

Enclosure 3

**Summary of
Independent External Peer Review
Final Panel Comments**

November 5, 2010

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Independent External Peer Review
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EXECUTIVE SUMMARY

Type I independent external peer reviews (IEPRs) assess the economic, engineering, and environmental aspects of a project study. In particular, IEPRs address the technical soundness of the project study's assumptions, methods, analyses, and calculations, and identify the need for additional data or analyses to make a good decision regarding implementation of alternatives and recommendations. Subject matter experts (IEPR panel members) with experience in issues relevant to the project conduct the reviews.

The long-term value of peer-reviewed comments is continuous learning and process improvement. This report is based upon input from Battelle Memorial Institute and National Research Council of the National Academies. In accordance with reporting requirements described in Section 2034 (i)(1), and to ensure that the long-term value was being achieved, this assessment was performed, which is a meta-analysis of the Final Panel Comments produced in the IEPRs managed to date.

The IEPR panels and model reviewers have generated several hundred Final Panel Comments and most of them have been presented in a standardized four-part format: (1) a clear statement of the comment, (2) the basis for the comment, (3) significance of the comment (high, medium, or low), and (4) recommendations to resolve the comment, including recommendations of additional research or analysis that may influence the conclusions.

This report compiled and categorized 508 comments from 28 projects according to study name, comment type, and significance. Final Panel Comments were analyzed based on:

- Four business lines, also corresponding to USACE Planning Centers of Expertise (PCX), were represented in the 508 Final Panel Comments: Coastal Storm Damage Reduction (CSDR); Deep Draft Navigation (DDN); Ecosystem Restoration (ECO); and Flood Risk Management (FRM).
- Disciplines associated with DrChecks (Design Review and Checking System). Final Panel Comments fell into 10 of the 74 categories of the DrChecks technical disciplines, plus an additional three new categories....

The Final Panel Comments each had a level of significance assigned to them. The overall number of Final Panel Comments varied by project and ranged from 11 to 40, with an average of 18 comments per project.

Overall, most Final Panel Comments focused on the need for improved documentation (e.g., assumptions, methods, and rationale) and additional or more rigorous analyses. Other issues frequently encountered included readability (e.g., clarity of figures, cross referencing to appendices, redundancy), concerns with model application, and comprehensiveness of adaptive management and monitoring plans. A summary of important issues is presented below.

Documentation

- Important information, such as details to support alternative selection, are either missing or buried in the appendices and need to be presented in the main document.
- More details to help lead the reader to the recommended plan need to be included. Details that are well known to the project team but not known by the reader/public are often missing.
- The purpose and need should clearly detail the problem and why the project is needed. It should be written as if the reader knows nothing of the project history.
- Assumptions used should be documented.

Analyses

- An evaluation of all related costs needs to be included in the comparison of alternatives.
- All alternatives should undergo a similar level of detailed comparison. No alternative should be added at a later stage without a full comparison to the original alternatives.
- Sea level rise must be considered among the alternatives.
- Some analyses (e.g., economics) are based on incomplete, outdated, or questionable data.

Other

- The monitoring plans and adaptive management plans for ECO and CSDR projects need to be more comprehensive. Monitoring plans need to consider the overall restoration.
- The use of a model needs to include the rationale as to why a specific model and version of the model was used, how it was used to determine impacts, and how it was incorporated into the alternative comparison.
- Most reports appear prepared by multiple authors and therefore the presentation of the information is sometimes confusing or redundant and affects the readability.
- Figures and tables could be improved for clarity (e.g., some are unreadable), to better support the documentation, and to illustrate the project area.

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LIST OF ACRONYMS

BBCW	Biscayne Bay Coastal Wetlands
CECW-CP	Corps of Engineers Directorate of Civil Work, Community of Planning
CSDR	Coastal Storm Damage Reduction
DDN	Deep Draft Navigation
DEIS	Draft Environmental Impact Statement
DFR	Draft Feasibility Report
DMMP	Dredged Material Management Plan
DrChecks	Design Review and Checking System
EC	Engineering Circular
ECO	Ecosystem Restoration
EIS	Environmental Impact Statement
ERDC	Engineering Research and Development Center
ESH	Emergent Sandbar Habitat
FR	Feasibility Report
FRM	Flood Risk Management
GRR	General Reevaluation Report
HEC-RAS	Hydrologic Engineering Center-River Analysis System
H&H	Hydrology and Hydraulics
ICA	Incremental Cost Analysis
IEPR	Independent External Peer Review
LaCPR	Louisiana Coastal Protection and Restoration
LRR	Limited Reevaluation Report
MsCIP	Mississippi Coastal Improvement Plan
NED	National Economic Development
NEPA	National Environmental Policy Act
OMB	Office of Management and Budget
PIR	Project Implementation Report
PTR	Preliminary Technical Report
PCX	Planning Center of Expertise
SNWW	Sabine-Neches Waterway
USACE	United States Army Corps of Engineers
WRDA	Water Resources Development Act
WVA	Wetland Value Assessment

1.0 INTRODUCTION

The objective of this work is to report a summary of the Final Panel Comments collected as part of the Independent External Peer Review (IEPR) process. Independent review ensures the quality and credibility of U.S. Army Corps of Engineers (USACE) decision documents. Type I IEPRs follow the procedures described in the Department of the Army, U.S. Army Corps of Engineers, Water Resources Policies and Authorities' *Civil Works Review Policy* (Engineering Circular (EC) 1165-2-209) dated January 31, 2010; CECW-CP Memorandum dated March 31, 2007; and the Office of Management and Budget's (OMB) *Final Information Quality Bulletin for Peer Review* released December 16, 2004. Provisions in the Water Resources Development Act (WRDA) of 2007 (Section 2034) reinforce and add further definition to the Type I IEPR USACE review processes. WRDA 2007, Public Law 110-114, not only authorizes Civil Works programs, projects, and studies, but requires USACE to conduct external peer reviews for project studies. Type I IEPRs have been conducted for several types of decision documents, including Feasibility Reports (FR), Environmental Impact Statements (EIS), General Reevaluation Reports (GRR), Limited Reevaluation Reports (LRR), Project Implementation Reports (PIR), Dredged Material Management Plans (DMMP), as well as Technical Reports and Appendices.

This purpose of the IEPR is to assess the adequacy and acceptability of the economic, engineering, and environmental methods, models, data, projections, and analyses performed for USACE projects. The IEPRs are limited to technical review and do not involve policy review. 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.

As part of the review process, each study team with the assistance of a Planning Center of Expertise, a charge to the IEPR panel members is prepared with instructions regarding the objective of the IEPR and the specific input sought. The charge directs the panel members to respond to specific charge questions focused on individual sections of the document. In accordance with EC 1165-2-209, the IEPR panel members should identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods. Review panels should be able to evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable. Reviews should focus on assumptions, data, methods, and models. The panel may offer opinions as to whether there are sufficient analyses upon which to base a recommendation. The charge is finalized based on technical direction received from USACE.

The panel's responses to the charge questions are discussed in a teleconference to identify the issues that will be presented to the USACE as Final Panel Comments and represent the key findings of the IEPR panel as a whole. A significance level is identified for each Final Panel Comment. Following the teleconference, each panel member writes his or her Final Panel Comments (Figure 1) following a four-part format: (1) a clear statement of the comment; (2) the basis for the comment; (3) significance of the comment (high, medium, or low); and (4)

recommendations to resolve the comment (including additional research or analysis that may influence the conclusions). Significance definitions are as follows:

- High: A fundamental problem with the project could affect the recommendation or justification of the project
- Medium: Affects the completeness or understanding of the reports/project
- Low: Affects the technical quality of the reports, but will not affect the recommendation of the project.

This assessment focused on 28 Type I IEPR projects (Table 1) that have been completed.

Table 1. Type I IEPRs Used in the Analysis of Final Panel Comments.

Official Project Name	Reference
Independent External Peer Review of the Geotechnical and Economic Aspects of Continuing Deficiency Corrections Letter Report, Alton to Gale Organized Levee Districts, Illinois and Missouri.	Alton to Gale
Independent External Peer Review (IEPR) Louisiana Coastal Area (LCA) Restoration, 6 Projects: Amite River Diversion Canal Modification,	Amite
Independent External Peer Review (IEPR), Biscayne Bay Coastal Wetlands (BBCW) Project Implementation Report (PIR)	Biscayne Bay
Boston Harbor Navigation Improvement Project, Massachusetts, Feasibility Study	Boston Harbor
General Re-Evaluation Report and Supplemental EIS for Brevard County, Florida: Mid-Reach Shoreline Protection Project	Brevard County
Independent External Peer Review (IEPR) Western C-111 Spreader Canal (C111SC) Project Implementation Report (PIR) and Review of the C-111 SC Ecological Model.	C-111
External Peer Review for the Calcasieu River and Pass, Louisiana Dredged Material Management Plan and Supplemental Environmental Impact Statement	Calcasieu
Engineering, Economic, and Environmental Re-Evaluation of the Geotechnical, Hydrological, Hydraulic and Economic Aspects of Flood Risk Reduction Report, Clear Creek, Texas – Independent Technical Review and Model Certification	Clear Creek
Common Features General Re-Evaluation Report (Does not include the Natomas Review)	Common Features
Independent External Peer Review (IEPR) Louisiana Coastal Area (LCA) Restoration, 6 Projects: Small Diversion at Convent/Blind River	Convent Blind
Independent External Peer Review (IEPR) Louisiana Coastal Area (LCA) Restoration, 6 Projects: Convey Atchafalaya River Water to Northern Terrebonne Marshes	Convey Atchafalaya
Independent External Peer Review (IEPR) East Branch Dam, Elk County, Pennsylvania: Dam Safety Modification Study	East Branch Dam

Table 1. Type I IEPRs Used in the Analysis of Final Panel Comments – Continued.

Official Project Name	Reference
Engineering, Economic, and Environmental Review of the Geotechnical and Economic Aspects of Limited Reevaluation Report and Environmental Assessment on Design Deficiency Corrections, East St. Louis Flood Protection Project, East St. Louis, Illinois.	East St. Louis
Mechanical Creation and Maintenance of Emergent Sandbar Habitat on the Upper Missouri River Independent External Peer Review	ESH
Fargo-Moorhead Metropolitan Flood Risk Management Feasibility Study, North Dakota and Minnesota	Fargo-Moorhead
External Peer Review for Freeport Harbor Texas Feasibility Report	Freeport Harbor
L-31N Seepage Management Pilot Project, Draft Integrated Pilot Project Design Report Environmental Assessment	L31N
External Peer Review Mid-Chesapeake Islands (Mid-Bay) Ecosystem Restoration	Mid-Bay
Mississippi Coastal Improvement Plan (MsCIP) External Peer Review for the Comprehensive Plan	MsCIP
Independent External Peer Review, Navigation and Ecosystem Sustainability Program, Project P2, Lock and Dam 22 Fish Passage Improvement Project Implementation Report (L/D 22 Fish Passage PIR)	NESP
San Clemente Storm Damage and Shoreline Protection Feasibility Study	San Clemente
External Peer Review of the Sabine-Neches Waterway (SNWW) Channel Improvement Project (CIP) Draft Feasibility Report and Draft Environmental Impact Statement	SNWW
Draft Integrated Feasibility Report and Environmental Impact Statement for Surf City and North Topsail Beach, North Carolina	Surf City
St. Johns Bayou and New Madrid Floodway, MO, Consolidated NEPA Document and Work Plan Environmental, Economic, and Hydrologic and Hydraulic Review - Independent External Peer Review	St. Johns
EPR and Model Certification, Tamiami Trail Limited Re-Evaluation Report	Tamiami Trail
Independent External Peer Review (IEPR) Louisiana Coastal Area (LCA) Restoration, 6 Projects: Terrebonne Basin Barrier Shoreline Restoration	Terrebonne
Independent External Peer Review (IEPR) Louisiana Coastal Area (LCA) Restoration, 6 Projects: Medium Diversion at White Ditch	White Ditch
Final Report from the NRC Committee on the Review of the Louisiana Coastal and Protection and Restoration (LaCPR) Program	LaCPR

2.0 MATERIALS AND METHODS

The 508 comments from 28 projects have been entered into a comprehensive Excel matrix using the following headers: Study Name, Comment, and Significance. Only studies which had submitted the final report and uploaded Final Panel Comments into DrChecks were selected. These comments were analyzed based on the following categories: (1) four Civil Works business lines of the IEPR projects, and (2) disciplines relevant to the review.

Business Lines

IEPRs have been conducted for four different USACE Civil Works business line – Coastal Storm Damage Reduction (CSDR), Deep Draft Navigation (DDN), Ecosystem Restoration (ECO), and Flood Risk Management (FRM). All Final Panel Comments were reviewed and classified into one of these four business lines.

2.1 Disciplines

DrChecks (Design Review and Checking System), which is integral to the USACE internal/agency review process and is used for the IEPRs, lists 74 disciplines. It was determined that using these disciplines as the basis of categories for comments, was the most efficient for analyzing the Final Panel Comments. A review of the 74 disciplines showed that the Final Panel Comments could be classified into 10 of the 74 DrChecks disciplines, and that three additional disciplines (denoted by an asterisk in Table 2) were required to more clearly classify the Final Panel Comments. It should also be noted that DrChecks does not provide a definition of the disciplines and therefore definitions had to be developed to use for this analysis. Table 2 lists the 13 disciplines used to review and classify all the Final Panel Comments.

Table 2. Discipline Categories and Details

Discipline	Details
* Climate Change/ Sea Level Rise	Included due to the release of EC 1165-2-211 Incorporating Sea-Level Change Considerations in Civil Works Programs.
Communications	Includes communication between USACE and the public and other agencies
Construction Management	NA
Cost Engineering	Includes all associated project costs
Design	NA
Economics	NA
* Engineering	Includes engineering management, engineering support, environmental engineering,
Environmental	Includes ecology, habitat (e.g., wetlands), air quality, and biota , sediment, and water quality
Geotechnical	Includes issues affecting subsurface geological conditions and levees
Hydraulics and Hydrology	Hydraulics includes flow of liquids in pipes, rivers, and channels and their confinement by dams; hydrology includes properties, distribution, and affects of water on the earth's surface, in the soil and underlying rocks
* Model	Includes inputs and outputs of models and modeling tools
Other	Includes formatting and editorial issues affecting technical quality
Plan Formulation	NA

* Indicates this is a new category

3.0 RESULTS

The number of Final Panel Comments varied greatly by project. Figure 1 illustrates the distribution of the 508 comments to each project. These results are presented for illustration purposes only and do not imply that one project (e.g., review documents) was better than another based on the number of Final Panel Comments. The Final Panel Comments specifically address the quality of the review documents, depiction of the planning process, and intended implementation of the project. The following discussion is organized by business line, and discipline. Some Final Panel Comments presented as examples could be assigned to more than one category; thus there may be some duplication in the examples provided.

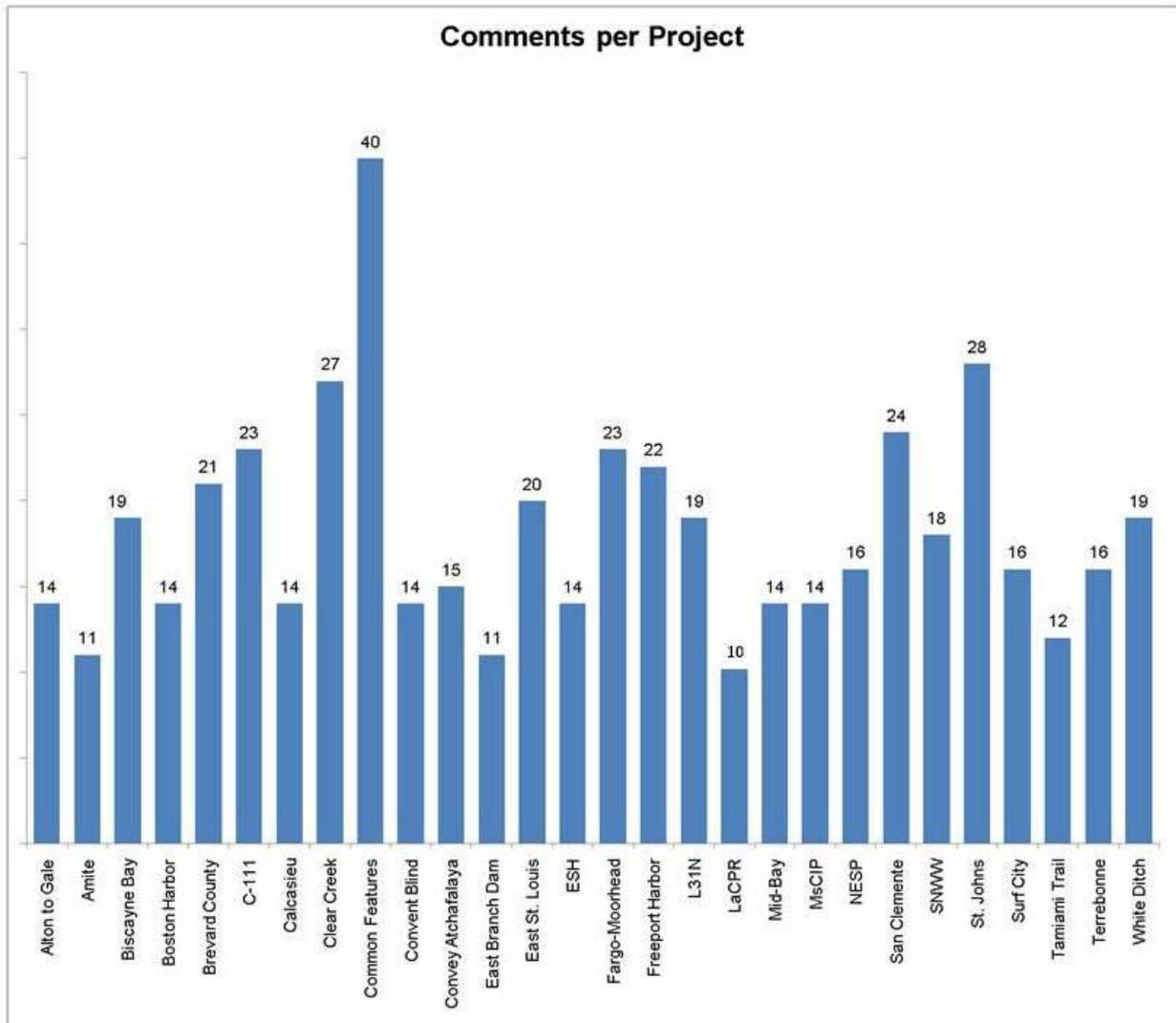


Figure 1. Number of Final Panel Comments by Project
(Note: Common Features project involved a review of technical appendices only)

3.1 Results and Analysis by Business Line

IEPRs for four business lines, and this assessment analyzes the comments received for them. Table 3 presents the projects by business line and gives the total number of comments for all projects associated with each business line. CSDR, DDN and ECO all had an average of 18 comments per project (range: 16-18.6); FRM had an average of 23 comments per project.

Table 3. Number of Comments by Project within Each Business Line.

CSDR (85)		DDN (68)		ECO (192)		FRM (163)	
Brevard County	21	Boston Harbor	14	Amite	11	Alton to Gale	14
LACPR	10	Calcasieu	14	Biscayne Bay	19	Clear Creek	27
MsCIP	14	Freeport Harbor	22	C-111	23	Common Features	40
San Clemente	24	SNWW	18	Convent Blind	14	East Branch Dam	11
Surf City	16			Convey Atchafalaya	15	East St. Louis	20
				ESH	14	Fargo-Moorhead	23
				L31N	19	St. Johns	28
				Mid-Bay	14		
				NESP	16		
				Tamiami Trail	12		
				Terrebonne	16		
				White Ditch	19		

Of the 508 comments, 39% (200) were classified as high, which describes a fundamental problem with the project that could affect the recommendation, justification, or success of the project. Forty-two percent (211) were rated medium, which signifies an issue with the completeness or understanding of the reports/project. The remaining 19% (97) were rated low due to the technical quality of the reports, but not serious enough to affect the recommendation of the project. The majority of the comments were rated as high or medium significance. As shown in Figure 2, comments at all significance levels were distributed among all four business lines.

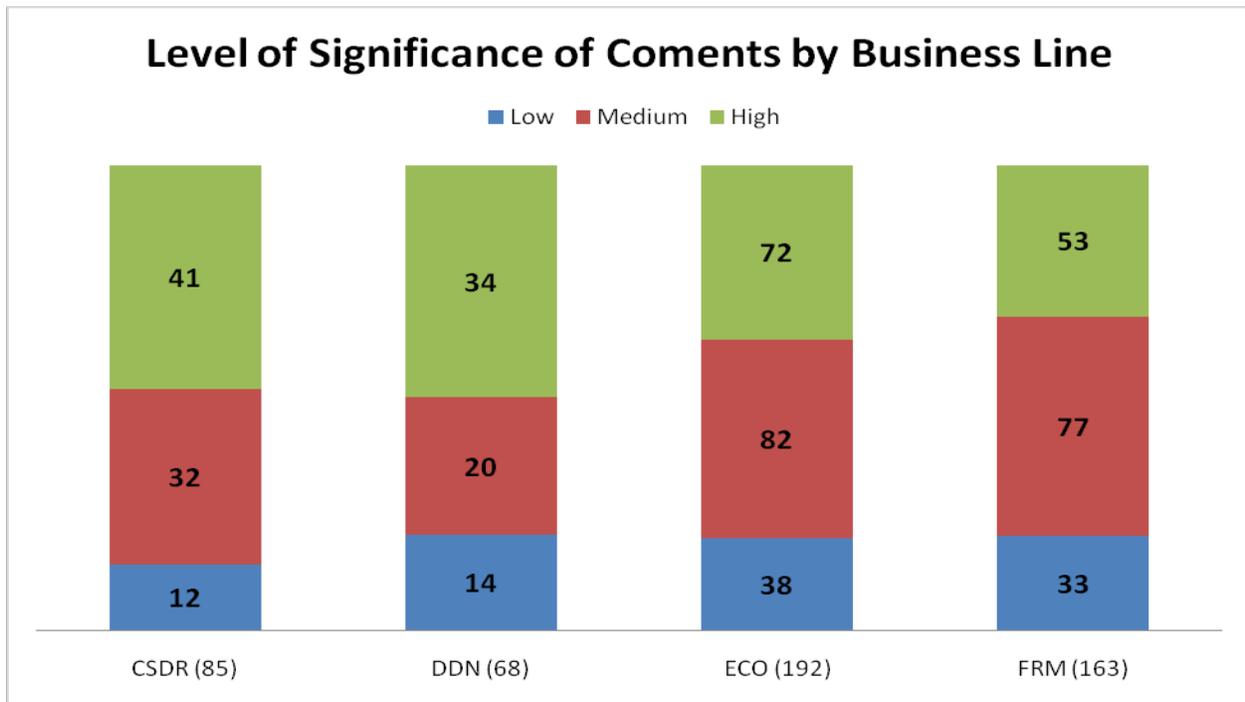


Figure 2. Number of Comments at Each Level of Significance for Each Business Line.

While the peer review panels reviewed a variety of documents for each business line, there were some types of comments that arose multiple times. These repeated comments are summarized for each business line in the following subsections.

3.1.1 Coastal Storm Damage Reduction (CSDR)

A frequent comment provided to the **CSDR** was that the design analyses were deficient and that a more refined analysis of design and build needed to be conducted. The panel indicated that it was necessary to detail inputs and assumptions of models and that calculations of sea level rise, which are outdated, should be reviewed. Reviewers commented that tradeoffs between restoration alternatives needed to be identified and a formal evaluation conducted. Overall, panel members asked for more detailed description of protection and human and recreational uses of the coast in the economic and environmental analyses. These reports were complimented on their recognition of and information on environmental baseline and coastal resources.

The following are examples, extracted directly from final reports, of Final Panel Comments for CSDR projects.

- The effects of relative sea level rise need to be explained more explicitly, taking into account local effects in addition to global effects and incorporating recent studies.
- It is unclear how relative sea level rise (RSL) is incorporated.
- The second major weakness identified by the reviewers was inadequate discussion of the protection of human uses of the coast.

- More details on the 2008 profile data and template designs should be included to enable verification of quantities as part of justifying the engineering design.
- The preliminary evaluations of the Hurricane Storm Damage Reduction, erosion control, and ecosystem restoration need more explanation. For example it is unclear if dynamic habitat models and geomorphic evolution are considered.
- The discussion of forecast and future conditions, especially with regard to sea level rise and water availability, is not comprehensive and needs to be expanded to include more quantitative analysis and graphical explanation.
- More detailed examination of the impacts of future sea level rise on the project is warranted.
- The recreation benefits analysis omits overnight users, lacks an explanation for selecting the contingent valuation benefit estimate over the travel cost benefit estimate, and omits a discussion of congestion, all three of which can be addressed with existing project data or literature.
- Additional risk and uncertainty analysis is necessary to address the assumptions and inherent variability in project costs, property values, climate change, and recreation.
- Some elements of project monitoring are missing and an adaptive management plan needs to be developed.
- Local data sets and prior analyses on longshore sediment transport, wave height, and background erosion rate have not been fully discussed.

3.1.2 Deep Draft Navigation (DDN)

The reviewers of the **DDN** reports commented that assumptions regarding future business (e.g., trucking costs, longshoreman association fees, cement industry, transportation costs) and the benefits provided were not supported by analysis; long-term sustainability needs to be a consideration. There were many comments about the impacts on biological resources and habitat, with issues such as dredged rock, oil and gas, sediment management, and hurricane storm surge identified as needing further evaluation. Reviewers observed that the evaluation of alternatives was too cursory and would benefit from a more detailed background of prior studies and additional input from the public and other agencies. Some estimates were questionable as they were based on ranges and averages, and required detailed inputs to clarify the estimates. In general, many of the Final Panel Comments fell into the categories of economic benefits, models, vessels, dredging, and alternative analysis.

The following are examples, extracted directly from final reports, of Final Panel Comments for DDN projects.

Economic Benefits

- The benefits estimates cannot be validated from the report material, and include some questionable uses of ranges and averages.
- The choice of project design vessel appears to drive the project design and benefits estimates, yet remains unjustified in the report.
- Incremental trucking costs between Port of New York and New Jersey - New York Harbor (PONYNJ) and Boston Harbor (BH), which are presented to constitute a major

proportion of the National Economic Development (NED) benefits (shipper savings) for the project, are not analytically supported. Moreover, the actual total transportation costs savings to shippers are a function of the total transportation costs, vessel, port, landside and related inventory (transit time) costs, which are far more than land side trucking costs.

- The benefits to the cement industry are entirely speculative and pending contractual commitments, and there is no supporting documentation related to vessel costs, markets served, delivered prices, etc., in competition with other ports and existing domestic suppliers.
- Economic benefits which will accrue to foreign flag carriers may not be fully passed on to U.S. shippers, and the report does not provide any recognition of this.
- There is insufficient detail or documentation to determine the validity of the transportation cost benefits.
- The potential benefits of the project are not supported by the analysis in the report

Models

- The ERDC, HarborSym, and @ risk models were used in crucial analyses, but the analyses lack documentation.
- Wave transformation and sediment transport processes are inadequately evaluated using STWAVE and GENESIS models.
- The hydrodynamic modeling did not fully support the alternative analysis. It is not clear that the lateral extents of the model are sufficient to fully model the system.

Vessels

- The report does not present a strong analysis of the current and future vessel fleet, or of vessel dimensions.
- The crucial analysis of vessel design and sailing drafts is inadequately supported by data and appears questionable.
- There is no comprehensive description of existing vessel operations.

Dredging

- Several dredging issues should be clarified to increase confidence in predictive capability and possibly reduce dredging and adjacent beach erosion.
- Options to reduce the dredging requirement (average rate of dredging) should be investigated.

Alternative Analysis

- The evaluation of the alternatives is too cursory, both at the initial screening and the subsequent discussion of chosen alternatives.
- The alternatives analysis ignores major non-structural alternatives.
- The risk from oil and chemical spills for all alternatives has not been addressed.
- A detailed description of the no action and the without project alternatives must be presented in comparison to the recommended plan.

- The long-term sustainability of the project, beyond a 20-year time period, needs to be considered in the comparison of project alternatives and in the assessment of project impacts.

3.1.3 Ecosystem Restoration (ECO)

One of the predominant comments for the **ECO** reports was that both current and future issues and threats (e.g., water quality, climate change, invasive species, mercury release, or sea level rise) should be addressed. Distributions and abundance of species and habitats should be described in greater detail, alternatives should address ecological processes and cycles, and monitoring plans need to be described. The panel commented that all alternatives should be assessed with the same rigor. Panel members indicated that inputs to models and calculations should be detailed and required additional descriptions of how the models were used. Panelists observed that the background of the existing systems would benefit from additional literature searches, and that figures should be improved throughout. They were concerned that project goals and outside requirements (e.g., Comprehensive Everglades Restoration Plan) should be met. In general, many of the Final Panel Comments fell into the categories of hydrology and hydraulics, monitoring, environmental impacts, costs, and models.

The following are examples, extracted directly from final reports, of Final Panel Comments for ECO projects.

Hydrology and Hydraulics

- Connectivity between the salt marsh and estuary is unclear both during and post construction.
- The report does a poor job of describing the overall general pattern of water flow through the system and describing what areas will be impacted by different alternatives.
- Further clarification is needed on the relationship between the water available for diversion and the hydrologic regimes necessary to achieve the target level of wetland area/function.
- The hydrology sections do not provide sufficient information to evaluate the effects of implementing the proposed plan compared to the baseline
- Sediment transport modeling was not performed to support statements that the project will distribute sediments to the study area, and conflicting/misleading statements regarding sediment delivery must be addressed.
- The accuracy of the predicted effects of storm events and sediment transport is uncertain.
- The hydrology discussion is not complete, and the links between the hydrology and vegetative communities need to be explained.

Monitoring

- Each of the processes and functions included in the performance measures directly or as contributing functions should be monitored under a plan with significant geospatial dispersion.
- The Draft Project Monitoring Plan does not sufficiently address the stated project goals, and if implemented, would not detect changes in the ecosystem and water quality.

- Given that this is a system driven by cycles, the monitoring program should identify and be responsive to natural environmental cycles.

Environmental Impacts

- Water quality impacts associated with construction and the potential negative impacts of resettled suspended sediment to submerged aquatic vegetation (SAV) and natural oyster beds (NOBs) were not addressed.
- The existing ecological conditions are unclear, which makes it difficult to assess the potential impacts of the project alternatives.
- Several of the alternatives may result in increased phosphorus inputs to Taylor Slough. Their possible impacts on future vegetation (i.e., increased area of cattails), and how this increase in inputs might be controlled, needs to be addressed.
- The assumption that long-term environmental impacts associated with the pilot project will be similar to those for the full scale project is not proven, and long-term impacts of the pilot project were not fully discussed.
- The impacts are generally well described from the perspective of the project, but not necessarily from the perspective of the affected ecosystems or organisms.
- The operation and management plan should be expanded to include actions designed to meet ecological goals, specifically pulsed and extended dry periods.
- The flood control impacts of the proposed improvements are not properly documented or addressed.
- The “no-rise” impact should be a pre-determining factor and not a post-determining analysis.
- The overall impacts and benefits of the various alternatives is not supported by the PIR due to uncertainties in the accuracy of the model (MODBRANCH), data and assumptions used to compare the alternatives.

Costs

- Without a list of detailed assumptions, the reader cannot accurately determine that the initial construction costs and amortized/annual operation and maintenance (O&M) costs are valid.
- Some of the uncertainties associated with possible construction activities could add significant costs to the project.
- Critical elements of the future cost analysis lack sufficient detail and contain inconsistencies that could impact the selection of the preferred alternative.
- Within the context of evaluating alternatives, the road user costs (RUCs) should be included in the cost estimate.
- There is a discrepancy in the final cost analysis, which uses a 39% contingency rather than the 34% contingency determined in the risk analysis.
- More information about the sources of the cost and environmental output figures used in the Cost Effectiveness/Incremental Cost Analysis (CE/ICA) (Appendix K) needs to be provided.

- The Monitoring and Adaptive Management Plan provides adequate description of the monitoring and reporting systems and their costs, but little information on the potential range of adaptive management options and related costs.

Models

- The Wetland Value Assessment (WVA) of project benefits and its supporting documentation are incomplete.
- The Hydrologic Engineering Center-River Analysis System (HEC-RAS) model does not accurately represent the hydrologic conditions necessary for project success and is not well documented.
- Documentation on the Boustany model is needed to determine whether the model is being appropriately applied.
- The introduction needs a better description of how the models were used. Specifically, it is unclear if the spreadsheet model was used only to compare alternatives or if it is being used in a predictive capacity

3.1.4 Flood Risk Management (FRM)

The panel members for the **FRM** projects commented several times about incomplete explanations, such as the rationale for comparing alternatives, the objectives, and justifying assumptions. Panel members stated that when defining flooding problems, the floodplain, damages, and habitat characteristics need to be clarified. Methods and models should be defined and assumptions should be clearly stated. Panel members were concerned that in some cases alternatives were dismissed without a detailed explanation. Questions about future conditions were raised, specifically how survey elevations would be established and maintained over the life of the project.

Examples of Final Panel Comments, extracted directly from final reports, related to cost/economic analysis, models, and floodplains are presented in the following subsections.

Cost/Economic Analysis

- Information in the Economic Evaluation needs to be updated and rely less on appraisals from October 2005 price levels.
- The interest cost and benefits from the completed features should be calculated for each year during the construction period.
- The economic analysis is confusing because it does not follow the standard practice of calculating the present value of future benefits and costs using a single discount rate for the project analysis, and for a well-defined and consistent period of analysis.
- The operation and management costs associated with managed moist soil units and levees around bottomland hardwood flooding were not considered.
- The economic analysis is missing key assumptions used in flood reduction projects, such as injuries avoided and lives saved from flooding.
- Economic impacts that could be cancelled out in other regions should not be included in a Benefit-Cost (BC) analysis or economic analysis for a project that focuses on national economic development.

- The Letter Report should include relevant terminology definitions and backup data to support the estimated real estate, construction, and contingency costs.
- The economic analysis of alternatives should consider losses that may be experienced by businesses disrupted by flood and/or dam failure (e.g., manufacturing plant production, lost time and revenue), as well as the appropriate emergency response measures.
- Operations, maintenance, repair, replacement, and rehabilitation (OMRRR) considerations have not been fully described.
- Potential hazardous, toxic, and radioactive waste (HTRW) considerations could affect cost, scheduling, and implementation of the tentative recommended plan and should be addressed prior to construction.

Models

- The future conditions assumptions for HEC-1 models appear to be inconsistent with those used for the Habitat Evaluation Procedure (HEP) analysis.
- Additional information is needed regarding the creation of the frequency-damage relationship for use in the HEC-FDA model.
- Verification of the unsteady models should be performed using data from an additional event, such as the 1986 flood-of-record, to demonstrate the accuracy of the HEC-RAS model.
- Clarification is needed regarding the presentation of the water surface elevations both inside and outside the levees related to the FLO-2D and HEC-RAS models, respectively.

Floodplains

- The discussion of contributions to the Clear Creek watershed would benefit from a figure that demonstrates the difference in the extent of the 100-year or other floodplain areas.
- The description of floodplain hydraulics and floodplain delineation needs more detail.
- Mitigating floodplain average annual habitat unit (AAHU) loss with modified borrow pits overestimates compensation of mid-season fish rearing habitat.
- The Consolidated NEPA Document is inadequate in justifying the use of the two-year floodplain in calculating the environmental impact.
- Some environmental consequences are not fully described, such as contradictory impacts to floodplain habitats, impacts resulting from repetitive repairs, and impacts resulting from the no-action alternative.
- There are insufficient geotechnical analyses to justify the proposed channel slopes, channel depth, spoil pile configuration, cost estimates, and real estate requirements for the North Dakota Diversion Alternative.
- The performance of existing and future upstream flood control measures needs to be better quantified with respect to their effect on the magnitude and frequency of floods in the defined project area.
- The plan acceptability discussion should be expanded to include the impacts and risks associated with each alignment alternative such as flood plain impacts, upstream and downstream effects, and tolerable risks.

3.2 Results and Analysis by Discipline

The Final Panel Comments fell into 13 discipline categories. The greatest number of comments was in the Environmental disciplines (135), followed by Economics (78). The lowest numbers of comments were Construction Management (6) and Communications (7). Counts for all categories are given in Figure 3.

Table 4 illustrates the distribution of comments by discipline, broken out by project. Twenty-five of 25 projects had environmental comments, and 23 projects had economic comments. Of the categories that were created for this assessment, 18 of the 28 projects had model comments and nine projects had climate change/sea level rise comments.

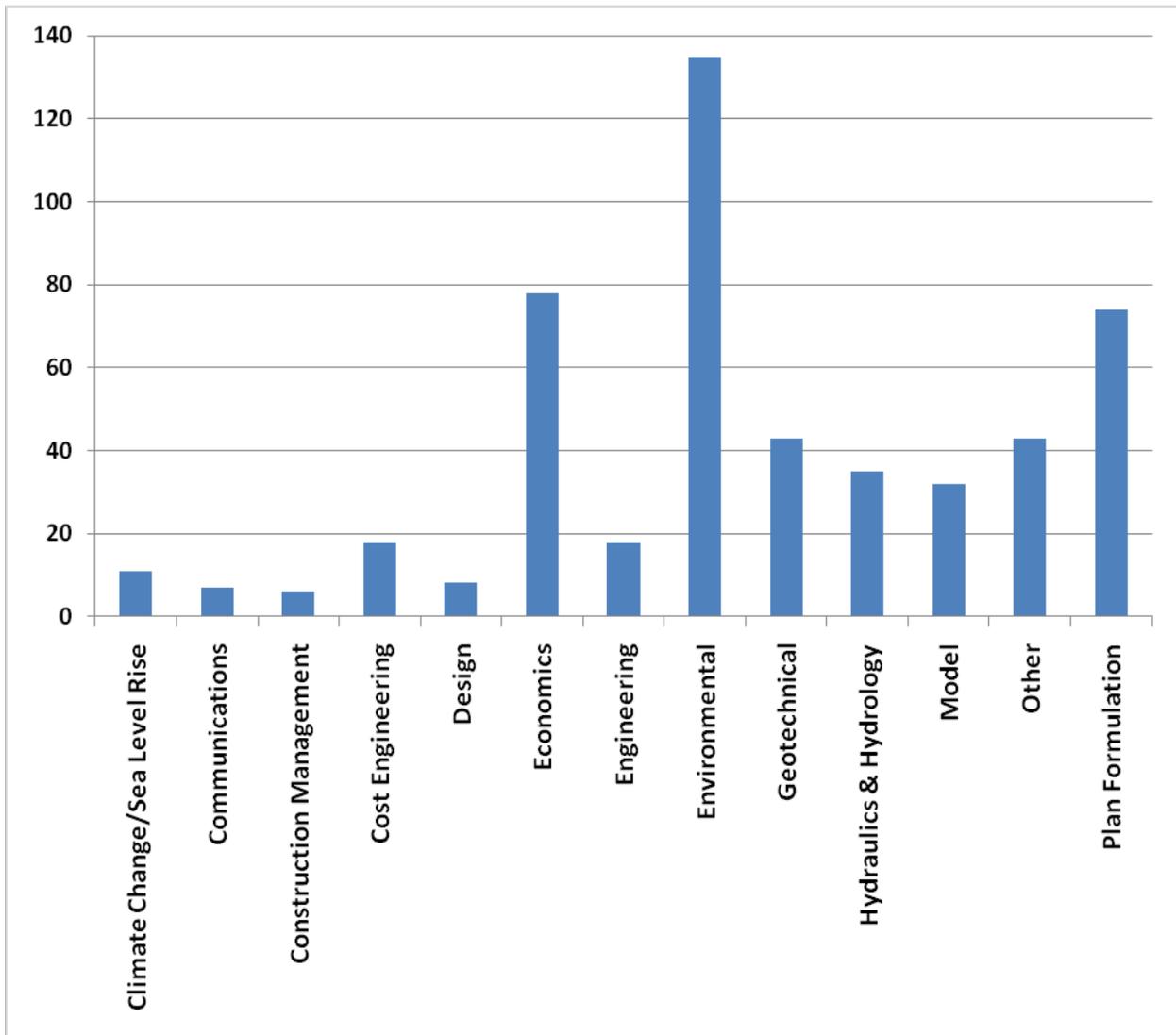


Figure 3. Final Panel Comments by Discipline.

Table 4. Final Panel Comments by Project and Discipline

Project	Climate Change/Sea Level Rise	Communications	Construction Management	Cost Engineering	Design	Economics	Engineering	Environmental	Geotechnical	Hydraulics & Hydrology	Model	Other	Plan Formulation	Totals
Alton to Gale				1		4		3	3				3	14
Amite	1					3		3	2	1			1	11
Biscayne Bay	1		1	1		2		5		5		2	2	19
Boston Harbor						7	1	5				1		14
Brevard County	1				1	4		9			2	1	3	21
C-111			1	1	1	1	1	9	1	2	1	1	4	23
Calcasieu		1				2	1	3			2	1	4	14
Clear Creek			1			6	2	7	3		3	1	4	27
Common Features	1	1				6			12	4	5	4	7	40
Convent Blind						2	2	3		4	1	2		14
Convey Atchafalaya	1			1	1	1	1	4	1	1	2	2		15
East Branch Dam						1	1		3			3	3	11
East St. Louis				2	2	2	2	3	5	1		1	2	20
ESH				2				7		1		1	3	14
Fargo-Moorhead				3		3		3	4	5	1	3	1	23
Freeport Harbor		1		1		7	1	5				1	6	22
L31N			2	1	1			4	2	5	2	1	1	19
LaCPR		1									1	1	7	10
Mid-Bay	2					2		4		1		2	3	14
MsCIP	2	1			1	2		4			2	1	1	14
NESP				2			1	7		1			5	16
San Clemente	1	1		1		2	1	7	2		1	1	7	24
SNWW		1				7		2			2	5	1	18
St. Johns				1		4		20			2	1		28
Surf City				1		4	2	3	4		1		1	16
Tamiami Trail								5		2	1	1	3	12
Terrebonne			1		1	3	1	6			1	2	1	16
White Ditch	1					3	1	4	1	2	2	4	1	19
Totals:	11	7	6	18	8	78	18	135	43	35	32	43	74	508

The sections that follow present a summary of selected Final Panel Comments for each of the 13 disciplines and specific topics related to each discipline that best describe the issues identified by the IEPR panels. Each summary includes a representative sampling of Final Panel Comments. Note that Final Panel Comments related to Plan Formulation are presented in Section 4.3.

3.2.1 Environmental

The majority of Final Panel Comments focused on the environment. The specific environmental topics addressed in the Final Panel Comments were species distribution and classification, mitigation, adaptive management, impacts, monitoring, dredging, sediment, biology, ecology, and water quality. There were several questions regarding assumptions about future outcomes, and recommendations that these should be clarified. Several comments expressed concern that potential impacts were not addressed (e.g., air quality, releasing mercury) and that there should be more development of ecological risk. Additionally, tradeoffs between habitat protection versus price need to be evaluated.

The panel members had several requests for more details to clarify the distribution of species and habitats, and also noticed errors in species names and species information (e.g., incorrectly classifying species as migratory, invasive, or endangered). They had several comments regarding impacts both to habitats (e.g., additional information is needed on habitat demands and changes caused by the project) and to organisms (e.g., clarify measures to prevent mortalities of marine mammals and fish). Additionally, they indicated that management goals should be clearly stated and defined, assumptions should be explained, designs should be justified and analyzed, and sediment budget analyses should be conducted. Panel members requested additional detail on construction, water quality, and salinity impacts on plant and animal communities. They recommended that details of historic changes and potential future changes in the environment (e.g., habitat, water quality) be integrated into the reports. They also stated that analyses needed to include extremes, not just averages.

Examples of Final Panel Comments, extracted directly from final reports, are presented in the following subsections.

Species Distribution/Classification

- Additional information is needed on the distribution and abundance of amphibians within the Project area, their habitat demands, and whether their habitats will or will not be changed by the project.
- The report includes errors regarding species identification and scientific names which brings into question the credibility of species listings.
- Some fish species are incorrectly classified as migratory which may potentially overestimate the benefits to non-migratory fish species.
- Need to explain the rationale for selecting the oyster as a surrogate for other species.
- The FR/EIS should be expanded to address the relevant Federal and State protected species statutes and should be updated to clarify the present status of several species.
- The approach used to calculate habitat acres created at Year 1 and subsequent years should be explained in more detail, including whether the number of acres calculated includes existing habitat.

- The potential for substantial colonization of exotic and invasive species does exist and the approach to control these species as described in the White Ditch report is not feasible.
- Episodic flows should be considered in conjunction with mechanical maintenance of emergent sandbar habitat (ESH) to benefit the target species.

Mitigation

- There is strong evidence that moist soil units managed for both shorebirds and waterfowl would not provide habitat at the levels assumed for mitigation of impacts to both shorebirds and waterfowl.
- Mitigating floodplain average annual habitat unit (AAHU) loss with modified borrow pits overestimates compensation of mid-season fish rearing habitat.
- The Consolidated NEPA Document does not appear to compensate for the amount of shorebird habitat impacted, and does not provide sufficient detail to determine if mitigation of shorebird impacts can be achieved.
- Mitigation of the NSTAR cable is of concern. Mitigation will be expensive. Should mitigation not be resolved in a timely manner, the project could be authorized but not built for an undetermined length of time.
- It is unclear what percentage of impacted landcover categories is wetland, and the area of affected wetland should be more accurately defined to compare to mitigation plans and ensure no net loss.
- Best Management Practices that would be employed to mitigate construction impacts to water quality, sediment quality, air quality and noise impacts should be addressed.
- The proposed basic mitigation features are unlikely to achieve the desired level of wetland compensation.
- It is unclear how the proposed change in the condition of Big Oak Tree State Park will mitigate loss of wetlands and other habitat in the project.
- The impact analysis for the adjacent beaches is not complete and the opportunities for mitigation are not considered.
- The assumption used to calculate mid-season fish spawning habitat to mitigate winter waterfowl habitat has not been properly evaluated.
- The four mitigation alternatives presented in the Consolidated NEPA Document do not appear to compensate for loss of waterfowl habitat.

Impacts

- The impacts to the aquatic ecosystems in the vicinity need to be better addressed. Impacts to the Gulf shore are not mentioned.
- Impacts to shorebird habitats cannot be determined based on the information provided in the Consolidated NEPA Document, but the impacts are probably much larger than the analysis indicates.
- The potential for impacts to localized air quality is not addressed sufficiently.
- The report should briefly describe potential secondary impacts.

- The impacts from the connected action of relocating pipelines should be included in the analysis.
- The assumption that long-term environmental impacts associated with the pilot project will be similar to those for the full scale project is not proven, and that long-term impacts of the pilot project were not fully discussed.
- The impacts are generally well described from the perspective of the project, but not necessarily from the perspective of the affected ecosystems or organisms.
- There needs to be a more in-depth discussion of the municipal and industrial waste and the future impact to the treatment facilities.
- The cumulative impacts section lacks specific information on the incremental impacts of the proposed project.
- More development was needed on the ecological risk, particularly from changing coastline, wetlands, and ecosystems.
- The Consolidated NEPA Document is inadequate in justifying the use of the two-year floodplain in calculating the environmental impact.
- Water quality impacts associated with construction and the potential negative impacts of resettled suspended sediment to submerged aquatic vegetation (SAV) and natural oyster beds (NOBs) were not addressed.
- The water quality impacts on biological resources could be significantly higher than the report implies given the likely timing of dredging and the potential quantity of fine-grained sediment.
- The analysis of water quality impacts in the Consolidated NEPA Document did not meet the objectives of the study.
- The existing ecological conditions are unclear, which makes it difficult to assess the potential impacts of the project alternative
- Several of the alternatives may result in increased phosphorus inputs to Taylor Slough. Their possible impacts on future vegetation (i.e., increased area of cattails), and how this increase in inputs might be controlled, needs to be addressed.
- Impacts of the project to the local community are not described in detail sufficient to provide a clear and accurate representation of the current conditions in the study area.
- The predicted impact of the project alternatives on wetland areas would benefit from a more detailed description within the Fargo-Moorhead DFR/EIS.
- The assumptions and data used to develop the cost estimates for the commercial fisheries are needed to justify the potential impacts to this industry.
- The term "significant" with regard to environmental impacts needs to be better defined.

Adaptive Management

- Adaptive management processes should be a more integral part of the Comprehensive Plan and must include a strong monitoring and feedback mechanism.
- It is not clear from the Consolidated NEPA Document if adequate resources are available for adaptive management to be successfully applied at mitigation areas, and adaptive management plans are not described in sufficient detail.

- The Adaptive Management Plan needs to include a discussion on how climate change, sea level rise, and invasive species will be addressed.
- Adaptive management is appropriate and should be developed and implemented.
- The Adaptive Management Plan (AMP) needs to be revised to provide more detail, including identifying critical management trigger points for project reassessment (or realignment) purposes.
- The description of the scope and cost-sharing for the Adaptive Management and Monitoring Plan requires additional detail, and the projected costs for its administration may be underestimated.

Monitoring

- The proposed monitoring plans for fish passage, spawning, and rearing utilization lack critical study design and time-frame details.
- The design of the environmental monitoring to be conducted after initiation of the project is not described in sufficient detail to guarantee that the purposes of such monitoring can all be fulfilled.
- The Draft Project Monitoring Plan does not sufficiently address the stated project goals, and if implemented, would not detect changes in the ecosystem and water quality.
- The rationale, criteria, weighting and the process for selection and monitoring for adaptive management needs to be explained and further documented.
- Given that this is a system driven by cycles, the monitoring program should identify and be responsive to natural environmental cycles.
- Until conditions have stabilized, quarterly monitoring of injection and surface water is an insufficient timeframe to fully evaluate effects on water quality.
- The planned project monitoring for water quality lack key elements and sufficient detail to satisfy U.S. EPA guidance.
- Until conditions have stabilized, quarterly monitoring of injection and surface water is an insufficient timeframe to fully evaluate effects on water quality.
- The Draft Project Monitoring Plan does not clearly explain which organization or agency will be responsible for monitoring and adaptive management.
- The monitoring plan lacks relevance, justification, and methodology to properly evaluate the success of the project.
- The project operation manual should include a recommended levee inspection and monitoring plan for local sponsors for periods when there is a high water event.

Dredging

- Options to reduce the dredging requirement (average rate of dredging) should be investigated.
- Several dredging issues should be clarified to increase confidence in predictive capability and possibly reduce dredging and adjacent beach erosion.
- Given the large amount of dredging and disposal, the dredged material's physical properties, quantities, and disposal methods are too general and need more detail.

Sediment

- A Sediment Budget Analysis is needed to diagnose the causes of the very high shoaling rates, and to improve the DMMP.
- The justification for the beach nourishment design should include a description and evaluation of the alongshore sediment transport and a sediment budget for the system.
- It is not clear if there will be changes in sediment transport conditions and if the changes will impact the aquatic habitat.
- Sediment transport modeling was not performed to support statements that the project will distribute sediments to the study area, and conflicting/misleading statements regarding sediment delivery must be addressed.

3.2.2 *Climate Change*

All of the climate change comments were concerned with future conditions and that engineering designs and adaptive management plans should address the effects of climate change and sea level rise. The following are representative Final Panel Comments:

- Address how climate change will influence the engineering design.
- The effects of relative sea level rise need to be explained more explicitly, taking into account local effects in addition to global effects and incorporating recent studies.
- It is unclear how relative sea level rise (RSL) is incorporated.
- Some relative sea level rise (RSLR) calculations do not appear to be consistent with EC 1165-2-211, and the analyses of results do not appear to fully comply with all of the EC 1165-2-211 requirements thus the risks to the project are not understood.
- In the discussion of levee overtopping, the source for the provision for only one foot of freeboard to account for climate change and static settlement should be identified.

3.2.3 *Communication*

Panel members were concerned that public input was limited. The following comments are examples of this concern:

- Scoping and outreach efforts appear to meet only minimal requirements for local participation, and fall short of proactive efforts needed to support report findings.
- The forum to identify public concerns appears to have been limited and the public concerns identified in the report do not appear to fully characterize potential significant issues.
- The extent of inclusion of recommendations from the public and agency engagement process into the plan, and whether major controversies regarding the program plan exist, is unclear.
- Based on the information provided, it is not evident that a sufficient level of public involvement took place.

3.2.4 Construction Management

Comments classified as construction management urged clarification of available and used technologies and methodology. The following are typical comments, extracted directly from final reports, in this category:

- There is a lack of information on the precautionary measures that should be taken during construction.
- Proven technologies such as pre-cast concrete panels and secant walls have not been considered in the available technologies.
- The initial short-term impacts to habitat due to project construction need to be quantified in more detail, and revisions to designs and construction should be considered to reduce potential impacts.
- It is questionable how sheet pile and slurry wall will be installed given that no pre-blasting will be used in the construction methodology.

3.2.5 Cost Engineering

Panel concerns relevant to cost engineering included undefined assumptions, incomplete estimates (such as costs not being considered), which could contribute to increased costs. For example:

- Some of the uncertainties associated with possible construction activities could add significant costs to the project.
- The assumptions and specifics used to develop the cost estimates need additional detail.
- Critical elements of the future cost analysis lack sufficient detail and contain inconsistencies that could impact the selection of the preferred alternative.
- Project cost estimates associated with non-structural flood reduction techniques need to be explained and referenced.
- The cost estimate should reflect the techniques and details used to construct the earthworks excavation in similar clay deposits for the diversion on the Red River at Winnipeg, Manitoba.
- The assumptions about relocating the existing rail yard for the Minnesota Diversion Alternative are a concern because of the potential environmental cleanup, increased construction costs, and potential disruption to rail traffic.
- The operation and management costs associated with managed moist soil units and levees around bottomland hardwood flooding were not considered.
- The source and reliability of the assumptions used to estimate the Atchafalaya project costs, especially construction costs, do not include sufficient detail to make a determination regarding accuracy.
- The assumptions and rationale used to perform the cost analysis for the LRR need to be more specific and detailed to fully understand the basis for their development.
- The cost analysis assumptions are reasonable; however, the mobilization/demobilization costs and the estimate of contingencies should be revised to reflect equipment availability, travel times, and production capacity.

3.2.6 Design:

Panel members felt that further assessment and more details about the design are needed, for example:

- More details on the spatial distribution of soil type, particularly peat and marls, need to be provided to justify the engineering design.
- More refined analysis is recommended in certain areas before design and build can be conducted.
- More details on the proposed Morganza to the Gulf levee project and Houma Navigation Canal (HNC) lock are needed to understand how these major structural features affect the future without project conditions, can be operated to complement the Atchafalaya project, and influence the timing of benefits from the Atchafalaya project.
- The recommended design should be refined prior to construction with regard to relief well penetration and spacing.
- Several design assumptions or local conditions need to be resolved during final design. The subsurface exploration program supporting the seepage analysis should be expanded prior to final design to supplement the available subsurface information.

3.2.7 Economics

Economics comments focused on incomplete, outdated, and questionable data. The panel indicated that the existing situations, such as current vessel operations and rerouting impacts, need fuller descriptions and that missing assumptions need to be defined (e.g., assumptions of injuries avoided and lives saved from flooding). Risk and uncertainty required more discussion. Panel members stated that inputs to models and calculations should be detailed and include additional descriptions of how the models were used. When looking at historic or future conditions dates should be consistent, or inconsistencies should be explained. Most comments related to economics focused on five topics: risk and uncertainty, NED, vessel fleet/drafts, forecasts, benefits. Although each project had specific comments, there were some general patterns regarding comments in these topics.

Selected Final Panel Comments representing each topic, extracted directly from final reports are presented in the following subsections.

Sensitivity/Risk and Uncertainty Analyses

- It appears that the sensitivity analysis was not conducted, and sources of risk and uncertainty and their impact on plan formulation are not documented.
- Risk and uncertainty are mostly ignored.
- Risk and uncertainty are not addressed in sufficient detail.
- There is little discussion of risk or uncertainty, and limitations of the data or analysis methods may impact the credibility of some conclusions.
- Due to the application of incorrect coastal processes analyses in plan formulation, and lack of consideration in the variability of exposed hardbottom, the risk and uncertainty analysis is inaccurate and needs to be revised based on appropriate input parameters.

- The economic sections lack focused and useful sensitivity analysis, leaving the reliability of the findings in doubt.
- Key assumptions used in the risk analysis need to be clarified.
- Because of the many uncertainties associated with predicting the project's benefits, a sensitivity analysis for the Wetland Value Assessment (WVA) analysis should be conducted to demonstrate that the project will successfully provide benefits.
- Additional risk and uncertainty analysis is necessary to address the assumptions and inherent variability in project costs, property values, climate change, and recreation.

NED

- The Formulation Objectives, Constraints, and Criteria of the GRR should explain why only NED is used for decision making in this study and refer readers to the EIS for the RED, EQ, and OSE accounts.
- The Economics Appendix should indicate which of the three without-project/no-action conditions will be used to develop the National Economic Development Plan.
- Economic impacts that could be cancelled out in other regions should not be included in a Benefit-Cost (BC) analysis or economic analysis for a project that focuses on national economic development.

Vessel Fleet/Drafts

- The report does not present a strong analysis of the current and future vessel fleet, or of vessel dimensions.
- The reports need to include an explicit, well-documented analysis of vessel drafts and loading practices.

Forecasts

- The commodity discussions and forecasts are fragmented and incomplete, and do not adequately support the forecasts used for the benefits estimates.
- The vessel traffic and commodity growth forecasts are not documented or justified.

Benefits

- The choice of project design vessel appears to drive the project design and benefits estimates, yet remains unjustified in the report.
- The benefits to the cement industry are entirely speculative and pending contractual commitments, and there is no supporting documentation related to vessel costs, markets served, delivered prices, etc. in competition with other ports and existing domestic suppliers.
- Economic benefits which will accrue to foreign flag carriers may not be fully passed on to U.S. shippers, and the report does not provide any recognition of this.
- The calculations of the average annual costs and benefits cannot be reviewed for accuracy without more information.
- The interest cost and benefits from the completed features should be calculated for each year during the construction period.

- Baseline agricultural economic conditions are not adequately supported with evidence, nor are the predicted future economic benefits associated with the project.
- The benefits associated with the non-structural alternative may have been underestimated or not fully evaluated, and the spatial distribution of benefits is unclear.
- The lists of land and water and economic opportunities that may arise from the execution of the project should be expanded in order to support the decision making process.
- The role of barrier islands in enhancing and protecting mainland socioeconomic and business benefits is understated.
- The recreation benefits analysis omits overnight users, lacks an explanation for selecting the contingent valuation benefit estimate over the travel cost benefit estimate, and omits a discussion of congestion, all three of which can be addressed with existing project data or literature.

Other

- The analysis of the availability of borrow material biases the economic analysis toward the preferred alternative by assuming only two borrow areas offshore near Cape Canaveral, but does not describe other potential offshore sands closer to the project, including those recently identified by the State in the vicinity of the Mid-Reach project.
- The cost effectiveness and incremental cost analyses (CE/ICA) are not clearly explained and are not reported in a manner consistent with U.S. Army Corps of Engineers (USACE) standard procedures in the Planning Guidance Notebook.
- The needs of the railroads, which have only been informally discussed with them, may impact right-of-way acquisition and project design.
- The Real Estate Plan (Appendix J) requires an explanation of the source of the per acre real estate easement, acquisition costs and cost adjustment factors that were used to generate Total Real Estate Costs.
- More detail is needed to describe the causal relationship between levee embankment slope failure (slides) and risk of economic and environmental damage.

3.2.8 Engineering

The panel members had several engineering questions about the stability of various channel/basin/dam slopes because they were not being fully described. Structure feasibility was not analyzed. Some example comments are presented below:

- For the south jetty, the report should address stability for the end of construction condition and the low factor of safety for the long-term condition should be justified.
- Technical analyses do not sufficiently establish the required dike cross sections, placement locations, or stability. The feasibility of many dike sections is not established.
- The proposed structural actions are well engineered but are based on data which lack resolution, accuracy, precision, and spatial distribution, thereby compromising the logic in the derivation of management measures.
- Risks and precautions that should be considered during construction to address the excavation, and, if necessary, removal of abandoned oil/gas wells needs to be outlined.

- The volume-to-area relationship used to derive beach fill volume and expected fill performance is not supported and additional details are needed on specific beach profile characteristics and beach fill design parameters.

3.2.9 Geotechnical

Panel members requested additional detail on potential impacts and hazards (such as seismic vulnerability, breach locations, and erosion vulnerability). Analyses should include historic data and geologic cross sections and maps. Sensitivity analysis should be completed wherever levee failures could be an issue.

The following are examples, extracted directly from final reports, of Final Panel Comments related to geotechnical engineering.

- The subsurface geological conditions are important to the many aspects of the design, costing, and construction of the pilot project and need a more detailed discussion.
- Geological cross-sections would provide invaluable input and should be included in the report.
- The basis for selecting the analysis cross sections is not clearly explained and the mixture of representative with worst case cross sections make it difficult to interpret how the varying factors of safety were obtained.
- There needs to be additional discussion and reference to specific historic data to support the geotechnical design assumptions.
- The stability of the channel slopes, foundation deposits, and related spoil piles should be evaluated using ultimate or near ultimate soil strength values for the End of Construction (EOC) condition.
- The proposed re-establishment of river channel meanders along previously straightened portions of the Red River and its tributaries presents a potential high risk of streambank erosion and earth slides and should be evaluated.
- The supplemental exploration program should include strength testing of embankment and shallow underlying layers to support slope stability analyses.
- All potential modes of levee failure and the transition between various levee system components need to be evaluated in the design.
- The presented geotechnical data are either incomplete or indicate that the proposed borrow sites are not well-suited to meet the requirements and predicted performance of the Selected Plan from engineering, economic, and environmental standpoints.

3.2.10 Hydraulics and Hydrology

Both hydraulics and hydrology comments identified the same areas for improvements: more details need to be provided to fully evaluate plans, site-specific conditions need to be identified, and figures and maps should clarify the delineation of floodplains, illustrate water flow, and show habitat connectivity.

The following are examples, extracted directly from final reports, of Final Panel Comments related to hydraulics and hydrology.

- The description of floodplain hydraulics and floodplain delineation needs more detail.
- More site-specific hydraulic and lithologic data are needed to address all seepage conditions expected during the wet and dry seasons.
- Connectivity between the salt marsh and estuary is unclear both during and post construction.
- The report does a poor job of describing the overall general pattern of water flow through the system and describing what areas will be impacted by different alternatives.
- The hydrologic analysis of freshwater wetland rehydration areas should be based on a more complete water balance analysis.
- Further clarification is needed on the relationship between the water available for diversion and the hydrologic regimes necessary to achieve the target level of wetland area/function.
- Equally spaced/sized berm cuts and culvert locations/sizes are not tailored to the specific topographical, hydraulic, and ecological features of the receiving habitat areas, or to the specific diversion alternatives.
- Hydrology and hydraulics (H&H) modeling, including RMA-2 and RMA-11 2-D water surface modeling and modeling of salinity, needs to be better related to key estuarine species and their specific habitat requirements.
- A 3D (three-dimensional) hydrodynamic model, rather than a 2D (two-dimensional) hydrodynamic model should be used to compute the flow velocity field and flow depths at the Red River Control Structure.
- Physical hydraulic modeling and computational fluid dynamics (CFD) modeling studies should be conducted on the project hydraulic structures and flow conditions described in Figures 17, 18, 19, 20, 21, and 22.
- The extent of seepage and the potential impact that seepage may have on the project has not been considered and could be significant, affecting the hydrology and hydraulics of the study area.

3.2.11 Models

Panel members indicated that models needed documentation on how they are run and how they will be used, specifically for alternative analysis. Inputs, assumptions, and uncertainties need to be clarified for all models. Models need more documentation. The following subsections give examples of Final Panel Comments, extracted directly from final reports, on alternative analysis, uncertainties, and tools and techniques related to modeling.

Analysis/Justification/Documentation

- The ERDC, HarborSym, and @ risk models were used in crucial analyses, but the analyses lack documentation.
- The introduction needs a better description of how the models were used. Specifically, it is unclear if the spreadsheet model was used only to compare alternatives or if it is being used in a predictive capacity.
- The hydrodynamic modeling did not fully support the alternative analysis. It is not clear that the lateral extents of the model are sufficient to fully model the system.

- The justification for parameter selection and model calculations, as well as information on validation and application of the Wetland Value Assessment (WVA) models, should be provided.
- Detailed information is needed to justify the selection and use of the HEC-FDA Model Version 1.3 the current version 1.2.4.
- Documentation on the Boustany model is needed to determine whether the model is being appropriately applied.

Uncertainties

- There are uncertainties in the model and it is unclear how these are carried through in the design elements and costing.
- The model is conceptually acceptable; however it is unclear as to how the model was used in the final design, costing, and construction, and how the uncertainties were included in the project planning.
- Uncertainties in the hydrologic, hydraulic, and economic studies could be analyzed and presented in a more detailed and meaningful manner using methodologies incorporated in the HEC-FDA Flood Damage Reduction Analysis modeling system.
- The overall impacts and benefits of the various alternatives is not supported by the PIR due to uncertainties in the accuracy of the model (MODBRANCH), data and assumptions used to compare the alternatives.
- The LACPR report should provide a better and more quantitative explanation of the scientific uncertainty associated with projections of marsh and wetlands restoration (including diversions), surge attenuation by wetlands, numerical modeling efforts, and the implications of Mississippi River diversions. The high level of uncertainty of the effects of proposed river diversions suggests the need for careful monitoring and evaluation of existing diversions. It also suggests the importance of an adaptive strategy that can adjust to and build upon new information as more is learned about the responses of these coastal wetlands systems to human interventions.

Tools and Techniques

- The decision factors involved in using the models selected needs to be described. In some cases, updated modeling tools should be used.
- The accuracy of the hydrologic and hydraulic analyses needs to be improved by extending the period-of-analysis and using more detailed modeling techniques.

3.2.12 Other Comments

The panel was instructed not to make editorial comments unless they affected the technical quality of the report (i.e., low level of significance). These comments are categorized here as general comments and they relate to report organization, editorial review, and proofreading. Panel members commented that improvements could be made in the tables, figures, and maps. There were questions about inconsistencies, especially between appendices and main text. Panel members also felt that literature reviews and explanations of local area and issues leading to the project should be conducted and appropriately cited. Several comments recommending that the

report be reviewed by a technical editor. The following Final Panel Comments are examples, extracted directly from final reports, of these concerns.

- The presentation of data in maps, figures, and tables needs to be substantially improved.
- To better illustrate the connectivity between the salt marsh and open water, duplicate Figures 10 and 16 of Appendix C in the appropriate section of the main body of the report.
- Since this project is presented as a restoration, some attention needs to be paid to literature on the subject.
- The report organization and presentation need improvement. The report includes numerous inconsistencies, lacks some references, and some figures are unclear.
- The DFR, DEIS, and appendices would benefit from professional editing, better maps, and better diagrams.
- Report needs to eliminate inconsistencies between appendices and the main body of the report.
- The BBCW PIR main report needs to be revised to significantly reduce the references to the Appendices and to improve the quality and clarity of the graphics.
- Literature references and citations are required throughout the document to evaluate if statements are “thorough” and “accurate.”
- Additional information, including more detailed graphics depicting project features, potential hazards, and geographic boundaries, needs to be provided in Section A.4 and A.6 of the Appendix A in regards to previous geotechnical and other investigations.
- Figures should be revised for clarity and to better support the documentation.
- The appendices contain a wealth of material, some of which should be better summarized in the main text, especially the technical appendices such as PTR Appendix L.
- The overarching problems motivating the White Ditch project, their magnitude, and the need for project implementation should be clearly and specifically stated in an introductory paragraph.
- Stakeholder and public input should be documented in the DSM Report and Environmental Assessment.
- The study area needs to be clearly defined in text and illustrations.
- The project operation manual should include a recommended levee inspection and monitoring plan for local sponsors for periods when there is a high water event.
- The differences between the without-project condition and no-action condition need to be clearly described.

4.0 AFTER ACTION REVIEW

Overall, most Final Panel Comments focused on the need for improved documentation (e.g., assumptions, methods, and rationale) and additional or more rigorous analyses. Other issues frequently encountered included readability (e.g., clarity of figures, cross referencing to appendices, redundancy), concerns with model application, and comprehensiveness of adaptive management and monitoring plans. A summary of important issues is presented below.

Documentation

- Important information, such as details to support alternative selection, are either missing or buried in the appendices and need to be presented in the main document.
- More details to help lead the reader to the recommended plan need to be included. Details that are well known to the project team but not known by the reader/public are often missing.
- The purpose and need should clearly detail the problem and why the project is needed. It should be written as if the reader knows nothing of the project history.
- Assumptions used should be documented.

Analyses

- An evaluation of all related costs needs to be included in the comparison of alternatives.
- All alternatives should undergo a similar level of detailed comparison. No alternative should be added at a later stage without a full comparison to the original alternatives.
- Sea level rise must be considered among the alternatives.
- Some analyses (e.g., economics) are based on incomplete, outdated, or questionable data.

Other

- The monitoring plans and adaptive management plans for ECO and CSDR projects need to be more comprehensive. Monitoring plans need to consider the overall restoration.
- The use of a model needs to include the rationale as to why a specific model and version of the model was used, how it was used to determine impacts, and how it was incorporated into the alternative comparison.
- Most reports appear prepared by multiple authors and therefore the presentation of the information is sometimes confusing or redundant and affects the readability.
- Figures and tables could be improved for clarity (e.g., some are unreadable), to better support the documentation, and to illustrate the project area.

REFERENCES

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