DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
WASHINGTON, D.C. 20314-1000

MAY 2 2012

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MEMORANDUM FOR ASSISTANT SECRETARY OF THE ARMY (CIVIL WORKS)

SUBJECT: Biscayne Bay Coastal Wetlands Project, Comprehensive Everglades Restoration Plan, Central and Southern Florida Project, Miami-Dade County, Florida, Project Implementation Report and Integrated Environmental Impact Statement (PIR/EIS)

1. Independent External Peer Review (IEPR) was conducted for the subject project in accordance with Section 2034 of the Water Resources Development Act of 2007, EC 1165-2-209, 33 CFR §385.22(b)(1) – for Comprehensive Everglades Restoration Plan (CERP) projects, and the Office of Management and Budget's Final Information Quality Bulletin for Peer Review (2004).

2. The IEPR was conducted by Battelle Memorial Institute. The IEPR panel consisted of 5 individuals with technical expertise in design, construction cost engineering, civil works planning, coastal/estuarine ecology, hydraulic engineering, and economics.

3. The final written responses to the IEPR are hereby approved. The enclosed document contains the final written responses of the Chief of Engineers to the issues raised and the recommendations contained in the IEPR Report. The IEPR Report and USACE responses have been coordinated with the vertical team and will be posted on the internet, as required in EC 1165-2-209.

4. If you have any questions on this matter, please contact me or have a member of your staff contact Ms. Stacey Brown, Deputy Chief, South Atlantic Division Regional Integration Team, at (202) 761-4106.

Enclosure

MERDITH W.B. TEMPLE
Major General, USA
Acting Commander

Comprehensive Everglades Restoration Plan (CERP)
Biscayne Bay Coastal Wetlands
Project Implementation Report (PIR) and Environmental Impact Statement (EIS)

USACE (U.S. Army Corps of Engineers) Responses to Independent External Peer Review (IEPR)
20 March 2012

Independent External Peer Review (IEPR) was conducted for the subject project in accordance with Section 2034 of the WRDA 2007, EC 1105-2-410,33 CFR §385.12(d) for Comprehensive Everglades Restoration Plan (CERP) projects and the Office of Management and Budget's *Final Information Quality Bulletin for Peer Review (2004).*

The purpose of the Biscayne Bay Coastal Wetlands project is to contribute to the restoration of Biscayne Bay and adjacent wetlands as part of a comprehensive plan for restoring the south Florida ecosystem. The project intends to restore the ecosystem function in southeastern Florida by rehydrating coastal wetlands and reducing point source freshwater discharges into Biscayne Bay by replacing lost overland flow and partially compensating for the reduction in groundwater seepage by redistributing, through a spreader system, available surface water entering the area from regional canals. This project will also help restore saltwater wetlands and the nearshore bay through the re-establishment of optimal salinity concentrations for fish and shellfish nursery habitat.

The IEPR was conducted by the Battelle Memorial Institute through their contract with the Army Research Office. The IEPR panel consisted of five individuals selected by Battelle with the technical expertise in the following categories: Design and construction cost engineering, civil works planning, coastal/estuarine ecology, hydraulic engineering, and economics.

The IEPR panel reviewed the Draft Biscayne Bay Coastal Wetlands Project PIR/EIS. The Final Report from the IEPR Panel was issued 1 December 2009. Overall, 19 final comments were identified and documented. Of the 19 total comments, 2 were identified as having high significance, 15 were identified as having medium significance, and 2 were identified as having low significance.

The following discussions present the USACE Final Response to all of the IEPR comments. Further details on each comment, such as the Basis for Comment, Significance, Comments Cross-Reference, and Recommendations for Resolution can be found in the IEPR Final Report referenced above.

1. IEPR Comment – High Significance: 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.

This comment includes eight recommendations for resolution, all of which have been adopted as discussed below.

USACE Response: Adopted. Response curves for the three habitat types were placed in the document.

- Recommendation #1. A discussion of forecasted conditions for FWO and with project conditions has been included in the Sea Level Rise Analysis (7.13.2.3) for time = 0 years, 20 years, 50 years, and 100 years.

- Recommendation #2. The following was added to Section 7.13.2.3: "For the sea level rise analysis, the timing of project construction and benefit accrual is based upon having construction complete by 2012. Given the delayed ecological response to project induced changes, the restoration benefits resulting from this project are expected to ramp up from zero benefits at time of construction to maximum project benefits at 10 years post construction. Taking into account sea level rise, the period of maximal project benefits will occur during the period between 10 and 20 years post construction. After 20 years until the end of the project life 30 years later, project benefits are expected to decrease as a result of SLR."

- Recommendation #3. As the furthest downstream project, the BBCW project has limited influence on upstream CERP projects. Additional information was added to this in Section 7.11.1.1. "It is important to note that the BBCW project study area is furthest downstream of the CERP components. As such, this project has little to no impact on the achievement of CERP system-wide benefits that occur upstream of the BBCW study area.

- Recommendation #4. A sea level rise analysis was added in Section 7.13.2.3.

- Recommendation #5. The sea level rise analysis includes the required three projections. Limited information exists regarding quantitative changes in future temperature and precipitation. A discussion of climate change was added to Section 4.2.1 Climate (Future Without Conditions Chapter).

- Recommendation #6. . There are several locations within the document that inappropriately tie wetland loss to future water supply demands. Wetland loss within the project area is generally not regarded to be a result of excessive water demands but rather the result of land use and flood protection actions resulting from the operation of drainage canals. The SFWMD, has recently put in place a consumptive use permitting strategy that greatly restricts future increases in consumptive use groundwater withdrawal permitting within Miami Dade County. A discussion of these facts has been added to the document in the HH and water supply section (Section 7.14.2.1).

- Recommendation #7. See comment above for water demand/wetland discussion summaries of Section 7.14.2.1. As for incidental water supply benefits, none of the with-

project alternatives are located close enough to municipal well fields to have any impact on the water supply. This discussion of incidental water supply benefits has been added to in Section 6.1.13.

- Recommendation #8. The revised document includes improved descriptions of the project alternatives in Sections 5 and 6.

2. IEPR Comment – High Significance: 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.

This comment includes four recommendations for resolution, all of which have been adopted as discussed below.

USACE Response: Adopted.

- Recommendation #1. Additional narratives were provided in Section 3 (Existing Conditions) and the Executive Summary to discuss the effects of existing hydroperiods on vegetative communities, with an emphasis on the comparison to hydroperiod targets and the anticipated vegetative responses under a with-project scenario. Much of this information is contained in the performance measure sheets developed during the planning process; this information is presented to better demonstrate the relationships between hydrology, salinity, and wetland vegetation. Ross, M.S., J.F. Meeder, E. Gaiser, P.L. Ruiz, J.P. Sah, D.L. Reed, J. Walters, G.T. Telsnicki, A. The target hydrology for the freshwater impoundments is to maintain groundwater stage between -0.5 ft and 2.0 ft relative to land surface for a minimum of 120 days per year. This discussion is in Section 1 of Appendix C.

- Recommendation #2. Models do not exist for these areas that can accurately predict how often the wetlands will be inundated at a two-foot level, but is likely to occur only during storm events. By virtue of the increased hydration of these areas, the proliferation of woody vegetation, including nuisance exotics should be impeded. The primary benefit to wetland vegetation will be during the dry season when occasional freshwater inputs will maintain soil moisture, and thus maintain vegetative productivity. The Selected Plan section (Section 7) was enhanced to include a discussion on the intent of impounding water in wetlands. A discussion of non-stationary climate conditions was added to Section 6.3.5.2.

- Recommendation #3. A qualitative discussion of the impact of water availability on achieving project benefits was added to section 6.3.5.2. This discussion notes that the target habitats generally experience stress during extreme drought periods but that the ecological resources have adapted to these events and are capable of surviving and recovering.

- Recommendation #4. The ecological monitoring plan contained in Annex E includes monitoring of water levels within both of the impounded wetlands, and transects that will document baseline and any future changes to the vegetative communities. As stated in responses to comments #5 and 13, the monitoring plan was enhanced, per the recommendations of the panel, to verify assumptions while reducing project risks and uncertainties.

3. IEPR Comment - Medium Significance: The habitat units for each measure need to be clarified, and it should be clear whether habitat units for a given measurement represent relative or actual magnitudes.

This comment includes seven recommendations for resolution, six of which have been adopted and one which has not been adopted, as discussed below.

USACE Response: Adopted.

- Recommendation #1. Additional description of three habitat units has been added to Section 6.3 Ecological Benefits Evaluation.

- Recommendation #2. Additional description was provided where relative magnitudes and actual magnitudes are reported in the text. To resolve this comment, a short discussion of how habitat lift acreages were derived for the project was included in the executive summary, Section 6.3, and Appendix C.

- Recommendation #3. Table 5-5 was amended to include a description of the three habitat units. This regards Table 6-2 in the revised report (Section 6.3). Footnotes have been added to the bottom of this table to describe the makeup of the three habitat unit types.

    - Nearshore Habitat Lift is computed by averaging the three sub-indices and multiplying this result by the total available nearshore acreage. The three sub-indices are:
        1) Percent of available water diverted from coastal structure,
        2) The average of the percent nitrogen and phosphorus load targets achieved,
        3) Percent of nearshore acres within 500 meters of the shoreline meeting the target salinity conditions. This habitat lift is measured in units of "acres of lift".
    - Saltwater Wetland Habitat Lift is computed by averaging the two sub-indices and multiplying this result by the total saltwater wetland acreage. The two sub-metrics are:
        1) Percent of available water diverted directly to saltwater wetlands, and
        2) Percent of saltwater wetland acreage meeting the target salinity condition. This habitat lifts is measured in units of "acres of lift".
    - Freshwater Wetland Habitat Lift is computed by averaging two sub-indices and multiplying this result by the total freshwater wetland acreage. The two sub-indices are :
        1) Acres of freshwater wetland with sufficient water, and

2) the acreage of freshwater wetland free of invasives and exotics. This habitat lift is measured in units of "acres of lift".

- Recommendation #4. The various units were reported in the tables and in the text in section 5. Also, corresponding Table 6-2 has been modified by adding "(acre lift) to describe measure of habitat unit.

- Recommendation #5. The report was revised to include a definition of "nearshore indices' and HU lift. This has been added to Section 6.3.

- Recommendation #7. The report was revised to include more detail regarding the weight assigned to each of the three habitat types in Section 6.3.4.

USACE Response: Not Adopted.

- Recommendation #6. The maps used in the real estate report to estimate land requirements generally reflect the largest potential footprint for the saltwater and freshwater wetlands targeted for each alternative. These maps are referenced in the document where benefits are discussed in Sections 6.3.1, 6.3.2, 6.3.3.

4. IEPR Comment – Medium Significance: 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.

This comment includes six recommendations for resolution, all of which have been adopted, as discussed below.

USACE Response: Adopted.

- Recommendation #1. The report was rewritten to reduce the reliance on the appendices. The main report can now be viewed as a standalone document.

- Recommendation #2. The report was rewritten to accommodate readers with varying levels of familiarity with south Florida as well as varying levels of technical understanding.

- Recommendation #3. Figures have also been reworked and should now be easier to read and understand.

- Recommendation #4. The management measures and alternatives are thoroughly described and summarized in Section 5 of the main report. Maps are included to support the text of the report. CE/ICA graphs and tables are included in Section 6.5 of the report.

- Recommendation #5. The tables and figures were edited to remove any inconsistencies between them.

- Recommendation #6. Cross sections of the spreader canals and ditch closures are included in the Engineering Appendix.

5. IEPR Comment – Medium Significance: The effects of the BBCW project and the resulting changes in hydrologic regime on "downstream" foundation species (e.g., mangroves) should be assessed.

This comment includes three recommendations for resolution, all of which have been adopted, as discussed below.

USACE Response: Adopted.

- Recommendation #1. To address this recommendation, the ecological monitoring plan was revised with input from resource agencies and the co-sponsor, and coordinated with Corps Headquarters prior to the completion of the final PIR/EIS. As a result, the monitoring duration was increased from five to ten years. The comment also notes that the project-level monitoring plan includes only "minor assessments of periphyton" in the intertidal wetlands. In fact, the project's monitoring plan includes detailed vegetation monitoring in those wetlands along 8 transects.

- Recommendation #2. The comment addresses an important component of the intertidal wetlands--the effects of the project on dwarf mangrove forest. In their study on dwarf mangrove communities that are part south Florida's ecological "white zone," Ross et al. (1992) notes several factors that may contribute to this low-productivity community type, including: (1) wide seasonal fluctuations in salinity and moisture content, and (2) absence of freshwater input from upstream sources. The project is anticipated to alleviate the wide salinity fluctuations and increase freshwater input from upstream sources, which should result in an increase in productivity and habitat quality in these areas. Historically, the area presently occupied by dwarf mangrove forest was graminoid marsh. Ideally, the dwarf mangrove system would gradually be replaced by a healthy graminoid marsh in response to reestablishing appropriate hydrologic and salinity conditions. A discussion on project effects to mangrove communities was included in Section 3.1 of the PIR. Reference: Ross, M.S, et al. 2002. Multi-taxon analysis of the "White Zone," a common ecotonal feature of south Florida coastal wetlands. In Porter and Porter (eds.), The Everglades, Florida Bay, and Coral Reefs of the Florida Keys, CRC Press, Boca Raton, FL.

- Recommendation #3. Experts in the area have deemed that the oysters associated with mangrove prop roots do not constitute a viable population, and they have indicated that monitoring prop root oysters is a difficult, time-consuming, and expensive prospect. As was noted in Comment #5, severe restrictions on funding allowed for project-level monitoring (no greater than 1% of total project cost) precludes additional monitoring in the intertidal wetlands. Aside from these issues, the planning team is most interested in reestablishing viable oyster reefs at creek mouths that historically existed in the project

area. To that end, an appropriate monitoring plan has been developed to detect and evaluate the desired end state. However, it can be noted that we anticipate that the oysters associated with prop roots will provide valuable seed/spat to help reestablish oyster beds once appropriate salinity conditions are restored.

6. IEPR Comment – Medium Significance: The quantification of long-term reductions in nutrient loading is unclear as it relates to benefits and changes over time.

USACE Response: Adopted.

- Recommendation #1. A discussion of nutrient removal assumptions and analytical methodology was added to the document. Added to Appendix C.1.1.7, and Section 6.3.3

- Recommendation #2. The nutrient removal calculations took into account the maximum wetland area available and the volume of water available on a given day. (Subsequent to this comment, the CBEEM estimator was rerun after altering the wetland acreage estimates for WQ treatment lands. The new estimates of freshwater acreage were taken from the freshwater wetland acreage rehydration values computed for the freshwater wetland habitat units. The saltwater wetland acreage estimates were derived from the freshwater wetland rehydration estimates for each basin taking into account the relative pump capacity assigned to the saltwater wetlands. The change in wetland treatment acreage resulted in a decrease of YB total habitat lift by 12%, Q by 9%, M by 1%, and O by 1.5%. Based on this analysis, this change would not have altered the results of the Cost Effectiveness / Incremental Cost Analysis or changed the selected plan. No change to the existing benefits assessment appears warranted though a discussion of these land estimates was included in the CBEEM write-up and potentially in the risk / uncertainty discussion. Discussion was added to section 6.3.3. and Appendix C.)

- Recommendation #3. The rational for the selected nitrate removal rate was provided in the document as well as the justification for weighting the nitrate and phosphorus removal components. The following additional discussion was included CBEEM text: "The nitrate removal rate was estimated by using the reduction rate of 35 m/yr provided on page 430 of Kadlec and Kight for surface treatment systems. This rate is for treatment systems operating at 20° C so it was adjusted using the denitrification temperature adjustment coefficient for a reasonable estimate of annual average South Florida operating temperature of 25° C. The temperature adjustment equation is: K25 = K20*1.08^(25-20) . This was noted in Appendix C. A discussion of weighting of the two WQ sub-metrics was included in Appendix C.

7. IEPR Comment – Medium Significance: The process by which the management measures were developed, screened, and combined into alternatives was not clearly described.

This comment includes four recommendations for resolution, all of which have been adopted, as discussed below.

USACE Response: Adopted.

- Recommendation #1. A description of how all the management measures considered for this project were identified, evaluated, and screened is in Section 5.3.4 (Management Measures) of the draft report and are further developed in the alternative plans formulation sections that follow.

- Recommendation #2. A thorough discussion of management measures is located in Section 5.3.2 of the main report. This section details the objectives of the management measures as well as which measures were dropped from consideration and why.

- Recommendation #3. Section 5 of the main report details the development of alternative plans. Rationale is provided as to screening of management measures and alternatives, and why alternatives were either dropped or carried forward. Section 6 of the report goes into further detail regarding the comparison and selection of alternatives.

- Recommendation #4. There were five alternatives in the final array of alternatives. The relationship between outputs and costs are not linear for these alternatives. These plans are incrementally built. Starting with the Alt O-Phase 1 features (which are considered minimal features to complete objectives) and adding or substituting components to build larger alternatives. This would account for the perception of linear relationships, but upon completion of the cost effectiveness analysis it can be noted that there are at least two cost effective plans for the combined habitat units, freshwater and nearshore zones. There is only one for the saltwater ecological zone. Having a narrower array of best buy plans further emphasizes that the plan selected is by far the most efficient at producing the given output. A discussion of the number of best buys was added to CE/ICA section.

8. IEPR Comment – Medium Significance: The hydrology sections do not provide sufficient information to evaluate the effects of implementing the proposed plan compared to the baseline.

This comment includes three recommendations for resolution, all of which have been adopted as discussed below.

USACE Response: Adopted.

- Recommendation #1. The hydrology section 2.1.4 was amended to discuss the general hydrologic conditions within the freshwater and saltwater wetlands as well as the nearshore tidal area. The existing conditions discussion in chapter 3 (Section 3.1.3 Hydrology) has been amended to include a water availability analysis for the four basins (exceedance probability plots). Monthly flow volume return frequencies were computed using the 1986-2006 period of record. In the evaluation and comparison chapter (chapter 6) , graphs of the monthly diverted flow volume return frequencies were added to the

hydrology discussion. Benefit assessment write-up (Section 6.3) has been amended to include wet and dry season estimates as well as dry year and average year estimates per committee suggestion.

- Recommendation #2. Section 7.14.2.3 of the report was revised to include a sea level rise analysis per EC 1165-2-211. This analysis is based upon the Key West NOAA tide station. Based on the historic record at this station, the analysis is based upon eustatic conditions (land elevation is not changing.) Land subsidence is considered to be insignificant.

- Recommendation #3. Additional discussion of the modeling work done on this project was provided. A discussion of the models used in this project has been added to the chapter 6, Evaluation and Comparison of Alternative Plans (Section 6.1.3 Hydrology) A discussion of the risk/reliability of the simplified wetlands rehydration method used in CBEEM has been added to Section 6 and Appendix C. Additional wetland rehydration analysis using the Miami-Dade County Test Wetland Site at Military Canal was performed to supplement current estimation methods.

9. IEPR Comment – Medium Significance: The water quality analyses need to focus more on extreme values and ranges of salinity, dissolved oxygen, and nutrients rather than just averages.

This comment includes three recommendations for resolution, all of which have been adopted as discussed below.

USACE Response: Adopted.

- Recommendation #1. The range of expected nutrient concentrations and salinity concentrations has been included in Appendix C and in section 4 of the document. The risk / uncertainty discussion, in Section 6.3.5 was amended to include a discussion of the use of averages as boundary conditions and average responses as a measure of the project benefits. The Appendix C benefits write up and the risk/ uncertainty section will include the results of the recently completed benefits assessment for water supply conditions representing the 10% and 90% exceedance frequency canal flows.

- Recommendation #2. A discussion of drought year impacts to downstream salinity is discussed in Section 6.3.3. Exceedance probability plots for available and diverted water for the selected plan have been added to Section 6.1.3 Hydrology (in chapter 6, Evaluation and Comparison of Alternative Plans). A discussion of the availability of water to divert to the project features was included in this hydrology discussion. The risk/uncertainty section (Section 6.3.5will also include discussion of variability in water supply for the project features.

- Recommendation #3. The prediction models used to develop the BBCW PIR used likely salinity and nutrient concentrations as recommended. None of the water quality models included dissolved oxygen as a boundary condition.

10. IEPR Comment – Medium Significance: The BBCW PIR needs to address how sufficient, long-term dispersion of flow will be achieved across the maximum extent of the project area, while avoiding the development of concentrated flows and short-circuiting around microtopographic features.

This comment includes four recommendations for resolution, one which was adopted and three which were not adopted, as discussed below.

USACE Response: Adopted.

- Recommendation #2. The historical regime consisted of multiple natural channelized flows, or small creeks or streams. Studies have identified more than 20 such creeks existed in or near the project area. Some of these, such as Black Creek were relatively large. An objective of the project is to simulate creek flows through the wetlands, not to spread water uniformly over them. The original creek systems have converted into linear tree islands since the freshwater flow has been eliminated, and it not desirable to dredge, or otherwise disturb the tree islands. Instead, flow is expected to create new creeks based on the microtopography. Since this topography cannot be discerned easily, it is difficult to predict where these creeks will form exactly. This discussion was added to the main report in Section 6.3 and in Appendix C and in Adaptive Management section of report. . This discussion also responds to the critical role of flow distribution in rehydrated areas in response to recommendation #1.

- Recommendation #4. While effective dispersion of water across the targeted wetlands is desirable at the western side of the saltwater wetlands, flow concentration into tidal creeks is preferred at the eastern interface with the shoreline. A discussion of this was added to the adaptive management plan located in Annex E, Project Monitoring Plan.

USACE Response: Not Adopted.

- Recommendation #1. It is presumed this comment is targeted at diverted freshwater flow into the salt intruded wetlands. The assumption that uniform spreading of the freshwater over large areas of the saltwater wetlands is critical for restoration is false. The historical regime consisted of multiple natural channelized flows, or small creeks or streams. Studies have identified more than 20 such creeks existed in or near the project area. Some of these, such as Black Creek were relatively large. An objective of the project is to simulate creek flows through the wetlands, not to spread water uniformly over them. The original creek systems have converted into linear tree islands since the freshwater flow has been eliminated, and it not desirable to dredge, or otherwise disturb the tree islands. Instead, flow is expected to create new creeks based on the microtopography.

Since this topography cannot be discerned easily, it is difficult to predict where these creeks will form exactly.

- Recommendation #3. Monitoring within the saltwater wetland zone can be difficult to implement and is problematic due primarily to access. Furthermore, data from such monitoring can be difficult to evaluate given a tidal signal that influences groundwater stages and salinity. Extensive monitoring within the wetlands using traditional methods is not viable without causing impacts to the wetlands themselves, therefore, results from the salinity monitoring along the shoreline will provide evidence of how much water is exiting the wetlands into Biscayne Bay at any given point. These results will be compared to salinity performance ranges to ensure that water is distributed north to south to optimize nearshore salinity targets by controlling operations upstream. Most of these adjustments to flow should occur during the initial operating period, but will also be monitored over the long term by observations made at the transect and water level monitoring sites. This discussion was added to the monitoring plan (Annex E).

11. IEPR Comment – Medium Significance: The scientific basis for categorizing "low-functioning wetlands" and "high-functioning wetlands" as a function of the Criterion Based Ecological Evaluation Matrix (CBEEM) and the aerial extent of the benefits for each of the final array need to be clarified.

This comment includes five recommendations for resolution, three of which were adopted and two which were not adopted, as discussed below.

USACE Response: Adopted.

- Recommendation #1. Wetland functional values were determined using the vegetation type presently occurring in each of the 3 evaluation components. Functional values for each vegetation type were scored based mainly on whether or not the vegetation type was historically in this part of the project area. Historic vegetation conditions, as defined by the Davis (1943) vegetation map, were used to guide the analysis and set the maximum function values (Figure 2). According to the Davis (1943) map, the predominant vegetation type in the Alternative Q delineated area was "southern coast marsh prairies" with "bay tree forests" scattered as tree islands throughout the prairies. Davis's map agrees closely with another historic map that covered the Model Lands part of the project area (Egler 1952). Vegetation types that closely match Davis's two classes are scored the maximum (1.0). Habitat types that probably occurred in the project area (e.g., freshwater marshes) are scored 0.8. If the habitat type was not historically in the project area then it is considered generally undesirable because it does not support the suite of species that would be supported by the historic habitat type, even though the habitat may be generally considered of good value in other parts of the south Florida landscape (score = 0.4). Mixed classes that include an historic vegetation type and a non-historic type (but not non-native) are scored 0.7. Any habitat type that also has non-natives (*Melaleuca*, Brazilian pepper, or Australian pine) is penalized by 0.1 points. Row crops and

developed areas are scored zeros. This assessment was prepared by the USFWS (Pitts, 2008) and is referenced in performance metric descriptions located in Appendix C.

- Recommendation #2. One or more maps showing the primary habitat types was added to Section 3.1.7.

- Recommendation #3. The CBEEM methodology does not provide geographically explicit mapping of the benefitted areas since it is an aggregation of the multiple performance metrics. Discussion of benefited area in Section 6.3 now references real estate maps to give reader of general location of expected benefits.

- Recommendation #4. Much of the CBEEM write up has been condensed and included in the revised main report in Section 6.3. The executive summary was amended to include a short summary of the benefits estimation methodology.

- Recommendation #5. The revised benefits assessment section (Section 6.3) includes a clearer description of CBEEM output and benefited areas

12. IEPR Comment – Medium Significance: Risk and uncertainty are not addressed in sufficient detail to meet the requirements of the CERP Program Regulations.

This comment includes three recommendations for resolution, two of which were adopted and one which was not adopted, as discussed below.

USACE Response: Adopted.

- Recommendation #1. Additional discussion of the risk/uncertainty associated with water availability, sea level rise, and ecosystem response was added to the document. A sea level rise analysis has been incorporated into the document. Additional information regarding water availability has been added to chapters 3 and 6 (existing conditions, plan evaluation) using monthly water flow data as well as 10 and 90 percent exceedance analysis. Additional discussion of ecosystem response was added to risk/uncertainty Section 7.14.

- Recommendation #2. The present risk assessment was modified to include quantitative analysis to the extent that a quantitative risk-based estimates can be derived given the underlying structure of the available models (hydrologic and benefits) and their inputs. (The entirety of the CERP plan is based upon simulations using a 35 year period of record that is stationary. The Corps and the SFWMD are studying the implications of climate change to water resource planning; however, at present no guidance exists regarding how hydrologic simulation boundary conditions should account for "non-stationarity". Discussion of non-stationarity added to climate in chapter 2. The benefit assessment tool was used to calculate benefits for 10% and 90% exceedance frequency flow conditions. This was used to evaluate stationarity issue.

- Recommendation #3. The findings of the risk/uncertainty analysis were included in the executive summary and in the selected plan chapter (Section 7).

13. IEPR Comment – Medium Significance: 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.

This comment includes six recommendations for resolution, all of which were adopted, as discussed below.

USACE Response: Adopted.

Recommendation #1. Recognizing the initial funding restrictions for project-level monitoring the following monitoring parameters were proposed: Water Quality monitoring: The number and location of water quality monitoring sites with the wetlands is admittedly not ideal; however, there will be additional water quality monitoring sites required for project permitting. Discussion of this is included in the draft project monitoring plan in Annex E.

- Recommendation #2. Oyster monitoring: Experts in the area have deemed that the oysters associated with mangrove prop roots do not constitute a viable population, and they have indicated that monitoring prop root oysters is a difficult, time-consuming, and expensive prospect. As was noted in Comment #5, severe restrictions on funding allowed for project-level monitoring (no greater than 1% of total project cost) precludes additional monitoring in the intertidal wetlands. Aside from these issues, the planning team is most interested in reestablishing viable oyster reefs at creek mouths that historically existed in the project area. To that end, an appropriate monitoring plan has been developed to detect and evaluate the desired end state. However, it can be noted that we anticipate that the oysters associated with prop roots will provide valuable seed/spat to help reestablish oyster beds once appropriate salinity conditions are restored. Details of the methodology and justification of this monitoring parameter is contained in the Ecological Monitoring Plan in Annex E.

- Recommendation #3 & #4. SAV monitoring: Regarding the frequency of sampling comment, the PDT is not necessarily concerned about seasonal fluctuations in SAV composition and coverage. Local experts are more concerned with establishing a persistent coverage of desirable species. So, it will be important for the annual sampling to be conducted during the same season each year, to eliminate known seasonal differences among the SAV species. The section in the monitoring plan on aerial photo interpretation of SAV is a CERP MAP project that is presently on hold. The MAP also conducts extensive in-water SAV assessments by trained SAV experts. The additional SAV sampling included in the BBCW project-level component is intended to fill some spatial gaps in the CERP MAP monitoring. We believe that MAP monitoring combined with the project-level components will provide ample spatial and temporal resolution to

assess project-level changes. Details of the methodology and justification of this monitoring parameter is contained in the Ecological Monitoring Plan in Annex E.

- Recommendation #5. It is true that there are no well-defined targets for SAV at this time. The current target is qualitative--a shift to SAV species that are more indicative of desired lower salinity conditions along the shoreline (i.e., a shift from *Thalassia testudinum* to *Halodule wrightii* and *Ruppia maritima*). These SAV indicator species require relatively low salinity conditions that are consistent with desired salinity conditions in the nearshore areas, as defined by the project's salinity performance measure. It should be noted that the lack of a well-defined SAV target is partly due to the lack of appropriate tools to predict what SAV changes will occur in response to desired salinity targets. Coastal wetlands monitoring: The comment notes that "it will be difficult to link the vegetation changes to changes in the physical variables because (with the exception of a few locations) the physical variable monitoring is not happening at the same locations as the vegetation monitoring." The physical variables of primary interest are hydroperiod and salinity. What the reviewers may have failed to notice is that the wetland algae monitoring proposed in the BBCW monitoring plan is intended to serve as a surrogate for salinity and other physiochemical variables. Gaiser et al. (2005, 2006) have developed statistically significant relationships between diatom species and salinity. Details of the methodology and justification of this monitoring parameter is contained in the Ecological Monitoring Plan in Annex E.

- Recommendation #6. The BBCW monitoring plan notes that: "Surveys throughout Biscayne and Florida Bays found that diatoms could be used to predict salinity within 2 and 5 psu, respectively (Gaiser et al. 2005, 2006). Ample evidence now exists locally and globally to support the use of diatoms in salinity monitoring in wetlands and nearshore habitats. They respond at a time-scale appropriate to monitoring and adaptive management (months to years) and can be sampled at a resolution adequate to detect spatial variation in environmental changes." The monitoring plan also specifies that wetland algae would be sampled at five sites along each of the vegetation monitoring transects, so the linkage between changes in physical variables and vegetation changes could be drawn.

14. IEPR Comment – Medium Significance: An operational response plan is necessary because there is no backup power for the pumping system.

This comment includes three recommendations for resolution, all of which have been adopted, as discussed below.

USACE Response: Adopted.

- Recommendation #1. There would not be any impacts to the project goals due to a power outage. The project has no flood-control functions. The goals are for "environmental restoration" and if the power is out for a few days to a week there would be a slight loss of potential rehydration which currently is not happening at all.

- Recommendation #2. There are no existing flood control measures associated with this project. It is designed for environmental restoration only.

- Recommendation #3. Electric power is planned to come from the local utility company and they have their own action plan depending on what might be the cause of the outage.

15. IEPR Comment – Medium Significance: The hydrologic analysis of freshwater wetland rehydration areas should be based on a more complete water balance analysis.

This comment includes three recommendations for resolution, two of which have been adopted and one was not adopted, as discussed below.

USACE Response: Adopted.

- Recommendation #1. Additional discussion of the freshwater wetland hydrology and the assumptions used to estimate benefits was provided in Section 6.3.5.3 of the document.

- Recommendation #3. The uncertainty analysis was expanded to discuss water availability and seepage estimates. (Benefits were estimated using the CBEEM tool for the 10% and 90% exceedance frequency flow quantities. This information was provided in Appendix C and in the risk/uncertainty write up (section 6 or 7)).

USACE Response: Not Adopted.

- Recommendation #2. No additional modeling can be done to address this fully; however, a monthly analysis of projected pumpage at the project features was provided in the document. An analysis of benefits computed using CBEEM for the 10% and 90% exceedance frequency flows was added to the document to address uncertainty regarding water availability. Monthly water flows are included in Section 3.1.3 of the document.

16. IEPR Comment – Medium Significance: The calculations of the average annual costs and benefits cannot be reviewed for accuracy without more information.

This comment includes two recommendations for resolution, all of which have been adopted.

USACE Response: Adopted.

- Recommendation #1. Graphs were inserted in the report depicting the ecological response over the life of the project. The CE/ICA will use a static sea level scenario for plan formulation and identification. The risk and uncertainty section will include scenarios showing the low, intermediate and high impacts of sea level rise and the implications on plan formulation and selection. This was conducted through a series of cost effective analysis.

The future without project condition for Nearshore habitat is actually better than the existing condition due to improved water quality that results from changes to land use within the upstream basin, so there is a greater lift in the early years of the project which leads to a higher average annual lift than occurs in the snapshot of the year 2050.

Habitat Units estimates have now been calculated for each sea level scenario and compared back to the static condition to give an overall assessment of the risk of loss of benefits. A graph showing the expected benefit curve attributed to sea level scenarios was included in the benefit calculation section. Misc: For the CE/ICA rerun, the annual costs were updated to reflect the new construction schedule, new interest rate, and IDC was adjusted accordingly.

- Recommendation #2. The CE/ICA uses planning level cost estimates (ROM) costs. Upon selection of the TSP, the costs are further refined and more detailed cost estimates are conducted. These reflect further engineering design (typically 30%) and more thorough real estate analysis. The discrepancy between the TSP and the CE/ICA was noted in the report and made clear to the reader.

17. IEPR Comment – Medium Significance: Some of the uncertainties associated with possible construction activities could add significant costs to the project.

This comment includes two recommendations for resolution, two of which have been adopted, as discussed below.

USACE Response: Adopted.

- Recommendation 1. For the L-31 portion of the project, geotechnical borings and surveys were included as work that would be performed in the PED phase in order to develop the plans fully. This information can be found in Appendices A.1.1 Geology, A.4.1 Civil and A 7.1 Project Features.

- Recommendation #2. An in depth review of project risks will provide the appropriate contingencies as they relate to specific project uncertainties. A copy of this assessment was included in the Final PIR in Section 7-14.

18. IEPR Comment – Low Significance: The Draft Project Monitoring Plan does not clearly explain which organization or agency will be responsible for monitoring and adaptive management.

This comment includes three recommendations for resolution, all of which have been adopted, as discussed below.

USACE Response: Adopted.

- Recommendation #1. The USACE and SFWMD are ultimately responsible for all aspects of the project-level monitoring including data collection, storage, dispersion, and analyses. This information has been added to the Ecological Monitoring Plan contained in Annex E of the PIR.

- Recommendation #2. See response to Recommendation #1.

- Recommendation #3. RECOVER oversees all aspects of adaptive management. Protocols for adaptive management and/or operational changes are outlined in Part IV Adaptive Management Plan contained in Annex E, Part IV of the PIR.

19. IEPR Comment – Low Significance: Literature references and citations are required throughout the document to evaluate if statements are "thorough" and "accurate."

This comment includes one recommendation for resolution, which has been adopted, as discussed below.

USACE Response: Adopted.

- Recommendation #1. References were provided for each of the identified sections of the report.