine activities expected to occur in the region, on regional benthic communities and fisheries. |

| **Final Panel Comment 10:** |
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| **The descriptions of mechanisms by which the renourishment material will resupply the dune are not well defined and create uncertainty as to whether the renourishment would meet goals.** |
| **Basis for Comment:** |
| Maintenance of the project involves the placement of nourishment material along Caminada Headland. The material will be placed 100 to 300 feet offshore, with the assumption that this material will be transported landward, deposited on the beachface to address beaches and erosional hot spots, or be transported by the wind to replenish the dune. This transfer of sediment is key to the long-term success of the project, but is based only on assumptions. Specifically:<br>• It is assumed that nourishment material will be transported landward and weld to the beachface. In most coastal environments this is an appropriate assumption, but it still requires modeling to determine if the landward transport occurs at a sufficient and assumed rate. The project area is a relatively low energy environment punctuated by tropical storms and hurricanes that maintain sediment offshore or transport it alongshore.<br>• It is assumed that the nourishment material delivered to the beachface will be transported to the backshore and dune by the wind. This assumes that the site is not transport-limited and that the only limitation to dune development is sediment supply. Transport to the dune is based on what appears to be personal observation of sediment accumulation along Grand Isle sand fences following a single wind event. There is no evidence that these transport events (most common during the same storms that erode the beach) are sufficient to move the sediment into the dune before it is moved offshore or alongshore. |
| **Significance – Medium:** |
| Without supporting model data or evidence from other projects to describe the transport of nourishment sediment and aeolian transport, there is uncertainty that the maintenance events will be successful and that the project as described will have long-term stability. |
| **Recommendations for Resolution:** |
| 1. Apply and evaluate models to predict the rate at which nourishment sediment is transported and redistributed for a range of forcing conditions.<br>2. Re-evaluate the maintenance plan if the revised modeling and evidence differ sufficiently from the results presented in the CR/EIS.<br>3. Document and evaluate evidence to support beach and dune recovery from nourishment material placed offshore. |

| **Final Panel Comment 11:** |
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| **The use of construction sequencing to minimize potential affects to piping plovers and their critical habitat has not been discussed in depth in the CR/DEIS.** |
| **Basis for Comment:** |
| Potential adverse impacts to threatened and endangered species are discussed as a planning constraint in the CR/DEIS (p. 2-14). Two Biological Assessments (BA; April 2009 and June 2011) discuss listed species potentially occurring in the project area, including critical habitat for the piping plover.<br><br>Construction sequencing is discussed as a primary mitigation measure to minimize effects on piping plovers. The assumption is that plovers will leave the construction area and find nearby places to roost and forage. Information to support this assumption is not fully presented.<br><br>Mention is made in the CR/DEIS Environmental Effects section and in the BA that effects of the Deepwater Horizon Spill as well as effects from other planned restoration projects resulted in USACE making a "likely to adversely affect" assessment on this species and that a consultation with USFWS should be initiated. The implication is that there may not be adequate suitable habitat for plovers in the region during the construction period. |
| **Significance – Medium:** |
| Information on avoidance and minimization measures to protect the piping plover needs to be included in the CR/DEIS in order to completely describe the potential impacts on the project schedule. |
| **Recommendations for Resolution:** |
| 1. Discuss USACE's commitment to following steps recommended by USFWS (in its response to the BA) to minimize effects on the piping plover.<br>2. Fully describe all studies and measures to be implemented prior to and during construction to protect listed species.<br>3. Include more detail on the construction sequencing program intended to reduce effects on piping plovers.<br>4. Provide studies or describe experience supporting the construction sequencing approach.<br>5. Elaborate on the discussion of cumulative effects of all planned restoration projects as well as other foreseeable actions (e.g., routine maintenance dredging and oil and gas activity) on plovers and their critical habitat. |

**Final Panel Comment 12:**

**The risk and uncertainty in the methods used in the analysis and design are not sufficiently acknowledged.**

**Basis for Comment:**

Coastal engineering embodies major uncertainties in terms of both the forcing processes and coastal response. Deterministic representations of processes and responses can mask uncertainties and may be misleading (USACE 2002). The estimated period of time that a particular project feature or benefit is sustained is based on model output and is therefore only as accurate as those models. The SBEACH and GENESIS sensitivity analyses and other known sources of uncertainty were not translated into confidence intervals on estimated benefits for high, medium, and low response scenarios. Instead, forcing processes and project response are largely presented as deterministic outcomes.

The report does not contain a clear and explicit statement about confidence in the input data and model results, and does not provide evidence of rigorous and consistent sensitivity and uncertainty analyses. For the Caminada Headlands models, there was no model sensitivity analysis or uncertainty analysis. Sensitivity analyses of model parameters were performed for the SBEACH and GENESIS models applied to Shell Island. Although the parameter uncertainty significantly affected model results in some instances, the implications of this analysis for the project design are not clear. If the results of the sensitivity analysis had any influence on the designs or decisions made, the nature of the influence is not stated. In addition, the sensitivity analyses did not vary uncertain model parameters in combination, so the uncertainty is underestimated for scenarios in which two or more influential parameters are unspecified. Errors may be transferred and compounded through the coupled wave/erosion models used in these analyses.

Despite these substantial uncertainties, there is no discussion of how the confidence intervals and prediction accuracies of key model outputs have implications for the selection and performance of the TSP. Therefore, it is not clear how the project will fare with different storm combinations and sequencing, greater or lesser relative sea level rise, etc. By explicitly including uncertainty, different scenarios can be more realistically assessed and separated in terms of whether there is a significant difference for the price.

**Significance – Medium:**

An explicit description and analysis of uncertainty in model inputs and outputs is necessary to understand the accuracy of projected benefits and the range of plausible project outcomes.

**Recommendations for Resolution:**

1. Explain the implications of the sensitivity analyses in the broader context of the accuracy of predicted project performance.
2. Describe confidence intervals on model inputs and outputs.
3. Examine a range of plausible scenarios (e.g., high, moderate, and low erosion/RSLR) that reflect the key uncertainties to provide a more probabilistic representation of project outcomes. The IEPR Panel acknowledges that in some cases confidence intervals will be difficult to estimate as they depend on processes that are difficult to quantify such as aeolian transport from beach to dune. In such cases, reasonable estimates of low,

medium, and high transport can be used to quantify the impact to the project.

**Literature Cited:**

USACE (2002). Coastal Engineering Manual. Engineer Manual 1110-2-1100, U.S. Army Corps of Engineers, Washington, D.C. (in 6 volumes).

| **Final Panel Comment 13:** |
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| **Some of the proposed project elements may degrade backbarrier habitat through a change in hydrology and the analysis does not provide the detail to assess the impacts on this habitat.** |
| **Basis for Comment:** |
| Each of the project alternatives call for the placement of marsh fill along the backbarrier shoreline. This constructed marsh accounts for a large proportion of AAHU in the WVA and therefore represents an important component of the project value. The TSP calls for the placement of a uniform layer of marsh fill over the existing Chenier Plain of ridges and swales at Caminada Headland. This diverse and healthy wetland system is being replaced by a relatively simple wetland of low diversity that covers and blocks hydrologic exchange with the Gulf of Mexico. This raises the following issues:<br>• Relative wetland value: The relative importance of the constructed marsh compared to the existing and more diverse ridge and swale wetland is not evaluated<br>• Hydrologic change: The impact of the dune and marsh fill on the hydrology of the Chenier Plain that depends (to an unknown degree) on hydrologic exchange with the Gulf of Mexico is not described in terms of degradation of the existing marsh system<br>• Change in habitat: Dune fill improvements come at the expense of the feeding habitat for plovers and terns. The fill may also adversely affect what the document refers to as "rare maritime habitat", the nationally-recognized cheniers themselves. The main report vaguely refers to the potential for the dune fill to disrupt key ecological processes and habitat, but there is no accounting for this impact in the estimate of project impacts and benefits<br>Similarly, maintenance of Shell Island includes the placement of 1.2 ft of nourishment material in year 20, which may significantly degrade established marsh vegetation along the backbarrier. |
| **Significance – Medium:** |
| The habitat value of the TSP cannot be fully evaluated without accounting for the value of lost Chenier Plain habitats. |
| **Recommendations for Resolution:** |
| 1. Document value (in terms of habitat units) of existing Chenier Plain<br>2. Evaluate quality and quantity of Chenier Plain relative to the constructed marsh<br>3. Evaluate and document importance of hydrologic connection between Chenier Plain and Gulf of Mexico<br>4. Evaluate impact of future with and without project conditions on habitat quantity and quality within the Chenier Plain |

| **Final Panel Comment 14:** |
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| **A description of protection activities in response to the Deepwater Horizon oil spill is not provided.** |
| **Basis for Comment:** |
| The CR/DEIS (Section 5, Environmental Consequences) describes various emergency structures that may have been put into place in the project area following the Deepwater Horizon incident (summer 2010). The document is unclear as to whether such structures were constructed on the Caminada Headland and/or Shell Island. The document indicates that more than 50 emergency permits were issued by USACE allowing placement of structures or other "fill" material in coastal Louisiana to protect the shoreline as well as the bays and estuaries from oil.<br><br>Specifically, the use of HESCO baskets and tiger dams is described in Table 5.2, Cumulative Effects. These types of structures are substantial, and their removal may have an effect on cost and schedule. If they do already exist on the Caminada Headland and/or Shell Island, their effectiveness in physically protecting the shoreline during storm events may be worthy of evaluating in the context of the TSP. The substantial amount of borrow material potentially filling existing HESCO baskets may change the requirements for material described in the CR/DEIS. The HESCO baskets may also hold potentially hazardous materials, such as recovered oil or oil-covered sand.<br><br>In addition, the information provided in the CR/DEIS conflicts with the NMFS comments, which indicate that HESCO baskets and other structures described in the CR/DEIS were never placed in the project area. |
| **Significance – Medium:** |
| A description of existing Deepwater Horizon emergency structures is necessary to determine if changes in the without project conditions might create a need to re-evaluate cost and schedule. |
| **Recommendations for Resolution:** |
| 1. Document what shoreline protection measures have been implemented or are in place on Caminada Headlands and Shell Island.<br>2. Assess the amount of material already placed on the shorelines of the project sites, if any.<br>3. Assess whether any potentially hazardous materials may be confined in shoreline protection structures.<br>4. Determine if shoreline protection measures, if any, should be removed during construction or if it would be valuable to leave them in place.<br>5. Evaluate the effect on schedule and cost of removing any shoreline protection devices or measures currently in place on the project locations. |

| **Final Panel Comment 15:** |
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| **The engineering design does not reference USACE's experience with similar projects.** |
| **Basis for Comment:** |
| Engineering judgment is well-recognized as a critical factor in the sound application of numerical models such as SBEACH and GENESIS. USACE undoubtedly has extensive experience in the design, construction, and maintenance of beach and dune fill projects. However, there is limited reference in the report to similar USACE projects. Clearly there are points in the development of this project where best professional judgment has been exercised, such as the selection of beach profile, dune height, construction processes, and renourishment strategies. The Panel is often left to accept the presented judgment on faith. The credibility of the judgment used in the engineering and other project plan development areas would be significantly improved by the inclusion of appropriate references to lessons learned from similar projects. |
| **Significance – Medium:** |
| The addition of appropriate references to USACE experience with similar projects would strengthen the technical quality and credibility of the report. |
| **Recommendations for Resolution:** |
| 1. Review USACE experience with recent similar projects<br>2. Identify lessons learned that are applicable to this project.<br>3. Provide appropriate, context-sensitive references to similar USACE projects. |

| **Final Panel Comment 16:** |
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| **Strategies for mitigating the risk of turtle and dredger conflicts have not been fully developed and could affect the project schedule and cost.** |
| **Basis for Comment:** |
| All species of sea turtles are protected by the Endangered Species Act (ESA) as recognized in the BBBS Revised Biological Assessment (BA) and the response of the U. S. Fish and Wildlife Service (USFWS) to the BA.<br><br>The CR/DEIS and the BA discuss the presence of sea turtles in the project area. Additionally, the Cost and Schedule Risk Report indicates that turtle/dredge conflict is a major schedule and cost risk factor. Information on turtle deflectors, turtle monitoring, and turtle avoidance is presented in the BA. However, this information does not consider seasonal or time-of-day operations with respect to turtles.<br><br>To minimize turtle/dredge conflicts, dredging operations are often planned for times of year and times of day when turtles are less likely to be present. If sea turtle/dredge conflicts occur, the USFWS may request that dredging be suspended until a resolution is found. |
| **Significance – Low:** |
| The potential for a turtle/dredge conflict event has been acknowledged in the report as a significant risk factor that may cause a substantial delay, thereby leading to increased costs. |
| **Recommendations for Resolution:** |
| 1. Include considerations of seasonal limitations on dredging, time-of-day limitations (e.g., elimination of night dredging), and other avoidance measures.<br>2. Develop additional strategies for mitigating turtle/dredge conflicts during the design phase and implement these strategies during construction. |

# APPENDIX B

## Final Charge to the Independent External Peer Review Panel
## as
## Submitted to USACE on September 13, 2011

## on the

## BBBS CR/DEIS

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**Charge Questions and Guidance to the Peer Reviewers**
**for the**
**Independent External Peer Review**
**of the**
**Barataria Basin Barrier Shoreline (BBBS) Restoration**
**Draft Construction Report and Draft Environmental Impact Statement (EIS)**

## BACKGROUND

The Barataria Basin Barrier Shoreline (BBBS) Restoration Study was identified as a critical near-term restoration project in the Louisiana Coastal Area, Louisiana Ecosystem Restoration Study Report (LCA Report 2004). Title VII of the Water Resources Development Act of 2007, P.L. 110-114, Section 7006(c)(1)(C), authorizes construction of the BBBS Restoration project in accordance with the restoration plan as outlined in the Report of the Chief of Engineers, contingent on completion of a construction report documenting any modifications to the Chief's report and approval of the Secretary of the Army.

The BBBS is a regional segment of the Gulf Coast of Louisiana situated between the west bank of the Mississippi River at the active delta and the eastern shore of Terrebonne Bay. The proposed action evaluated in this report is the shoreline and marsh restoration of two reaches of the BBBS: Caminada Headland and Shell Island. The Caminada Headland, forming the western portion of the Barataria Basin barrier system, has experienced some of the highest rates of shoreline retreat on the Louisiana or Gulf Coast. Shell Island used to enclose both Bastian Bay and Shell Island Bay, but has since disintegrated into several smaller islands and shoals and now consists primarily of open water with little beach or saline marsh habitat. Restoration of the shoreline and coastal marshes of Caminada Headland and Shell Island would restore critical habitat, form and function, and long-term sustainability of the barrier shoreline. The proposed action would help restore the diversity and sustainability of coastal habitats.

## OBJECTIVES

The objective of this work is to conduct an independent external peer review (IEPR) of the BBBS Restoration Draft Construction Report and Draft Environmental Impact Statement (EIS) (hereinafter: BBBS IEPR), in accordance with the Department of the Army, USACE, 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.

The purpose of the IEPR is to assess the "adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (EC 1165-2-209; p. D-4) for the BBBS IEPR documents. 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 or the Panel) with extensive experience in Civil Works planning, wetland ecology/biology, coastal geomorphology, coastal engineering, and hydrology/hydraulic engineering issues relevant to the project. They will also have experience applying their subject matter expertise to ecosystem restoration.

The Panel 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. Review panels should identify, explain, and comment upon assumptions that underlie all the analyses, and 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 members may offer their opinions as to whether there are sufficient analyses upon which to base a recommendation.

## DOCUMENTS PROVIDED

**Table D-1. Documents for the Panel**.

| | Title | Approx. No. of Pages | Required Disciplines |
|---|---|---|---|
| **Review** | LCA BBBS Draft Construction Report and Draft EIS | 419 | All |
| | Appendix A: Engineering | 1,404 | Coastal engineering; hydrology and hydraulic engineering |
| | Appendix B: Economics | 13 | Civil Works planning |
| | Appendix C: Real Estate Plan | 56 | Civil Works planning |
| | Appendix D: Environmental | 493 | Wetland ecology/biology; coastal geomorphology |
| **Reference** | 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 | | |

## SCHEDULE

This draft schedule (Table 2) is based on an NTP of 8/23/2011. **Due to likely future changes in teleconference dates, this schedule will be revised. The panel members will be kept updated on all relevant schedule changes.**

**Table D-2. Draft Schedule for IEPR**

| Task | Action | Days to Complete Action | Due Date |
|---|---|---|---|
| **Conduct Peer Review** | Battelle sends review documents to IEPR Panel | Within 1 day of panel members being under subcontract or submission of final Work Plan, whichever is later | 8/30/2011 |
| | Battelle/Panel hold kick-off meeting | Within 2 days of the Panel being under subcontract or submission of final Work Plan, whichever is later | 8/31/2011 |
| | USACE/Battelle/Panel hold kick-off meeting | Within 2 days of the Panel being under subcontract or submission of final Work Plan, whichever is later | 8/31/2011 |
| | Battelle convenes mid-review teleconference for Panel | At the halfway point of the Panel's review | 9/7/2011 |
| | Panel members complete their individual reviews | Within 7 days of Battelle/Panel kick-off meeting | 9/12/2011 |
| **Prepare Final Panel Comments and Final IEPR Report** | Battelle provides the Panel merged individual comments and talking point | Within 2 days of panel members completing their review | 9/14/2011 |
| | Battelle convenes Panel Review Teleconference | Within 3 days of panel members completing their review | 915/2011 |
| | Final Panel Comments finalized | Within 4 days of receipt of draft Final Panel Comments | 9/28/2011 |
| | Battelle provides Final IEPR Report to the Panel for review | Within 1 day of Final Panel Comments being finalized | 9/29/2011 |
| | Panel provides comments on Final IEPR Report | Within 1 day of receipt of Final IEPR Report | 9/30/2011 |
| | *Battelle submits Final IEPR Report to USACE | Within 1 day of panel members providing draft Final Panel Comments | 10/4/2011 |
| **Comment/ Response Process** | Battelle convenes teleconference with Panel to review the Comment Response Process (if necessary | Within 2 days of submittal of Final IEPR Report | 10/6/2011 |
| | USACE provides draft Evaluator Reponses to Battelle | Within 5 days of receipt of Final IEPR Report | 10/12/2011 |
| | Battelle provides the Panel the draft Evaluator Responses | Within 1 day of receipt of draft Evaluator Responses from USACE PDT | 10/13/2011 |
| | Panel members provide Battelle with draft comments on draft Evaluator (BackCheck) Responses | Within 2 days of receipt of draft Evaluator Responses from Battelle | 10/17/2011 |
| | Battelle convenes teleconference with Panel to discuss draft BackCheck Responses | Within 1 day of receipt of draft BackCheck Responses | 10/18/2011 |
| | Battelle convenes teleconference with Panel and USACE to discuss Final Panel Comments and draft responses | Within 5 days of USACE providing draft Evaluator Responses | 10/19/2011 |
| | USACE inputs final Evaluator Responses in DrChecks | Within 4 days of Final Panel teleconference | 10/25/2011 |
| | Battelle provides Evaluator Responses to Panel | Within 0 day of final Evaluator Responses being available | 10/25/2011 |
| | Panel members provide Battelle with final BackCheck Responses | Within 2 days of receipt of final Evaluator Responses | 10/27/2011 |
| | Battelle inputs the Panels BackCheck Responses in DrChecks | Within 3 days of notification that USACE final Evaluator Responses have been posted in DrChecks | 10/28/2011 |
| | *Battelle submits pdf printout of DrChecks project file | Within 1 day of DrChecks closeout | 10/31/2011 |

## CHARGE FOR PEER REVIEW

Members of this IEPR Panel are asked to determine whether the technical approach and scientific rationale presented in the BBBS IEPR documents are credible and whether the conclusions are valid. The Panel is 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 panel members are not being asked whether they would have conducted the work in a similar manner.

Specific questions for the Panel (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 BBBS IEPR documents. Please focus your review on the review materials assigned to your discipline/area 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 evaluating 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.

1. 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.
2. Please contact the Battelle Project Manager (Corey Wisneski, wisneskic@battelle.org) or Program Manager (Karen Johnson-Young (johnsonyoungk@battelle.org) for requests or additional information.
3. In case of media contact, notify the Battelle Program Manager, Karen Johnson-Young (johnsonyoungk@battelle.org) immediately.
4. Your name will appear as one of the panel members 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 Corey Wisneski, wisneskic@battelle.org, no later than September 12, 2011, 10 pm ET. This date is subject to change.**

**Independent External Peer Review**
**of the**
**Barataria Basin Barrier Shoreline (BBBS) Restoration Draft Construction Report and Draft Environmental Impact Statement (EIS)**

**Charge Questions and Relevant Sections as Supplied by USACE**

## 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. Were all models used in the analyses used in an appropriate manner?

5. Are the models used sufficiently discriminatory to support the conclusions drawn from them (i.e., identify meaningful differences between alternatives)?

6. Were risk and uncertainty sufficiently considered?

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

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

9. In your opinion, are there sufficient analyses upon which to base the recommendation?

10. Are the expected changes in the quality and abundance of desired ecological resources clearly and precisely specified in justifying the ecosystem restoration and protection investment?

11. Is the significance of the sought ecological resources clearly determined by institutionalized national goals (e.g., the ESA national goal to sustain native fish and wildlife, the NEPA goal to preserve natural heritage)?

12. Is the scarcity of the sought ecological resources characterized in terms of national abundance and significance (e.g., with indicators of low to high potential for sustainability)?

13. Is the distinctiveness of the sought ecological resources quality described in terms of national goals)?

14. Are forecast changes in sought ecological resource quality quantified so as to indicate achievement of national goals?

15. Is it clear that restoration of the desired ecological resource quality is a function of improvements in habitat quality or quantity?

16. Do planning models and procedures clearly link habitat improvement to the needs of the targeted ecological resources?

17. Do planning models and procedures adequately consider and provide for limiting factors beyond quality and quantity of habitat?

18. Is it clear that the restored ecological resource quality will be sustainable over the long run?

19. Are the risks facing successful restoration of sustainable ecological resource quality clearly shown to be managed and any residual risks identified in terms of: sufficient geophysical support (hydrology and geomorphology), sufficient environmental chemistry, sufficient biological support (e.g., food, habitat and systems-stabilizing species), and changes in climate and in the influential ecoregion (e.g., major land use changes).

20. Are the required long-term commitments (both Federal and non-Federal) to sustaining the restored ecological resource quality adequately described and adequately demonstrated?

**Chapter 2 - Problems, Opportunities, and Needs**

21. Are the problems facing the BBBS area accurately described?

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

23. Comment on whether the Barataria Basin Barrier Shoreline Restoration Project (BBBS) as proposed will contribute to national ecosystem restoration (NER) output.

24. Have the public concerns been identified?

25. Are the planning goals and objectives described clearly?

26. Comment on whether the BBBS Project as proposed will meet the planning objectives.

27. Are the planning constraints described clearly and comprehensively?

28. Comment on whether the BBBS Project as proposed fully considers and accounts for the planning constraints.

29. Do the identified problems, needs, constraints, and opportunities reflect a systems or ecosystem approach, addressing a geographic area large enough to ensure that plans address the cause and effect relationship among affected resources and activities that are pertinent to achieving the study objectives (i.e., evaluate the resources and related demands as a system).

**Chapter 3 - Alternatives**

30. Was a reasonably complete array of possible measures considered in the development of alternatives?

31. Are the management measures thorough and accurate?

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

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

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

35. Are the criteria for developing the plan comprehensive?

36. Did the formulation process follow the requirement to avoid, minimize, and then mitigate adverse impacts to resources?

37. Following the plan formulation screening process, does each alternative selected to be included in alternative plans meet the formulation criteria of being effective, efficient, complete and acceptable?

38. Were the assumptions made for use in developing the future with project conditions for each alternative reasonable? Were adequate scenarios considered? Were the assumptions reasonably consistent across the range of alternatives and/or adequately justified where different?

39. Are the changes between the without and with project conditions adequately described for each alternative?

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

41. Are the uncertainties inherent in our evaluation of benefits, costs, and impacts, and any risk associated with those uncertainties, adequately addressed and described for each alternative?

42. Are future Operation, Maintenance, Repair, Replacement, and Rehabilitation efforts adequately described and are the estimated cost of those efforts reasonable for each alternative?

43. Please comment on the screening of the proposed alternatives. Are the screening criteria appropriate? In your professional opinion are the results of the screening acceptable? Were any measures or alternatives screened out too early?

44. Were the engineering, economic, and environmental analyses used for this study consistent with generally accepted methodologies? Why or why not?

45. Does any alternative include identified separable elements (a portion of a project that is physically separable, and produces hydrologic effects or physical or economic benefits that are separately identifiable from those produced by other portions of the project)? If so, is each identified separable element independently justified and are the benefits, costs, and effects of the separable elements correctly divided?

46. How accurate and comprehensive is the calculation of costs and outputs used to determine the cost effective and best buy alternatives?

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

48. Is each of the different alternative plans clearly described?

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

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

51. 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. How risk and uncertainty is handled

    f. Whether the best data sources are used

**Chapter 3.6.2 – Cost Effectiveness and Incremental Cost Analysis**

52. To what extent have significant project design and construction costs been adequately identified and folded into the cost and benefit evaluation?

53. Is the calculation of net benefits used to describe the final array of alternatives adequate?

54. How complete and valid is the methodology used to conduct the incremental cost analysis?

**Chapter 3.8 – Plan Selection**

55. Is the NER plan sufficiently detailed?

56. Is the tentatively selected plan sufficiently detailed?

57. Are the design, environmental, and construction considerations outlined for the tentatively selected plan appropriate and adequate?

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

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

60. Have the operations and maintenance considerations of the tentatively selected plan been addressed?

61. Are the descriptions of the risk and uncertainties associated with the development, selection, and construction of the tentatively selected plan sufficiently comprehensive?

62. Comment on whether you agree or disagree with how the selected alternative was formulated and selected. Comment on the plan formulation. Does it meet the study objectives and avoid violating the study constraints?

63. Are there any unmitigated environmental impacts not identified and if so could they impact plan selection?

64. Please comment on the likelihood of the recommended plan to achieve the expected outputs.

65. Please comment on the completeness of the recommended plan (i.e., will any additional efforts, measures, or projects be needed to realize the expected benefits?).

66. Please comment on the appropriateness of location, sizing and design of plan features.

67. Does the preferred alternative give adequate consideration to ongoing or planned projects within the project area?

68. Have the impacts to existing infrastructure, such oil and gas infrastructure, been adequately addressed?

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

70. Are the proposed actions/solutions for addressing the potential issues surrounding privately owned lands adequate?

**Chapter 3.8.12 - Monitoring Plan and Adaptive Management**

71. Are the performance measures, desired outcomes, and monitoring designs for each of the project objectives sufficiently detailed?

72. Are the proposed monitoring procedures appropriate and adequate?

73. Is the monitoring program assessment process appropriate and thorough?

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

**Chapter 4 - Affected Environment**

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

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

77. Is the description of the geomorphic and physiographic setting of the proposed project area accurate and comprehensive?

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

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

80. Is the discussion on the relationship between flow and water levels and the hydrodynamics of the project area complete?

81. Are the factors affecting estuarine circulation adequately discussed? Based on your experience, are there additional factors to be considered?

82. Is the description of the historical and existing sedimentation and erosion conditions in the study area adequate?

83. Are the water quality and salinity discussions sufficient to allow for an evaluation of the effects of implementation of the proposed plan compared to current baseline conditions?

84. Is the description of the historical and existing wetland vegetation resources in the study area adequate?

85. Is the description of the historical and existing vegetation resources in the study area adequate?

86. Is the description of the historical and existing wildlife and habitat resources in the study area complete and accurate?

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

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

89. Is the discussion on shrimp, crabs, and oysters sufficient to allow for an evaluation of the effects of implementation of the proposed plan compared to current baseline conditions?

90. Is the description of threatened and endangered species resources in the study area complete and accurate?

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

92. Is the description of the historical and existing socioeconomic resources in the study area complete and accurate?

93. Public lands, navigation, and natural resources (esp. petrochemicals, fisheries, and oysters) are of major importance to the population in the study area. Have the existing and historic conditions been characterized properly?

**Chapters 4 and 5 - Existing and Future Without-Project Resources**

94. Has the character and scope of the study area been adequately described and is the identified study area appropriate in terms of undertaking a systems/ecosystem based investigation?

95. Do you agree with the general analyses of the existing social, financial, and natural resources within the study area?

96. For your particular area of expertise, provide an in-depth review of whether the analyses of the existing social, financial, and natural resources within the project area are sufficient to support the estimation of impacts of the array of alternatives.

97. Given your area of expertise, does this section appropriately address the existing conditions of all resources pertinent to the study?

98. Were there surveys conducted to evaluate the existing social, financial, and natural resources adequate? If not, what types of surveys should have been conducted?

99. Were socioeconomic conditions adequately addressed? Were specific socioeconomic issues not addressed?

100. Was the hydrology discussion sufficient to characterize current baseline conditions and to allow for evaluation of how forecasted conditions (with and without proposed actions) are likely to affect hydrologic conditions? Please comment on the completeness of the discussion on the relationship between subsurface hydrology and the hydrodynamics of the project area.

101. Was the discussion of natural resources sufficient to characterize current baseline conditions and to allow for evaluation of forecasted conditions (with and without proposed actions)?

102. Were the assumptions used as the basis for developing the most probable future without project conditions reasonable? Were adequate scenarios effectively considered (applied during analyses where relevant and/or reasonably investigated)? Were the potential effects of climate change addressed?

103. Are the future conditions expected to exist in the absence of a Federal project logical and adequately described and documented?

104. Please comment on the conclusion of the most probable future without project condition. Do you envision other potential probable outcomes?

**Chapter 5 - Environmental Consequences**

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

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

107. Have the short- and long-term impacts associated with the alternatives been adequately discussed and evaluated?

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

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

110. Are environmental effects of changes to sedimentation and erosion from the alternatives reasonable and factually supported?

111. Are environmental effects of changes to water quality and salinity from the alternatives reasonable and factually supported?

112. Are the suspended particulate/turbidity determinations appropriate?

113. Are environmental effects of changes to air quality from the alternatives reasonable and factually supported?

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

115. Is the description of projected impacts to aquatic resources for each of the alternatives reasonable and factually supported?

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

117. To what extent have the potential impacts of the alternatives on cultural resources been addressed and supported?

118. Have the potential impacts to recreation resources from the alternatives been adequately considered?

119. 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 additional public outreach and coordination activities be conducted?

**Engineering Appendix**

120. Have the design and engineering considerations presented been clearly outlined?

121. Are any additional design assumptions necessary to validate the preliminary design of the primary project components?

122. To what extent have significant project construction costs been adequately identified and described?

123. Are the assumptions used to develop the stages of cost estimating for the project: conceptual cost estimate, the refined conceptual cost estimate, and the preliminary cost estimate sufficiently clear?

124. Is the rationale clearly presented for the progressive refinements of the cost estimate?

125. Has the feasibility of constructing the proposed measures been adequately addressed?

126. Are the Wave Information Studies (WIS) baseline data, land/water surveys, and shoreline changes estimates for use in coastal processes modeling adequate and valid? Are these data sufficient to conduct a valid analysis of coastal processes?

127. Based on past storm events (wave height and volume losses), are the results from the SBEACH model reasonable and the ability of the model to predict project success adequate?

128. Has the role of background erosion and sea level rise been adequately considered in the model analysis?

129. Is the proposed borrow material well-suited for beach fill material from an engineering, economic, and environmental standpoint?

130. Is the volume of available borrow material a factor in future nourishment activities?

131. Are the available geotechnical data to predict offshore borrow locations, characteristics, and construction activities adequate?

132. Were the technical assumptions used to determine the proposed barrier island components and hard-structural measure designs valid?

133. What other assumptions should be included to justify the preliminary design?

134. Are the proposed construction methods and sequence outlined for the off-shore dredging, transportation and placement of the borrow, beach, and dune fill material appropriate and adequate?

135. Is the length of the estimated time for construction adequate?

136. Have all the significant issues been taken into consideration in estimating construction timeframe?

137. Are the assumptions used to determine the cost of operations and maintenance for the proposed project adequate?

**Economics Appendix**

138. Comment on the extent to which assumptions and data sources used in the economics analyses are clearly identified and the assumptions are justified and reasonable.

139. Comment to the extent to which significant uncertainties in the analyses have been identified, addressed, and quantified.

**Real Estate Appendix**

140. Comment on the extent to which assumptions and data sources used in the economics analyses are clearly identified and the assumptions are justified and reasonable.

**Environmental Appendix**

141. Is the biological assessment of aquatic and terrestrial resources in the project area complete and accurate?

142. Comment on the extent to which assumptions and data sources used in the biological assessment are clearly identified and the assumptions are justified and reasonable.

143. Are the impacts of the recommended plan as it relates to designated and proposed critical habitat and essential fish habitat adequately described in the biological assessment?