



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

CECW-SAD

JAN 30 2012

MEMORANDUM FOR ASSISTANT SECRETARY OF THE ARMY (CIVIL WORKS)

SUBJECT: C-111 Spreader Canal Western 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, estuarine and freshwater ecology, hydrogeology and hydraulics, 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
C-111 Spreader Canal Western Project
Project Implementation Report and Environmental Impact Statement**

**U.S. Army Corps of Engineers Response to
Independent External Peer Review
18 January 2012**

Independent External Peer Review (IEPR) was conducted for the subject project in accordance with Section 2034 of WRDA 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)*.

The goal of the U.S. Army Corps of Engineers (USACE) Civil Works program is to always provide the most scientifically sound, sustainable water resource solutions for the nation. The USACE review processes are essential to ensuring project safety and quality of the products USACE provides to the American people. Battelle Memorial Institute (Battelle), a non-profit science and technology organization with experience in establishing and administering peer review panels for USACE, was engaged to conduct the IEPR of the C-111 Spreader Canal Western Project Draft and Final Project Implementation Report (PIR) with integrated Environmental Impact Statement (EIS).

The IEPR panel reviewed the Draft PIR/EIS, as well as supporting documentation. The Final IEPR Battelle Report was issued 30 October 2009. A final back-check review was completed on the Final PIR/EIS dated November 2009.

Overall, 23 comments were identified and documented. Of the 23 comments, 13 were identified as having high significance, six were identified as having medium significance, and four were identified as having low significance. Of the 13 comments which have high significance, 9 were adopted into the PIR and 4 were partially adopted into the PIR. Of the 6 comments which have medium significance 4 were adopted into the PIR and 2 were partially adopted into the PIR. Of the 4 comments which have low significance, 2 were adopted into the PIR, 1 was partially adopted into the PIR, and 1 comment was not adopted. The following discussions present the USACE Final Response to the 23 IEPR comments.

1. Comment – *High Significance*: A map of the entire Taylor Slough should be included showing major features and flows in and out of Taylor Slough, as well as the changes in flow anticipated from the components listed in Section 1.5.1 of the PIR. This map and accompanying overlays are needed to indicate existing flow and path conditions, and to allow comparison of potential effects from the project alternatives.

USACE Response: Adopted.

Action Taken: A map of Taylor Slough has been added to Section 1 of the PIR showing its natural boundaries, directions of water flow and pumping, and the locations of major natural

features. Anthropogenic features such as Tamiami Trail have also been added to the map where possible. Boundaries have been superimposed on new maps throughout the document to improve the frame of reference.

2. Comment – *High Significance*: The existing ecological conditions are unclear, which makes it difficult to assess the potential impacts of the project alternatives.

This comment was broken into two parts, which was partially adopted by the USACE. The first part references the portion of the comment (ecological/vegetative community map , lists of plant species and factors influencing natural communities) which was adopted and incorporated into the document. The second part references the portion of the comment (plant species analysis to gradients, plant species count, significant natural habitat maps and indicator species maps) which was not adopted and incorporated into the document.

Part 1:

USACE Response: Adopted.

Action Taken: In regards to the request for a list of plant species in each community and their abundance, information regarding vegetation communities has been included in Section 2.3 of the PIR. A map of Ecological/Vegetative Zones has also been added in Figure 2-2, page 2-6 of the PIR. A description of each Zone follows the Figure and is located in Table 2-1.

Section 2.3 of the PIR provides a discussion of the primary factors influencing the distribution of vegetation in the project area and a discussion of alternative effects on resources in the area has been expanded and is included for each alternative in Section 7, Environmental Effects, of the PIR.

Part 2:

USACE Response: Not Adopted.

Full inventories of existing resources and descriptions of associated habitats (including plant communities) in the project area and adjacent south Florida ecosystems, are documented and referenced in Section 3.5 of the Yellow Book (Comprehensive Review Study).

An analysis relating plant species composition of Taylor Slough to gradients such as topography, peat content, hydrology and fertility, and a map showing the occurrence of these communities within Taylor Slough is beyond the scope of information required to evaluate and compare alternatives for the proposed project. Additional research would be required and the information would not affect the outcome or success of the study as it does not reflect the relative size of the restoration project. For instance, the mapping of a 10' x 15' area of wet prairie in Taylor Slough would have no practical purpose when evaluating a project that is affecting 240,000 acres of wetlands. A full enumeration of plant species found in the project area has not been added to the report as the project features of the Recommended Plan cannot be adjusted or adapted to encourage species-specific restoration. The hydrologic restoration will be occurring on a much more considerable scale with changes occurring on a community level. Indicator species were not used in the analysis therefore a map potential indicator species was not added. However,

resource maps are included in the PIR that depict threatened and endangered species or boundaries of designated critical habitat that address conservation concerns.

3. Comment - *High Significance*: The specific details on the existing system, including the physical, operational and triggers, and how they will change must be provided to understand the impact of flow to the ENP.

USACE Response: Adopted.

Action Taken: Section 7 of the report, Environmental Effects, has been revised to include the IEPR recommended factors in the evaluation of alternatives. A discussion of the water management operations for the different alternatives has been added to Section 7.6 of the PIR. Additionally, a discussion was added to Section 7.5 (Hydrology) that discusses water budget estimations during average and extreme conditions. Table 7-2 depicts flows through critical structures and has also been added to the report. A discussion has also been added to Section 7.6 (Water Management) that details any possible alternative effects on the conveyance system. A description of how these factors are included in the evaluation of the project alternatives is included in Section 5.3.8 of the PIR, as well as Section C.13 in the Appendices. These two sections provide a breakdown of the hydraulic modeling which utilized water budget estimations, flows through critical structures, operating rules, etc. in the estimation of proposed alternative effects. In regards to the flood damage reduction and the prevention of detrimental effects on the conveyance system, Section D.22 of the report provides detailed information on the preliminary operations during the operational testing and monitoring phase. This section includes an implementation schedule for incremental increases at Structure S-18C, a description of the monitoring methodology that will be implemented to ensure that no detrimental effects will occur, and other factors that will be utilized to contribute to successful project implementation. Section D.7 of the Draft Project Operating Manual provides a description of other operational strategies that will be employed, including those for flood damage reduction and water supply. Section D.8 provides information on Pre-Storm/Storm Operations and the subsequent sections provide for consistency with Savings Clause and State Assurances, Flood Emergencies, Deviations from Normal Operating Criteria, etc.

4. Comment – *High Significance*: The assumptions leading to the "future without project" should be clearly specified in relation to water demands and land use changes and how those impact the "future without project" water budget.

This comment was broken into two parts, which was partially adopted by the USACE. The first part references the portion of the comment (water demands and hydrology changes in future without project conditions) which was adopted and incorporated into the document. The second part references the portion of the comment (primary study area and model domain for hydrological model relationship) which was not adopted and incorporated into the document.

Part 1

USACE Response: Adopted.

Action Taken: In regards to Water Supply demands, Section 3.3.5 of the PIR indicates that, although there would be an increase in demand, the future without project condition assumes a significant increase in the amount of available water in the C-111 (project) basin, due to the Modified Water Deliveries project that is currently being implemented. Both water supply demands and future increases in CERP and south Florida projects were taken into account for project hydraulic modeling.

In section 3.3.5, water supply demands have been added and the tables have been included based on the population scenarios. These data were partially used as the basis for designing/permitting the pumping wells for water supply in the region. In the model, the pumping well data were entered and then simulated to investigate the effects for different scenarios including Future Without Project condition. The hydrologic, hydraulic, and hydrogeologic systems included in the modeling tool (MODBRANCH) allowed representation of different water balance components for Future Without Project condition. As mentioned in the report (page A-190), model input changes were made to reflect the predicted land use and withdrawal by wells. The water demands projections are water demands, they do not always equate to water supply. Water demand projections were calculated for the LEC service area to account for population projections at the county level. Population projections were not conducted at a local level. The LEC water supply plan is the venue that the SFWMD uses for future supply to meet expected future demand, and is what was utilized for the modeling effort. There is not necessarily a direct correlation between water demands and groundwater withdrawals, as future water demands are anticipated to come from alternate sources of water supply. Appendix G: Page G-20 contains a list of the conservation methods. This appendix also contains will be expanded to show the reason is due to population increases. The per capita consumption would decrease, but overall consumption increase due to increases in population. Table 3-3 will be amended to reflect that the majority of the future development that is expected is on previously farmed lands.

Part 2:

USACE Response: Not Adopted.

The PIR contains descriptions of the proposed project, project area, and model domain. Therefore, additional information regarding the relation of water demands, land use changes, and the water budget were not included. A description of the proposed project area is contained in Section 1.3 of the PIR. Figure 1-1 is referenced and provides a visual representation of the lands, structures and other notable elements discussed in Section 1.3. More information regarding the proposed project area is included in Section 2.1 of the PIR. In Section A.10 a description of the model domain, which is generally larger than a project area and is not referenced as the project area in the document, is provided. A model domain and accompanying grid is typically larger than a project area, which is not uncommon for hydrologic models that were not specifically designed solely for the use of one project..

5. Comment – *High Significance*: The rationale, criteria, weighting and the process for selection and monitoring for adaptive management needs to be explained and further documented.

USACE Response: Adopted.

Action Taken: Adaptive Management has fully been considered during formulation for the proposed project, as the Initial Array of Alternatives was reformulated to incorporate an Incremental Adaptive Restoration (IAR) approach. The IAR approach and incorporation of Adaptive Management into the design and operation of the C-111 Spreader Canal Western Project is imperative to gain optimal performance of the alternative features and promote learning to guide the remainder of project implementation and restoration within the study area.

An Adaptive Management section has been added to Section 6 of the PIR. This section generally outlines the operations for the adaptively managed features in the project (S-18C, Frog Pond Detention Area, Aerojet Canal, and new operable plug in lower C-111). The features are adaptively managed to prevent flooding in private lands while maximizing ecosystem restoration, to optimize ecosystem restoration in Everglades National Park and optimize project performance. The effectiveness of these features will be used to guide further restoration in the future Eastern PIR.

Additional weighting criteria were not necessary to address wetland impacts and were not added into the analysis during the final stages of alternative comparison. The referenced section of the report on page 5-44 refers to additional “bracketing” of alternatives that was done to ensure that an adequate array of potential sizes of the Aerojet Canal Detention Area feature would be evaluated. A full analysis under Section 404 of the Clean Water Act was conducted for the PIR. Furthermore, utilization of the existing Aerojet Canal for project purposes translates into a nearly complete avoidance of wetland impacts for this feature, as additional construction would be limited to berm construction to contain water within the detention area.

6. Comment – *High Significance*: 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.

This comment was broken into two parts, which was partially adopted by the USACE. The first part references the portion of the comment (more detailed modeling analysis) which was adopted and incorporated into the document. The second part references the portion of the comment (more detail on direct, indirect and real estate cost) which was adopted and incorporated into the document.

Part 1:

USACE Response: Adopted.

Action Taken: Language addressing the concerns referenced has been added in the Final PIR. A detailed Cost and Schedule Risk Analysis that places contingencies on the various components using the Crystal Ball program. This is the Corps mandated procedure, and it takes into account a wide array of risks, such as weather events and differing site conditions.

Part 2:

USACE Response: Not Adopted.

The USACE does not typically perform detailed cost estimates during the planning level analysis of alternatives, unless it is determined that a specific aspect of the project cost is necessary to separate alternatives via performance and cost comparison methods. A narrative explaining the planning level analysis for all alternatives and summarizing the information used is normally appropriate and sufficient, as was the case for this project. The Engineering Appendix describes many components of the various alternatives that were analyzed, and the level of design detail utilized was consistent across all the alternatives to ensure a reasonable and balanced comparison. Detailed estimates are and have been developed for the selected plan, and the direct, indirect, and real estate costs were incorporated into that figure.

7. Comment – High Significance: 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.

USACE Response: Adopted.

Action Taken: In response to the comment, the 2007 Model Calibration Report was added to the PIR in Appendix A. The Report provides a discussion of model utilization for previous and ongoing studies within the project study area. Additionally, the Calibration Report provides a description of the capabilities of the Modbranch model, including further modification and refinements that were conducted to optimize model performance in the area of south Florida. In addition, the Modbranch Model Documentation Report has been added to the PIR in Appendix A. The Report provides a discussion of model selection and utilization for the complex hydrologic interactions within the aquifer and conveyance features within the study area. The Model Documentation Report also provides a discussion of critical elements of the model such as topography, hydrogeology, water sources and sinks, and rainfall, recharge and evapotranspiration. The Report also provides a discussion of limitations such as Rainfall, Evapotranspiration and Variable Head Boundary Conditions, Canal leakance and hydraulic parameters, structure operations and implementation, and topography.

8. Comment – High Significance: 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.

USACE Response: Adopted.

Action Taken: Extensive water quality, vegetative, and wildlife monitoring has been conducted in the Frog Pond Detention Area and adjacent project area for a considerable amount of time. As a result, phosphorus concentrations and loads in the C-111 canal area are within regulatory standards, with recent trends indicating a decline in overall phosphorus levels. There is not a substantial problem with phosphorous loading in affected area of ENP and no phosphorous gradient exists. Vegetation in this area is stressed due to poor hydrology caused by drainage features rather than nutrient inputs to the system. As such, although phosphorous thresholds have been established for inflows into the northern portions of the Everglades system, no such

attempt was made for the proposed project. Increases in phosphorous loading through surface water input into ENP will not occur as a result of the proposed project.

There could be some negative effects on vegetation along the eastern boundary of ENP, most likely cattail growth, as a result of water seepage to the west out of the two Detention Areas. These effects are likely to be extremely minimal, and would likely only occur along the immediate edges of the two Detention Areas. The spread of cattails further into ENP is unlikely to occur due to the high quality of the water in the C-111 Canal in this area and the limited seepage that would occur to the west with the absence of any substantial flow gradient in that direction. Section 7.8 of the PIR/EIS has been revised to state: The proposed project will not result in any increased phosphorous loading in Taylor Slough.

9. Comment – *High Significance*: The PIR needs to comprehensively discuss the characterization of salinity throughout the Taylor Slough and Florida Bay area including historical changes/impacts, expected salinity changes, and negative impacts for the alternatives.

USACE Response: Adopted.

Action Taken: The PIR has been revised to make reference to extensive surveys, data collections, and monitoring efforts throughout the Florida Bay and Taylor Slough region. Salinity characterization, along with physical processes of the region is discussed in the following reports that have been referenced in the PIR: Fish and Wildlife Research Institute TR 11: “A Synthesis of Research on Florida Bay,” “A History of Recent Ecological Changes,” “Wetland Fish Salinity,” “The Florida Bay Main Report,” and “The effect of hydrological patterns and breeding-season flooding on the numbers and distribution of wading birds in Everglades National Park.” Additionally, the CERP Conceptual Ecological Model for Florida Bay was utilized for the project and is included in Appendix C of the PIR.

In addition to the information on Florida Bay listed above, Appendix C (Section C.13.1.3) has been revised to include detailed information regarding the existing salinity regime and its causal factors. Additionally, Figure C-20 was included which displays historical and predicted salinities for Long Sound, Little Madeira Bay, Joe Bay, Manatee Bay, and Barnes Sound areas of the Florida Bay ecosystem. Table C-15 was included and provides the results for Alternative effects on Florida Bay. Section 5.2.8.1.2 of the Main PIR document was revised to include a detailed discussion of the results and conclusions of alternative performance.

The Atlantic Multidecadal Oscillation (AMO) cycle is an approximately 60-90 year cycle that would change substantially beyond the 41-year period of analysis for the proposed project. The current warming cycle is predicted to have begun in approximately 1995, which would place the proposed project timeframe completely within the warm/wet cycle of the AMO. Predictions were not made for timeframes beyond the period of analysis for the proposed project as conditions would have typically changed beyond rational predictability. As such, it is unlikely that an exhaustive analysis of AMO effects on Alternative performance would produce any data that would change the evaluation and selection of the Recommended Plan for the proposed project.

10. Comment – *High Significance*: The PIR needs to comprehensively discuss the characteristics, possible inputs to and releases (i.e., nutrients and contaminants) from the creation of Frog Pond Stormwater Treatment Area (STA).

USACE Response: Adopted.

Action Taken: The Frog Pond and Aerojet Canal Detention areas would not function as a Stormwater Treatment Area (STA). As such, no information was given concerning cumulative effects of STA construction and lessons learned from those nearby already in operation. Water quality in the C-111 Canal in this area meets current standards and no substantial phosphorous input in the Detention Areas is anticipated. As such, there are no mechanisms for phosphorous removal in the Detention Areas, and no surface water would be pumped into Taylor Slough or Everglades National Park. There may be some minimal growth of cattails as a result of westward seepage of water out of the detention areas; however, any possible growth of cattails in this area is expected to be minimal, and should be limited to the immediate western edges of the detention areas. A general drawing of the project features, including the Frog Pond and Aerojet Canal Detention Areas, was included on pages A-3, A-11 and A-12 of the report. Additionally, a description of the Frog Pond Detention Area was added in Section A.2.3 and a description of the Aerojet Canal Detention Area to page A.2.5.

In regards to the recommendations concerning vegetation and wildlife, the two detention areas, the Frog Pond Detention Area and the Aerojet Canal, will not function or be managed as habitat. The function of the detention areas is solely for water detention and infiltration to form a hydraulic ridge. As water will not be permanently retained in the detention areas, it is unlikely that they will be utilized by native species in the area for foraging or breeding. Any colonization by exotic species will be managed as part of normal operation in the detention areas. Additionally, as part of the construction plan for the project, the Frog Pond Detention Area will be scraped in order to eliminate areas for the colonization of exotic vegetation. Section 6.8.3, “Detention Area Physical Characteristics,” has been added to the PIR to fully explain that the Detention Areas will not be managed as habitat.

11. Comment – *High Significance*: The PIR should address the issue of climate cycles and ecological processes, recognizing that wetlands require periods of drought, even extreme drought, as well as periods of flooding, even extreme flooding, to maintain their natural composition and natural functions. This variation occurs among years as well as within years.

This comment was broken into two parts, which was partially adopted by the USACE. The first part references how the PIR was updated to adopt and incorporate into the document the Project’s plan managing project operations during floods, droughts, and other climatic events. The second part references the portion of the comment (describe climatic cycle) which was not adopted.

Part 1:

USACE Response: Adopted.

Action Taken: In regards to drought and flooding effects on project operations, a Draft Project Operating Manual (DPOM) has been completed for the proposed project and added to Annex D. The DPOM contains a Drought Contingency Plan in Section D.11 and a Flood Emergency Action Plan in Section D.12. Water restrictions are typically enforced during periods of serious drought, as water supply must be maintained for both the ecosystem and communities of south Florida. Effects on the natural system and the balance with the human environment are considered during implementation of water restrictions and flood emergencies, and will be considered and evaluated during finalization of the Project Operating Manual.

Part 2:

USACE Response: Not Adopted.

The PIR was not updated to include information regarding climatic cycles as this information did not influence the selection of the recommended plan, however, Section 2.6 of the PIR has been revised to emphasize the importance of maintaining extreme high and low water events that constitute natural cycles and drive wetland processes.

The main climatic cycle that is affecting the south Florida ecosystem is the Atlantic Multidecadal Oscillation. According to recent observations, the warm/wet cycle of the Atlantic Multidecadal Oscillation (AMO) cycle began in approximately 1995, which would encompass the entire period of analysis for the proposed project, theoretically ending between 2055-2085. The effects of the AMO have been observed within ENP, with the increases in hydroperiod and stage depths occurring during the warm/wet cycle in south Florida. The reaction to these cycles is not well documented in the Everglades; however, increased productivity in the aquatic ecosystem and some reduction of nearshore estuarine salinities would be expected during wet years, as well as other effects typical of increased water levels.

Water levels in the project area are primarily dependent on natural rainfall and Central and Southern Florida Project operational schedules, and will be altered as CERP projects are developed and implemented. Although some natural fluctuation of water levels already occurs in accordance with natural cycles, future restoration of this area and the ability to better mimic natural cycles will be dependent on future CERP water storage and conveyance projects. Although the C-111 Spreader Canal Western Project was not designed to distribute greater amounts of water into Everglades National Park during the warm/wet cycle of the AMO, the project has been modeled and designed utilizing a Systems Analysis. As such, the project has been designed to be flexible and would function with and without future increases in CERP flows. In regards to the possible future system alterations, the project would be capable of incorporating increased magnitudes of flow into a hydrologic regime that mimics natural, pre-drainage conditions as closely as possible, especially during the dry season.

Although the AMO certainly influences water levels within the project area, incorporation of the natural cycle was not a key factor in the evaluation and selection of a Recommended Plan due to the nature of the project. Additional information regarding the AMO climatic cycle and its effects has not been added to the report as it did not influence the outcome; however, Section 2.6

of the PIR has been revised to emphasize the importance of maintaining extreme high and low water events that constitute natural cycles and drive wetland processes. Modeling for the proposed project utilized an average wet year, a normal year, and a dry year for rainfall. As such, inter-year, climatic variation was incorporated into the modeling simulations conducted for the proposed project. Flooding events were also incorporated into the model to incorporate intra-year climatic variation as well.

12. Comment – *High Significance*: Given that this is a system driven by cycles, the monitoring program should identify and be responsive to natural environmental cycles.

USACE Response: Adopted.

Action Taken: Since a large proportion of the project-specific monitoring network already exists as part of other monitoring networks, the ecological section of the project-level monitoring plan recommends the continuation of parameters and methodologies that are presently being monitored with emphasis on augmenting sampling sites and station location to better assess project-specific effects. With the exception of complying with endangered species monitoring, the PDT added relatively few new components to fill unmet needs. This yields the benefit of having long-term records regarding the variability of hydrologic and climatic conditions, water quality, SAV, and even some fish (Audubon network). For additional stations or metrics that were added, short and long-term variability will be more difficult to assess; however, statistical comparisons of new sites to old sites will likely be possible, and, if necessary, hindcasting of variations at the new sites will be performed.

Environmental cycles were considered in the establishment of sampling frequencies and durations in order to ensure proper evaluation of system responses. The additional metrics that were added, beyond existing monitoring networks, were done to make certain that a full array of data could be produced to successfully implement adaptive management. These attributes represent key indicators that are responsive to changes in the natural system that will result from project implementation. Rainfall data, other climatic events, and human-induced changes in the operation of the C&SF system will be fully evaluated along with data collected through the ecological monitoring to ensure that the proper decisions are made if operational or structural adjustments to the project become necessary.

13. Comment – *High Significance*: The real estate analysis is incomplete and the relationship between land acquisition costs and flood risks for the recommended plan and the alternatives is not well-documented.

USACE Response: Adopted.

Action Taken: Appendix D has been expanded to include a more detailed analysis of the potential flooding impacts and land acquisition costs associated with the Recommended Plan. Additionally, Section 5 of the Main Report of the PIR has been expanded to include: (1) A description of the hydrological modeling used to support the flooding impacts analysis and the spatial resolution of the model; (2) a description of the process used to convert hydrological model results to GIS maps of land parcels in the study area; (3) an analysis of the potential

flooding impacts and land acquisition costs associated with each Final array of alternatives. Section 5 of the PIR also includes more information on the potential flooding impact analysis for each alternative in the Final Array, and therefore the cost effectiveness analysis in the PIR will not have to be revised to reflect the more detailed assessment of land acquisition costs.

14. Comment – *Medium Significance*: More details on the spatial distribution of soil type, particularly peat and marls, need to be provided to justify the engineering design.

USACE Response: Adopted.

Action Taken: A review of the geotechnical studies, geology, and geotechnical engineering evaluations was added to Sections A.4 through A.6 of the Engineering Appendix provide. These evaluations are detailed as they were based on the non-Federal Sponsor's project design, which has since been finalized. Additionally, as recommended, a soils map has been added to Section 2 of the PIR and an additional paragraph has been added to Section 2.7. The expanded Section now includes information regarding the impacts of current water management practices on soil properties and associated ecosystem responses to fluctuating hydroperiods and water stages.

15. Comment – *Medium Significance*: 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.

This comment was broken into two parts, which was partially adopted by the USACE. The first part references how the PIR was updated to adopt and incorporate into the document species diversity and habitat within the project area. The second part references the portion of the comment (amphibians as indicator species) which was not adopted.

Part 1:

USACE Response: Adopted.

Action Taken: In regards to information on amphibians, the USACE indicated that Section 2.4.2 of the PIR provides general information on the species diversity and habitat type for amphibians inhabiting the project area. This section has been revised to distinguish between amphibians recorded in the greater South Dade Wetlands versus those observed in the project area. A complete list of species, habitats, and distribution can be obtained through inventory reports conducted by the Everglades National Park. None of the recorded amphibians in the area are federally or state listed Endangered Species and none of the project alternatives anticipate negative impacts to these species. The restored hydrology resulting from the project is expected to benefit these amphibians and other wetland organisms.

Part 2:

USACE Response: Not Adopted.

In regards to the importance and possible incorporation of amphibian monitoring into the overall ecological monitoring plan, Section 3.6 of the Yellow Book (page 3-9) discusses the importance of wading birds as a key indicator of the freshwater community as well as ecosystem health in

the Everglades. The monitoring of prey organisms such as amphibians and juvenile fish provides a method to gauge project effects on wading birds. In particular, the monitoring will indicate if the project is able to sustain pools of water that would condense these prey organisms suitable for wading bird feeding throughout the dry season. As juvenile fish monitoring has been historically and continually conducted in this area of the Everglades, the ecological monitoring plan includes provisions to continue these monitoring efforts. Although amphibian monitoring would also serve as an excellent indicator of wading bird health and project effectiveness, the baseline data for a pre-project comparison does not exist, and therefore juvenile fish monitoring would be the more accurate attribute to monitor in gauging project success. As such, juvenile fish, rather than amphibians, will serve as indicator species of wading bird health and project effectiveness in Taylor Slough and Everglades National Park. Pertinent papers supporting the monitoring effort and referenced in the PIR include “Roseate spoonbill reproduction as an indicator for restoration of the Everglades and the Everglades estuaries” and “The effect of hydrological patterns and breeding-season flooding on the numbers and distribution of wading birds in Everglades National Park.”

16. Comment – *Medium Significance*: The discussion on rock mining operations in the project area was very limited in the PIR and did not have any details as to the potential impacts to the project functions and features.

USACE Response: Adopted.

Action Taken: There are currently no rock mining operations in the proposed project area. The closest rock mining operations are approximately 6 miles from the main project features. Rock mining in south Florida is typically done "wet", and there is no dewatering activity required, so reuse is not an option to aid in the project functions. No hydraulic effects are anticipated to the proposed project as a result of any future rock mining that may occur near the project area. A paragraph was added to the PIR on page 7-13 that reflects this information.

17. Comment – *Medium Significance*: The plugs alone, as proposed, are likely to cause deep holes which will develop low dissolved oxygen, high residence times, and generally an undesirable deep pond in an otherwise shallow water habitat.

USACE Response: Not Adopted.

Although the isolated canal ponds may not be "desirable" habitat, they will not result in further ecological degradation due to water quality impairment. Degradation of water quality already occurs to some extent during extended dry periods when surface water flows in the canal are negligible. After plugging, the quality of the water in the isolated canal ponds is very likely to be moderated by flux exchange with the highly transmissive Biscayne Aquifer. Water quality in terms of phosphorus concentration would be expected to moderate after plugging since no new source of this nutrient would be transported via surface flow. No significant adverse impact to groundwater quality is expected to result from the exchange of the surface water in these ponds with adjacent groundwater. The plugging will result in positive net habitat enhancement in the surrounding area due to reduction in drainage of adjacent wetlands.

18. Comment – *Medium Significance*: The Recreational Benefits Analysis discusses only local recreational use benefits of the study area, but should also consider the larger benefits associated with ecosystem restoration within ENP.

USACE Response: Adopted.

Action Taken: The recreation analysis has been expanded to include visitor data for the ENP and present further SCORP –State Comprehensive Outdoor Recreation Plan – statistics about the recreation in the vicinity relating to the ecological focus related recreation opportunities. The Economic Appendix information is specifically geared towards Taylor Slough and the ENP and corresponding data added to Section 2.20. The benefit to cost ratio presented in the Recreation Appendix remains unchanged as a result of this, because this is a measure of the direct construction of the recreation features that are being planned (constrained by facility size and parking availability).

19. Comment – *Medium Significance*: The PIR would benefit from a description of the concerns that led to a complete redesign of the project.

USACE Response: Adopted.

Action Taken: Section 1.4.2 of the PIR titled "Changes Since the Restudy" has been revised to reflect the comment. The DOI comments were not necessarily based on hydrologic modeling; rather, during development of the proposed project, a great deal of ecological research on the project area was published. Where only weak scientific evidence of water management practices and the resulting ecological stressors were present during the compilation of the Restudy, since the Restudy long term scientific research has been conducted in Everglades National Park and Florida Bay.

The large numbers of predatory fauna in the Everglades such as alligators, crocodiles, and wading birds are instrumental in maintaining the fine balance that exists in the ecosystem. Research in the area indicated that the dynamics of water flows were directly correlated to the breeding success of wading birds (Russell 2002). Additionally, it was noted that changes in small demersal fish communities seemed to lead to reductions in top trophic-level consumers in the Everglades (Lorenz 2006). As such, reductions in freshwater flows and subsequent disruptions in salinity levels in Florida Bay were identified as the culprit that was reducing population numbers of large predators in this portion of the Everglades (Lorenz 2006). This research as well as additional material that was published allowed for the identification of deficiencies in the potential for restoration of the project study area, specifically, how and where restoration needs should be focused. As such, it was determined that the project goals and objectives that were identified in the Restudy, which only focused on the eastern portion of the study area, did not completely address the entire needs of the ecosystem. In order for more complete restoration in the study, a more comprehensive restoration approach was needed to restoration functions and values to optimal levels, and the restoration focus area from the Yellow Book would need to be expanded to ensure that a complete restoration plan was formulated.

20. Comment – *Low Significance*: Inclusion of Acroporids, which are Threatened not Endangered, confuses the reader and raises unnecessary concerns because it is not found in the area.

This comment was broken into two parts, which was partially adopted by the USACE. The first part references how the PIR was updated to describe that acroporids are a threatened species rather than as an endangered species. The second part referenced the portion of the comment (remove Acroporids text) which was not adopted.

USACE Response: Adopted.

Action Taken: *Acropora palmata* and *A. cervicornis* are currently Federally-listed “Threatened” species. Sections of the PIR that show them as “Endangered” (eg. Tables 2-2 and A4-2) have been revised accordingly.

USACE Response: Not Adopted

Addressing potential project impacts to *Acropora palmata* and *A. cervicornis* was requested by the National Marine Fisheries Service during informal consultation. At its request, the discussion of these species will remain in the Biological Assessment contained in Annex A.

21. Comment – *Low Significance*: There is a lack of information on the precautionary measures that should be taken during construction.

USACE Response: Not Adopted.

The requested information on precautionary measures taken during construction is not typically listed in a PIR. This information is developed during the later project phase of Final Plans and Specifications. However, the SFWMD is constructing the proposed project under its State Expedited Construction Program. A Department of the Army permit was issued to the SFWMD and contains certain standard construction measures that are relayed to the contractor by the SFWMD. Additionally, a Biological Opinion has been issued that requires certain terms and conditions for the protection of Federally-listed threatened and endangered species.

22. Comment – *Low Significance*: It is unclear why the southern third of the header distribution channel was moved 200' to the east of its identified location in Figure A-2.

USACE Response: Adopted.

Action Taken: The location of the distribution channel has not been moved. The drawings are based on an initial design that was provided by the SFWMD contractor. As the proposed project is in a feasibility phase, there is a recommendation that the distribution channel could be moved in order to prevent possible seepage from occurring, which could possibly in turn provide a buffer area to ENP. The full design of the Frog Pond Detention Area will be completed during the Detailed Design Phase, which would occur after project authorization. During that phase, additional modeling would be undertaken to optimize the design of the Detention Area. If

substantial seepage is encountered then design refinements would be instituted to correct any deficiencies. Additional detail has been added to Section A.2.4 of the PIR that fully explains why the header distribution channel may need to be relocated in future design.

23. Comment – *Low Significance*: Additional information, including more detailed graphics depicting project features, potential hazards, and geographic boundaries, needs to be provided overall in the PIR.

USACE Response: Adopted.

Action Taken: The level of detail for the maps in the PIR has been increased to depict additional features such as geographic boundaries of natural areas, project features, and water flow patterns. Specifically, Figure 1-1 provides a detailed image of the project area that clearly shows existing structures and canals, natural landscape features, major roadways such as Tamiami Trail, and also other relevant geographic boundaries. Figure 1-2 provides an overlay of the same map with water flow patterns indicated. There no mines in existence nor significant contaminated areas within the project area boundaries. These features and project boundaries are discussed in Section 1.3, Project Area. Further information on water management and patterns are discussed in Sections 2.8 and 2.9, with Figure 2-4 providing a view of the 1995 water flows and ponding within the Everglades system. Section 2.18, Roads and other Barriers to Sheetflow, contains Figure 2-5 that depicts major canals as well as U.S. and Card Sound Road that cross the project area.