# COMPREHENSIVE EVERGLADES RESTORATION PLAN PICAYUNE STRAND RESTORATION PROJECT

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## COMMUNICATION

FROM

## THE ASSISTANT SECRETARY OF THE ARMY, CIVIL WORKS, DEPARTMENT OF DEFENSE

TRANSMITTING

THE COMPREHENSIVE EVERGLADES RESTORATION PLAN PICAYUNE STRAND RESTORATION PROJECT LIMITED RE-EVALUATION REPORT & ENVIRONMENTAL ASSESSMENT FOR APRIL 2016



SEPTEMBER 6, 2016.—Referred to the Committee on Transportation and Infrastructure and ordered to be printed

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**HOUSE DOCUMENT NUMBER 114-157**

DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
CIVIL WORKS
108 ARMY PENTAGON
WASHINGTON, DC 20310-0108

JUL 15 2016

The Honorable Paul Ryan
Speaker of the House of Representatives
U.S. Capitol Building, Room H-232
Washington, DC 20515-0001

Dear Mr. Speaker:

The Secretary of the Army recommends modifying the total project first cost of the authorized Comprehensive Everglades Restoration Plan: Picayune Strand Restoration project to increase the total project first cost from $375,330,000 (October 2004 price levels) to $617,967,000 (October 2015 price levels). The increase in the authorized cost is necessary because the construction costs are projected to exceed the maximum allowed by section 902 of the Water Resources Development Act (WRDA) of 1986. The enclosed April 2015 Post Authorization Change Report/Limited Reevaluation Report (PACR/LRR) explains and supports the cost increase. The report also documents that the project remains technically sound, cost effective, and environmentally acceptable.

The authorized project was based on the National Ecosystem Restoration (NER) plan and consists of spreader channels, canal plugs, road removal, and pump stations to restore and enhance wetlands in Golden Gate Estates and adjacent public lands, improve estuarine water quality by reducing large freshwater inflows, and improve groundwater recharge.

The project was originally authorized for construction in section 1001(15) of WRDA 2007 (Public Law 104-303), at a total cost of $375,330,000. The authorized project is described within the Chief's Report, dated September 15, 2005. Prior to the authorization in 2007, the non-Federal sponsor initiated pre-construction, engineering, and design efforts and started construction activity under the state of Florida's Acceler8 initiative. Roadway removal and the Prairie Canal backfilling were completed in 2007 by the non-Federal sponsor.

In 2008, the U.S. Army Corps of Engineers (Corps) and the sponsor agreed the Corps would complete construction of the project. Subsequently, significant revisions to the design, including phasing of construction and updating the pump stations and telecommunication system, were recommended. The construction phasing was required to comply with the Corps budget process and adhere to Federal acquisition regulations.

A manatee refugium feature was also required. On March 12, 2009, the U.S. Fish and Wildlife Service (USFWS) issued a Biological Opinion in accordance with the Endangered Species Act that did not concur with the Corps' determination of "may

affect, not likely to adversely affect" the manatee or its critical habitat. This led to the U.S. Geological Survey (USGS) studies and creation of a manatee study team that confirmed in 2011 that a manatee refugium would be the best solution for protection of the West Indian manatee. The Corps reinitiated consultation with USFWS on September 11, 2014 with a determination of "may affect, not likely to adversely affect" the manatee or its critical habitat with the addition of the manatee refugium feature. Based on the USGS studies and multi-agency consultations, the USFWS concurred with the Corps' determination of "may affect, not likely to adversely affect" manatee on October 31, 2014.

The total project cost has increased and exceeds the maximum authorized cost of the project. The design refinements to the three pump stations and associated earthwork are the major drivers of the increased costs. The remaining project features to be constructed are the southwestern protection feature, additional road removal and canal plugging, and the manatee refugium feature.

The maximum cost for the authorized project, adjusted for allowable inflation in accordance with section 902, is $505,904,000 (October 2015 price levels). Based on cost increases described in the LRR, the revised estimated project first cost (without inflation) is $617,967,000 (October 2015 price level). In accordance with section 601(e) of the WRDA 2000, the Federal and non-Federal shares of the costs for this project each are $308,983,000 (50%).

Based on October 2015 price levels, a 3.125 percent discount rate, and a 50-year period of analysis, the total equivalent average annual costs of the Picayune Strand Restoration project are estimated to be $37,477,000. The Picayune Strand Restoration project is estimated to restore 50,350 average annual habitat units of non-monetary benefits. The average annual cost per average annual habitat unit is about $749.

An Environmental Assessment and Finding of No Significant Impact was prepared in accordance with the National Environmental Policy Act and concluded that there are no significant effects anticipated as a result of the design refinements to the project as described in the 2004 project implementation report and Environmental Impact Statement.

A Type I Independent External Peer Review (IEPR) was completed for the Picayune Strand Restoration project PACR/LRR by Battelle Memorial Institute. The review comments resulted in expanded narratives throughout the PACR/LRR to support the decision-making process and justify the recommendation. All comments from the review have been addressed and incorporated into the final documents.

The Office of Management and Budget (OMB) advises that there is no objection to the submission of the report to Congress and concludes that the report recommendation is consistent with the policy and programs of the President. A copy of OMB's letter dated July 7, 2016 is enclosed. I am providing a copy of this transmittal and the OMB letter to the Subcommittee on Water Resources and Environment of the House

Committee on Transportation and Infrastructure and the Subcommittee on Energy and Water Development of the House Committee on Appropriations. I am providing an identical letter to the President of the Senate.

Very truly yours,

for Jo-Ellen Darcy
Assistant Secretary of the Army
(Civil Works)

Enclosures

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
441 G STREET, NW
WASHINGTON, DC 20314-1000

CECW-SAD

Mar 09 2016

MEMORANDUM FOR ASSISTANT SECRETARY OF THE ARMY (CIVIL WORKS)

SUBJECT: Comprehensive Everglades Restoration Plan, Picayune Strand Restoration Project, Limited Reevaluation Report and Environmental Assessment

1. Purpose. To provide for your review and approval of the enclosed Final Picayune Strand Restoration Project, Limited Reevaluation Report and Environmental Assessment. Section 1001(15) of the Water Resources Development Act 2007 authorized construction of this ecosystem restoration project.

2. Post Authorization Change. This Limited Reevaluation Report presents a revised cost estimate and updated economic analysis of the authorized project in order to request authorization of a new project cost. Some features of the project cannot be implemented until the new project cost is authorized so as not to exceed the current Section 902 limit. The current total project cost is $617,967,000 (Fiscal Year 2016 price level). The current Section 902 limit is $505,904,000 (Fiscal Year 2016 price level).

3. Background.

a. The Central and Southern Florida Comprehensive Everglades Restoration Plan, Picayune Strand Restoration Project encompasses an area of environmentally sensitive lands in southwestern Collier County, Florida. Covering an area of 55,247 acres, the project was authorized to restore natural water flow across 93 square miles of Collier County lands that were drained for an extensive residential development. The South Florida Water Management District is the non-federal sponsor.

b. The overarching objective of the authorized plan is the hydrologic restoration, preservation, and protection of the southwest Florida ecosystem while maintaining flood protection to the adjacent lands. The project is in the center of a block of surrounding state and federal nature preserves and wildlife areas. The completed project will result in a much larger contiguous natural area, providing valuable wildlife habitat that was previously lost due to development. The plan consists of constructing three pump stations, spreader basins, and levees, filling and plugging existing canals, and removing existing roadways to restore natural sheetflow to rehydrate the wetlands within Picayune Strand and reduce point source freshwater discharge to the estuary, along with flood risk reduction features and a manatee refugium feature. When completed, the project will successfully achieve all of the planning objectives authorized in the 2004 Final Picayune Strand Restoration Project Implementation Report and Environmental Impact Statement:

(1) Reestablish natural freshwater flows to the estuary;

(2) Restore historic hydropatterns, sheetflow and flowways;

(3) Reestablish natural plant distribution and composition;

(4) Increase surface aquifer recharge;

(5) Restore habitat for listed species;

(6) Increase fish and wildlife resources;

(7) Restore ecological connectivity and provide contiguous habitat;

(8) Provide resource based recreational opportunities; and

(9) Restore natural fire regime.

c. The Picayune Strand Restoration Project Implementation Report and Environmental Impact Statement were completed in 2004. Prior to the authorization in 2007, the non-federal sponsor initiated preconstruction, engineering and design efforts and started construction activity under the state of Florida's Acceler8 initiative. Roadway removal and the Prairie Canal backfilling were completed in 2007 by the non-federal sponsor.

d. In 2008, the U.S. Army Corps of Engineers and the sponsor agreed the Corps would complete construction of the project. Significant revisions to the design including phasing of construction and updating the pump stations and telecommunication system were recommended. The construction phasing was required to comply with the Corps budget process and adhere to federal acquisition regulations.

e. The Corps awarded a contract for the construction of the first pump station, Merritt and associated tieback levee, spreader basin, road removal and canal plugging activities in 2009. The Merritt project was completed in 2014. The second pump station, Faka Union and associated tieback levee, spreader basin and canal plugging construction contract was awarded in 2010 and completed in 2016. The final pump station, Miller and related tieback levee, spreader basin and road removal construction contract was awarded in 2013 with a construction completion target of 2017.

f. The remaining project features to be constructed are the Southwestern protection feature, the manatee refugium feature, and additional road removal and canal plugging not included in other contracts. The restoration benefits will be realized when all identified roads are degraded and the Merritt, Faka Union and Miller Canal plugs can be installed. In order to plug the Faka Union and Miller Canals, the Southwestern protection feature (earthen levee to maintain existing levels of flood protection) and the manatee refugium feature (excavated oxbow basin adjoining the Faka Union Canal at the Port of the Islands) must be completed.

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4. Discussion.

a. Manatee Refugium Feature. The project was authorized consistent with the 2004 Final Project Implementation Report and Environmental Impact Statement, which recommended Alternative 3d. The potential need for a manatee refugium feature was identified in the 2004 Final Project Implementation Report and Environmental Impact Statement. At that time, it was unclear as to whether the project would adversely affect the thermal refugium utilized by manatees within the Port of Islands Basin (south of "Port of the Islands") and it was recognized that additional information was needed to make this determination. Subsequent investigations conducted by the U.S. Geological Survey, funded by the Corps and South Florida Water Management District, determined that a feature was necessary to ensure the continuance of the Port of Islands Basin as a manatee thermal refugium, thereby avoiding adverse impacts to manatees as a result of project implementation. Details regarding the scope of the refugium required were not finalized in the Project Implementation Report and Environmental Impact Statement. An interagency team of biologists has been involved with defining the scope, design, and cost of this feature. Incidental take of marine mammals, in this case, manatees, is prohibited under the Marine Mammal Protection Act of 1972. National Oceanic and Atmospheric Administration/National Marine Fisheries Service concurred with all species determinations under Section 7 consultation on a letter dated December 13, 2013. On March 12, 2009, the U.S. Fish and Wildlife Service issued a Biological Opinion in accordance with the Endangered Species Act that did not concur with the Corps determination of "may affect, not likely to adversely affect" manatee or its critical habitat. This led to the U.S. Geological Survey studies and creation of a manatee study team that confirmed in 2011 that a manatee refugium would be the best solution for protection of the West Indian manatee. The Corps reinitiated consultation with U.S. Fish and Wildlife Service on September 11, 2014 with a determination of "may affect, not likely to adversely affect" manatee or its critical habitat with the addition of the manatee refugium feature. Based on the U.S. Geological Survey studies and multi-agency consultations, the U.S. Fish and Wildlife Service concurred with the Corps determination of "may affect, not likely to adversely affect" manatee on October 31, 2014.

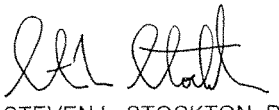
b. Authorization of New Project Cost. The 2004 Project Implementation Report and Environmental Impact Statement were prepared based on feasibility-level engineering study and analysis, resulting in a project plan and cost estimate that were conceptual in nature and subject to refinement during engineering and design. Design refinements to the three pump stations and associated earthwork are the major drivers in increasing the project's total cost. Some refinements stemmed from the need for larger, more complex pump stations (including telecommunications), detailed surveys of the project area revealing previously unknown topographic features and additional tram roads requiring removal, and requiring a revised, full project-width tieback levee to preclude recirculation of water from the pump stations. An increase in engineering, design and construction management costs have also resulted in increasing the project's total cost above the authorized level.

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c. Based on FY 2016 price levels, a 3.125 percent discount rate, and a 50-year period of analysis, the total equivalent average annual costs of the Picayune Strand Restoration project are estimated to be $37,477,000. The Picayune Strand Restoration project is estimated to restore 50,350 average annual habitat units of non-monetary benefits. The average annual cost per average annual habitat unit is about $749.

d. The Picayune Strand Restoration Project is an important component in the Comprehensive Everglades Restoration Plan and essential for the recovery of the South Florida ecosystem. Since authorization, a substantial investment (over $470,000,000) has been made constructing the sequential project components required to ultimately restore the project area to pre-drainage conditions. The additional funding requested is necessary to complete the project and realize the ecological benefits envisioned in the 2004 Final Project Implementation Report and Environmental Impact Statement, as well as connect the surrounding federal and state parks, preserves, and refuges. If the new total project cost is not authorized, the protection features will not be constructed and full restoration will not be achieved, resulting in the loss of approximately 70 percent of the hydrologic benefits, 62 percent of the biological benefits, and 100 percent of the estuarine benefits.

5. Conclusion. I have reviewed the Final Limited Reevaluation Report and Environmental Assessment and concur with the increase of the authorized cost to $617,967,000 (Fiscal Year 2016 price levels). Based on this review, I find the proposed plan is being implemented in accordance with the authorizing document. The proposed project complies with applicable Corps planning procedures and regulations. In addition, the views of interested parties, including federal, state, and local agencies, have been considered.



Encl

STEVEN L. STOCKTON, P.E.
Director of Civil Works

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503

July 7, 2016

The Honorable Jo-Ellen Darcy
Assistant Secretary of the Army (Civil Works)
108 Army Pentagon
Washington, DC 20310-0108

Dear Ms. Darcy:

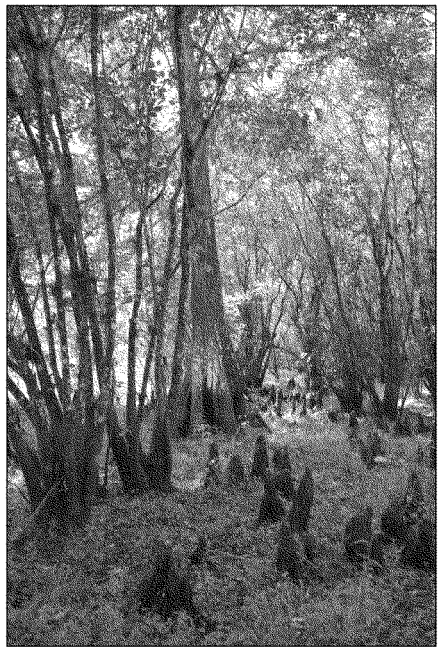
As required by Executive Order 12322, the Office of Management and Budget has reviewed an April 2016 Army Corps of Engineers (Corps) limited re-evaluation report (report) for the Picayune Strand Restoration Project in Collier County, Florida. The report estimates that the project will now cost a total of $617,967,000 (October 2015 prices), and proposes to increase its estimated Federal, non-Federal, and total costs accordingly. We have concluded that an authorization to increase the estimated costs in this manner would be consistent with the policy and programs of the President.

The Office of Management and Budget does not object to you submitting this report to the Congress. When you do so, please advise the Congress that the project would need to compete with other proposed investments in future Budgets.

Sincerely,

John Pasquantino
Deputy Associate Director
Energy, Science, and Water

# LIMITED REEVALUATION REPORT



# PICAYUNE STRAND RESTORATION PROJECT

U.S. Army Corps
of Engineers
Jacksonville District

**CENTRAL AND SOUTHERN FLORIDA PROJECT**
**PICAYUNE STRAND RESTORATION PROJECT**
**LIMITED REEVALUATION REPORT**

**ADDENDUM**
**APRIL 2016**

Following are updated costs of the Recommended Plan, escalated to FY16 price levels.

The total project first cost of the Recommended Plan from the final PIR/EIS, escalated to FY16 price levels, is estimated at $617,967,000. The average annual cost is $37,477,386. Overall the project produces a net increase of over 50,000 average annual habitat units[1]. The average annual cost per average annual habitat unit is about $749. These computations assume a 50 year period of analysis (base year 2020) and are based on the current (FY16) water resources discount rate of 3.125% and current (FY16) price levels.

In accordance with the cost-sharing requirements of Section 601(e) of the WRDA 2000, as amended, the Federal cost of the Recommended Plan is $308,983,500 and the non-Federal cost is $308,983,500. The estimated lands, easements, right-of-way, and relocation (LERRs) costs for the Recommended Plan are $211,100,000.

(1)15 Sep 2005 PSRP Chiefs Report

**CENTRAL AND SOUTHERN FLORIDA PROJECT**
**PICAYUNE STRAND RESTORATION PROJECT**
**LIMITED REEVALUATION REPORT**

**ADDENDUM**
**APRIL 2016**

The need for a manatee mitigation feature was realized under the Endangered Species Act Consultation process, which was completed and submitted to the Corps in the 2009 Biological Opinion. The reason the PSRP needs mitigation for manatees is that monitoring showed that reducing the point source discharge/freshwater flows from the Faka Union Canal at the POI basin would have an adverse effect on the existing manatee refugium. There is no provision for an incidental take statement under the Marine Mammal Protection Act, therefore, alternatives were analyzed in the LRR/EA on how to best mitigate for the adverse effect on the manatee in order to reduce the effect determination to "May Affect, Not Likely to Adversely Affect".

The manatee mitigation feature was considered as several different alternatives during the formulation process, rather than as a feature needed for adaptive management, for the LRR/EA Design Refinements (2015). An interagency team of managers and biologists, meeting regularly between February 2011 and August 2014, formulated 27 initial alternatives to consider which could potentially mitigate for impacts to the manatee refugium at the POI Basin. The initial array of alternatives is shown in Table 2-1 of the EA. These alternatives evaluated different methods to mitigate for the loss of freshwater input in the POI Basin, including supplementing freshwater flows, connections with warm saline groundwater, and improving other natural refugium within the Ten Thousand Islands region. Meeting minutes, documenting discussions and decisions at the interagency meetings are included as Appendix F. The preferred alternative manatee mitigation feature creates an oxbow adjacent to the Faka Union Canal that would provide a warm groundwater connection for manatees to seek refuge during cold, dry periods. These alternatives and screening process are discussed in detail in Section 2.1 of the EA.

Following are updated costs of the Recommended Plan, escalated to FY16 price levels.

The total project first cost of the Recommended Plan from the final PIR/EIS, escalated to FY16 price levels, is estimated at $617,967,000. The average annual cost is $37,477,386. Overall the project produces a net increase of over 50,000 average annual habitat units(1). The average annual cost per average annual habitat unit is about $749. These computations assume a 50 year period of analysis (base year 2020) and are based on the current (FY16) water resources discount rate of 3.125% and current (FY16) price levels.

In accordance with the cost-sharing requirements of Section 601(e) of the WRDA 2000, as amended, the Federal cost of the Recommended Plan is $308,983,500 and the non-Federal cost is $308,983,500. The estimated lands, easements, right-of-way, and relocation (LERRs) costs for the Recommended Plan are $211,100,000.

(1)15 Sep 2005 PSRP Chiefs Report

PICAYUNE STRAND RESTORATION PROJECT
LIMITED REEVALUATION REPORT

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## ACRYNOYMS

AOU - American Ornithologists' Union
BA – Biological Assessment
BO – Biological Opinion
BODR – Basis of Design Report
CARL – Conservation and Recreational Lands
CEQ – Council on Environmental Quality
CERCLA – Comprehensive Environmental Response Compensation and Liability Act
CERP – Comprehensive Everglades Restoration Program
CERPRA – Comprehensive Everglades Restoration Plan Regulation Act
CFR – Code of Federal Regulations
CFS – cubic feet per second
$CO_2$ – Carbon Dioxide
CORPS – Corps of Engineers
CWCCIS - Civil Works Construction Cost Index System
CZMA – Coastal Zone Management Act
DDR – Design Documentation Report
DO – Dissolved Oxygen
DOF – Division of Forestry
EA – Environmental Assessment
EC – Engineering Circular
EDC – Engineering During Construction
EIS – Environmental Impact Statement
EFH – Essential Fish Habitat
EO – Executive Order
EOR – Engineer of Record
ERDC – Engineering Research and Development Center
ESA – Endangered Species Act
FDEP – Florida Department of Environmental Protection
FDOT – Florida Department of Transportation
FFS – Florida Forestry Service
FONSI – Finding of No Significant Impact
FWC – Florida Fish and Wildlife Commission
FU – Faka Union
FY – Fiscal Year
GHG – Greenhouse Gas
GSSHA - Gridded Surface Subsurface Hydrologic Analysis
H&H – Hydraulic and Hydrology
HDT – Hydraulic Design Tool
HUL – Habitat Unit Lift
HSWA – Hazardous and Solid Waste Amendments
HTRW – Hazardous, Toxic, Radioactive Waste
LCR – Lands, Canals and Roads
LERRD – Lands, Easements, Rights of Way, Relocations and Disposal Areas
lidar - Laser Interferometry Detection and Ranging

LRR – Limited Reevaluation Report
MAG – Monitoring and Assessment Group
MHHW – Mean High Higher Water
MMPA – Marine Mammal Protection Act
MOM - Management Option Matrices
NAVD – North American Vertical Datum
NEPA – National Environmental Policy Act
NFS – non federal sponsor
NGGE – Northern Golden Gate Estates
NMFS – National Marine Fisheries Service
NOA - Notice of Availability
NOAA – National Oceanic and Atmospheric Administration
NPDES – National Pollutant Discharge Elimination System
NRCS – Natural Resource Conservation Service
OMB - Office of Management and Budget
OMRR&R – Operation, Maintenance, Repair, Replacement and Rehabilitation
PED – Pre-Construction, Engineering, and Design
PIR – Project Implementation Report
POI – Port of the Islands
PSRP – Picayune Strand Restoration Project
PSSF – Picayune Strand State Forrest
RCW – Red Cockaded Woodpecker
RCRA – Resource Conservation and Recovery Act
RECOVER - Restoration Coordination and Verification
SAJ –South Atlantic Jacksonville
SAV - Submerged Aquatic Vegetation
SCDA - Supervisory Control and Data Acquisition
SFWMD – South Florida Water Management District
SGGE – Southern Golden Gate Estates
SHPO – State Historic Preservation Officer
SLR – Sea Level Rise
T&E – Threatened and Endangered Species
TPCS – Total Project Cost Summary
TMDLs – Total Maximum Daily Loads
TSCA – Toxic Substances Control Act
USACE – U.S. Army Corps of Engineers
U.S.C. – United States Code
USFWS- U.S. Fish and Wildlife Service
USGS – U.S. Geological Survey
WAI - Wetland Affinity Index
WBID – Water Body Identification Number
WRDA – Water Resources Development Act

## EXECUTIVE SUMMARY

The Central and Southern Florida Comprehensive Everglades Restoration Plan, Picayune Strand Restoration Project encompasses an area of environmentally sensitive lands in southwestern Collier County, Florida (See Figure E-1 and Figure E-2). Covering an area of 55,247 acres, the project was authorized in the Water Resources Development Act of 2007 to restore natural water flow across 93 square miles of Collier County lands that were drained for an extensive residential development. The South Florida Water Management District is the non-federal sponsor.

The purpose of this Limited Reevaluation Report is to request a post-authorization change for the project to increase the authorized project cost to $617.9 million (FY 15 price level). The Picayune Strand Restoration Project was authorized in the Water Resources Development Act of 2007 at a total cost of $375.3 million (FY 05 price level). The current Section 902 limit is $505.2 million (FY 15 price level).

The overarching objective of the authorized plan is the hydrologic restoration, preservation, and protection of the Southwest Florida ecosystem while providing flood protection to the adjacent lands. The project area is in the center of a block of surrounding state and Federal nature preserves and wildlife areas (See Figure E-2). The completed project will result in a much larger contiguous natural area, providing valuable wildlife habitat that was previously lost due to development. The plan consists of constructing three pump stations, spreader basins, and levees, filling and plugging existing canals, and removing existing roadways to restore natural sheetflow to rehydrate the wetlands within Picayune Strand and reduce point source freshwater discharge to the estuary along with flood risk reduction features and necessary mitigation feature. When completed, the project will successfully achieve all of the planning objectives authorized in the 2004 Final Picayune Strand Restoration Project Implementation Report and Environmental Impact Statement:

- Reestablish natural freshwater flows to the estuary
- Restore historic hydropatterns, sheetflow and flowways
- Reestablish natural plant distribution and composition
- Increase surface aquifer recharge
- Restore habitat for listed species
- Increase fish and wildlife resources
- Restore ecological connectivity and provide contiguous habitat
- Provide resource based recreational opportunities
- Restore natural fire regime

The Picayune Strand Restoration Project Implementation Report and Environmental Impact Statement were completed in 2004. Prior to the authorization in 2007, the non-federal sponsor initiated preconstruction, engineering and design efforts and started construction activity under the State of Florida's Acceler8 initiative. Roadway removal and the Prairie Canal backfilling effort were completed in 2007.

In 2008, the U.S. Army Corps of Engineers and the non-federal sponsor decided the Corps would complete construction of the project. During detailed design, revisions to the pump stations including updating the telecommunication system and phasing of construction were required based on design criteria agreed upon jointly by the Corps and non-federal sponsor. The revised construction phasing, constructing the pump stations and levees first was required by the Savings Clause requirement to ensure upstream neighborhood conditions were not changed. The Corps awarded a contract for the construction of the first (Merritt) pump station and associated tieback levee, spreader basin, road removal and canal plugging activities in 2009. The Merritt project was completed in 2014. The second pump station (Faka Union) and associated tieback levee, spreader basin and, road removal construction contract was awarded in 2010 and is scheduled for completion in 2015. The final pump station (Miller) and related tieback levee, spreader basin and road removal construction was awarded in 2013 with a final project completion target of 2017. The remaining project components to be constructed are the Southwestern (formerly 6Ls Farm) protection feature, the manatee mitigation feature, and additional road removal and canal plugging that was not included in other contracts. The restoration benefits will be realized when all identified roads are degraded and the Merritt, Faka Union and Miller Canal plugs can be installed. In order to plug the Faka Union and Miller Canals, the Southwestern protection feature (earthen levee to maintain existing levels of flood protection) and the manatee mitigation feature (excavated oxbow basin adjoining the Faka Union Canal) must be completed.

The 2004 Project Implementation Report and Environmental Impact Statement were prepared based on feasibility-level engineering study and analysis, resulting in a project plan and cost estimate that were conceptual in nature and subject to refinement during engineering and design. Design refinements to the three pump stations and associated earthwork are the major drivers in increasing the project's total cost. Some refinements stemmed from the need for larger, more complex pump stations (including telecommunications), detailed surveys of the project area revealing previously unknown topographic features and additional tram roads requiring removal, and requiring a revised, full project-width tieback levee to preclude recirculation of water from the pump stations. An increase in engineering, design and construction management costs have also resulted in increasing the project's total cost above the authorized level.

The Picayune Strand Restoration Project is an important component in the Comprehensive Everglades Restoration Plan and essential for the recovery of the South Florida ecosystem. Since authorization, a substantial investment (over $470 million) has been made constructing the sequential project components required to ultimately restore the project area to pre-drainage conditions. When completed in full, the project will provide the hydrologic, biological, and estuarine restoration as described in the 2004 Final Project Implementation Report and Environmental Impact Statement. The additional funding requested is necessary to complete the project and realize the ecological benefits envisioned in the 2004 Final Project Implementation Report and Environmental Impact Statement, as well as connect the surrounding Federal and state parks, preserves, and refuges. If the additional funding is not authorized, the protection features will not be

constructed and full restoration will not be achieved, resulting in the failure to realize approximately 70 percent of the hydrologic benefits, 62 percent of the biological benefits, and 100 percent of the estuarine benefits.

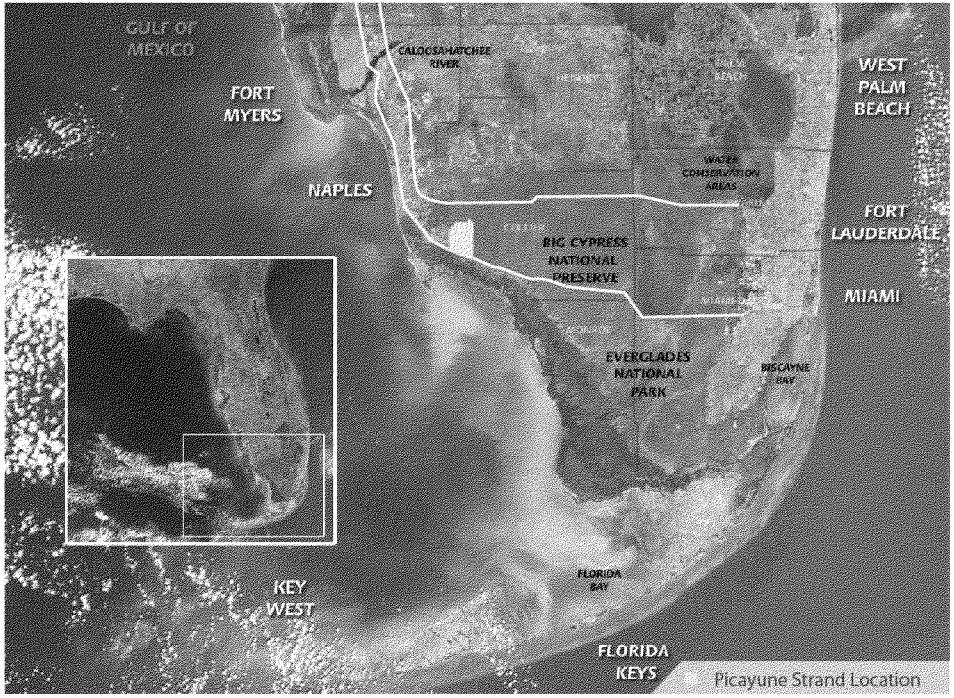



**Figure E-1. Vicinity Map of the Picayune Strand Restoration Project**

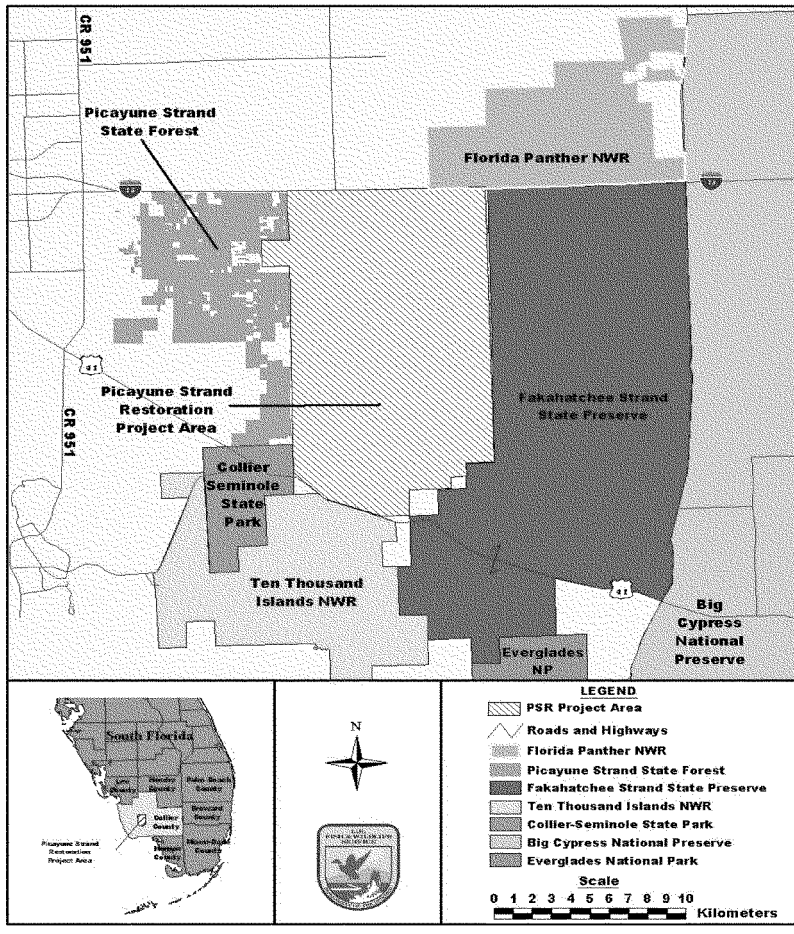



**Figure E-2. Location of the Picayune Strand Restoration Project and Other Adjacent Public Lands**

## 1.0 INTRODUCTION

The Picayune Strand Restoration Project (PSRP) encompasses an area of sensitive environmental land located in southwestern Collier County, Florida. It is located southwest of the Florida Panther National Wildlife Refuge, north of Ten Thousand Islands National Wildlife Refuge, east of the South Belle Meade State Conservation and Recreation Lands (CARL) project, west of the Fakahatchee Strand State Preserve, and northeast of Collier Seminole State Park. The South Belle Meade CARL project known as "Belle Meade" and the Southern Golden Gate Estates (SGGE) CARL project were combined to create the Picayune Strand State Forest. The central location of the PSRP among these nature preserves and wildlife areas reflects its importance to ecosystem connectivity of the region. For more information on the SGGE history and area, please see Section 1 of the 2004 Final Project Implementation Report and Environmental Impact Statement (2004 Final PIR/EIS)(U.S. Army Corps of Engineers (Corps), 2004). The PSRP consists of removing the infrastructure of a 55,247 acre subdivision and restoring its pre-development hydrology and ecology.

This Limited Reevaluation Report (LRR) presents a revised cost estimate and updated economic analysis of the authorized project. It evaluates the authorized project within the context of the existing socioeconomic conditions of the study area and the cost increase of the refined detailed design developed during preconstruction, engineering and design (PED). This LRR requests the authorization for a total project cost of $617.9 million (See Sec. 2.5.2 for detailed discussion of the cost figures). The current 902 limit authorized cost is $505.2 million in Fiscal Year (FY) 15 price levels. During the detailed design, refinements were determined necessary to realize all the benefits prescribed in the 2004 Final PIR/EIS and work best within the Southwest Florida system. These design refinements resulted in project infrastructure more complex than envisioned in the 2004 Final PIR/EIS. These refinements are needed to achieve the project goals and the benefits have not changed since the 2004 Final PIR/EIS and WRDA 2007 authorization.

### 1.1 STUDY AUTHORITY

The 2004 Final PIR/EIS was completed in September of 2004 under the authority of Section 601(d) of the Water Resources Development Act (WRDA) of 2000, which states:

(d) AUTHORIZATION OF FUTURE PROJECTS

(1) IN GENERAL.–Except for a project authorized by subsection (b) or (c), any project included in the Plan shall require a specific authorization by Congress.

(2) SUBMISSION OF REPORT–Before seeking congressional authorization for a project under paragraph (1), the Secretary shall submit to Congress –
(A) a description of the project; and

(B) a project implementation report for the project prepared in accordance with subsections (f) and (h).

The 2004 Final PIR/EIS was approved by the Office of the Chief of Engineers on September 15, 2005. The project was authorized for construction in Section 1001(15) of WRDA 2007. The 2004 Final PIR/EIS presents the results and recommendations of investigations into restoration of natural water flow across 93 square miles of western Collier County that were drained as a result of an extensive residential development.

## 1.2 PURPOSE AND NEED

This LRR requests the authorization for a total project cost of $617.9 million. The PIR/EIS cost and the current total project cost (detailed in Appendix B – Cost Estimate) differences are due to multiple factors. The project components portrayed in the 2004 Final PIR/EIS were conceptual and required significant refinement. Greater detailed information obtained through PED phase investigations provided a more accurate cost. Additional information regarding the project cost increase is detailed within Section 2.0 of this report and Appendix A – Engineering Design.

As stated in the 1999 Central and South Florida Project Restudy, known as the Comprehensive Everglades Restoration Plan (CERP), the restoration of SGGE, now known as the PSRP is "*to restore and enhance the wetlands in Golden Gate Estates and in adjacent public lands by reducing over-drainage. Implementation of the restoration plan would also improve the water quality of coastal estuaries by moderating the large salinity fluctuations caused by freshwater point discharge of the Faka Union Canal. The plan would also aid in protecting the City of Naples' eastern Golden Gate well field by improving groundwater recharge.*" Refer to Section 1 of the 2004 Final PIR/EIS for more information on the purpose and need of the PSRP.

### 1.2.1 MANATEE MITIGATION FEATURE

A portion of the Southwest Florida manatee population currently uses the Port of the Islands (POI) Basin as a warm water refugium during the colder months of the year. The passive thermal refuge or "refugium" appears to be maintained by freshwater discharged from the canal system in the PSRP site that routes through the Faka Union Canal and over Faka Union Weir Number 1 located immediately north of US-41 (Tamiami Trail) and the POI Basin. The anticipated reduction in flow from the PSRP to the POI Basin resulting from plugging of project canals raised concern for the continued viability of the refugium under restored conditions and the potential for increased winter manatee mortality. The 2004 Final PIR/EIS acknowledged that an additional source of water, most likely groundwater, may be needed in the POI to maintain the existing refugium (Section 9.6.8 and 11.12 of Final PIR/EIS).

Manatees are protected under the Marine Mammal Protection Act (MMPA) of 1972 which prohibits "take" of marine mammals in U.S. waters. Under MMPA "take" is defined as "*harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill.*" Manatees are also listed under the ESA of 1973 as endangered. Under ESA, "take" is "*to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.*" Based on the best available scientific information, the PSRP may have an adverse effect on the manatee refugium at POI potentially resulting in increased manatee mortality due to cold stress. Therefore, the project must protect manatees at POI by ensuring the continued existence of the refugium according to USFWS. Through informal

consultation, the Corps developed the proposed manatee mitigation feature which increases project costs.

In summary, on October 17, 2001, the Corps provided a Biological Assessment to FWS requesting formal consultation on West Indian Manatee. FWS did not respond to this request for formal consultation and cited several reasons including changes in the hydrologic modeling platform and pending results of hydrologic model. In the 2004 Final Coordination Act Report for PSRP, FWS noted that additional biological, engineering and hydrologic information would be needed. Thus, in 2004 a species effect determination was not reached for West Indian manatee within the FWS 2004 Biological Opinion due to lack of sufficient information. In order to better understand potential effects on manatee due to PSRP implementation, the Corps contracted with U.S. Geological Survey (USGS) to model effects of reductions in flow from the Faka Union Canal on the manatee refugium at Port of the Islands. Results from the USGS study indicated that PSRP implementation would negatively affect the manatee refugium and could result in an increase in manatee mortality due to cold stress. Manatees are protected under the Endangered Species Act of 1973 (ESA), as amended, and the Marine Mammal Protection Act (MMPA) of 1972. Although the ESA allows for incidental take of endangered species, MMPA does not offer any such provisions. Therefore, the Corps convened a multiagency technical team to develop alternatives for a manatee mitigation feature within Port of the Islands that would result in an "no adverse effect" determination under ESA and thus be compatible with MMPA provisions. The technical analysis to support implementation of a manatee mitigation features is included within the U.S. Army Corps of Engineers 2014 Supplemental Biological Assessment for PSRP and the U.S. Fish and Wildlife Service 2014 Biological Opinion Amendment.

### 1.2.2 MANATEE CONSULTATION HISTORY

In October 2001, the Corps provided a Biological Assessment (BA) that requested initiation of consultation under the ESA on the West Indian manatee (manatee), the red-cockaded woodpecker, the Florida panther, the wood stork, the snail kite, and the eastern indigo snake. In the BA, the Corps determined that the project "may affect, but would not likely adversely affect" the manatee. The USFWS did not respond to this initial request for concurrence for the following reasons:

- Several immediate changes in the project development schedule;
- the lack of details provided with the identified selected plan;
- subsequent development of new alternatives;
- pending results of several iterations of the hydrological model; and
- a change in the hydrological model platform.

In October 2003, the USFWS completed consultation with the Corps on the Prairie Canal Early Start portion of the PSRP. The USFWS concurred with the Corps' determination that the backfill of the Prairie Canal on the eastern extent of the project "may affect, but would not likely adversely affect" the Florida Panther, the wood stork, the Everglades snail kite, the manatee and manatee critical habitat, the American crocodile, red-cockaded

woodpecker, the eastern indigo snake, and the bald eagle. In August 2004, the USFWS requested additional information concerning the manatee including project effects on its warm water refugium and critical habitat. The USFWS and U.S. Geological Service (USGS) provided the Corps with updated information on the status of the southwest Florida regional population of the manatee and USGS manatee studies conducted in the project vicinity.

On October 20, 2004, the Corps provided a second more extensive BA. In that BA, the Corps determined that the project "may affect, but is not likely to adversely affect" West Indian Manatee critical habitat. The Corps determined that they did not have sufficient information to reach an effect determination for the manatee. Also on October 24, 2004, USFWS issued a consultation letter for the PSRP in which a "no effect" concurrence was made for the Everglades snail kite critical habitat and American crocodile critical habitat, and "may affect, not likely to adversely affect" the Everglades snail kite, American crocodile, red-cockaded woodpecker, bald eagle, eastern indigo snake, and West Indian manatee critical habitat. The USFWS concluded in the consultation letter that monitoring of manatee behavior was necessary to determine effects and potential incidental take of the manatee population.

On October 22, 2004, the USFWS provided a final Fish and Wildlife Coordination Act (FWCA) Report to the Corps, noting additional information needs including: (1) an accurate description of the anticipated hydrology and its effects on surrounding public lands and federally-threatened and endangered species; (2) a plan for protecting wetlands in the upper project watershed and explaining how project operations would affect flooding concerns, particularly in NGGE; (3) a completed Project Operations Manual; (4) a completed Water Quality and Ecological Monitoring Plan; (5) completion of consultation on threatened and endangered species; and (6) analysis of Off-Road Vehicle (ORV) use if proposed on the project site. The USFWS noted the concurrence of the Florida Fish and Wildlife Conservation Commission (FWC) with the USFWS position on project concerns and a lack of response or concurrence by the National Oceanic and Atmosphere Administration, National Marine Fisheries Service (NMFS).

In the 2004 Final PIR/EIS, the Corps agreed to "cooperate with the USFWS and USGS manatee researchers and manage flows at the weir interactively (probably by installation of a well-supplied alternate freshwater source) to assure that lack of freshwater does not add to natural cold stress (Section 11.12 of Final PIR/EIS)."

In 2004 through 2006, multiple meetings were held to discuss aspects of the PSRP including potential impacts of the PSRP on the manatee. In 2006, the USFWS provided comments on the PSRP road removal permit which included project commitments to reduce impacts on the manatee and other listed species, including: 1) completion of the committed funding for the project baseline monitoring plan, 2) initiation of an Assessment and Adaptive Management (AAM, now Monitoring and Assessment Group [MAG], 3) contaminant remediation, 4) compensation for wetland impacts, 5) pre-construction wildlife surveys, 6) pre-construction contractor education, 7) site access restrictions, and 6), financial assurances for project completion.

In 2007, the USFWS, Corps, and SFWMD attended an interagency conference in Gainesville, Florida to discuss the PSRP and southwest Florida manatee issues with state and federal manatee experts. At the time, there were a number of uncertainties related to the effects on manatees, including:

- The effect of PSRP on the thermocline/halocline in the existing thermal refuge at marina basin used by the manatee;
- the potential for PSRP to impact the volume and timing of freshwater in the Faka Union Canal and at Faka Union weir number 1 upstream of marina basin used by the manatee;
- the effects of the redistribution of freshwater to receiving estuaries and potential effects on the regional distribution/behavior of manatees in the Ten Thousand Islands, including exposure to additional boat traffic leading to injury/mortality; and.
- the effects of the redistribution of freshwater on manatee critical habitat.

Based on these uncertainties, the Corps, SFWMD, and USFWS determined that more information was needed. In March 2007, the USGS submitted a Scope of Work (SOW) entitled "Monitoring and Assessing Effects of the PSRP Restoration Project on the Manatee". This SOW was negotiated by the USFWS, Corps and SFWMD in response to concerns regarding the potential effects changes in hydrology may have on the thermocline/halocline that supports the manatee warm water refugium in the POI basin. The SOW also included monitoring in the upper estuaries. Monitoring directly funded by the project is confined to the 2008 Corps/District contract that identifies three tasks, which focus on water in or near the POI basin:

1) Task A - Real-time and deep-water sensors to determine salinity and temperature in POI basin, the juncture of the POI basin and the Faka Union Canal; and isotope analysis to verify the presence/absence of a groundwater source in the POI Basin.
2) Task B – Compile and analyze data from existing stage stations upstream and downstream of Faka Union Weir and establish a salinity/temperature station downstream of FU-1 weir to monitor the fresh water lens at the weir to analyze availability of fresh water for drinking.
3) Task C – Monitor temperatures and salinities in the upstream/downstream segments of tributaries surrounding POI by establishing additional monitoring stations in the upper-river estuaries to complement real-time monitoring stations at the Tamiami Trail bridges and in the lower estuaries.

An additional task, Task E – Interpret hydrology and other data to identify important and sensitive habitat areas associated with tasks A-C, was included in the SOW but was not funded by the Corps. Other manatee monitoring was included in the monitoring plan but was not funded by the project including aerial and telemetry baseline surveys, as well as water quality and quantity assessments funded by USGS and the USFWS.

On November 10, 2008, the USFWS received the PSRP Supplemental BA from the Corps dated November 6, 2008. In the 2004 BA, insufficient information was available for the USFWS to concur with a "may affect, not likely to adversely affect" determination for the West Indian manatee. Based on updated information provided in the November 2008 BA, the USFWS concurred with that determination and provided rationale for that concurrence in a BO dated March 2009. In the 2009 BO, the USFWS stated that "if through research, observation, or monitoring it is discovered that manatees are being adversely affected by the PSRP, reinitiation of consultation would be necessary" and outlined a number of potential measures that could be used to alleviate stress on manatees. The USFWS concurred with the Corps' determination of "may affect, not likely to adversely affect" the West Indian manatee based on the project commitments, assumptions, and analyses provided in the 2009 BO.

In February 2011, USGS, USFWS, SFWMD, and the Corps met to discuss the results of the USGS pre-construction monitoring conducted from 2009 to 2011. The study indicated that a reduction of freshwater flow to the refugium resulting from the PSRP construction and operation may result in additional manatee morality during the cold, dry season (Stith, et al, 2011). Based on the information provided by this study, the project team determined that the PSRP had the potential to negatively affect the existing manatee refugium at the POI Basin, primarily as a result of freshwater flow reduction to the basin during the cooler winter months. From 2011 to 2014, an interagency team of biologist and engineers worked to formulate alternatives to mitigate for the potential effects of the PSRP. The details of the selected alternative for the manatee mitigation feature is described in the attached draft Environmental Assessment (Appendix D)

## 1.3 LOCATION

Development of the PSRP area, previously known as SGGE, began in the early 1960's within Collier County in Southwest Florida. Private interests planned to develop a 173 square mile (111,000 acre) residential subdivision. Today this development is split into two entities by Interstate 75. Northern Golden Gate Estates (NGGE) remains a residential subdivision, SGGE had very limited development and was acquired by the State of Florida, Florida Department of Environmental Protection from private owners for restoration. The SGGE area is now known as the Picayune Strand State Forest.

The PSRP consists of approximately 94 square miles located between Interstate 75 and US Highway 41 (Figure 1-1). It is situated southwest of the Florida Panther National Wildlife Refuge, north of Ten Thousand Island National Wildlife Refuge and Collier-Seminole State Park, east of the Belle Meade Conservation and Recreation Lands Project Area, and west of the Fakahatchee Strand State Preserve.

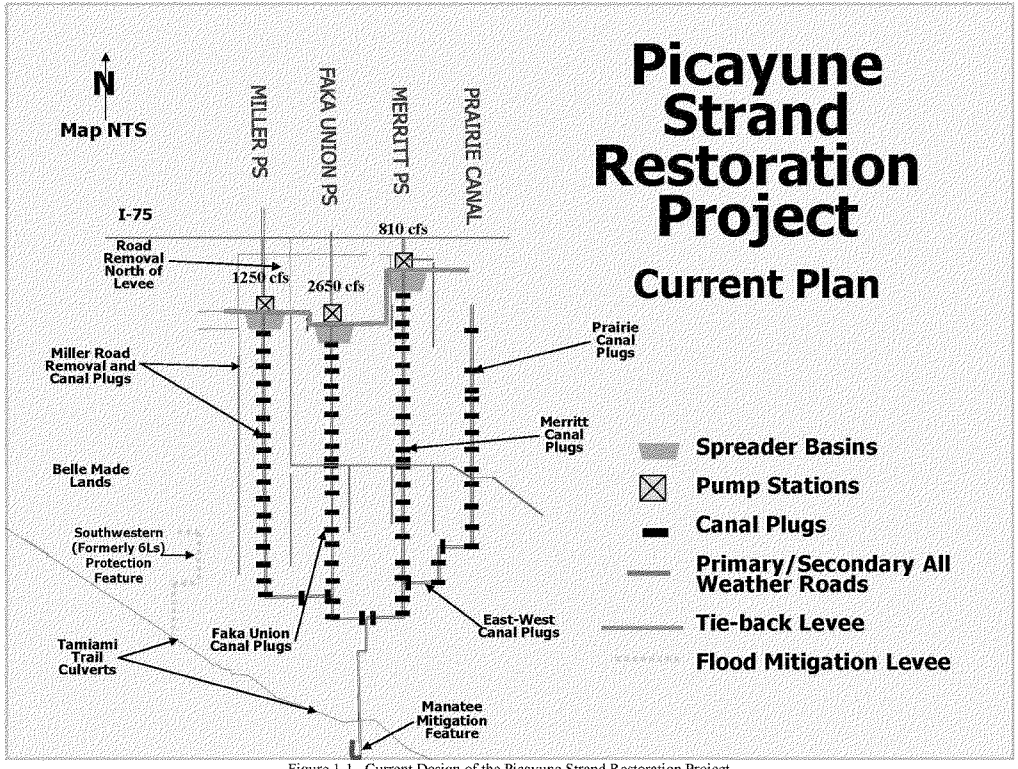



Figure 1-1 . Current Design of the Picayune Strand Restoration Project

The manatee mitigation feature is located just south of US-41 (Tamiami Trail), adjacent to the Faka Union Canal and POI Basin (Figure 1-2).

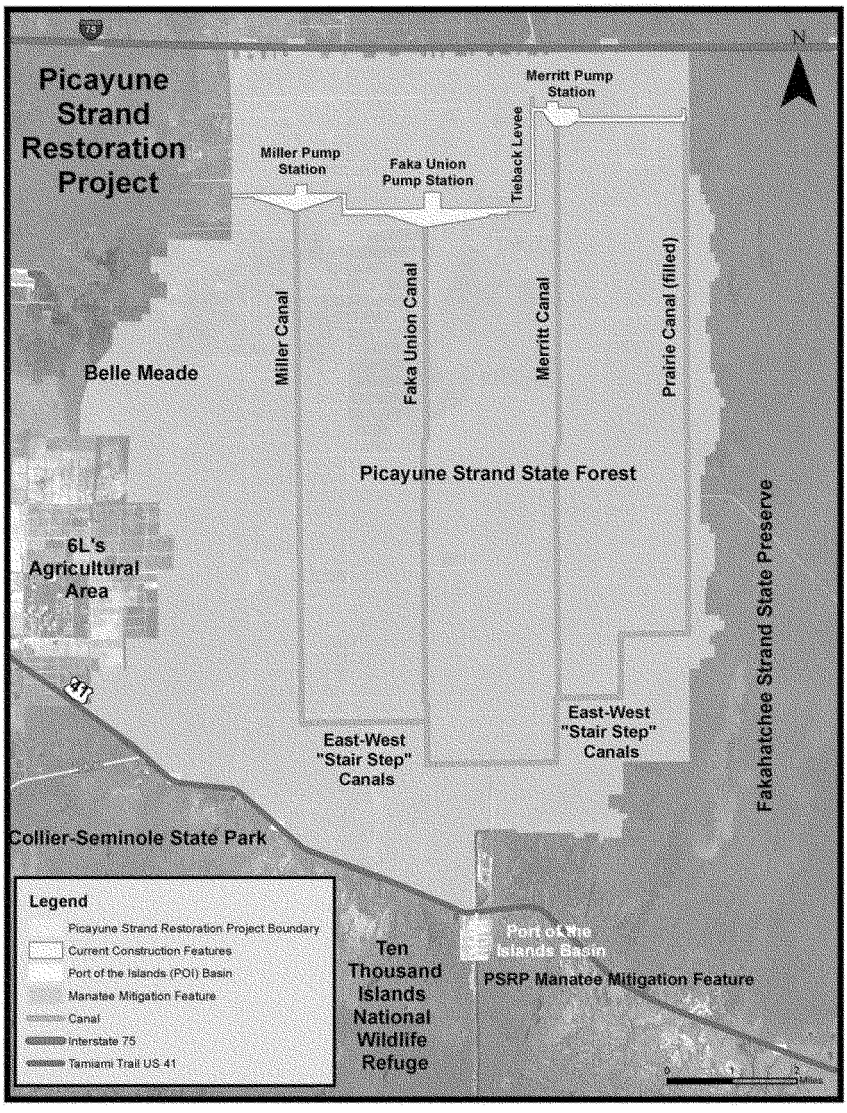



**Figure 1-2. Picayune Strand Restoration Project Location and Adjacent Areas**

## 1.4 REQUIREMENTS

In a letter dated March 25, 2009, the South Florida Water Management District (SFWMD) as the non-federal sponsor restated its strong support for this ecosystem restoration project. The SFWMD entered into a Project Partnership Agreement (PPA) with the Corps on August 13, 2009, agreeing to serve as local sponsor and to cost share the project in accordance with Section 601 of WRDA 2000. The Master Agreement for Cooperation in Constructing and Operating, Maintaining, Repairing, Replacing, and Rehabilitating Projects Authorized to be Undertaken Pursuant to the Comprehensive Everglades Restoration Plan Cooperation, also signed August 13, 2009 between the Corps and SFWMD, within the PPA identifies the parties' responsibilities for PSRP. The SFWMD continues to support this project.

## 1.5 PROJECT HISTORY

A detailed project history can be found within Section 1 of the 2004 Final PIR/EIS and is incorporated into this document by reference. The PSRP was authorized for construction in WRDA 2007. Under the Acceler8 initiative, wherein the SFWMD initiated construction of "foundation" restoration projects concurrent with Corps preparation of the PIR/EIS for authorization, the SFWMD started design and construction. The upper two miles of the Prairie Canal were plugged in early 2004 and the lower five miles plugged in 2006-2007. The Corps took over the construction after the completion of the Prairie Canal phase and continued the project with the established "east to west" project sequencing, in sync with historic sheetflow to be restored.

The Merritt Pump Station construction contract was awarded in October 2009 with construction beginning in December 2009. This phase includes the Merritt Pump Station, tieback levee, spreader channel, road removal, and Merritt Canal plugging. The Merritt Pump Station component was physically completed in 2014.

The Faka Union Pump Station construction contract was awarded in November 2010 with construction starting in January 2011. The Faka Union construction phase includes the Faka Union Pump Station, tieback levee, spreader channel, road removal, and Faka Union Canal plugging. The Faka Union construction contract is scheduled to be completed in 2015. The Miller Pump Station construction contract was awarded in September 2013. The project is currently scheduled for completion in 2017 subject to approval of the proposed revised authorized cost limit. The Faka Union and Miller Canals cannot be plugged until the completion of the southwestern flood protection feature and the manatee mitigation feature contingent upon approval of the increased project cost.

## 1.6 PRIOR REPORTS AND ENVIRONMENTAL DOCUMENTS

A number of studies related to the Golden Gate Estates development and canal network have been conducted over the past 30 years. These studies have been reviewed and were referenced for hydrological, biological, and ecological information related to the study area and the progression of this project. All of these studies assumed some limited development in SGGE. Brief summaries of these studies can be found in Section 1.5 of the 2004 Final PIR/EIS. The pertinent Corps studies are listed below:

- 1980 U.S. Army Corps of Engineers, Golden Gate Estates Reconnaissance Report
- 1986 U.S. Army Corps of Engineers, Golden Gate Estates Feasibility Report
- 1999 Central and Southern Florida Project Comprehensive Review Study Integrated Feasibility Report and Programmatic Environmental Impact Statement, Comprehensive Everglades Restoration Plan.
- 2004 CERP Picayune Strand Restoration Project Final Project Implementation Report and Environmental Impact Statement

## 1.7 DECISION TO BE MADE

This LRR requests the authorization for a project cost of $617.9 million. The current Section 902 limit authorized cost is $505.2 million.

This LRR also describes the potential need for a manatee mitigation feature south of the POI Basin (Figure 1-2). At the time of PIR/EIS authorization, it was unclear whether or not a feature would be needed. A study conducted by the U.S. Geological Survey (USGS) from 2009 to 2011 identified that the PSRP would have a significant adverse effect on the POI refugium.

In summary, on October 17, 2001, the Corps provided a Biological Assessment to FWS requesting formal consultation on West Indian Manatee. FWS did not respond to this request for formal consultation and cited several reasons including changes in the hydrologic modeling platform and pending results of hydrologic model. In the 2004 Final Coordination Act Report for PSRP, FWS noted that additional biological, engineering and hydrologic information would be needed. Thus, in 2004 a species effect determination was not reached for West Indian manatee within the FWS 2004 Biological Opinion due to lack of sufficient information. In order to better understand potential effects on manatee due to PSRP implementation, the Corps contracted with U.S. Geological Survey (USGS) to model effects of reductions in flow from the Faka Union Canal on the manatee refugium at Port of the Islands. Results from the USGS study indicated that PSRP implementation would negatively affect the manatee refugium and could result in an increase in manatee mortality due to cold stress. Manatees are protected under the Endangered Species Act of 1973 (ESA), as amended, and the Marine Mammal Protection Act (MMPA) of 1972. Although the ESA allows for incidental take of endangered species, MMPA does not offer any such provisions. Therefore, the Corps convened a multiagency technical team to develop alternatives for a manatee mitigation feature within Port of the Islands that would result in an "no adverse affect" determination under ESA and thus be compatible with MMPA provisions. The technical analysis to support implementation of a manatee mitigation feature is included within the U.S. Army Corps of Engineers 2014 Supplemental Biological Assessment for PSRP and the U.S. Fish and Wildlife Service 2014 Biological Opinion Amendment.

Details regarding the scope of the mitigation required were not finalized in the Project Implementation Report and Environmental Impact Statement. An interagency team of biologists have been involved with defining the scope, design, and cost of this feature.

## 1.8 REAL ESTATE

In the 2004 Final PIR/EIS, the description of the lands required for the recommended plan were based on an analysis of the lands needed for construction, operation, maintenance, repair, replacement and rehabilitation of the Project. Section 13 Recommendations of the 2004 Final PIR/EIS and the Chief of Engineers' Report contained the following:

a. For any lands or acreage within the former Southern Golden Gate Estates Subdivision comprised of 55,247 acres acquired by the non-federal Sponsor or the Florida Department of Environmental Protection prior to May 31, 2004, the creditable value shall be a sum not to exceed $75,394,333, subject to a Peer Review Report by a party designated by the Deputy Assistant Secretary of the Army (Civil Works) and approval of the Peer Review Report by the Deputy Assistant Secretary of the Army (Civil Works) and subject to a determination that the lands are required for the Project.
b. For lands, easements and rights-of-way within the former Southern Golden Gate Estates Subdivision comprised of 55,247 acres acquired by the non-federal Sponsor or the Florida Department of Environmental Protection after May 31, 2004, the creditable value shall be the actual acquisition cost of such real property interests at the time the interests are acquired, subject to a determination that the lands are required for the Project and that the costs are reasonable, allowable and allocable.
c. Subject to a Peer Review Report by a party designated by the Deputy Assistant Secretary of the Army (Civil Works) and approval of the Peer Review Report by the Deputy Assistant Secretary of the Army (Civil Works), the incidental/administrative costs incurred by the Florida Department of Environmental Protection for the acquisition of all lands, easements, and rights-of-way within the former Southern Golden Gate Estates Subdivision shall not exceed the sum of $29,158,914.
d. If the lands, easements and rights-of-way which lie outside the boundaries of the former Southern Golden Gate Estates Subdivision were acquired prior to execution of the Project Partnership Agreement, the creditable value shall be their purchase price, subject to a determination that the lands are required for the Project and that the costs are reasonable, allowable and allocable, together with their reasonable and necessary incidental costs of acquisition.
e. The value of lands, easements, or rights-of-way required for the Project which lie outside the boundaries of the former Southern Golden Gate Estates Subdivision acquired by the non-federal Sponsor after the effective date of the Project Partnership Agreement executed for this Project shall be the actual acquisition cost of such real property interests at the time the interests are acquired, subject to a determination that the lands are required for the Project and that the costs are reasonable, allowable and allocable, together with their reasonable and necessary incidental costs of acquisition.

The real estate component of the recommended plan was tentative in nature for planning purposes only. In the 2004 Final PIR/EIS, the Lands and Damages for the Project were estimated at a cost of $193,043,100 broken down as follows:

Southern Golden Gate Estates-total $172,338,212

a. Actual acquisition costs for lands acquired by FDEP prior to May 31, 2004 - not to exceed $75,394,333-credited to non-federal sponsor;

b. Administrative costs for all lands acquired in SGGE both before and after May 31, 2004 - not to exceed $29,158,914-credited to non-federal sponsor;
c. Actual acquisition costs of Department of Interior Farm Bill Funds of $31,312,693 - credited to the Federal Government;
d. DOI Farm Bill federal funds expended for acquisition/administrative cost of FDEP of $3,761,290 - credited to Federal government;
e. DOI Farm Bill federal funds expended for PL91-646 costs of $3,010,982 - credited to Federal government;
f. Estimated land acquisition costs to be expended by FDEP or SFWMD for lands in SGGE acquired after June 1, 2004 - estimated in the 2004 Final PIR/EIS at $22,000,000 with a 35% contingency ($7,700,000) for a total of $29,700,000;

Belle Meade-perpetual Flowage Easement - 8,868 acres at cost of $6,834,020 with a 35% contingency ($2,391,907) for a total of $9,225,927.

Other lands outside of SGGE - 575.20 acres at a cost of $2,643,100 with a 35% contingency ($925,085) for a total of $3,568,185.

Future Federal Administrative Costs of $1,868,500 with a contingency of 35% ($653,975) for a total of $2,522,475.

Future non-federal Administrative costs for lands outside of SGGE of $2,600,000 with a 35% contingency ($910,000) for a total of $3,510,000.

Future non-federal PL91-646 costs of $500,000 with a 35% contingency ($175,000) for a total of $675,000.

FDEP 91-646 relocation cost of $891,325 with a 35% contingency ($311,972) for a total of $1,203,301.

### 1.8.1 LAND REQUIREMENTS CHANGES

In the 2004 Final PIR/EIS, the total estimated land requirement was approximately 64,690 acres, with 55,247 acres in the Southern Golden Gate Estates (SGGE) CARL Area, to be required in fee title. A perpetual flowage easement would be required over approximately 8,868 acres in the Belle Meade State Conservation and Recreation Land (CARL) Area. Fee title would be required over approximately 20 acres for installation of the Tamiami Trail Culverts and over 397 acres required for construction of the five levees. Additionally, a temporary road easement would be required over 5.20 acres for the period of construction. More detail was discussed in Appendix F of the 2004 Final PIR/EIS. The following paragraphs detail the changes recommended in this LRR from the 2004 Final PIR/EIS:

**Southern Golden Gate Estates**

The 55,247 acres in the Southern Golden Gate Estates CARL Area are still required in fee title. The real estate costs have increased on the lands acquired after June 1, 2004. This was based on the fact that these lands were acquired by condemnation and the court awards and stipulated final settlements were higher than anticipated in the 2004 Final PIR/EIS. Actual land acquisition costs expended by FDEP for lands in SGGE acquired after June 1,

2004 through 2011 are $18,391,500. Additionally there are approximately 300 parcels awaiting final judgments or Stipulated Final Settlements at an estimated cost of $13,000,000 excluding any contingency.

**Lands outside of Southern Golden Gate Estates**
In 2013, additional more detailed hydraulic and hydrologic analysis for Port of Islands, Private Lands area, Belle Meade area, and Fakahatchee Strand State Preserve using more recent lidar and the Gridded Surface Subsurface Hydrologic Analysis (GSSHA) model platform was completed. Below is a discussion of each area.

**Belle Meade Area**
In the 2004 Final PIR/EIS, the preliminary H&H analysis used for the 2004 Final PIR/EIS showed that approximately 8,868 acres would be inundated by the Project and therefore a perpetual flowage easement was required over the approximately 9,021 acres in the Belle Meade State Conservation and Recreation Land (CARL) Area. More detailed H&H analysis was performed in 2013 using more recent lidar and the GSSHA model platform. The analysis was completed to verify the land acquisition and estates required in the Belle Meade Area. Results from the 2013 H&H Analysis have indicated that the required acreage in the Belle Meade Area impacted by the Project was reduced to approximately 6,894.55. The takings analysis for the 2004 Final PIR/EIS did not consider that removal of the roads in SGGE would remove all access to the lands required in the Belle Meade Area. Impacting the properties both hydrologically and by removal of access would result in the requirement for fee title versus a perpetual flowage easement. Of the approximately 6,896.55 acres required in the Belle Meade Area, FDEP has acquired 5,696.75 acres at an estimated cost of approximately $10,854,807, excluding FDEP administrative costs associated with the acquisition of these lands. SFWMD was requested by FDEP to acquire any additional lands required for the Project in Belle Meade. SFWMD will acquire the additional approximately 1,197.80 acres at an estimated cost of $7,222,659, excluding SFWMD's administrative costs and contingency. SFWMD and FDEP estimated administrative costs for the acquisition of these lands at $2,350,071. Total estimated real estate costs for lands in Belle Meade are $20,427,537, excluding contingency.

**Southwestern (formerly 6Ls Farm) Protection Feature**
The preliminary hydraulic and hydrologic (H&H) analysis used for the 2004 Final PIR/EIS showed an increase in water levels that could impact 6Ls Farm, southwest of the project. The Southwestern Protection feature was designed to prevent an increase in surface water levels due to operating the project. More detailed H&H analysis was performed using more recent lidar and the GSSHA model platform. The analysis was completed to verify the land acquisition and protection features prescribed in the 2004 Final PIR/EIS to mitigate a reduction in the level of service for flood protection as required in Section 601(h)(5) or "Savings Clause" of the WRDA 2000. The results of the more detailed H&H analysis determined that the levee could be reduced to only 8.75 miles (Figure A-2) instead of the original PIR length of approximately 17.25 miles. The 2004 Final PIR/EIS estimated 252 acres would be required in fee for this feature within the Belle Meade area. Since the lands in the Belle Meade Area are now all being required in fee, the cost of the lands required for this feature are included in the Belle Meade real estate cost estimate above.

**Private Lands and Port of the Islands**
In the Real Estate Appendix – Appendix F, it was estimated that for the construction of the protection features around the Private Lands located northwest of the Southern Golden Gate Estates and for the Port of the Islands a total of approximately 145 acres would be required. The remaining approximately 252 acres were required for the 6L Farm Protection Feature discussed above.

**Private Lands Protection Feature and Pump Station**
The preliminary H&H analysis used for the 2004 Final PIR/EIS showed an increase in water levels that could impact the privately owned lands (or "private lands") northwest of the project. The Private Lands Protection Feature was intended to protect the private lands on the boundary with Belle Meade at the northwest corner of the project when it was shown to cause an increase above existing conditions in surface water levels. More detailed H&H analysis was performed in 2013 using more recent lidar and the GSSHA model platform. The analysis was completed to verify the land acquisition and protection features prescribed in the 2004 Final PIR/EIS to mitigate a reduction in the level of service for flood protection as required in Section 601(h)(5) or "Savings Clause" of WRDA 2000. The results of the 2013 detailed H&H analysis determined that the Private Lands Protection Feature and Pump Station included in the 2004 Final PIR/EIS are not necessary. Therefore the lands formerly recommended for acquisition for this feature are not required.

**Port of the Islands Protection Feature**
The preliminary H&H analysis used for the 2004 Final PIR/EIS showed an increase in water levels that could impact the Port of the Islands housing development. The Port of the Islands Protection Feature was intended to protect the private lands in the Port of the Islands area shown to have an increase in surface water levels. More detailed H&H analysis was performed in 2013 using more recent lidar and the GSSHA model platform. The analysis was completed to verify the land acquisition and protection features prescribed in the 2004 Final PIR/EIS to mitigate a reduction in the level of service for flood protection as required in Section 601(h)(5) or "Savings Clause" of the WRDA 2000. The results of the 2013 detailed H&H analysis determined that the Private Lands Protection Feature and Pump Station included in the 2004 Final PIR/EIS were not necessary. Therefore, the lands formerly recommended for acquisition for this feature are not required.

**Fakahatchee Strand State Preserve**
In the 2004 Final PIR/EIS, no lands in the Fakahatchee Strand State Preserve, lying east of the SGGE, were identified as being required for Project operations; therefore, there was no real estate cost estimate for any lands within this area. Detailed H&H analysis performed in 2013 using more recent lidar and the GSSHA model platform concluded that approximately 1,864.62 acres will be hydrologically impacted by the Project operations. A perpetual flowage easement is recommended over this acreage. FDEP has acquired fee to approximately 1,813.62 acres at an estimated cost for the fee of $765,439. Estimating that a perpetual flowage easement would be at 90% of fee or lower, the estimated credit for these lands would be $688,895. The remaining approximately 51 acres will be acquired

by the SFWMD at an estimated cost of $108,000. Total estimated costs for these lands are $796,895, excluding FDEP's and SFWMD's administrative costs and contingency.

**Manatee Mitigation Feature**

The manatee mitigation feature is located just south of US-41 (Tamiami Trail), adjacent to the Faka Union Canal and POI Basin. This feature will occupy approximately ten acres and be located on State lands within the Ten Thousand Island National Wildlife Refuge. The SFWMD will certify these lands before construction of the manatee mitigation feature.

See attached Real Estate Plan, Appendix C, for more details and information related to the changes in Real Estate requirements of the Picayune Strand Restoration Project.

## 2.0 DESIGN AND COST CHANGES

The design refinements detailed in this report reflect the difference between the preliminary design envisioned by the 2004 Final Project Implementation Report and Environmental Impact Statement (PIR/EIS) and the detailed design developed during the project's engineering and design phase. The project purpose has not changed. The authorized project is still intended to provide hydrologic and ecologic restoration of the previously developed area as stated in the 2004 Final PIR/EIS while maintaining existing levels of flood protection for the adjacent developed lands.

### 2.1 FUNDING SINCE AUTHORIZATION

The following Table 2-1 breaks down the Federal allocation and the South Florida Water Management District (SFWMD), contribution per fiscal year.

**Table 2-1. Federal & Non-Federal cost allocation per fiscal year**

| Fiscal Year | Federal Allocation | Non-FED Sponsor Contribution |
|---|---|---|
| Sunk Cost thru 2006 | $ 8,372,038 | $ 15,886,737 |
| 2007 | $ 708,007 | $ 11,552,498 |
| 2008 | $ 1,648,952 | $ 3,318,275 |
| 2009 | $ 3,079,945 | $ 617,066 |
| 2010* | $ 98,136,726 | $ 1,031,631 |
| 2011** | $ 93,554,793 | $ 125,967,791 |
| 2012 | $ 33,922,454 | $ 1,434,299 |
| 2013 | $ 67,159,000 | $ 1,763,399 |
| Total | $ 306,581,915 | $ 161,571,696 |
| *FY 10 FED includes lands purchased by DOI | | |
| **FY 11 Non-FED included land contributions to date | | |

### 2.2 CHANGES IN SCOPE OF AUTHORIZED PROJECT

There are no substantial proposed changes to the project scope with the exception of the manatee mitigation feature. The intention to restore the 55,247 acre former Southern Golden Gate Estates subdivision to pre-development hydrology and ecology remains unchanged.

The potential need for a manatee mitigation feature was identified in the 2004 Final Project Implementation Report and Environmental Impact Statement. Subsequent investigations conducted by the U.S. Geological Survey determined that a feature was necessary to ensure the continuance of the Port of Islands Basin as a manatee thermal refugium, thereby avoiding adverse impacts to manatees as a result of project implementation. Incidental take of marine mammals, in this case, manatees, is prohibited under the Marine Mammal Protection Act of 1972. Details regarding the scope of the mitigation required were not finalized in the Project Implementation Report and Environmental Impact Statement. Through further detailed consultation with the FWS, concurrence was recently reached on

the design of the manatee mitigation feature necessary to provide the West Indian manatee with a refugium to mitigate for the loss of the refugium at the Faka Union canal.

## 2.3 CHANGES IN LOCAL COOPERATION REQUIREMENTS

There are no changes to the local cooperation requirements previously identified in paragraph 10 of the September 15, 2005 Chief of Engineers Report and Memorandum, Subject: Comprehensive Everglades Restoration Plan, Picayune Strand Restoration Project, Collier County, Florida and agreed to in the Project Partnership Agreement signed on August 13, 2009.

## 2.4 CHANGE IN LOCATION OF THE PROJECT

There are no changes to the overall location of the Picayune Strand Restoration Project (PSRP) (Figure E-2).

## 2.5 PROJECT DESIGN CHANGES

### 2.5.1 CHANGES IN TOTAL PROJECT FIRST COSTS

There has been a significant increase in total cost since the project was originally authorized. A detailed comparison between the original cost estimate and current cost estimate is provided in Table 2-2. Please note that Table 2-2 was designed to provide an "apples to apples" comparison between the original first cost estimate and the current first cost estimate. The "original cost" reported in the table is from the 2004 PIR. The original project cost at FY05 price levels was estimated to be $349.4 million. At FY15 price levels, the original project cost is $417.5million. The current estimate is $617.9 million.

**Table 2-2. Comparison between and original and current cost estimates**

| Category | Original Cost (1Q05 dollars) | Original Cost (1Q15 dollars) | Current Estimate (1Q15 dollars) | $ Change |
|---|---|---|---|---|
| Buildings, Grounds, and Utilities | $2,094,000 | $2,796,000 | $8,457,000 | $5,661,000 |
| Roads, Railroads, and Bridges | $34,065,000 | $45,474,000 | $33,184,000 | ($12,290,000) |
| Channels and Canals | $5,382,000 | $7,185,000 | $10,923,000 | $3,738,000 |
| Levees and Floodwalls | $7,401,000 | $9,879,000 | $45,132,000 | $35,253,000 |
| Pump Stations | $67,476,000 | $90,075,000 | $185,617,000 | $95,542,000 |
| Floodway Control and Diversion Structures | $8,528,000 | $11,384,000 | $1,877,000 | ($9,507,000) |
| Fish & Wildlife Facilities | $7,433,000 | $9,860,000 | $20,875,000 | $11,015,000 |
| **Subtotal (Construction)** | **$132,379,000** | **$176,653,000** | **$306,065,000** | **$129,412,000** |
| Lands and Damages (Real Estate) | $193,041,000 | $209,127,000 | $213,435,000 | $4,308,000 |
| PED | $11,369,000 | $15,011,000 | $70,583,000 | $55,572,000 |
| Construction Management | $12,633,000 | $16,679,000 | $27,864,000 | $11,185,000 |
| **Subtotal (Non-Construction)** | **$217,043,000** | **$240,817,000** | **$311,882,000** | **$71,065,000** |
| Grand Total | **$349,422,000** | **$417,470,000** | **$617,947,000** | **$200,477,000** |

**NOTES:**
1) Reference EM 1110-2-1304, 13 March 2014 for FY15 CWCCIS escalation factors.
2) PED and CM accounts are calculated as a percentage of construction costs. Original estimate used 9% and 10%.
3) Only portions of the real estate cost were escalated. Costs associated with lands that were already acquired as of 2004 were escalated.
4) There is a minor difference between the Lands and Damages 2004 PIR/EIS RE Appendix estimate and M-CACES estimate, due to rounding differences.

The largest increase in cost is associated with construction ($129 million in FY15 dollars), as shown in Figure 2-1. The second largest increase in cost is associated with PED ($56 million in FY15 dollars). Table 2-2 shows the increase in total costs, by category and the increase in construction cost, by component. Figure 2-2 shows the proportion of construction cost increase defined by component and shows that most of the construction cost increase is associated with pump stations. Levee costs are also a substantial part of the construction cost increase.

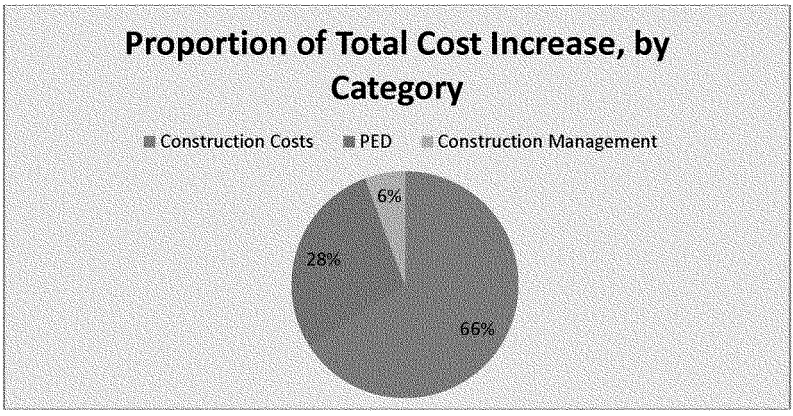



**Figure 2-1. Proportion of Total Cost Increase, by Category**

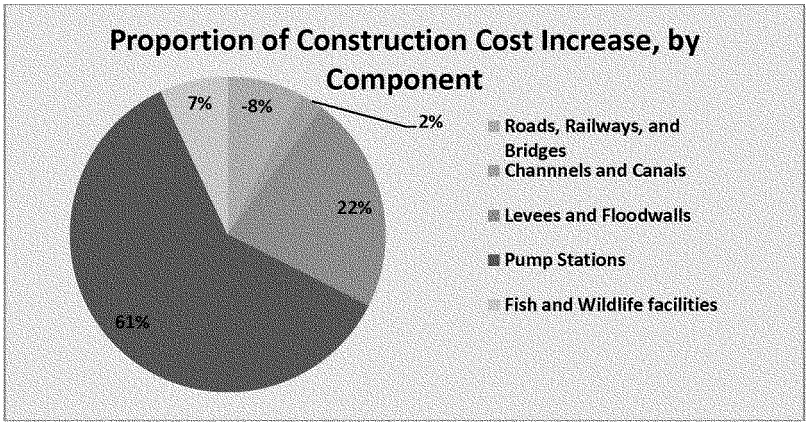



**Figure 2-2. Proportion of Construction Cost Increase by Component**

### 2.5.2 COST DISCREPANCIES BETWEEN MAIN REPORT AND TPCS

It should be noted that total project cost and total fully funded project cost reported in this document and are not identical to the estimates provided in the Total Project Cost Summary (TPCS) shown in Appendix B, Sub-Appendix A, page 2. The figures in the TPCS are given in October 2013 (FY14) price levels and are escalated using Civil Works Construction Cost Index System (CWCCIS) escalation factors. The current figures reported here are shown in October 2014 (FY15) price levels and escalated based on March

2014 Office of Management and Budget (OMB) escalation factors. The differences in the numbers are described in table 2-3 and below.

**Table 2-3. Input Table for 902 Limit calculation**

| | Project Cost Estimate | Fully Funded Cost |
|---|---|---|
| TPCS | $619,626,000 | $623,461,000 |
| Current | $617,946,700 | $625,273,450 |

The differences noted in the table reflect slight changes in the cost since the TPCS was approved in December 2013. These differences include:

- A more up to date accounting of sunk costs, including costs incurred by the non-federal sponsor
- Updated escalation factors
- All awarded contracts are considered as "sunk costs"

All the costs reported in this document reflect the differences mentioned above and are considered the current cost. The project cost at current (FY15) price levels is $617,946,700, and the fully funded cost (inflated through the mid-point of construction) is $625,273,450. The current cost is consistent with the FY 16 budget request.

### 2.5.3 SECTION 902 LIMIT

Total project costs, after being adjusted for inflation, are projected to exceed the 20% allowance provided by Section 902 of the WRDA of 1986 (33 U.S.C. 2280). Therefore, this Post-Authorization Change Report is required. The total fully funded project cost is $625.3 million. The Section 902 limit, calculated using current (FY15) price levels, is $505.2 million. Table 2-4 shows the 902 Limit as calculated by the certified Corps 902 Limit tool. Table 2-5 shows the 902 Limit computation input table. Total project and fully funded costs are not identical to the estimates provided in the TPCS as discussed previously in Section 2.5.2. The authorized cost reported in Table 2-5 ($375 million) is the total cost that was authorized by law in WRDA 2007. This figure was escalated from the 2004 PIR estimate ($349 million). The 902 Limit reported here is consistent with the FY16 Budget request for Picayune Strand.

**Table 2-4. Input Table for 902 Limit calculation**
**(Table G-4 / ER 1105-2-100 Appendix G)**

**MAXIMUM COST INCLUDING INFLATION THROUGH CONSTRUCTION**

| **FY 15** | - | **Thousands Dollars** |
|---|---|---|
| **Line 1** | | |
| **a.** | Current Project estimate at current price levels: | $617,947 |
| **b.** | Current project estimate, inflated through construction: | $625,273 |
| **c.** | Ratio: Line 1b / line 1a | 1.0119 |
| **d.** | Authorized cost at current price levels: | $425,106 |
| | (Column (h) plus (i) from table G-3) | |
| **e.** | Authorized cost, inflated through construction: | $430,146 |
| | (Line c x Line d) | |
| | | |
| **Line 2** | Cost of modifications required by law: | $0 |
| | | |
| **Line 3** | 20 percent of authorized cost: | $75,066 |
| | .20 x (table G-3, columns (f) + (g) | |
| | | |
| **Line 4** | Maximum cost limited by section 902: | $505,212 |
| | Line 1e + line 2 + line 3 | |

**Table 2-5. Section 902 Limit Input Table**

| | |
|---|---|
| **Project Name:** | **PICAYUNE STRAND** |
| **Date Prepared:** | **4/2/2014** |

| | |
|---|---|
| **Total Authorized Cost:** | $375,330 |
| **Authorized Cost for Construction** | $164,462 |
| **Authorized Cost for Real Estate** | $210,868 |
| **Date of Authorized Price Level:** | 10/1/2006 |
| **First Year of Expenditure:** | 10/1/1999 |

| | |
|---|---|
| **Current Cost Estimate (At Current price level):** | $617,947 |
| **Current Cost for Construction (Construction Portion of Current Cost):** | $404,340 |
| **Current Cost for Real Estate (Real Estate Portion of Current Cost):** | $213,607 |
| **Current Fully Funded Cost Estimate (Inflated thru mid-point of Construction):** | $625,273 |
| **Date of Current Price Level:** | 10/1/2014 |

| | |
|---|---|
| **Costs of modifications specified by Law** | |

| | |
|---|---|
| **Project Purpose:** | 13 - PUMPING PLANT |

| | |
|---|---|
| **Date of EM 1110-2-1304 Used** | Sep-13 |
| **Type of CWCCIS Used** | QUARTERLY PUMPING STATIONS (13) |
| **Date of Real Estate Index Used** | 20-Feb |
| **Type of Real Estate Index Used** | CPI (U) |

| INDEX INPUTS | | |
|---|---|---|
| **Fiscal Year** | **CWCCIS Index** | **Rent-Residential Index** |
| **FY 07** | 658.14 | 228.00 |
| **FY 08** | 696.70 | 237.14 |
| **FY 09** | 715.95 | 245.86 |
| **FY 10** | 705.25 | 248.89 |
| **FY 11** | 738.68 | 249.62 |
| **FY 12** | 770.37 | 255.65 |
| **FY 13** | 773.09 | 262.71 |
| **FY 14** | 779.96 | 269.96 |
| **FY 15** | 795.17 | 272.32 |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

| EXPENDITURE INPUTS | | |
|---|---|---|
| **Fiscal Year** | **Construction Expenditures ($ 1,000's)** | **Real Estate Expenditures ($ 1,000's)** |
| **FY 00** | 64 | 0 |
| **FY 01** | 783 | 0 |
| **FY 02** | 1561 | 0 |
| **FY 03** | 3013 | 0 |
| **FY 04** | 3801 | 0 |
| **FY 05** | 1746 | 0 |
| **FY 06** | 1924 | 0 |
| **FY 07** | 1325 | 0 |
| **FY 08** | 1649 | 0 |
| **FY 09** | 3050 | 154,892 |
| **FY 10** | 60052 | 0 |
| **FY 11** | 93555 | 6138 |
| **FY 12** | 45587 | 60 |
| **FY 13** | 85188 | 87 |
| **FY 14** | 9936 | 200 |

The following sections provide more information about the increases in project cost.

### 2.5.4 CONSTRUCTION COSTS

As described in the previous section, construction costs have increased significantly since the project was authorized. The largest component of this increase is construction of the pump stations with a cost increase of approximately $96 million. The original estimate included in the PIR/EIS included all three pump stations and was completed based on the PIR design concept at year 2000 cost levels and escalated to year 2005 price levels. The original estimate assumed that all pump stations would be constructed under one contract and followed concepts of pump stations in the late 1990's. When the detailed design was initiated in 2007, the design configuration had evolved, taking advantage of experience with existing facilities in south Florida, a better understanding of the needs of the area and Corps experience with Hurricane Katrina. Some refinements include the inclusion of form suction intake pumps; the addition of one pump per station to increase the reliability of the station, increase of building size to allow layout for safer maintenance operations, and

layout changes to allow a single person to operate the station. Additional refinements are included in Appendix A.

The second largest component of the cost increase is levee construction. The total cost of levee construction increased by approximately $35 million. Detailed design showed that a tieback levee that spans the northern width of the project and connects the three pump stations to prevent recirculation of water to the upstream side of the pump stations would be needed in lieu of the smaller berms provided in the 2004 Final PIR/EA. In addition, further survey and geotechnical investigations performed during design and construction warranted a more costly method of construction than assumed in the 2004 Final PIR/EIS.

In the 2004 Final PIR/EIS cost estimate, the cost for the construction of the Southwestern protection features assumed that all earthen material would be obtained from the construction site. However, subsequent geotechnical investigations revealed that a majority of the onsite material is unsuitable for levee construction. Therefore, the current estimate for the Southwestern (6Ls Farm) protection feature assumes that the foundations for the levees will be excavated and replaced with suitable quarry fill hauled in from offsite.

Another significant construction cost increase is in the Buildings, Grounds, and Utilities category, which increased by $5.7 million measured in FY15 price levels. The sub-components included in the Buildings, Grounds, and Utilities category were accounted for in the Pumping Plant work category in the 2004 Final PIR/EIS estimate. Therefore, this increase is due to a reallocation as opposed to an increase in total project cost. Additionally, the approximate $11 million cost of the manatee mitigation feature was included as a cost increase under the Fish and Wildlife Facilities category.

More information about the various increases in construction cost is provided in Appendix A.

### 2.5.5 REAL ESTATE COSTS (LANDS AND DAMAGES)

Real Estate costs have also increased from $193,043,100 in the 2004 Final PIR/EIS to $213,435,000. The original cost estimate was developed using: (a) estimated land costs in the Belle Meade Area for a perpetual flowage easement versus actual acquisition costs for the fee title; (b) no land or administrative costs for lands in Fakahatchee Strand; and (c) an estimated land cost for lands in SGGE to be acquired after June 1, 2004. The requirement for fee acquisition in Belle Meade, the requirement of a perpetual flowage easement in Fakahatchee Strand, and more detailed costs and estimated costs for lands in SGGE, all have led to a significant increase. Additionally, final judgments for lands not acquired as of June 1, 2004 have been higher than anticipated in the 2004 Final PIR/EIS as noted in Table 2-2. The Real Estate costs were calculated to conform to the Section 13 of the PIR dated 2004 pages 13-6 and 13-7 which provide:

I recommend that credit for the value of the lands, easements, and rights-of-way required for the Project shall be as follows:

a. For any lands or acreage within the former Southern Golden Gate Estates Subdivision comprised of 55,247 acres acquired by the Non-Federal Sponsor or the Florida Department of Environmental Protection prior to

May 31, 2004, the creditable value shall be a sum not to exceed $75,394,333, subject to a Peer Review Report by a party designated by the Deputy Assistant Secretary of the Army (Civil Works) and approval of the Peer Review Report by the Deputy Assistant Secretary of the Army (Civil Works) and subject to a determination that the lands are required for the Project.

b. For lands, easements and rights-of-way within the former Southern Golden Gate Estates Subdivision comprised of 55,247 acres acquired by the Non-Federal Sponsor or the Florida Department of Environmental Protection after May 31, 2004, the creditable value shall be the actual acquisition cost of such real property interests at the time the interests are acquired, subject to a determination that the lands are required for the Project and that the costs are reasonable, allowable and allocable.

c. Subject to a Peer Review Report by a party designated by the Deputy Assistant Secretary of the Army (Civil Works) and approval of the Peer Review Report by the Deputy Assistant Secretary of the Army (Civil Works), the incidental/administrative costs incurred by the Florida Department of Environmental Protection for the acquisition of all lands, easements, and rights-of-way within the former Southern Golden Gate Estates Subdivision shall not exceed the sum of $29,158,914.

d. If the lands, easements and rights-of-way which lie outside the boundaries of the former Southern Golden Gate Estates Subdivision were acquired prior to execution of the Project Cooperation Agreement, the creditable value shall be their purchase price, subject to a determination that the lands are required for the Project and that the costs are reasonable, allowable and allocable, together with their reasonable and necessary incidental costs of acquisition.

e. The value of lands, easements, or rights-of-way required for the Project which lie outside the boundaries of the former Southern Golden Gate Estates Subdivision acquired by the Non-Federal Sponsor after the effective date of the Project Cooperation Agreement executed for this Project shall be the actual acquisition cost of such real property interests at the time the interests are acquired, subject to a determination that the lands are required for the Project and that the costs are reasonable, allowable and allocable, together with their reasonable and necessary incidental costs of acquisition.

More details can be found in Appendix C

### 2.5.6 PRE-CONSTRUCTION, ENGINEERING, AND DESIGN (PED) COSTS

The PED costs have increased significantly since the project was authorized. Measured in FY15 dollars, the total cost of PED increased by approximately $56 million. The 2004 Final PIR/EIS estimate assumed that PED cost would be approximately 9% of total construction cost. The current estimate projects the PED cost to be approximately 23% of

total construction cost. See Table 2-6 below for PED expenditures to date. More information about the various increases in PED cost is provided in Appendix A. The appendix also provides the history of PED activities that have already occurred.

**Table 2-6. Planning, Engineering and Design Costs to Date**

| | Federal | Non-Federal |
|---|---|---|
| Project Implementation Report (PIR) | $ 6,420,000 | $ 2,568,000 |
| Modeling and Design Costs | $ 18,008,000 | $ 16,897,000 |
| Engineering During Construction | $ 14,830,000 | $ 1,326,000 |
| Limited Revaluation Report | $ 361,000 | |
| Totals: | $ 39,619,000 | $ 20,791,000 |

### 2.5.7 CONSTRUCTION MANAGEMENT COSTS

Measured in FY14 dollars, the total cost of construction management has increased by approximately $11 million. The original estimate in the PIR/EIS and the current cost for construction management are 9% of the construction cost. More information about the increase in the engineering management cost is provided in Appendix A.

## 2.6 CHANGES IN COST ALLOCATION

Due to changes outlined above, the allocation of costs has changed since authorization. In the 2004 Final PIR/EIS, most of the cost was associated with real estate. In comparison, within the current cost estimate, most of the project cost is associated with construction. Real Estate is the second largest category of allocated costs. Real estate and construction costs have both increased significantly since the 2004 Final PIR/EIS. In absolute terms, PED and Construction Management costs have both increased significantly. Figure 2-3 provides a comparative breakdown of total project costs.

Though the total allocation of costs has changed since 2004, the allocation of costs between different construction components has not changed dramatically. Pump stations were the largest component of construction cost in 2004, and they continue to be the largest component. As a proportion of the total, levees and floodwalls have increased since 2004. Two construction categories have decreased as a proportion of the total: Culverts and Roads. Figure 2-4 provides a comparative breakdown of construction costs.

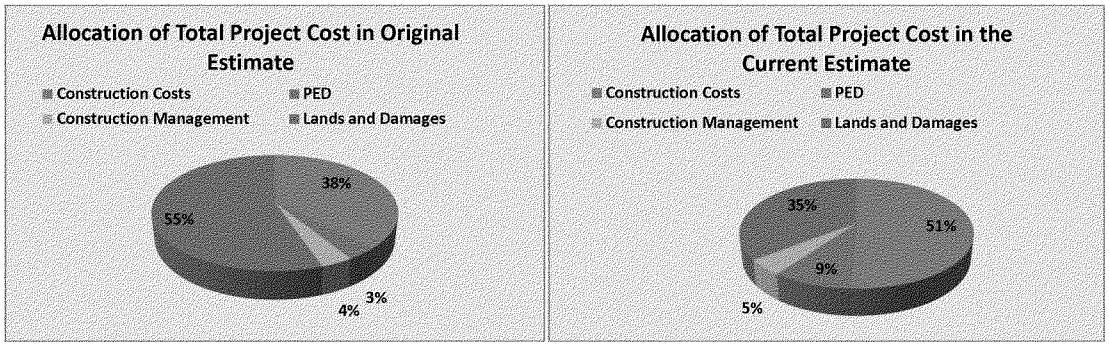



**Figure 2-3. Comparison of total project costs**

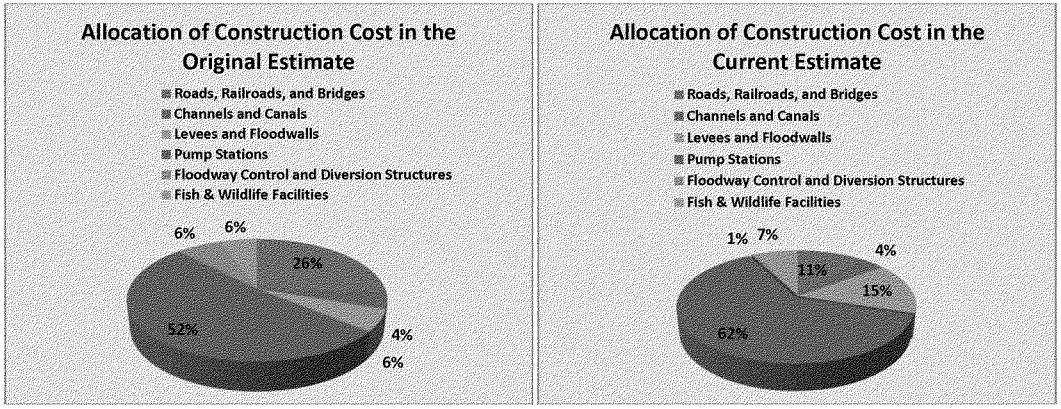



**Figure 2-4. Comparison of total construction costs**

## 2.7 CHANGES IN COST APPORTIONMENT

There are no proposed changes in cost apportionment. The PSRP is a component of the Comprehensive Everglades Restoration Program which is programmatically cost shared with the non-federal Sponsor.

## 2.8 MANATEE MITIGATION FEATURE

A portion of the Southwest Florida manatee population currently uses the Port of the Islands (POI) Basin as a warm water refugium during the colder months of the year. The refugium appears to be maintained by fresh water discharged from the canal system in the PSRP site that routes through the Faka Union Canal and over Faka Union Weir #1 located immediately north of US-41 (Tamiami Trail) and the POI Basin. The anticipated reduction in flow from the PSRP to the POI Basin resulting from plugging of project canals raised concern for the continued viability of the refugium under restored conditions, thereby creating the potential for increased winter mortality to the manatees utilizing the site.

The PSRP was authorized for construction in the WRDA of 2007. Prior to construction authorization, informal consultation with the U.S. Fish and Wildlife Service (USFWS) for the West Indian manatee under the Endangered Species Act (ESA) was determined to be incomplete based on insufficient information for a manatee effects determination. The 2004 PIR/EIS acknowledged there was a potential adverse impact to the endangered manatee, indicated that additional consultation was required, and predicted that a project modification would be required to mitigate for the anticipated loss of the fresh water source during periods of natural cold stress. The 2009 Biological Opinion (BO) determination (USFWS, 2009) that the project "was not likely to adversely affect" the manatee was caveated pending the results of detailed studies by the U.S. Geological Survey (USGS) of manatee use of the POI Basin. Subsequent analysis of best available data (Stith, et al., 2011) indicated that a reduction of freshwater flow to the refugium resulting from the PSRP construction and operation may result in additional manatee stress, injury or mortality during the cold, dry season when manatees are dependent on the refugium for shelter. Based on the information provided by these studies, the project team determined that a manatee mitigation feature was necessary to maintain the existing manatee refugium at POI Basin.

An interagency team with representatives from the Corps, SFWMD, USFWS, Florida Fish and Wildlife Conservation Commission (FWC) and the FDEP formulated potential mitigation options in order to maintain the function of the refugium. Design and construction will be completed by SFWMD. The design of this feature is included in Appendix A, Engineering Appendix. The draft EA and BA are included in Appendix D. Additionally, the cost of the manatee mitigation feature has been included in the certified cost estimate. Currently, the fully funded cost of manatee mitigation is estimated to be approximately $11 million. The cost of the manatee mitigation feature is included in the cost estimate under the account Fish and Wildlife Facilities (WBS 06) (Appendix B). Approximately $21 million is included in the project cost estimate under the WBS 06 account pre-construction environmental monitoring, adaptive management, and design and construction of the manatee mitigation feature. The overall environmental monitoring associated with the PSRP will be paid for in O&M funds.

## 3.0 EVALUATION OF BENEFITS

The environmental benefits of the Picayune Strand Restoration Project (PSRP) as described in the 2004 Final Project Implementation Report and Environmental Impact Statement (PIR/EIS) will still be achieved at completion of the total project. The objective is to re-establish wetlands conditions over most of the PSRP lands. In order to achieve this, water must be freely conveyed freely from the north and retained on the land, which is currently over-drained. The reason that full restoration benefits cannot be achieved without installation of plugs in the canals is that the original cause of dehydration of the 55,000+ acre area was over-drainage. The canals were constructed to drain the mesic-to-wetland area to support a residential housing development. Data from monitoring wells installed in Picayune Strand by the SFWMD show that the N-S trending canals were highly effective: the drainage effect extends in a perpendicular direction far from each N-S canal, leading to the current condition of an overall lowered groundwater table throughout the area. The desired restoration would raise the ground water table and re-establish surficial sheet flow, not just in close proximity to the canals, but throughout the area. Before canal plugs could be installed, however, it was necessary to install the pumps, berms and protective levees in order to comply with the Comprehensive Everglades Restoration Plan's commitment to not decrease the existing level of flood protection on adjacent lands. Without the pumps located near the northern end of the canals, flooding probability would increase in the residential lands of Northern Golden Gate Estates, located immediately north of I-75. The drainage provided by un-plugged canals is too effective, in that they rapidly shunt water draining from north of the project (higher lands) down the waterways and out into the Ten Thousand Islands. Too little residual water remains in the canals at the end of the rainy season to sustain the high water table needed to support restoration of wetlands and wet mesic forest during the long winter dry season. That is why the sequence of construction (levees and pump stations first; plugging canals second) is the only logical way to proceed with construction. This project could not have been reverse-constructed, for it would have led to undesirable flooding north of I-75 in residential areas.

In addition to benefits in the PSRP area, benefits would be gained in the adjacent Fakahatchee Strand State Forest, Belle Meade State Conservation and Recreation Lands (CARL), Collier-Seminole State Park, and the Florida Panther Wildlife Refuge. Benefits for estuarine communities (Collier-Seminole State Park and Ten Thousand Islands National Wildlife Refuge) were also included as a result of the PSRP. Without the implementation of the yet to be constructed protection features and Miller and Faka Union Canal plugging, approximately 70 percent of the hydrologic benefits, 62 percent of the biological benefits, and 100 percent of the estuarine benefits would be lost (Table 3-1). The location of the adjacent benefitted areas outlined in Table 3-1 is shown in Figure 3-2. In addition to the loss of quantitative benefits, there would be a significant loss of qualitative benefits in the region. These include the loss of: a major flow-way through Picayune Strand, reestablishment of the natural flows to the estuaries, and restoration of ecological connectivity. A number of project objectives as described in the 2004 Final PIR/EIS would not be met for 25,240 of 59,294 acres with the loss of the Miller canal plugging and for 43,918 of 59,294 acres with the loss of the Faka Union and Miller canal plugging within Picayune Strand, including:

- Restoration of natural hydropatterns, sheetflow, and flowways,
- Provision of resource based recreational opportunities,
- Restoration of natural fire regime,
- Reestablishment of natural plant distribution and composition,
- Restoration of habitat for listed species,
- Increasing fish and wildlife resources,
- And increasing surface aquifer recharge.

In addition, two of three decision criteria used to select Alternative 3D in the 2004 Final PIR/EIS would not be met; specifically, the elimination of point discharge to the estuary and restoration to more than 50% of historic hydrologic conditions would not be met. The other major loss would be that the PSRP would not provide the intended connectivity of surrounding Federal and state parks, preserves, and refuges (Figure 3-3). The goal of more natural distribution of water to the Ten Thousand Islands National Wildlife Refuge would not be met and no estuarine benefits would be achieved. The implementation of the full PSRP will result in a contiguous public land holding of about 2,602,144 acres in Southwest Florida.

Figure 3-1 depicts the hydrological restoration expected from each incremental component when the Prairie, Merritt, Faka Union and Miller Canals are plugged; including hydrological benefits extending to the estuarine boundaries of the project area."

Phased restoration is expected as each component is completed. Since each canal is approximately 2 miles apart, after filling Prairie Canal, Merritt Canal will produce drainage effects 1 mile east of Prairie Canal and the filled Prairie Canal restoration area will be 1-3 miles east of Prairie Canal. Likewise when Merritt Canal is filled, Faka Union Canal will produce drainage effects 1 mile east of Merritt Canal, and the filled Merritt Canal restoration area will be 1-3 miles east of Merritt Canal. If Faka Union and Miller Canal are being filled at the same time, anticipated restoration would occur concurrently (green), with the drainage effects extending west 3 miles from Miller Canal. The East-West, Stair-Step Canal also has drainage effects extending three miles upstream and an indefinite distance downstream towards the coast.

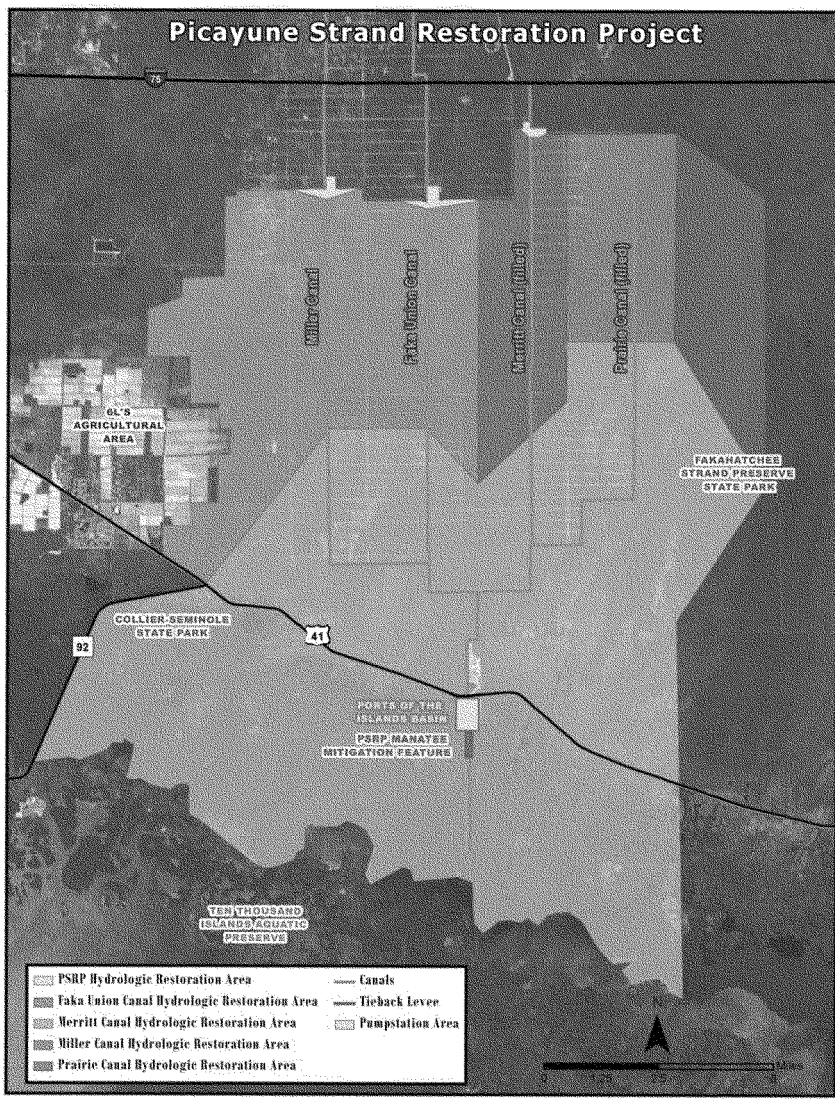



**Figure 3-1. Estimated Benefit Areas for each Phase of Canal Plugging**

**Table 3-1. Average annual benefits with and without the completion of Faka Union and Miller canal plugging**

| Location | Acres (2004 PIR EIS) | Acres without Miller and Faka Union | Future Without (2004 PIR EIS) (average annual HUs) | Revised Future without (average annual HUs) | HU with Miller and Faka Union (2004 PIR EIS) | Lift with Miller and Faka Union (2004 PIR EIS) (HU-Future Without) | HU without Miller and Faka Union | Lift without Miller and Faka Union (HU-revised Future Without) | Percent of HU Lost | Percent of Benefit (Lift) Lost |
|---|---|---|---|---|---|---|---|---|---|---|
| **Hydrology** | | | | | | | | | | |
| SGGE | 59,294 | 15,376 | 20,753 | 5,382 | 49,807 | 29,054 | 12,916 | 7,534 | 74% | 74% |
| Fakahatchee | 80,161 | 80,161 | 69,740 | 69,740 | 72,145 | 2,405 | 72,145 | 2,405 | 0% | 0% |
| Belle Meade | 30,061 | 0 | 24,951 | 0 | 27,055 | 2,104 | 0 | 0 | 100% | 100% |
| Collier-Seminole | 4,339 | 0 | 3,645 | 0 | 3,948 | 303 | 0 | 0 | 100% | 100% |
| Panther NWR | 24,947 | 24,947 | 21,704 | 21,704 | 21,953 | 249 | 21,953 | 249 | 0% | 0% |
| **Total** | **198,802** | **120,484** | **140,793** | **96,826** | **174,908** | **34,115** | **107,014** | **10,188** | **39%** | **70%** |
| **Biota** | | | | | | | | | | |
| SGGE | 59,294 | 15,376 | 35,962 | 9,226 | 47,531 | 11,839 | 12,301 | 3,075 | 74% | 74% |
| Fakahatchee | 80,161 | 80,161 | 72,357 | 72,357 | 75,210 | 2,853 | 75,210 | 2,853 | 0% | 0% |
| Belle Meade | 30,061 | 0 | 21,564 | 0 | 22,322 | 758 | 0 | 0 | 100% | 100% |
| Collier-Seminole | 4,339 | 0 | 3,656 | 0 | 3,863 | 207 | 0 | 0 | 100% | 100% |
| Panther NWR | 24,947 | 24,947 | 18,993 | 18,993 | 19,058 | 65 | 19,058 | 65 | 0% | 0% |
| **Total** | **198,802** | **120,484** | **152,262** | **100,576** | **167,984** | **15,722** | **106,569** | **5,993** | **37%** | **62%** |
| **Estuarine** | | | | | | | | | | |
| Nekton | 1260.00 | 0 | 34.65 | 0 | 539.90 | 505.25 | 0 | 0 | **100%** | 100% |
| Oyster Reef | 13.75 | 0 | 0.60 | 0 | 7.88 | 7.28 | 0 | 0 | **100%** | **100%** |
| **PROJECT TOTAL** | | | | | **343,440** | **50,400** | **213,583** | **16,181** | **38%** | **68%** |

* Benefits without the completion of the Miller and Faka Union canal plugging were estimated based on information from 24 years of hydrologic studies done to document the extent of direct and indirect drainage effects of the PSRP canals on adjacent lands.
*Average annual benefit calculations were obtained from Tables 6-9, 6-10, 6-15, and 6-16 of the 2004 Final PIR/EIS

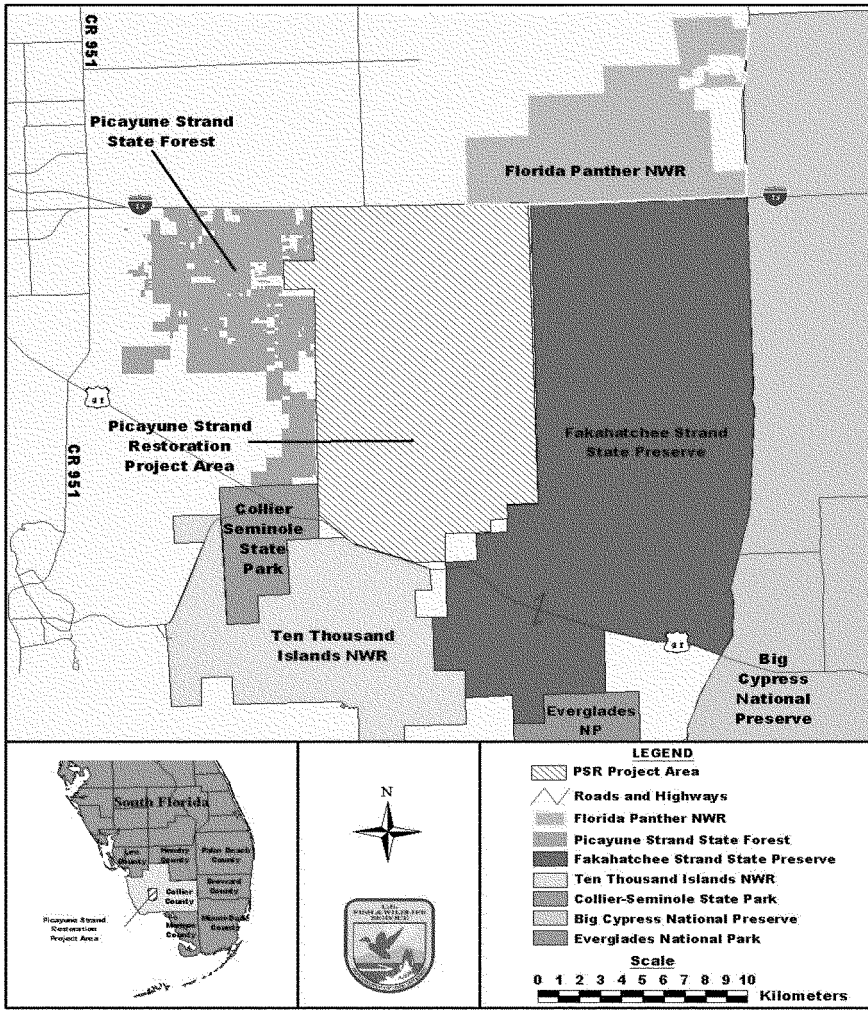



**Figure 3-2. Adjacent public lands benefiting from the PSRP restoration.**

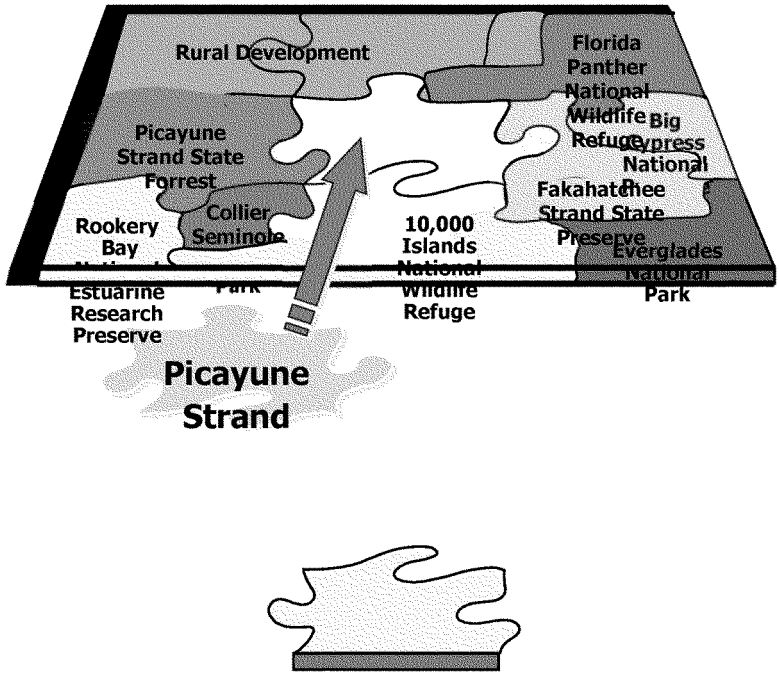



**Figure 3-3. Picayune Strand and adjacent publicly owned lands**

## 3.1 COST EFFECTIVENESS OF REMAINING BENEFITS

The environmental benefits of PSRP can be associated with different construction phases. The entire project is designed to work as an integrated system as described in the 2004 Final PIR/EIS. However, as explained in the previous section, the project was split into manageable phases in accordance with funding availability. The project was initiated with a logical phasing sequence assuming it would be completed within the authorized cost. However, design refinements were required resulting in this request for additional funding to enable project completion. Table 3-2 provides a breakdown of the benefits. The environmental benefits and restored acreage can be broadly linked to plugging of each of the three major canals that is part of the three pump station construction phases. Each "phase" corresponds to a given pump station and its associated canal plugging.

**Table 3-2. Environmental Benefits (habitat unit lift) by construction phase**

| Benefit Category | Merritt | Faka Union | Miller |
|---|---|---|---|
| Hydrology | 10,188 | 9,152 | 14,775 |
| Biota | 5,993 | 3,736 | 5,993 |
| Estuarine | 0 | 0 | 513 |

The Merritt Pump Station has been constructed and Faka Union Pump Station is under construction with anticipated completion in 2015. The benefits associated with the Merritt construction phase will be achieved without additional authorization of construction funds (beyond the current 902 Limit). However, if additional funding is not authorized, the associated features of the Faka Union and Miller Pump stations will not be fully constructed. As a result, full restoration will not be achieved and the environmental benefits associated with those two phases will not be realized. In order to achieve full restoration, the protection features and manatee mitigation component must be completed. In particular, the manatee mitigation feature must be completed before the Faka Union canal can be plugged.. Without the implementation of the Miller and Faka Union canal plugging phases, approximately 70 percent of the hydrologic benefits, 62 percent of the biological benefits, and 100 percent of the estuarine benefits would be lost.

Table 3-2 provides a simple breakdown of the benefits. Table 3-3 provides a simple cost/benefit comparison between the portions of project that are already under construction (including the obligated funds and awarded contracts) vs. the construction features that are associated with the additional funding request.

**Table 3-3. Environmental Benefits**

| Incremental Benefits | HU Lift | Current Cost (2014 dollars) | Cost per HU Lift |
|---|---|---|---|
| Authorized Cost (902 Limit) | 16,181 | $505,212,000 | $31,222 |
| Additional Request (above 902 Limit) | 37,819 | $112,735,000 | $2,981 |
| **Entire Project** | **50,400** | **$617,947,000** | **$12,261** |

Regardless of how the costs and benefits are separated into project phases, the cost per habitat unit lift (HUL) is always lower in the remaining portion of the project than the completed portion:

- $/HUL for remaining features < $/HUL for completed features
- $/HUL for authorized expenditures < $/HUL for requested authorization
- $/HUL for final portion < $/HUL for completed portion

Thus, completing the project is significantly more cost effective than ceasing work and leaving the project incomplete. Without full implementation of all project features, the project will only realize 30 percent of the hydrologic, 38 percent of the biological and zero percent of the estuarine benefits.

From an efficiency perspective, the features to be financed by the additional appropriation request are the efficient dollars to be spent on the project. Therefore, the recommendation of this report is that the authorized total project cost be increased from $505.2 million to $617.9 million so that the project can be completed as it was intended in the 2004 Final PIR/EIS.

## 3.2 BENEFITS ACHIEVED DUE TO IMPLEMENTING PRAIRIE CANAL RESTORATION

The following discussion is a summary of information and evaluations in the Environmental Appendix (Appendix E). The first canal plugged was Prairie Canal, the easternmost canal in PSRP, which did not require a pump station. The upper two miles of Prairie Canal were plugged with adjacent spoil in spring 2004. The lower five miles of the north-south portion of Prairie Canal were plugged in fall 2006, with substantial amounts of additional fill added from fall 2006 through June 2007 as the roads east of Merritt Canal were degraded. Additional degrading of fill along the roads east of Merritt Canal and along Prairie Canal was completed in winter-spring 2012. The logging trams east of Merritt Canal were degraded during winter-spring 2011.

### 3.2.1 HYDROLOGIC CHANGES

Portions of the PSRP area have already shown significant hydrologic improvement, as indicated by water levels in monitoring wells whose location is shown in Fig. 3-1 (green dots). These wells have been monitored prior to the PSRP project and continue to be monitored. Most observations of early improvements occurred near Prairie Canal and in Fakahatchee Strand immediately to the east of the PSRP. Based on 26 years of monthly water level monitoring documenting the effects of Prairie Canal across Fakahatchee Strand, we now know that the draw-down effects of the SGGE canals can extend 1-1.5 miles from the canal during the wet season and 2-3 miles during the dry season. The SGGE canals are only 2 miles apart. Thus, even though Prairie Canal has been plugged since 2007, lands to the west of the canal are still affected by drainage from Merritt Canal, and lands to the south are still affected by the unfilled East Stair-Step Canal. In addition, the natural main flow-way through project area enters from the north in the vicinity of Merritt Canal, and arcs close to Prairie Canal in the north-south middle of the project area before curving west again to where the Faka Union Canal crosses Tamiami Trail. Thus, when Merritt Canal is plugged, we expect to see additional hydrologic restoration along Prairie Canal, and there will be additional improvement in the southern portion of the area when the East Stair-Step Canal is plugged. While plugging Prairie Canal is providing some benefits to the inland portion of the project area, few if any of these benefits are reaching the estuarine areas

because most of the newly created overland flow is being recaptured by the East-West Stair-Step Canal from which it is routed as point discharge into Faka Union Bay. For this reason we have not attributed any estuarine zone benefits to PSRP restoration to date.

Hydrologic benefits first appeared after the 2006 plugging of Prairie canal, when groundwater wells near Prairie Canal and between Prairie and Merritt canals showed consistently higher levels than near the unplugged Merritt Canal. Restored water levels should more closely resemble wells in adjacent undrained Fakahatchee stand, especially after Merritt Canal is plugged as well. A graphic comparison of water levels through the years in two wells, one at Prairie Canal, and one inside Fakahatchee Strand 2.5 miles away from any canal, showed a dramatic rise in the water level at the Prairie Canal well, beginning in October 2007. Subsequently through 2011 the Prairie Canal well tracked closely with water levels inside Fakahatchee Strand, a natural area.

### 3.2.2 PLANT COMMUNITY CHANGES

Since most vegetation assemblages inside PSRP are tree-dominated, change in species predominance and mortality of less high water-tolerant species is expected to be relatively slower than hydrologic change. Monitoring of changes reported here is through 2011, four years after plugging parts of Prairie Canal. Various sampling methods were used including belt transects, line-intercepts and quadrats to characterize the canopy, sub-canopy, shrub and herb layers. Details are presented in Appendix E. In the sampled area, hydroperiods have increased since Prairie Canal was plugged, in spite of droughts. However, restoration effects have not yet been observed on growth rates or mortality of wetland trees (should be shown by increased growth) while pine stands showed more rapid growth in restored sites than control plots, a trend that should reverse as restored sites become wetter. Evidently the effects of increased water depth and duration are not yet affecting these plots. The undesired and invasive cabbage palm, has not yet decreased in density even in restored sites, except for some mortality of seedlings and young trees in cypress stands close to Prairie Canal. In general, cabbage palm densities continue to increase throughout the project area, a trend expected to reverse with ongoing hydroperiod restoration. The years between 2006 and 2011 included some extreme drought years, which may be partially responsible for the ongoing cabbage palm density increase. In contrast, wet prairie plots showed low cabbage palm densities. In the shrub layer, increased flooding and longer hydroperiods appear to have caused mortality of the invasive Brazilian pepper. In the ground layer, regarding calculation of a Wetland Affinity Index to indicate similarity of experimental plots to "natural" control plots, the index increased slightly, but no significant trends could be shown. In summary, time elapsed and the unusual drought periods during the first 4 years probably obscured any significant or widespread changes in vegetation.

Indicator species for restoration of fauna were relative abundance of green and squirrel tree frogs (native species) in comparison to Cuban tree frogs (invasive). This monitoring has not yet begun, but should indicate restoration of more natural habitat.

## 3.3 MONITORING AND ADAPTIVE MANAGEMENT

The goal of restoring the lands of PSRP below the pump stations is re-establishment, to the maximum extent practicable, of pre-drainage plant and animal communities. This presumes restoration of natural hydrologic and fire regimes and control of nuisance and

exotic plant and animal species. There is some uncertainty regarding restoration of the hydrologic regime related to the extent of the original watershed boundaries, and how they may have been affected by the Golden Gates canal systems. Other hydrologic unknowns relate to operation of control structures on the canals, as well as groundwater withdrawals by large well fields in Northern Golden Gates Estates. It is desirable to better delineate the natural watershed boundaries and current discharges and withdrawals, so that restored flows can be compared to pre-drainage conditions as closely as possible. This would allow adjustment of flows if necessary. Fortunately the PSRP lands are surrounded by natural Federal and State conservation lands encompassing a much larger area than the project area itself, which should favor successful restoration.

### 3.3.1 MONITORING

The PSRP monitoring plan includes measuring short and long-term responses in major communities on project and adjoining lands, including aquatic and terrestrial, freshwater and estuarine. The monitoring plan was developed by the PDT while the PIR was still in preparation, and was refined as more information became available. Monitoring of hydrology is accomplished through a network of groundwater wells as shown in Fig. 3-1. A multi-agency Monitoring and Assessment Group (MAG) comprised of representatives of USFWS, SFWMD, and the Corps has continued to guide ongoing monitoring. As the PSRP lands are largely forest-covered, access by helicopter or airboat is not feasible as it is in the sawgrass everglades. Monitoring locations were often determined in relation to access points.

As described in Picayune Project Implementation Report (PIR), establishment of a natural fire regime and an exotic vegetation management program, not just hydrologic restoration, are necessary to meet the project targets. As part of the PSRP, the PDT has created a plan for controlling nuisance native and exotic vegetation throughout the project area. The highest priority portions of the nuisance native and exotic vegetation plan have been implemented and are ongoing. Nuisance native and exotic vegetation control outside of the construction footprint is not being conducted at this time. It is expected that hydrologic restoration will be a significant ally in dealing with or at least reducing populations of a number of the problem species. Once the effects of hydrologic restoration are ascertained, a long-term plan for nuisance native and exotic vegetation can be developed for the PSRP.

### 3.3.2 ADAPTIVE MANAGEMENT

The original PSRP PIR was authorized in 2007 before the Corps guidance required adaptive management plans for ecosystem restoration projects. While an adaptive management plan was not developed at that time, a monitoring plan for restoration performance was included, along with a vegetation management plan to address invasive species management issues that were the primary uncertainty effecting restoration success at the time. New information gained from permit monitoring discussions related to endangered species, from recent PSRP monitoring data of the Prairie Canal backfill, from RECOVER monitoring data of estuarine restoration indicators and from new information gained from the detailed design of the remainder of the project has identified some additional uncertainty and risk related to meeting project restoration goals and objectives. The PSRP Limited Reevaluation Report (LRR) presented an opportunity to develop an Adaptive Management Plan and comply with the new guidance on adaptive management

to identify strategies to address uncertainty by linking project monitoring and success criteria to management options to be implemented if deemed necessary to improve restoration performance.

Prior to development of the adaptive management plan (Appendix E), existing monitoring funded by RECOVER, other agencies, and required for PSRP to undertake for other project purposes, e.g., operating new structures, compliance with water quality permits or biological opinions was reviewed. The monitoring recommended in this adaptive management plan is what is needed beyond the other sources to address key PSRP uncertainties (key questions) identified during the LRR planning that relate to achieving project goals and objectives. Project specific adaptive management activities will be implemented as necessary in coordination with PSRP Monitoring and Assessment Group (MAG), RECOVER (interagency system-wide science team) and partner agency monitoring activities. This adaptive management plan will be updated based on the new knowledge gained and key questions being addressed to ensure the adaptive management options proposed in this Plan are refined to what is needed to improve restoration success. Therefore, items included in this Plan are not guaranteed to be funded as-is, but will be considered again based on actual restoration project performance related to future project components being constructed and operated. Funding decisions regarding adaptive management strategies will be made commensurate with available funding at that time.

The 2004 Final PIR/EIS estimated that the average annual cost for monitoring and adaptive management was $887,000 over the 50-year life of the project. The average annual cost estimate took into account the cost per year, the different schedule and number of years of monitoring for different resources, and an interest rate to allow comparison of expenditures that are up to 50 years apart (Appendix H, 2004 Final PIR/EIS) (Table 3-4).

Table 3-4. Cost Estimate for Monitoring in 2004 Final PIR/EIS (Table H-13, Appendix H)

| | Pre-Construction & Construction Phase (5 years total) | | Post-Construction Phase (50 years total) | |
|---|---|---|---|---|
| **Resource** | **Number of Years** | **Subtotal** | **Number of Years** | **Annual Rate** |
| Oyster Reef Crab | 5 | $239,000 | 10 | $44,825 |
| Nekton | 5 | $316,000 | 10 | $59,250 |
| Benthic Habitat Mapping | 1 | $310,000 | 1 | $270,000 |
| | | | | |
| Oysters: | | | | |
| 5 Homologues, 4 Estuaries | 5 | $1,500,000 | 10 | $300,000 |
| Reef Mapping | 2 | $10,000 | 10 | $2,000 |
| | | | | |
| Water Quality | 5 | $1,406,000 | 10 | $204,300 |
| Hydrology | 5 | $500,000 | 50 | $100,000 |
| Vegetation | 1 | $150,000 | 50 | $36,000 |
| | | | | |
| Onsite Support | 5 | $1,150,000 | 10 (years 1-10) | $180,000 |
| | | | 40 (years 11-50) | $100,000 |
| | | | | |
| Listed Species | 5 | $1,250,000 | 10 | $250,000 |
| Inland Fish and Wildlife | 5 | $600,000 | 10 | $120,000 |
| | | | | |
| **Total Cost** | | **$7,431,000** | | -- |

The project monitoring costs were revised in 2009 through negotiations with USFWS (Table 3-5). The total cost estimates for environmental monitoring are shown in Table 3-6.

**Table 3-5. PSRP Ecological Response and Water Quality Monitoring Tasks (2012 Transfer Agreement, Appendix 5)**

| Monitoring Tasks | Revised Estimate (CG plus O&M) | Present thru 2022 (CG) | 2023 thru 2050 (O&M) |
|---|---|---|---|
| **Vegetation Transects** | | | |
| PS 1 (Phase 1 road removal) | $95,000 | $47,500 | $47,500 |
| PS 2 (Phase 2 road removal) | $83,125 | $35,625 | $47,500 |
| PS 3 (Phase 3 and 4) | $166,250 | $71,250 | $95,000 |
| *Vegetation Subtotal* | **$344,375** | **$154,375** | **$190,000** |
| **Aquatic Fauna (inland)** | | | |
| PS 1 (Phase 1 road removal) | $308,750 | $308,750 | $0 |
| PS 2 (Phase 2 road removal) | $308,750 | $247,000 | $61,750 |
| PS 3 (Phase 3 and 4) | $617,500 | $370,500 | $247,000 |
| *Aquatic Subtotal* | **$1,235,000** | **$926,250** | **$308,750** |
| **Estuarine Resources** | | | |
| Benthic Substrate | $266,800 | $75,600 | $151,200 |
| Oyster Reef | $282,110 | $169,266 | $112,844 |
| Oyster Reef Mapping | $25,000 | $10,000 | $15,000 |
| *Estuarine Subtotal* | **$533,910** | **$254,866** | **$279,044** |
| **T&E Species Monitoring** | | | |
| Wading Birds & Wood stork | $1,019,868 | $254,967 | $764,901 |
| Panther | $2,436,000 | $522,000 | $1,914,000 |
| Manatee | $750,000 | $300,000 | $450,000 |
| *Species Subtotal* | **$4,205,868** | **$1,076,967** | **$3,128,901** |
| **Water Quality** | | | |
| Lab Fees | $51,582 | $51,582 | $0 |
| Surface Water Samples | $163,944 | $163,944 | $0 |
| Mosquito Fish | $92,376 | $92,376 | $0 |
| Bluegill | $13,266 | $13,266 | $0 |
| *Water Quality Subtotal* | **$321,168** | **$321,168** | **$0** |
| ***Total Cost*** | **$6,640,321** | **$2,733,626** | **$3,906,695** |

**Table 3-6. PSRP Tasks Associated with Environmental Compliance, Assessment of Ecological Response and Hydrological Data, and Control of Exotic Plants (2012 Transfer Agreement, Appendix 5)**

| Environmental Tasks | Total Estimate |
|---|---|
| Collection of Hydrology & Meteorology Data thru Year 2050 | $5,200,000 |
| Nuisance & Exotic Vegetation Control in Construction Footprint during Construction Phases | $7,600,000 |
| Ecological Response & Water Quality Monitoring thru Year 2050 | $6,600,000 |

While the specific details of the Adaptive Management Plan are provided in Appendix E, management options include actions such as adjusting the new pump station flow rates and operational time periods, adjusting weir heights, invasive species control, selective clearing and/or limited seeding planting of vegetation and prescribed fire control options. The cost is estimated at $6,188,000 currently.

## 4.0 RECOMMENDATIONS

It is recommended that the Picayune Strand Restoration Project be reauthorized and appropriated at a total project cost of $617,946,700 in order to complete project construction and achieve restoration benefits described in the 2004 Final Project Implementation Report and Environmental Impact Statement (PIR/EIS). The objectives of the project remain the same. A number of design updates have occurred during the detailed design phase that contributed to the increased project cost. A review of the prior plan formulation, evaluation, comparison and selection has been conducted and has demonstrated it is still sufficient. This Limited Reevaluation Report has captured all current and future design changes, as well as cost contingencies for any potential future unknowns to establish a new total project cost. Additionally, the authorized plan is currently under construction. Any reformulation would likely result in unnecessary increased project costs resulting from a re-verification of the current authorized project.

The non-federal Sponsor, the South Florida Water Management District, has reviewed the contents of this report and is in agreement with the recommendations contained herein.



Jason A. Kirk, P.E.
Colonel, U.S. Army
District Commander

## 5.0 LIST OF PREPARERS

The people who are responsible for contributing to this Limited Reevaluation Report for the PSRP are listed in the table below (Table 5-1). In addition to the individuals listed below, this LRR was reviewed by the supervisory chain of the Environmental Branch and Planning Division of the U.S. Army Corps of Engineers, Jacksonville District.

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# Appendix A:

# Engineering and Design

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## 1.0 INTRODUCTION

The purpose of the Engineering and Design appendix is to document the Picayune Strand Restoration project history, provide the current project status, distinguish between the project features currently under construction, and those features yet to be constructed. This appendix will also provide an explanation of the total project cost differences between the Limited Revaluation Report (LRR) and Project Implementation Report/Environmental Impact Statement (PIR/EIS) and serve to support Appendix B: Cost Estimate. As stated in Section 1 of the main report, the project components that were added during the engineering and design phase are necessary to complete the project and realize all the benefits prescribed in the PIR/EIS.

## 2.0 PROJECT HISTORY

The following paragraphs provide a chronological history of the design and construction of the Picayune Strand Restoration Project (PSRP).

2004: USACE completed the PIR/EIS for the PSRP.

2005: In order to expedite construction of Comprehensive Everglades Restoration Program (CERP) projects, which include PSRP, the non-Federal sponsor, the South Florida Water Management District (SFWMD), enacted the Acceler8 program. As part of the Acceler8 program, the SFWMD hired an architectural/engineering firm as the Engineer of Record (EOR) to complete the preconstruction engineering and design (PED) activities for the PSRP, including preparation of construction contract documents.

2006: SFWMD's EOR completed a Basis of Design Report (BODR) for the PSRP Pumping Stations and a BODR for the PSRP Levees, Canals, and Roads (LCR). SFWMD began construction of the Prairie Canal Project, which included all road removal east of Merritt Canal and canal plugs along the length of Prairie Canal.

2007: PSRP was authorized by Water Resources Development Act (WRDA) legislation. SFWMD's EOR completed the engineering and design, construction plans and specifications, and supporting documentation for three pump stations (Merritt, Faka Union and Miller) and appurtenant features. However, a single construction contract for these facilities was judged to be cost-prohibitive, and the acquisition strategy was revised to include three separate contracts.

2008: Responsibility for project construction was transferred from SFWMD to USACE. USACE retained the original EOR to prepare/modify the existing construction plans, specifications, Design Documentation Report (DDR) and supporting documents for the Merritt Pumping Station (including tieback levee, existing canal plugging, and existing road removal) to bring the contract documents into conformance with USACE format requirements and design standards.

2009: USACE awarded Merritt Pump Station and Road Removal construction contract. USACE retained the original EOR to prepare/modify the existing construction plans, specifications, DDR, and supporting documents for the Faka Union Pump Station (including tieback levee, existing canal plugging, and existing road removal) to bring the contract documents into conformance with USACE format requirements and design standards.

2010: USACE awarded Faka Union Pump Station construction contract. USACE takes over design responsibility for the Miller Pump Station.

2012: USACE transferred responsibility for the design and construction of manatee mitigation features to SFWMD.

2013: USACE awards Miller Pump Station construction contract. Additional hydraulic and hydrologic analysis for the Port of Islands, Private Lands area, Belle Meade area, and Fakahatchee Strand State Preserve using more recent lidar and the Gridded Surface Subsurface Hydrologic Analysis (GSSHA) model platform is completed. See Section 7.0 for more explanation.

2014: All Merritt Pump Station features have been constructed. Merritt Pump Station is currently in the OTMP phase. Approximately 90% of all Faka Union Features have been constructed. The design for Manatee Mitigation features is underway.

**3.0 STATUS OF PROJECT**

The following PSRP design and construction features have been completed or are ongoing:

- Analysis and coordination necessary to complete the PIR/EIS
- Hydraulic & Hydrologic (H&H) Analysis for detailed design of pump stations and preliminary design for protection features by SFWMD
- Complete design for Merritt, Faka Union, and Miller Pump Stations by SFWMD
- Complete design for road removal and canal plugs by SFWMD
- Complete design and construction for Prairie Canal plugging and corresponding 55 miles of road removal by SFWMD
- H&H Analysis using more recent lidar and the Gridded Surface Subsurface Hydrologic Analysis (GSSHA) model platform
- Complete plans and specifications in USACE format for Merritt and Faka Union Pump Station contracts
- Final design, plans and specifications in USACE format for the Miller Pump Station and corresponding canal plugging and road removal
- Merritt Pump Station completed and in OTMP. Canal plugging and road removal are under construction
- Faka Union Pump Station and road removal (under construction)
- Construction management and engineering during construction (EDC) for awarded projects
- Miller Pump Station construction and corresponding canal plugging and road removal (under construction)

The remaining components of the PSRP are:

- Manatee Mitigation Feature construction
- Southwestern (6Ls Farm) Protection Feature construction
- Faka Union Canal and East/West Canal plugging
- Road removal north of tieback levee
- Analysis of the impact the project has on the US 41 (Tamiami Trail) roadway
- Engineering, design and plan development for the features not constructed
- Construction management and EDC for future projects

## 4.0 PROJECT COMPONENTS CURRENTLY UNDER CONSTRUCTION

Two major construction contracts are currently underway, the Faka Union Pump Station Project (Contract #W912EP-11-C-0003) and the Miller Pump Station Project (Contract #W912EP-13-R-0013). The following paragraphs describe the main project features under these three contracts.

### 4.1 Faka Union and Miller Pump Stations

The Faka Union and Miller Pump Stations are currently under construction to accommodate restoration in areas south of I-75 and maintain current levels of flood protection in areas north of I-75. The pump stations are being built on the existing Faka Union and Miller drainage canals and have flood control capacities of 2650 and 1250 cubic feet per second (cfs), respectively. The capacities of these pump stations were designed to have no adverse impact to the existing levels (year 2000) of flood protection to the adjacent private lands and to optimize the environmental restoration demands of the project area.

### 4.2 Spreader Basin/Spreader Berms

The Faka Union and Miller Pump Stations have been designed with a plunge pool (referred to as spreader basin in this document) for energy dissipation and aeration of the discharge waters. The spreader basins are bounded by a spreader berm located south of each pump station that ties into the tieback levee system. Each spreader basin conveys water from the basin, through weirs, along the length of the berm, and over land to the downstream project area. To distribute the flows evenly and remove the point source discharge, the spreader basins' capacities were optimized to handle restoration pumping rates. The length of the spreader berms for the Faka Union Pump Stations and Miller are approximately 9300 feet and 7200 feet, respectively.

### 4.3 Canal Plugs

The Faka Union Canal plugs (see Section 5.4) were removed from the Faka Union Pump Station contract because the Southwestern Protection Feature (see Section 5.1) and the Manatee Mitigation (see Section 5.3) feature must be installed before plugging. The Miller Canal plugs are included in the Miller Pump Station contract as an option and the canal can be plugged after the Southwestern Protection Feature (see Section 5.1) and the Manatee Mitigation (see Section 5.3) feature are installed. In addition, estimates indicate the Faka Union and Miller Canal plugs may not be afforded within the current Section 902 limit and construction will not commence until authorization of a total project cost increase or estimates show that the work will not affect the Section 902 limit. The source material for canal plugs will be obtained from the original side cast material that exists adjacent to the canals. Additional material for the plugs is sourced from degrading the existing roads. The purpose of the plugs is to block conveyance of flows downstream of the pump stations and to assist in providing a sheet flow regime to those downstream areas. The canal plugs also assist in elevating the water table along the canals and to limit the groundwater drawdown to the adjacent lands.

### 4.4 Road Removal

The existing vehicular roads within the project area are being removed and degraded to enhance the restoration of sheet flow throughout the PSRP area. Only the roads to the pump station structures and portions of Everglades Blvd., Stewart Blvd., and Miller Blvd., required by the State of Florida/Florida Forestry Service (FFS) for maintenance will remain in-place as shown in the PIR/EIS. The roads south of the pump stations that are within the project area will be degraded to match the surrounding natural ground elevation. These roads will be allowed to re-vegetate and will be treated to control invasive and exotic plants. The non-asphalt materials from the degraded

roads will be used to fill the roadside swales and ditches and to provide material for the plugging of the major canals. The asphalt will be disposed of or recycled in accordance with State of Florida regulations.

In addition to the vehicular roads, approximately 56 miles of abandoned tram roads used for logging operation were identified during subsequent field surveys. Since the elevated tram roads will disturb the natural restoration sheet flows as outlined in the PIR/EIS, a decision was made to degrade the tram roads in both contracts to match natural ground elevations.

In addition, the Miller Pump Station construction contract includes 43 miles of road removal and 5 miles of tram road removal as options to the contract because estimates indicate that the road removal may not be afforded within the current Section 902 limit. The road removal options will not be exercised until authorization of a total project cost increase or estimates show that the work will not affect the Section 902 limit.

### 4.5 Tieback Levee System

The tieback levee system is designed to prevent the discharge waters from short circuiting around the pump stations causing the overall system to be less efficient. The tieback levee system required would consist of approximately 49,000 linear feet to be constructed across the entire length of PSRP area from east to west. Portions of the tieback levee are divided among the Merritt, Faka Union and Miller Pump Station contracts.

## 5.0 PROJECT COMPONENTS REMAINING TO BE CONSTRUCTED

The remaining project components that will be constructed utilizing separate construction contracts include Manatee Mitigation Feature; 6Ls Farm Protection Feature, plugging of the Faka Union and East/West Canals and road removal north of the pump stations. Two projects components included in the PIR/EIS that are no longer required include the Private Lands Protection Feature and Pump Station and Port of the Island Protection Feature. The following paragraphs provide a brief description of the current design of those components remaining to be constructed and those components which are no longer required.

### 5.1 Southwestern (6Ls Farm) Protection Feature

The preliminary hydraulic and hydrologic (H&H) analysis used for the PIR/EIS showed an increase in water levels that could impact 6L's Farm, southwest of the project. The Southwestern Protection Feature was designed to prevent an increase in surface water levels from the project. More detailed H&H analysis was performed using more recent lidar data and the Gridded Surface Hydrologic Analysis (GSSHA) model platform. The analysis was completed to verify the land acquisition and protection features prescribed in the PIR/EIS to mitigate a reduction in the level of service for flood protection as required in Section 601(h)(5) or "Savings Clause" of the Water Resources Development Act to 2000 (WRDA 2000) was adequate. The results of the detailed H&H analysis determined that the levee could be reduced to 8.75 miles (Figure A-2) instead of the original PIR length of approximately 17.25 miles. The preliminary design of the levee determined the crest elevation to be 6 ft NAVD 88 (Figure A-1). The southern portion of the levee will tie into US Highway 41 (Tamiami Trail) which will cut off the roadside drainage swale. To

continue conveyance, 4-72" culverts will be constructed through the protection levee at the tie-in location.

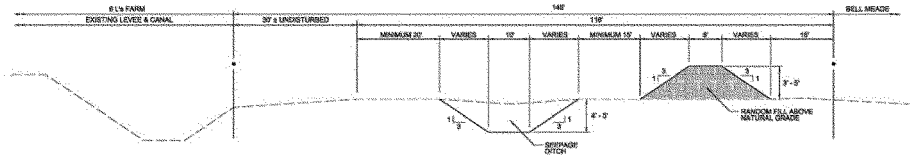



Figure A- 1: Typical Levee Cross Section for Southwestern (6Ls) Protection Feature

Estimates indicate that the design and construction of the Southwestern (6Ls) Protection Feature may not be afforded within the current Section 902 limit. The design and construction will commence when authorization of a total project cost increase or estimates show that the work will not affect the Section 902 limit.

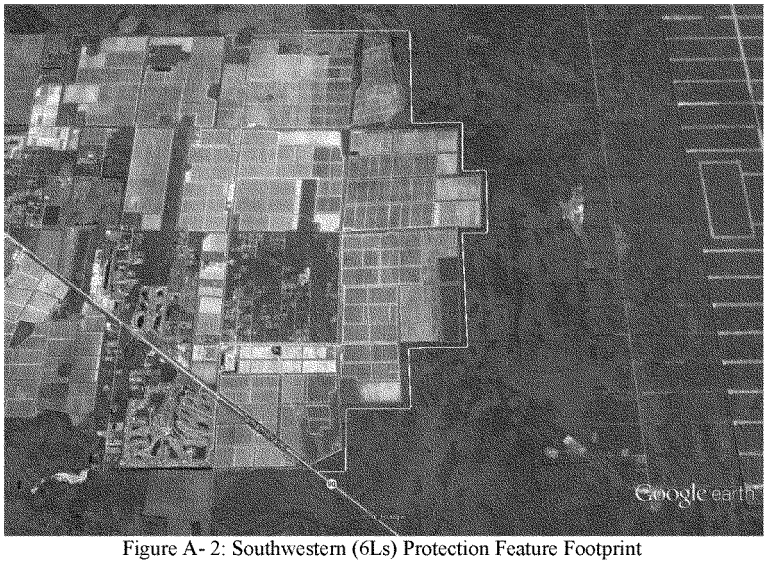



Figure A- 2: Southwestern (6Ls) Protection Feature Footprint

### 5.2 U.S. 41 (Tamami Trail) Seepage Analysis

A seepage analysis will be performed to determine effects of increased water elevations in the vicinity of 6Ls on the road bed of U.S. 41. Preliminary results indicate no impacts to the roadbed. However, if the final results indicate that increased water surface elevations affect the structural integrity of the U.S. 41, physical features will be analyzed and constructed to mitigate effects.

Mitigation features could include culverts installed under U.S. 41 and C.R. 92, rebuilding sections of U.S. 41, modifying roadside swales, diversion berms and/or similar features.

Estimates indicate that the analysis may not be afforded within the current Section 902 limit. The analysis will commence when authorization of a total project cost increase or estimates show that the work will not affect the Section 902 limit.

**5.3 Manatee Mitigation Feature**

The Biological Opinion, as part of the PIR/EIS, identified a warm water manatee refugium in the Port of the Islands marina and basin. Analysis from the US Geological Survey (USGS) concluded the refugium will likely be affected by the reduction in post project discharge flows verses the pre-construction condition. An interagency team with representatives from USACE, SFWMD, U.S. Fish and Wildlife Service, Florida Fish and Wildlife Conservation Commission, and the Florida Department of Environmental Protection analyzed alternatives that will ensure the continuance of a manatee thermal refugium in the Port of the Islands basin.

The design and construction of the Manatee Mitigation Feature will be completed by SFWMD. The current design is a feature in the spoil area located on the west side of the Faka Union Canal south of the Port of the Islands Basin (See Figure A-3). Manatee Mitigation Feature includes the construction of three 100' diameter pools with bottom elevations of -20.0 NAVD, designed to intercept the warm groundwater layer necessary to charge the pools and provide a warm water refugium for the manatees during the cold weather season. The three pools are to be inter-connected by a deep channel with bottom elevation of -11.0 NAVD to promote heat exchange between the three pools. Each pool will have a shelf area set at elevation -3.0 NAVD to provide a location within the pools that wildlife biologists can utilize, should it be necessary, to provide assistance to manatees in distress. The excess material from the excavation of the pools and channels will be utilized to construct berms that will surround the feature to provide seclusion from boat traffic and human contact. The berms will also function as a barrier against high winds that may reduce the water temperature in the pools during cold weather season. During the design of the proposed mitigation feature, an analysis, Section 9 of the DSDR, was performed to determine how the tidal flow and geometry of the feature would contribute to the flushing of the system and to what extent. It was determined that the feature should have only one open connection to the Faka Union Canal and the connecting canal should meander to minimize the flushing of the warm water. A 48" diameter culvert with headwalls, gate and manatee grates will be constructed from the northernmost pool to the Faka Union Canal to provide an operable flushing mechanism that can be utilized to flush the feature during the warm weather season and improve the water quality within the feature. The culvert will be closed approximately 90 days before the beginning of the cold season and will be opened once the manatees migrate out of the site during the warm weather season. The remaining excess material resulting from the excavation of the feature will be disposed of in areas both north and south of the feature within the upland areas between the Faka Union Canal and the Mangrove areas to the west. Boat barriers with lockable boat access gates will be installed across the northerly and southerly access channels from the Faka Union Canal to restrict the access of vessels that may disturb the manatees when they migrate to the feature during cold weather season. The resulting deep pool surface area once the Feature is completed will be approximately 2.6 acres and the Feature total water surface area will be approximately 4.2 acres. Estimates indicate that the manatee mitigation feature may not be afforded within the current Section 902 limit. Credit will be eligible for the design and construction of the feature when

authorization of a total project cost increase or estimates show that the work will not affect the section 902 limit.

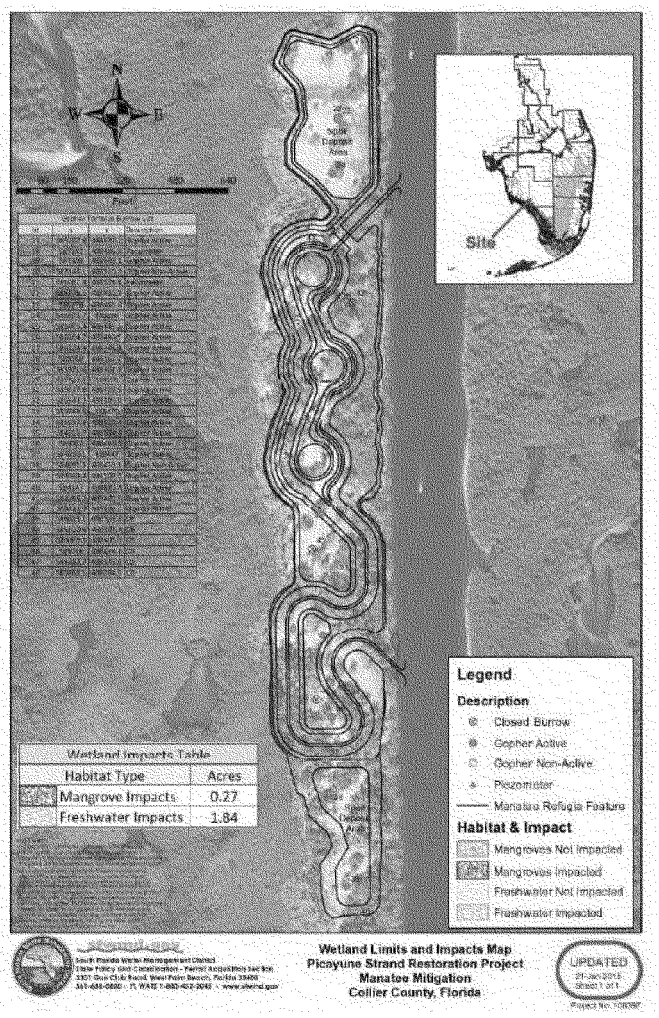



Figure A- 3: Manatee Mitigation Feature

### 5.4 Canal Plugs

The original Faka Union and Merritt Pumping Stations contract included 50 canal plugs that have been removed from the contract (see figure A-4). Current H&H analysis indicates that the Manatee Mitigation feature and the Southwestern Protection Features must be complete before the Faka Union Canal and East/West Canal can be plugged. These canals will be plugged in future contract(s) once Manatee Mitigation Feature and Southwestern Protection Features are constructed.

Estimates indicate that the plugging of the Faka Union and East/West Canals will not be afforded within the current Section 902 limit. The design and construction of the feature will commence when authorization of a total project cost increase or estimates show that the work will not affect the Section 902 limit.

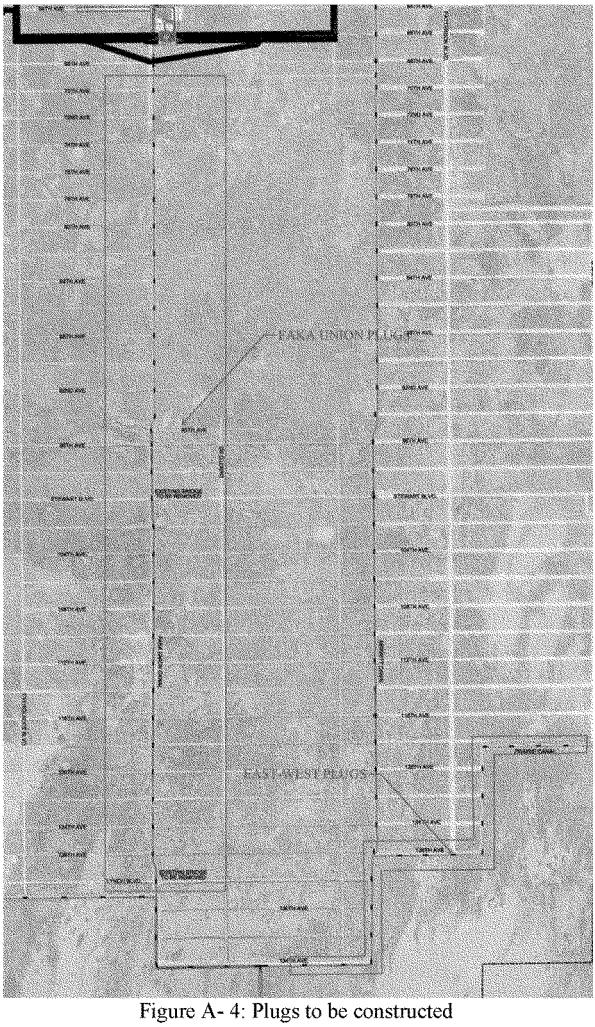



Figure A- 4: Plugs to be constructed

**5.5 Road Removal South between 64th and 100th and west of Miller Blvd**

An early design of Miller Pump Station contract had the roads in the area between 64th Ave SE and 100th Ave SE and west of Miller Boulevard to be removed (See figure A-5). Since these roads gave access to privately owned parcels in the Belle Meade area, access to the parcels must be maintained, as is, until the lands are acquired by the sponsor, SFWMD. The removal of these roads will be awarded in a separate contract once the parcels are acquired.

Estimates indicate that the road removal between 64th and 100th and west of Miller Blvd. and the acquisition of the private parcels in the Belle Meade area will not be funded within the current Section 902 limit. The design and construction of the feature will commence when authorization of a total project cost increase or estimates show that the work will not affect the Section 902 limit.

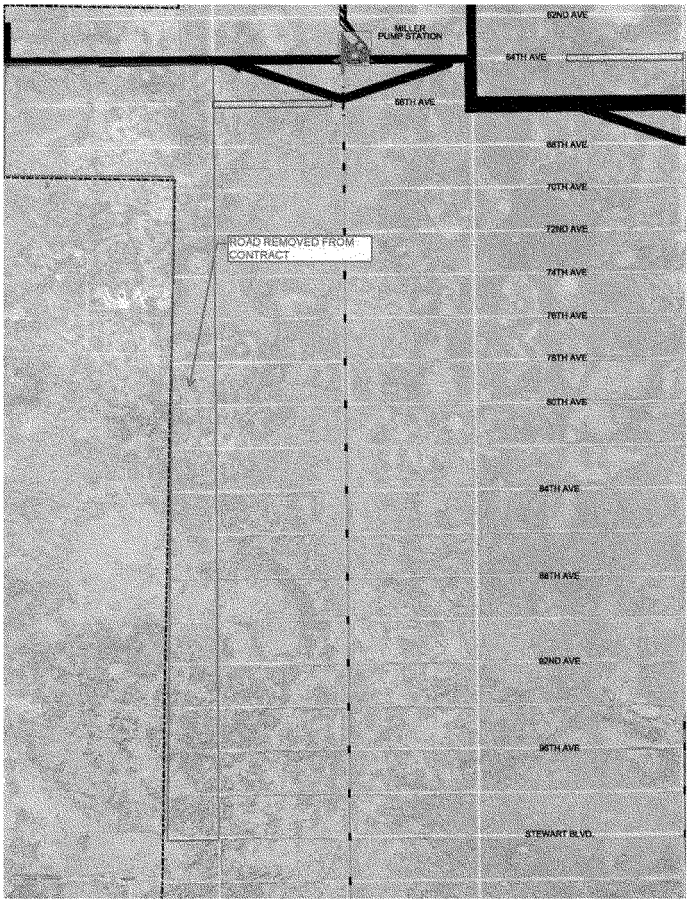



Figure A- 5: Roads Removed from Miller Pump Station Contract

### 5.6 Road Removal North of the Pump Stations

Approximately 36 miles of road removal north of the tieback levee was taken out of the Merritt, Faka Union, and Miller Pump Station construction contracts in order to keep cost within the Section 902 limit. The design and construction of the feature will commence when authorization

of a total project cost increase or estimates show that the work will not affect the Section 902 limit. The project sponsor, SFWMD, intends to complete the design and construction of the road removal north of the pump stations.

### 5.7 Private Lands Protection Feature and Pump Station

The preliminary H&H analysis used for the PIR/EIS showed an increase in water levels that could impact the privately owned lands (or "private lands") northwest of the project. The Private Lands Protection Feature was intended to protect the lands on the boundary with Belle Meade at the northwest corner of the project due to anticipate increase in surface water levels. More detailed H&H analysis was performed using more recent lidar and the GSSHA model platform. The analysis was completed to verify the land acquisition and protection features prescribed in the PIR/EIS to mitigate a reduction in the level of service for flood protection as required in Section 601(h)(5) or "Savings Clause" of WRDA 2000. The results of the detailed H&H analysis determined that the increase of waster surface elevation from Miller, Faka Union, Merritt Pumping Stations and associate tie-back levee features was insignificant and therefore the Private Lands Protection Feature and Pump Station included in the PIR/EIS are not necessary.

### 5.8 Port of the Islands Protection Feature

The preliminary H&H analysis used for the PIR/EIS showed an increase in water levels that could impact the Port of the Islands housing development. The Port of the Island Protection Feature was intended to protect the private lands in the Port of the Islands area from flooding due to an increase in surface water levels. More detailed H&H analysis was performed using recent lidar and the GSSHA model platform. The analysis was completed to verify the land acquisition and protection features prescribed in the PIR/EIS to mitigate a reduction in the level of service for flood protection as required in Section 601(h)(5) or "Savings Clause" of the WRDA 2000. The results of the detailed H&H analysis determined that the Private Lands Protection Feature and Pump Station included in the PIR/EIS are not necessary.

## 6.0 TOTAL PROJECT COST DIFFERENCES BETWEEN PIR/EIS AND LRR/EA

Total project cost differences in the PIR/EIS cost and the LRR/EA cost (detailed in Appendix B) are summarized in Table 2-2 of the main report. The PSRP PIR/EIS cost estimate was based on costs for a 4$^{th}$ Quarter Fiscal Year 2000 contract and was inflated to 2004 price levels at the time of approval.

While based on the typical level of engineering and design required for a feasibility study, the assumptions in the PIR/EIS proved inadequate during subsequent detailed design. The project components portrayed in the PSRP PIR/EIS were conceptual and subject to significant refinement. Addressing the PIR/EIS assumptions related to each of the project cost is beyond the scope of this appendix. Instead, this appendix will compare the PIR/EIS assumptions with the current project status and will compare the categories that produced the most significant cost differences between the PIR/EIS and LRR/EA.

The PIR/EIS recommended Alternative 3D, which is shown in Figure A-6. The primary features of Alternative 3D for flood control were the pump stations and levees. The primary features of environmental restoration were the canal plugs, pump stations, and spreader channels. Since the PIR/EIS was completed in 2004, there have been significant design refinements. Figure A-7

provides a site plan of the current project components. The following sections provide an explanation of the cost differences that resulted from these design refinements.

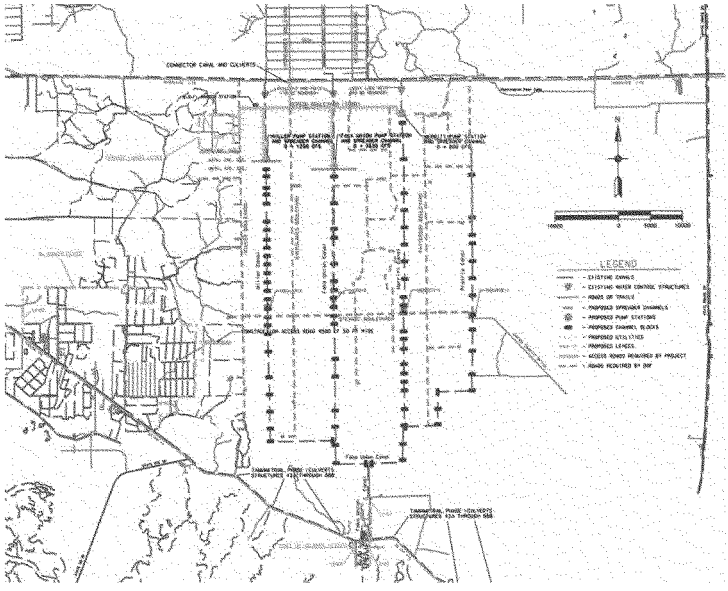
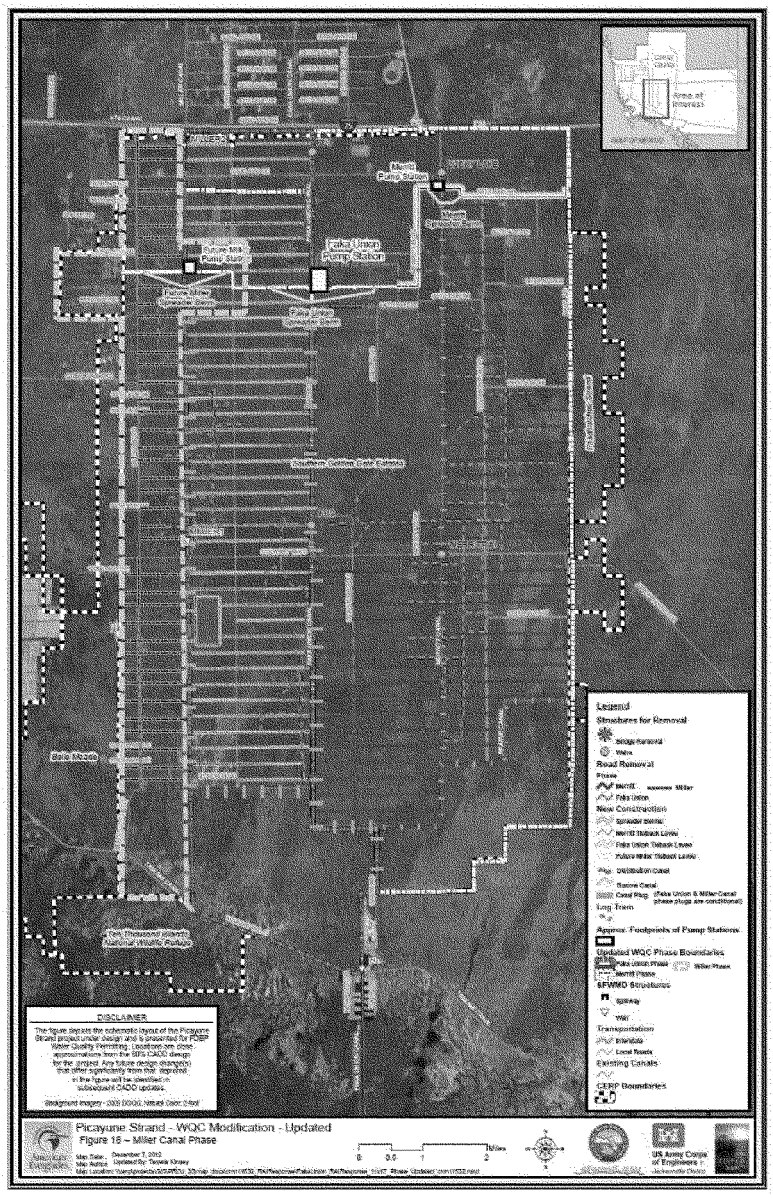



Figure A- 6: PIR/EIS Recommended Alternative 3D


Area of Interest
Miller Pump Station
Future Miller Detention Basin
Future Miller Diversion Basin
Future Miller Canal Plug
Future Miller Canal Plug
Future Miller Canal Plug

Refer to Table 2-2 in the main report and Total Project Cost Summary included in Appendix B. While the LRR preserves the majority of PIR/EIS project cost categories, subcategories were reallocated, added, or removed as indicated in Table A-1. The intent of Table A-1 is to clarify the allocation of costs in Table 2-2 and in Appendix B.

Table A-1: Comparison of Project Feature Accounts (construction only)

| PIR/EIS | LRR/EA |
|---|---|
| **(02) Relocations** | **(02) Relocations** |
| Utilities * | |
| Weir Removal * | |
| **(08) Roads, Railroads, and Bridges** | **(08) Roads, Railroads, and Bridges** |
| Mobilization and Demobilization | Mobilization and Demobilization |
| Clearing | Clearing |
| Road Demolition | Road Demolition |
| New Access Road | Access Road (renovate existing) |
| Asphalt Offsite Disposal | Asphalt Offsite Disposal |
| | Weir Removal |
| | Tram Roads *** |
| **(09) Channels and Canals** | **(09) Channels and Canals** |
| Canal Plugs | Canal Plugs |
| Merritt Spreader Canal and Berm ** | Relocation of Private Lands Drainage Canal at Miller *** |
| Faka Union Spreader Canal and Berm ** | |
| Miller Spreader Canal and Berm ** | |
| Connector Channel ** | |
| Protection Levee Seepage Ditches * | |
| | |
| **(11) Levees and Floodwalls** | **(11) Levees and Floodwalls** |
| Protection Levee-6Ls | Protection Levee-6Ls |
| Levee Port of Islands North** | Levee Fill Material Hauling |
| Levee Private Lands ** | Tieback Levee for Merritt, Faka Union & Miller *** |
| Levee South of 41 East** | Merritt Spreader Berm / Weirs *** |
| Levee South of 41 West** | Faka Union Spreader Berm / Weirs *** |
| Levee Fill Material Hauling | Miller Spreader Berm / Weirs *** |
| Mobilization and Demobilization | |
| **(13) Pump Plant** | **(13) Pumping Plant** |
| Faka Union Pump Plant 2630 CFS | Faka Union Pump Plant 2650 CFS |
| Miller Pump Plant 1250 CFS | Miller Pump Plant 1250 CFS |
| Merritt Pump Plant 800 CFS | Merritt Pump Plant 810 CFS |
| Pump Plant Private Lands 100 CFS** | |
| **(15) Floodway Control-Diversion Structure** | **(15) Floodway Control-Diversion Structure** |
| Mobilization and Demobilization | Mobilization and Demobilization |
| Protection Levee Culverts | Protection Levee Culverts |
| Levee Ramp Culverts | Levee Ramp Culverts |
| Access Road Culverts | Access Road Culverts |
| Connector Culverts ** | Earthwork Cut and Fill |
| Earthwork Cut and Fill | Tamiami Trail Culverts |
| Tamiami Trail Culverts | Manatee Mitigation *** |
| | |
| **(19) Buildings, Grounds, and Utilities** | **(19) Buildings, Grounds, and Utilities** |
| | Miller Pump Station (excavation, sitework, utilities, etc) * |

LEGEND: * Reallocated ** Removed from project *** Added to project

### 6.1 Relocations

The *(02) Relocations* project feature account in the PIR/EIS is not included in the total project cost summary in Appendix B. The sub-categories of Utilities and Weir Removal have been reallocated to the *(13) Pumping Plant* category. Therefore, there was a reduction in this project feature account as shown in Table 2-2 of the main report.

### 6.2 Roads, Railroads, and Bridges

The PIR/EIS identified the existing roads within the PSRP project area to be removed and degraded to enhance the restoration of sheet flow through the project area. However, the PIR/EIS assumed a more costly approach to the road removal than was later deemed necessary. In addition, the PIR/EIS assumed a larger quantity than necessary for the existing asphalt to be hauled offsite. All of these assumptions associated with the road removal work contributed to a higher total project cost included in the PIR/EIS.

During the construction of the Merritt Pump Station, a significant amount of boulders were uncovered in the spoil piles along the majority of roads indentified for removal. The boulders had to be buried along the side of the roads in order for natural sheet flow not to be impeded. Disposal of these boulders in the road removal work was not anticipated in the PIR/EIS.

The PIR/EIS also did not identify the existence of approximately 61 miles of tram roads within the project area that had been used for former logging operations. These tram roads were identified in 2006 by SFWMD after additional topographic surveys were obtained. Because these tram roads would prevent natural sheet flow, the removal of the tram roads was added to the project to support the restoration intent in the PIR/EIS. Removal of these tram roads in the Merritt Pump Station, Faka Union Pump Station, and Miller Pump Station construction contracts has led to a significant increase in total project cost.

The cost savings of the more efficient road removal technique and the reduced amount of asphalt to be hauled offsite were offset by the discovery of boulders and tram roads on the PSRP site. Therefore, the total project cost for the *(08) Roads, Railroads, and Bridges* feature account in the PIR/EIS is similar to the cost in the LRR as shown in Table 2-2 of the main report.

### 6.3 Channels and Canals

The PIR/EIS included 12,900 feet of spreader canals in combination with berms. The berms would be located in-line with the three pump station running outward east and west. The channels would be parallel to the berms and located immediately south on the downstream side of each of the three pump stations. At the pump station sites, the water would be pumped over the berms and into the spreader channels that would act as plunge pools for energy dissipation and water aeration. The berms and channels would redirect the water away from southerly flowing canals to an east and west direction. As the water would rise within each spreader channel, it would overtop the southern downstream bank of the channel and sheet flow over the land in a southward direction. Figure A-8 shows a typical profile drawing of the pump station with the berms and spreader channels, and Figure A-9 shows the plan view of the berms and spreader channels. For the Miller, Faka Union, and Merritt Pump Stations, the berm and spreader canal lengths were approximately 4500 feet, 7000 feet, and 1400 feet, respectively.

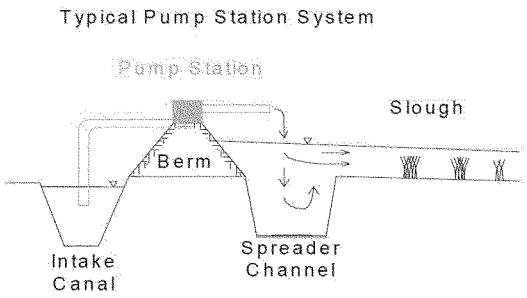



Figure A- 8: Typical Pump Station Section from PIR/EIS

During the engineering and design phase the function of these spreader canals as described in the PIR/EIS was replaced with spreader basins that are enclosed by 21,000 feet of spreader berms with strategically placed weirs. The Basis of Design Report for the Levees, Canals, and Roads (LCR BODR) completed in 2006 provides explanation for the change from spreader channels to the spreader berm, which will hold water above grade, and weir configuration that releases water into the natural system at strategic points. Figure A-9 shows the spreader berms for each of the three pump stations. This new system will better control and distribute the effluent sheet flow and allow for ease of access and maintenance.

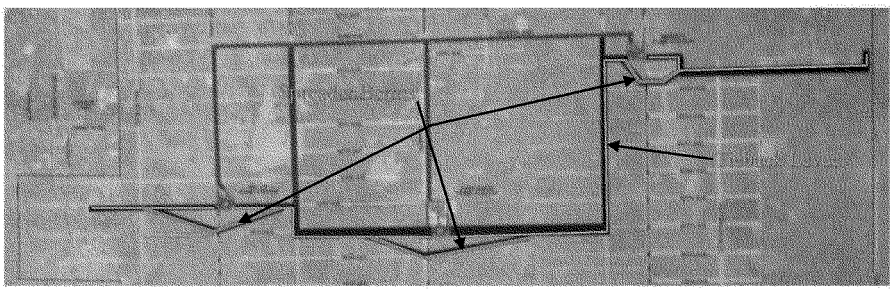


Figure A- 9: Spreader Berms and Tieback Levee Configuration

The underlying requirement to achieve restoration and re-hydration of the PSRP wetlands is to recreate the historic flow-ways and flow patterns across and through the length of the site. As conceptualized in the PIR/EIS, this could be achieved by constructing a canal which transfers flow laterally from the north-south drainage canal, and which then forces water to overflow from the lateral canal onto the land surface. Properly designed, these overflows would spread across the expanse of the floodway, and rehydration would be accomplished as the resulting sheet flow infiltrates to saturate the soils and strata below.

However, the LCR BODR concluded that there were limited precedents for the spreader canals as specified in the PIR/EIS. The original concept put forth in the PIR/EIS shows an unstructured spreader canal with no means to control the dispersion of flow. The PIR/EIS noted that some supplemental earthwork might be required to enable this concept, but it was generally expected that flow would be allowed to overflow at grade from a depressed spreader canal. The LCR BODR concluded that a problematic consequence of a spreader canal structured as a simple ditch is that low flows would be concentrated to and overflow from the lowest point on the spreader system, which would be inconsistent with the requirements of uniform distribution across the site and would inhibit re-hydration.

To implement the concept and intent of spreader canals as devised during the PIR/EIS, while ensuring that the system can be managed and adapted in the future, a controlled distribution of flow across the historic flow way was proposed in the LCR BODR. This controlled distribution of flow would be attained by construction of an at-grade spreader basin, tieback levee, and a flow distribution structure made up of an earthen spreader berm. Weirs would be located along the spreader berm to serve as defined spill points to distribute flow across the width of the flow-way. The use of the defined spill points would greatly enhance the ability of the system to direct flow as desired. In addition, this system allows for easy modifications to re-direct flow as necessary to maximize re-hydration.

The elimination of the spreader channels and associated berms in the engineering and design phase resulted in a decrease in the *(09) Channels and Canals* feature account category. However, the cost of the new spreader berm and associated tieback levee configurations resulted in an increase in the *(11) Levees and Floodwalls* category as discussed in the following section. There was an overall increase in construction costs for the *(09) Channels and Canals* feature account category as shown in Table 2-2 of the main report. This increase is mainly attributed to the PIR/EIS underestimating the cost to plug the Merritt, Faka Union, and Miller Canals. The relocation of the existing Private Lands drainage canal as shown in Figure A-10 was also not included in the PIR/EIS. The work associated with backfilling the existing Private Lands drainage canal and excavating the new canal attributed to the increase in the *(09) Channels and Canals* feature account category.

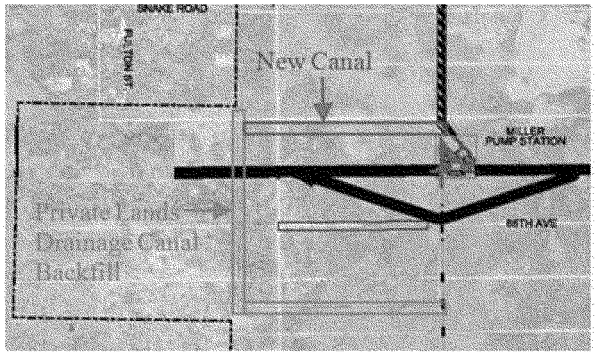



Figure A- 10: Private Lands Drainage Canal Backfill and Relocated Canal

### 6.4 Levees and Floodwalls

The PIR/EIS proposed 12,900 feet of berms, as shown in Figure A-9, provided the function to force the restorative water downstream and avoid recirculation of the pump station discharge. The analysis conducted for the LCR BODR showed that these berms needed to be more robust, so approximately 54,000 feet of tieback levee system was added to the design. The tieback levee, part of the current design, provides the same function as the berms proposed in the PIR/EIS. The function would prevent the water discharge from the pump stations from flowing north and affecting I-75 and the North Golden Gate Estates (NGGE) residential area. The design of the tieback levee proposed in the LCR BODR is based on the results of the H & H Phase 1 modeling for the 100 year design storm event.

The H&H modeling results showed that the tieback levee would need to extend from a point near the western limits of the Private Lands (South Belle Meade) to a point at the eastern limits of the project site approximately 1.6 miles east of the proposed Merritt Pump Station. The design of tieback levee has been further refined with subsequent H&H analyses. The extent of the tieback levee system is shown in Figure A-9, and a typical cross section is shown in Figure A-11. In the final design phase of Miller Pump Station, 5,000 linear feet of tieback levee system proposed in the BODR phase was removed from the western most reach of the tieback levee system after the subsequent H&H analyses determined that this extent was not needed to prevent flanking at the western end of the tieback levee. Therefore, the final extent of the tieback levee included a total of 49,000 linear feet of tieback levee system. The additional tieback levee height and extents added after the PIR/EIS phase caused the *(11) Levees and Floodwalls* feature account category to increase significantly as shown in Table 2-2 of the main report.

The PIR/EIS assumed that satisfactory levee fill would be generated from adjacent borrow canals. However, excavation during construction of the Merritt and Faka Union Pump Stations indicated that the borrow material contained significant amounts of organics and limestone that require extensive processing to produce satisfactory fill. Additionally, for the Miller Pump Station, the levee foundation design was revised to require significantly more in-situ surficial soil/rock removal than envisioned in the PIR/EIS, significantly increasing earthwork cut/fill volumes. Consequently, the PIR/EIS significantly underestimated the construction cost for the tieback levee system, which caused the *(11) Levees and Floodwalls* feature account category to increase significantly as shown in Table 2-2 of the main report.

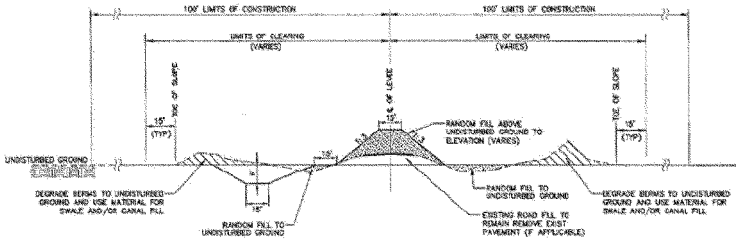



Figure A- 11: Typical Tieback Levee Section

In both the PIR/EIS and LRR/EA cost estimates, the costs for the construction of the 6Ls Farm Protection Feature, are included under the *(11) Levees and Floodwalls* feature account category. The PIR/EIS cost estimate assumed that all earthen material would be obtained from the construction site and little to no additional processing would be necessary. However, as previously discussed, the PSRP site contains significant amounts of unsuitable material that requires expensive processing to produce satisfactory fill. The costs of the construction of the Port of the Islands Protection Feature, and Private Lands Protection Feature have been deleted from the LRR/EA cost estimates since more detailed H&H analysis has determined that they are not required. The LRR/EA estimates for each of the 6Ls Farm protection feature assumes that the foundation for these levees need to be excavated and replaced with quarry material and that material will be hauled in from offsite. Consequently, the PIR/EIS significantly underestimated the construction cost for the protection features, which caused the *(11) Levees and Floodwalls* feature account category to increase as shown in Table 2-2 of the main report.

**6.5 Pumping Plants**

The PIR/EIS included three pump stations that were designed to maintain current levels of flood protection to the area north of the project area and I-75. The original estimate assumed that all pump stations would be built in the same contract and followed concepts of pump stations designed in the late 1990's. The Merritt Pump Station was classified in the PIR/EIS as a medium-sized pump station. The cross section of the medium-sized pump station is depicted in the Figure A-12, and the plan view is depicted in Figure A-13. The Faka Union and Miller Pump Stations were classified in the PIR/EIS as large-sized pump stations. The cross section of the large-sized pump station, considered typical at that time, is depicted in the Figure A-14, and the plan view is depicted in Figure A-15.

When the detailed design was initiated, the designs of the pump stations evolved taking advantage of experience with existing facilities in south Florida, a better understand of the needs of the area, and USACE experience with Hurricane Katrina. The team identified issues with the design in the PIR/EIS since it used a parametric design approach with historic construction costs. These issues were addressed through design refinements of the pumping stations. Some of the issues identified were: small pump bays that were too close together, bell suction intakes (used in medium pump stations) which require larger flow ways, insufficient area for maintenance, no work shop area, inefficient control station layout, and constricted the intakes which led to trash build-up. The design team determined that these issues must be addressed in the design in order to build functional pump stations that comply with the 2004 PIR/EIS in maintaining current levels of flood protection.

Over years of constructing and operating structures in the south Florida system, lessons learned and experience with recurring operational issues led USACE and SFWMD to develop design criteria for project features that would meet USACE design criteria but would also achieve consistency throughout the entire system. The design criteria also needed to respond to local needs and circumstances, meet current USACE design standards and guidelines, and prevent operational failure. The criteria follow EM 1110-2-3104 (Architectural and Structural Design of Pumping Station) which states "locale will determine some basic design factors that must be considered in the layout and architectural design of the facility" which recognizes the need to refine the criteria based on local needs.

During initial development of the Picayune Strand Restoration Project, SFWMD's and USACE's technical teams worked collaboratively to develop appropriate guidelines for development of the project design that incorporated historical lessons learned, as well as the intent of Corps guidance that allows refinement of Corps criteria to address to local conditions. The significant features that resulted in the more reliable, robust and resilient pump stations at Picayune are listed below.

- All pumping stations designed as large stations with efficient formed suction intake would need a FSI borne out in model tests performed as a part of the construction contract.
- Recirculation bay added so that pumps can be exercised during low flow periods.
- Low flow pumps which are to be used to maintain the necessary flow for the project purpose of environmental restoration as described in the PIR.
- Auxiliaries grouped efficiently by function
- Building height increased to accommodate pulling largest pump component
- Generator sets to maximize reliability of operations during extreme events
- Truck bay and ramp providing two alternative means to safely access and transport large components and equipment into and out of the pump station without restricting operations
- Aisle way facilitates use of a bucket truck and man lift to safely service and repair elevated equipment (e.g., overhead crane, lighting, exhaust fans, engine expansion tanks, etc.)
- Control room location and angled pump orientation reduces operational costs by allowing single person operation under non-emergency conditions
- Design provides all the facilities necessary for pump operation during the design 100 year storm event
- Floor plan allocates adequate floor space for on-site repair and storage of spare parts while maintaining safe operations
- Layout facilitates removal, repair and assembly of engines, pumps and gear drives
- Layout addresses safety and access:
  - Around engines and skids
  - To and from the control room to outside of pump station
  - From the operating deck to the gallery without the need to exit station

Although the total flood control pump capacity did not change, the pump mixes for all three pump stations changed from the PIR/EIS to the final design. All critical ancillary equipment elements utilized in the pumping station were reconfigured to have one back up unit which included pumps. Since the function of the PSRP pump station is to maintain existing levels of flood protection required by law, each station added one back up diesel engine-driven pump out of the six total pumps per station. A genset (back-up generator) was included in the design to further increase dependability of the pump stations. The addition of the back-up pump and generator increased the mechanical construction cost, as well as the building construction cost by increasing the footprint of the pump stations.

For the high-flow pumps, the medium-sized Merritt Pump Station depicted in the PIR/EIS had a suction bell pump intake. As discussed above, during the engineering and design phase, the intake was changed from a suction bell to a formed suction intake resulting in a redesigned structure. The

final design of Merritt Pump Station is shown in cross section in Figure A-16 and in plan view in Figure A-17. For Faka Union and Miller Pump Stations, the formed suction intake depicted in the PIR/EIS was retained in the final design. The final design of Faka Union Pump Station is shown in cross section in Figure A-18 and in plan view in Figure A-19. These figures illustrate the features discussed in the itemized listing above.

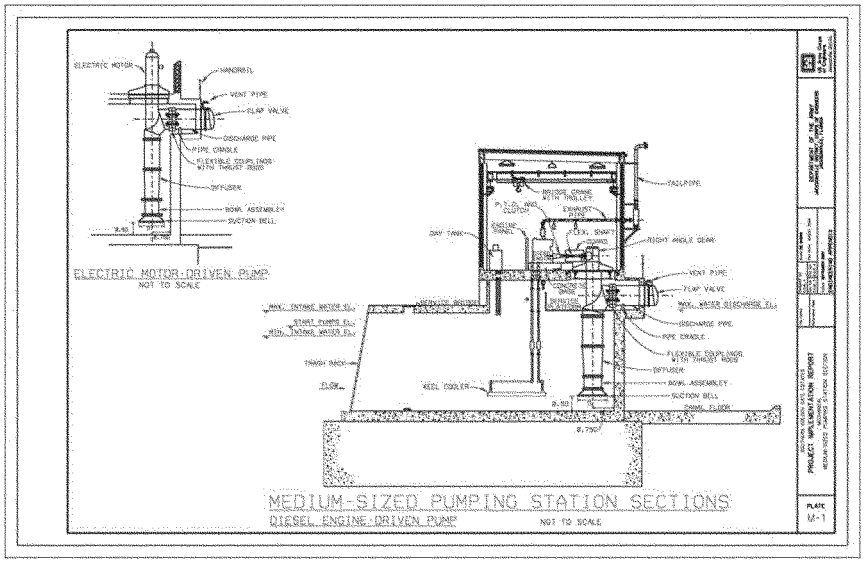



Figure A- 12: Medium-Sized Pumping Station Cross Section from PIR

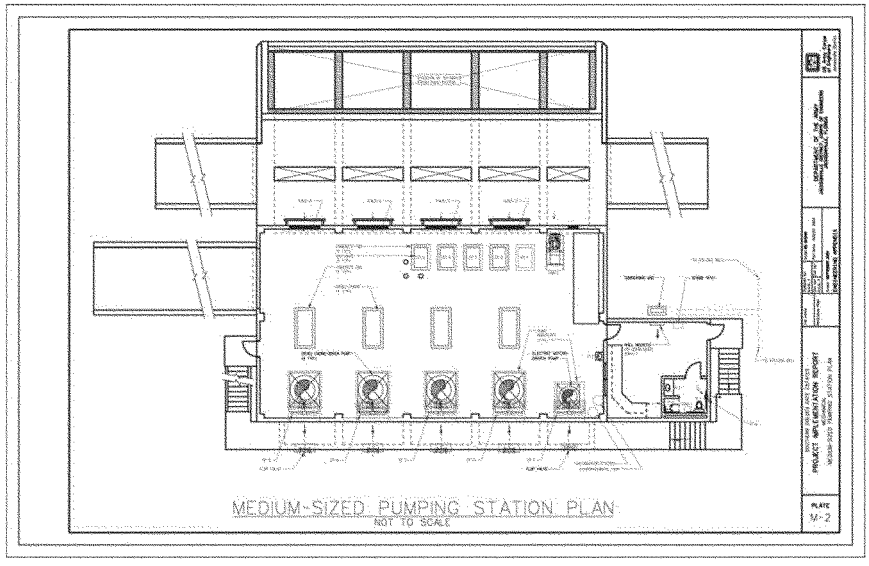



Figure A- 13: Medium-Sized Pumping Station Plan View from PIR

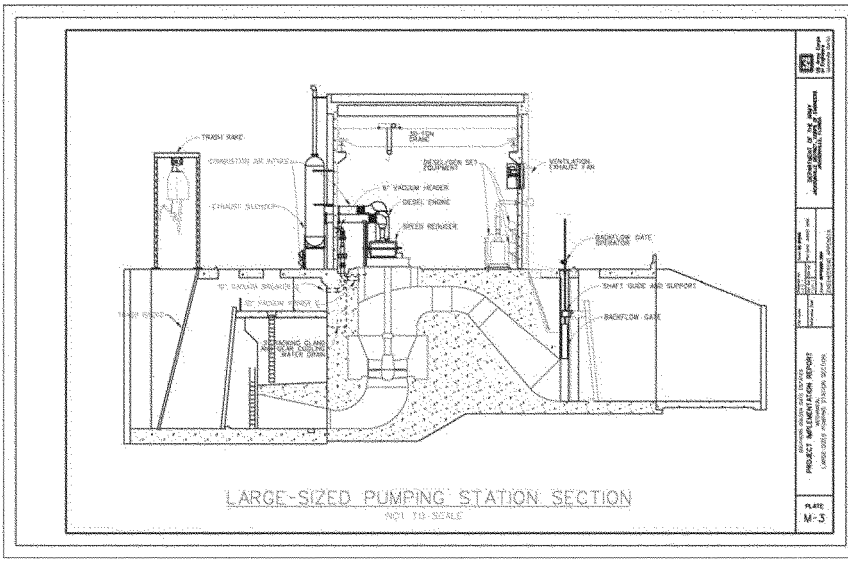



Figure A- 14: Large-Sized Pumping Station Cross Section from PIR

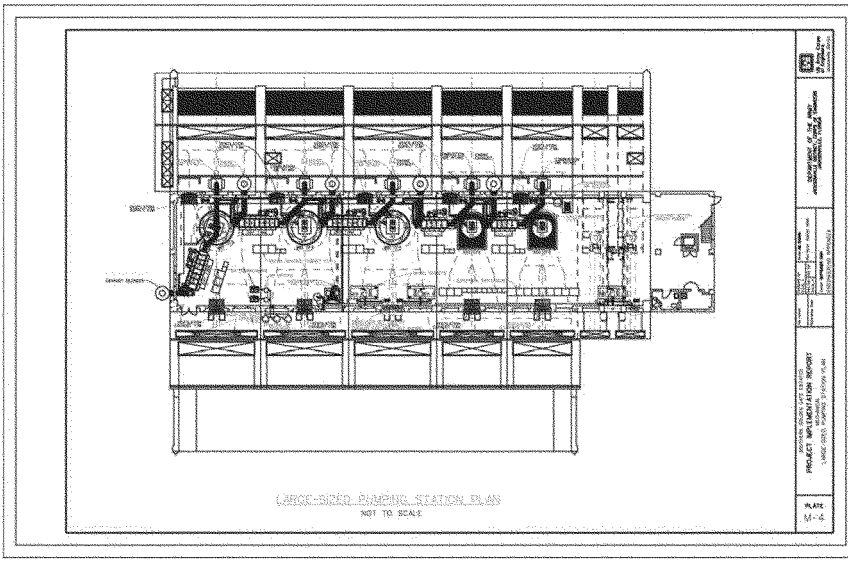



Figure A- 15: Large-Sized Pumping Station Plan View from PIR

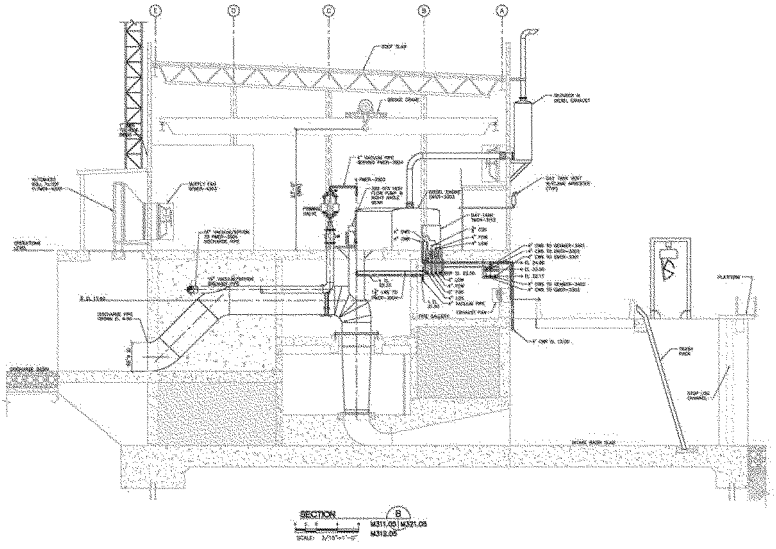


Figure A- 16: Merritt Pump Station Cross Section

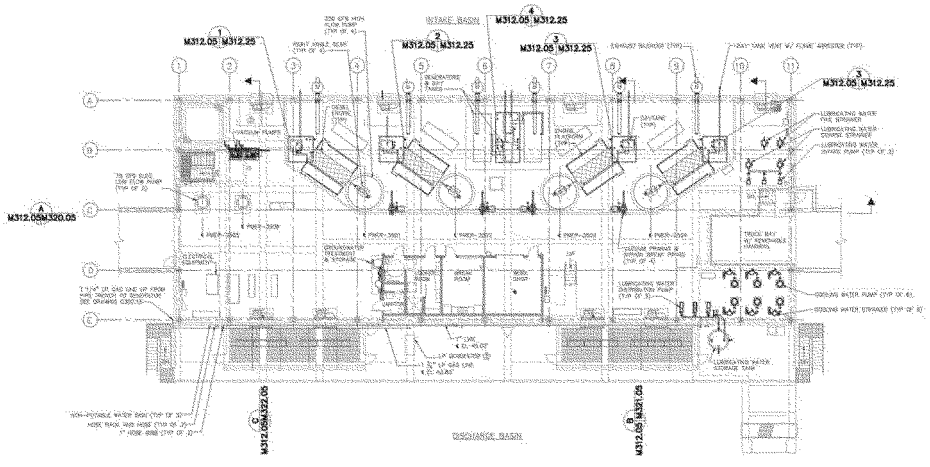


Figure A- 17: Merritt Pump Station Plan View

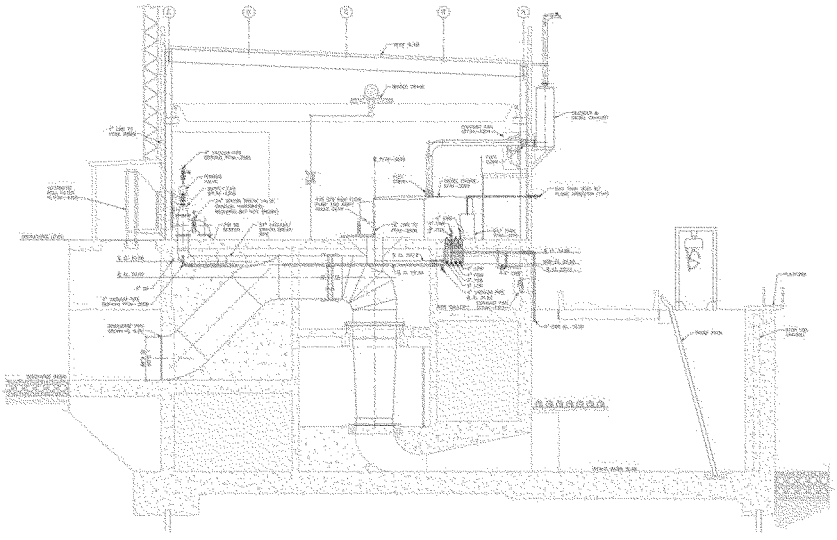


Figure A- 18: Faka Union Pump Station Cross Section

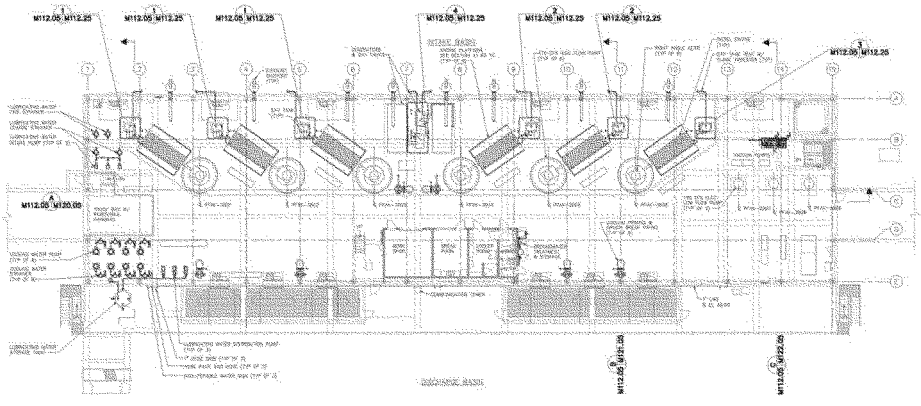


Figure A- 19: Faka Union Pump Station Plan View

Another significant design refinement developed during the engineering and design phase that contributed to a larger floor plan for all three pump stations was the relocation of the control room from the side of the pump station to the northern side of the operations floor inside the pump station. The layout of the pumps were changed to an angle to be viewed by the control room. An interior control room overlooking all the engines, pumps, and associated control panels allowed the pump stations to be operated by one person. The design also developed to include all the human amenities necessary and a safe room for pump operation during a 100 year storm event for extended periods.

Other operational issues in previous pump stations caused further refinement utilizing lessons learned. A recirculation bay was added to the pump stations so that pumps can be exercised during low flow periods. The auxiliary systems (e.g. fuel, lubrication, cooling, vacuum and raw water systems) were redesigned to be grouped together, preclude water intrusion and reduce failure probability. The aisles were also redesigned to accommodate the use of a bucket truck and man lift to safely service and repair elevated equipment (e.g. overhead crane, lighting, exhaust fans, engine expansion tanks, etc.). The truck bay and ramp were reconfigured to provide two alternative means to safely access and transport large components and equipment into and out of the pump station without restricting operations. The building height was increased to accommodate removal of the largest component. The increase in pump station footprint and size due to these refinements can be seen by comparing the operations floor plan view of Merritt Pump Station included in the PIR/EIS in Figure A-13 to the final design shown in Figure A-17. The floor plans of both Faka Union and Miller Pump Station were also expanded to accommodate the refinements described above.

The changes that increased the footprint of all three of the pump stations subsequently increased the amount of concrete, steel, and other materials required for pump station construction. Both the increase in quantity and higher commodity prices resulted in doubling the cost for concrete and more than tripling the cost of steel from what was assumed in the PIR/EIS to the total project cost.

In order to maintain existing flood control protection as required by law, the project includes a Supervisory Control and Data Acquisition (SCADA) system to remotely operate the pump stations from SFWMD operations center in West Palm Beach, Florida. The PIR/EIS assumed each pump station would include the SCADA system but did not discuss the necessary network design required for remote operation by SFWMD, including the addition of a 300-foot tall communications tower at the Faka Union Pump Station which allows remote operations for these three pump stations from the SFWMD operations center. The design for the SCADA system, which is intended solely for the remote operation of the PSRP, was eventually completed during the PED phase which subsequently increased total project costs. The SCADA systems are justified because it follows EM 1110-2-3104 (Architectural and Structural Design of Pumping Station) which states "locale will determine some basic design factors that must be considered in the layout and architectural design of the facility" which recognizes the need to refine the criteria based on local needs".

The relocation of the control room, addition of a back up pump per pump station, the increased complexity of the automation of the pumps, modification to the pump intake at Merritt Pump Station, increased material costs, and other refinements all contributed to a significant construction

cost increase for the pump station from what was assumed in the PIR/EIS as shown in Table 2-2 of the main report under the *(13) Pumping Plant* feature account category.

In summary, the pump stations, and the design refinements associated with the authorized pump stations, will mitigate for the potential impacts that result from implementation of the federal project.

**6.6 Operational Testing and Monitoring Period**

After the construction and commissioning of the pumping station are complete, a 12 month Operational Testing Monitoring Period (OTMP) will be performed. During this time SFWMD will be responsible for the interim operations and regularly scheduled maintenance while the contractor provides certain services. In order to ensure that the OTMP includes a full and continuous wet season (1 June through 30 November), the OTMP may be extended for one month increments for a maximum of 6 months.

**6.7 Floodway Control and Diversion Structures**

The account category *(15) Floodway Control and Diversion Structures* items had minor changes compared from the PIR/EIS. The Manatee Mitigation feature was not included in the PIR/EIS while the Connector Culvert feature was removed from the PIR/EIS. Cost associated with the Manatee Mitigation feature includes excavation and clearing and grubbing. Culvert Connectors were removed after a recent hydrologic and hydraulic analysis was performed which concluded that the culvert connectors were not necessary.

**6.8 Buildings, Grounds, and Utilities**

The feature account category *(19) Buildings, Grounds, and Utilities* were not included in the PIR/EIS. The costs included under this category primarily represent the costs associated with the clearing & grubbing, sitework, excavation, and other site features for the Miller Pump Station. Therefore, there was an increase in this project feature account as shown in Table 2-2 of the main report. However, this increase is mainly a reallocation of costs since this work was assumed in the PIR/EIS under the *(13) Pump Plant* category.

**6.9 Pre-construction, Engineering and Design (PED)**

The PIR/EIS estimated that the post-PIR "Pre-Construction, Engineering, and Design" or PED would be completed at a cost of 9% of the total construction cost and would be used to fund the following:

- All project management functions
- All pre-construction engineering and design activities (site investigations, engineering analyses, assembly of construction contracts and design reports, construction cost estimates, etc.)
- All coordination with the non-Federal sponsor and other State and county agencies regarding the implementation of environmental benefits and adverse impacts, including monitoring
- All engineering-during-construction activities

The PIR/EIS also assumed that PED would be performed by USACE and that the non-Federal role would be limited to general coordination and work product reviews. PED costs are of projects not yet designed are estimated by CESAJ to be approximately 10-15% of the total projected

construction cost for the project. Engineering during construction costs are estimated to be approximately 5% of the total construction cost of a project based on past performance of projects of similar scope. Given the level of engineering and design deferred by the PIR/EIS and the complexity of the engineering required for the project components during design and construction phases, 9% of the total construction cost detailed in the PIR/EIS was significantly under estimated.

Further, the non-Federal sponsor completed preconstruction engineering and design activities, including the assembly of construction contract documents, using a design service consultant, and then transferred the project to USACE to act as the agent responsible for construction. As a result, the construction contract and supporting documentation required modification into USACE format. This acquisition strategy resulted in multiple work product revisions and extensive technical coordination between USACE and the non-Federal sponsor. In addition, numerous design changes for all three pump stations were incorporated into the construction contract documents based on lessons learned from earlier stations and other engineering analysis by USACE. This effort was not contemplated in the PIR/EIS.

Section 2.0 of the supporting document further explains a breakdown of the PED costs that have been spent to date. Though the average of PED cost on construction projects already completed is 17%, it is not a good indicator of the PED cost for future projects because many of the issues causing the cost increases have been resolved.

### 6.10 Construction Management

The PIR/EIS assumed that all three of the pump stations would be built under a single construction contract. Because the construction of Merritt, Faka Union, and Miller Pump Stations have been accomplished through separate and staggered contracts, the time and effort required to administer the contracts increased significantly. The PIR/EIS assumed that construction contract supervision and administration would cost 10% of the total construction cost. Due to the increase in the construction cost of the project components as described above, the PIR/EIS significantly underestimated the construction management cost. The LRR/EA assumes remaining construction contract supervision and administration will be completed at a cost of 10% of the remaining construction cost.

## 7.0 HYDRAULIC AND HYDROLOGIC ANALYSIS

The following paragraphs provide an explanation of the hydraulic and hydrologic analyses that were performed for the design of the various features associated with the Picayune Strand Restoration Project.

The PIR design was based on model results from the MIKESHE model, which is an integrated groundwater-surface water computer software model. In the PIR and other documentations, the model(s) are sometimes referred to as the Hydraulic Design Tool (HDT). For the PIR, the design of the pumping stations and berm tieback system were not developed to completion, but were developed to an appropriate level to capture feasibility of design and reasonable potential costs for further authorization with establishment of a project cost.

The PIR/EIS provided a mitigating feature design for flood impacts to the area known as "Private Lands" that included a 100-cfs pump station with a 6 acre-ft detention basin. Additionally, the

PIR included approximately 12,900 ft of berm(s) for the prevention of Miller, Faka Union and Merritt pumping station discharges re-circulating back to the north or headwater side of the pumping stations. The general purpose of the berm was to prevent recirculation and backwater flood effects upstream of the pumping stations at I-75 and to the Northern Golden Gate Estates residential area. A specific purpose of the tieback levee to the west of the Miller Pumping Station was associated with the mitigation of potential flood impacts on the Private Lands. The topographical relief of the area is flat horizontally and with plugging of the downstream canals, backwater effects with pump discharge could lead to end-around flanking of the western end of the berm, thereby pumping the same water again; this is a recirculation of pump discharge.

The non-Federal sponsor South Florida Water Management District opted to move forward into final design under their Acceler8 program before Federal authorization of construction. Their findings and design are presented in a series of final reports also known as the Basis of Design Reports. During the BODR phase, USACE was provided results of analyses in various Technical Memorandums that together formed the final BODRs.

The SFWMD utilized the existing PIR MIKESHE model and developed it further as a HDT with additional data, version update and other refinements. Under the project's 100-year 5-day design storm event with final hydraulic pumping station designs, the BODR "with-project" model results (as referenced in the BODR documentation) showed an increase in water levels north of the PIR berm above that from the original PIR "with-project" model results. These results showed that recirculation flows were dominating near-field flows more than previously thought before model refinement. This finding led directly to the extension of the tieback berm further westward to higher ground and to a joining of the tieback berms between pumping stations leading to a continuous and engineered full project width tieback levee spanning approximately 54,000 ft across the floodway.

In 2008, USACE agreed to assume responsibility (Project Partnership Agreement signed in August 2009) for final design and construction of specific features, including the final layout of the tieback levee. On review of the HDT hydraulic analyses in the SFWMD BODR, the USACE considered the tieback levee to be both appropriate and applicable as a design feature for its mitigating effects on Private Lands and other lands north of the pumping stations water levels under the pre-project and post-project analyzed conditions.

Subsequent modeling results completed by USACE in 2013 determined that approximately 5,000 feet of levee at the western most extent of the tieback levee was no longer required to prevent end-around flanking at the western end of the levee. Therefore, the current design length of the tieback levee system is approximately 49,000 linear feet.

More detailed H&H analysis was performed using recent lidar and the GSSHA model platform. The analysis was completed to verify the land acquisition and protection features prescribed in the PIR/EIS to mitigate a reduction in the level of service for flood protection as required in Section 601(h)(5) or "Savings Clause" of WRDA 2000. The results of the detailed H&H analysis determined that the Private Lands Protection Feature and Pump Station included in the PIR/EIS are not necessary.

The preliminary H&H analysis used for the PIR/EIS showed an increase in water levels that could impact the Port of the Islands housing development. The Port of the Island Protection Feature was intended to protect the private lands in the Port of the Islands area shown to have an increase in surface water levels. A more detailed H&H analysis was performed using recent lidar and the GSSHA model platform. The analysis was completed to verify the land acquisition and protection features prescribed in the PIR/EIS to mitigate a reduction in the level of service for flood protection as required in Section 601(h)(5) or "Savings Clause" of the WRDA 2000. The results of the detailed H&H analysis determined that the Private Lands Protection Feature and Pump Station included in the PIR/EIS are not necessary.

PICAYUNE STRAND RESTORATION PROJECT

COLLIER COUNTY, FL

POST AUTHORIZATION CHANGE REPORT

# APPENDIX B

**Baseline Cost Estimate for the Post Authorization Change Report**



**Collier County, FL.**
Picayune Strand Restoration Project - LRR

# APPENDIX B –Cost Estimate

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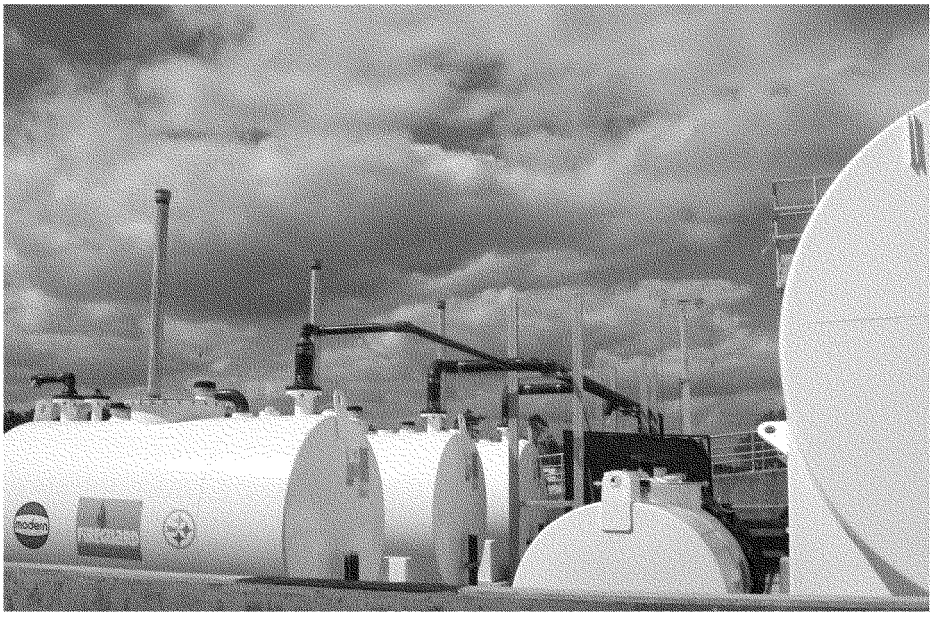
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# 1 PROJECT SCOPE

The Picayune Stand Restoration Project (PSRP) had an original authorized cost of $375,330,000 in November 2007. Recent design changes, contract modifications, and other unanticipated increases in project costs have led to USACE to seek Post Authorization Change Request (PACR) to increase the project's maximum cost limit to a necessary level for successful project completion.

A USACE-manned panel comprised of experts from LRC, SAJ and NWW reviewed the existing scope, cost, and schedule data in July 2013 and estimated the remaining project first costs at $256,229,000 (price level FY14). In addition, the project has obligated and expended $363,397,000 through September 30, 2013. Project First Cost is the sum of the remaining costs, with contingency, escalated to FY2014 plus the spent costs or $256,229,000 + $363,397,000 = $619,626,000. Obligated but un-expended funds totaled $103,322,000 excluding PED and CM. Adding escalation to the previous two figures yields the fully funded project estimate, which is $623,461,000. This report has been prepared to determine the TPC to support the PACR. Developing the TPC consists of updating the baseline cost estimate and obtaining certification from the Cost Engineering Directory of Expertise at Walla Walla (Dx).

The purpose of the PSRP is to provide for the construction and operation of spreader channels, canal plugs, road removal, and pump stations to restore and enhance wetlands and improve estuarine water quality by reducing large freshwater inflows and improve groundwater recharge in the project area. There is a 50/50 cost share agreement with the local sponsor, the South Florida Water Management District. For more information, see the Description of the Authorized Project.

The contract for Merritt Pump Station, which is approximately 94% complete, was awarded in October 2009. The contract for Faka Union Pump Station, which is approximately 71% complete, was awarded in November 2010. The Miller Pump Station was awarded in September 2013. Remaining contracts to be awarded in the future include: Environmental Monitoring, Manatee Mitigation Features, Six L's Ranch Protection Features and Road Removal North of the Tieback Levees. Additional H&H analysis eliminated the Port of the Islands Protection Features, US 41 Protection Features, and Private Lands Protection Features. This baseline estimate captures costs obligated through September 30, 2013, and for all remaining project features as well as non-construction costs such as engineering & design and contract supervision & administration.

# 2 COST METHODOLOGY

## 2.1 General

The feasibility cost estimate for the preferred plan has been prepared using MCACES 2nd Generation MII Version 4.1. The preparation of the cost estimate is in accordance with guidelines and policies included in: "ER 1110-1-1300 - Cost Engineering Policy and General Requirements, (26 March 1993)"; "ER 1110-2-1302 - Civil Works Cost Engineering, (15 Sept 2008)"; "EI 01D010, Construction Cost Estimates (1 Sept 1997)"; "EM 1110-1-8, Construction

Equipment Ownership and Operating Expense Schedule, Region III, (November 2011)"; and "EM 1110-2-1304, Civil Works Construction Cost Index System (CWCCIS), (31 March 2012)"; "ETL 1110-2-573, Construction Cost Estimating Guide for Civil Works, (30 Sept 2008)." The estimate was completed using the latest guidance from OCE concerning implementation of the Civil Works Breakdown Structure (CWBS) and Chart of Accounts. MII estimate software was used to apply unique crews to detailed work items and obtaining material and supply quotes from prospective vendors/contractors where possible for significant cost items. A District Quality Control check was provided on the cost estimate.

## 2.2 Direct Costs

Direct costs are based on anticipated equipment, labor and materials necessary to construct this project. Direct costs have been calculated independent of the contractor assigned to perform the tasks. Following formulation of the direct cost, a determination is made as to whether the work would be performed by the prime contractor or a subcontractor.

### *2.2.1 Quantities*

The estimate is based on detailed quantity take-offs prepared from the drawings as used as the basis of the estimate and augmented by spot checks of the takeoffs from the original drawings.

### *2.2.2 Rates for Labor and Equipment*

The estimate assumes remaining project features will be implemented as separate contracts either by the federal or the non-federal sponsor. Labor and equipment rates are based on Davis-Bacon Act wage determinations, EP 1110-1-8, and local market rates.

### *2.2.3 Vendor Quotes*

Vendor quotes have been acquired and documented for the key material prices associated with significant features of work. Key materials elements include imported borrow for levees and other building commodities.

### *2.2.4 Crews*

Project specific crews have been developed for use in estimating the direct costs for items not estimated using job quotes or historical cost information. Crew members consist of selected components of labor classifications and equipment pieces assembled to perform specific tasks. Productivity has been assigned to each crew reflective of the expected output per unit of measure for the specific activities listed in the cost estimate. Foremen have also been considered in the crews.

### *2.2.5 Work Schedules/Overtime*

The estimate assumes a 6 day/week 8 hr/day standard work schedule to optimize production of mobilized equipment.

*2.2.6 Productivty*

A crew general productivity loss factor has been applied in the MII estimate on labor hours due to the excessive heat experienced on site and the induced fatigue. The estimate assumes a loss of 24 minutes per 8 hour shift (7.6 HRS / 8 hrs = 95% productive).

*2.2.7 Sales Tax*

Sales tax for the state of Florida, Collier County is 6.0% and applied to bare material costs in the MII estimate.

## 2.3 Indirect Costs

*2.3.1 Prime Contractor*

The remaining construction contracts are planned to be let as a multiple contracts. Individual contracts will be let by the federal and non-federal sponsor. Materials, labor and equipment rates are fully burdened with all appropriate indirect markups. A general markup has been applied to remaining material and sub-quotes, when applicable to the estimate.

*2.3.2 Bond*

Bond added as a Class B bond for the prime contractor. It is assumed that the prime contractor will bond all of his subcontractors.

*2.3.3 Subcontractors*

Subcontractors are assumed to have indirect costs, to a lesser extent than the prime contractor. The estimate assumes that the prime contractor may have multiple subcontractors, depending on the nature of the work to be performed. Materials, labor and equipment rates are burdened with appropriate indirect markups.

## 2.4 Project Feature Accounts

The PSRP baseline cost estimate was prepared and organized according to the Civil Works Breakdown Structure (CWBS). As such, the estimate includes the following feature accounts:

*2.4.1 (01) Lands and Damages*

This feature account includes the cost for estimated values and costs for lands, easements, rights of way and relocations for the project. Key items of work include: lands purchased for restoration. Originally the project site was a real estate development knows as the Southern Golden Gates Estates.

*2.4.2 (08) Roads, Railroads & Bridges*

The work covered under this account involves new road construction, road degrading, access roads and roadway restoration.

*2.4.3 (09) Channels and Canals*

This account includes plugging of the existing canals and canal re-alignment.

*2.4.4 (11) Levees and Floodwalls*

The work covered under this account includes tie-back levees and levee construction protection features.

*2.4.5 (13) Pumping Plant*

This account includes the pumping stations that will protect the properties north of the project.

*2.4.6 (15) Floodway Control and Diversion Structures*

This includes the canal plugs and Tamiami Trail Culverts done as work in kind by the local sponsor.

*2.4.7 (19) Buildings, Grounds and Utilities*

The work covered under this account is primarily the utility feeds for the pump stations.

*2.4.8 (30) Planning, Engineering, and Design*

The work covered under this account includes project management, project planning, preliminary design, final design, preparation of plans, preparation of specifications, engineering during construction, advertisement, opening of bids, and contract award. The cost for this account is typically estimated as 13% of the construction contract value. Some projects have higher or lower costs depending on the stage of project development/construction.

*2.4.9 (31) Supervision and Administration*

The work covered under this account includes contract supervision, contract administration, construction administration, technical management activities, and District office supervision and administration costs. The cost for this account is typically estimated as 10% of the construction contract value. Some projects have higher or lower costs.

## 2.5 Risk Based Contingency Development

A Cost and Schedule Risk Analysis (CSRA) were performed on this project to identify the 80% confidence level project cost and schedule duration. The results of the analysis yielded a contingency of 31.73%.

## 2.6 Estimated Costs

The PDT developed a project implementation schedule for project that supports the development of the fully funded cost estimates. The remaining project first cost is estimated at $256,229,000 (price level FY14). In addition, the project has obligated and expended $363,397,000 and has 103,322,000 of obligated and unexpended funds through September 30, 2013. Real estate costs compose the single largest cost component of the project, totaling $213,681,000. These costs were provided by others. See the real estate appendix for more details on these costs.

### 2.7 Fully Funded Cost Estimate

The fully funded cost estimate including inflation to the mid-point of construction is $623,461,000 as shown in the Total Project Cost Summary in Sub-Appendix A. The fully funded table distributes the base level cost estimate across the appropriate years according to the schedule. Each feature account is inflated to the mid-point of expenditure activity using CWCCIS factors. These inflated feature account totals are summed to yield a total fully funded project cost.

## 3 PROJECT IMPLEMENTATION SCHEDULE

The total project schedule has been developed in Primavera P6 Scheduling Software by the PDT and managed by the Project Manager based on the significant construction activities, durations from the MII cost estimate, and associated network logic. The construction schedule calendars include major holidays and non-work weather days.

## 4 RISK ANALYSIS DEVELOPMENT

### 4.1 Cost and Scehdule Risk Analysis Development

A Cost and Schedule Risk Analysis (CSRA) was performed on this project to more accurately identify risk and potential impacts to the project. This analysis required participation by the entire PDT to identify the 80% confidence level project cost and contingencies.

### 4.2 CSRA Methodology

In coordination with the PDT, a risk register was developed to identify and document the various risks associated with the project. Low risk impacts to cost and/or schedule were not carried forward for further study. The final risk register is included in this volume. See Appendix C. Upon completion of the risk register, the cost and schedule risk models were developed using Crystal Ball risk software. Each risk item was studied to categorize the type of risk (internal/external, event, etc.) and then quantify the probability of occurrence for event risks and the high and low impacts from the most likely estimate and schedule.

A distribution curve was selected to best model how the impacts might occur. The majority of risk items were modeled using a triangular distribution, while the uniform and max extreme distributions were also used as well.

Correlations have been established between risk items where impacts from one are expected to strongly influence the impacts of another. For example, if a risk item "Variance of Project Scope Definition" were to cause a positive cost impact (presumably due to scope), the impacts to another risk item "Engineering & Design Costs" is more likely to react similarly to fund the engineering and design behind the increase costs/scope, and vice versa.

From the risk analysis results, various reports were generated summarizing contingencies based on the 80% confidence project costs, durations, and identification of the project components causing the most variation in project costs and schedule.

## 4.3 Risk Results

A summary of the results of the cost and schedule risk analysis are shown below in Table 1. In addition, details of the results are shown in Figures 1, 2, 3, and 4 below. Key risks contributing to the overall project contingency are presented in Figures 5 and 6. See the Risk Report for further details of the project risks. Please note that the costs in Table 1 do not include obligated and unexpended costs. They only include future costs. Obligated and unexpended costs are assigned a ten percent (10%) contingency.

**Table 1**

| Contingency on Baseline Estimate | 80% Confidence Baseline Estimate Cost |
|---|---|
| **Baseline Cost Estimate Cost (Most Likely) →** | **$95,722,097** |
| Baseline Cost Estimate Contingency Amount → | $21,911,804 |
| **Baseline Cost Estimate (80% Confidence) →** | **$117,633,901** |

| Contingency on Schedule | 80% Confidence Project Schedule |
|---|---|
| **Project Schedule Duration (Most Likely) →** | **56.0 Months** |
| Schedule Contingency Duration → | 39.2 Months |
| **Project Schedule Duration (80% Confidence) →** | **95.2 Months** |
| **Project Schedule Contingency Amount (80% Confidence) →** | **$8,461,640** |

| Total Project Contingency | 80% Confidence Project Cost |
|---|---|
| **Total Project Contingency Amount (80% Confidence) →** | **$30,373,444** |
| **Total Project Contingency Percentage (80% Confidence) →** | **31.73%** |

| Total Project Construction Cost (80% Confidence) → | $126,095,541 |
|---|---|

**Figure 1**

**- BASELINE COST ESTIMATE CONTINGENCY DEVELOPMENT -**

Contingency Analysis

| Baseline Cost Estimate | $95,722,097 | |
|---|---|---|
| Confidence Level | Contingency ($) | Contingency (%) |
| 0% | $2,782,007 | 2.91% |
| 5% | $10,263,942 | 10.72% |
| 10% | $11,787,617 | 12.31% |
| 15% | $12,880,816 | 13.44% |
| 20% | $13,772,001 | 14.39% |
| 25% | $14,487,516 | 15.13% |
| 30% | $15,211,329 | 15.89% |
| 35% | $15,868,751 | 16.58% |
| 40% | $16,449,421 | 17.18% |
| 45% | $17,060,419 | 17.82% |
| 50% | $17,696,616 | 18.49% |
| 55% | $18,279,585 | 19.10% |
| 60% | $18,911,157 | 19.76% |
| 65% | $19,584,027 | 20.46% |
| 70% | $20,281,721 | 21.19% |
| 75% | $21,045,787 | 21.99% |
| **80%** | **$21,911,804** | **22.89%** |
| 85% | $22,952,812 | 23.98% |
| 90% | $24,116,274 | 25.19% |
| 95% | $25,842,144 | 27.00% |
| 100% | $41,589,543 | 43.43% |

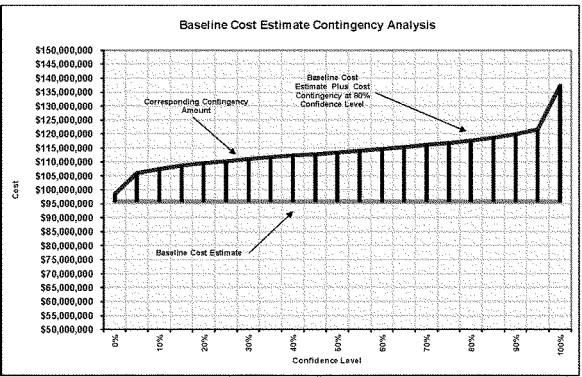
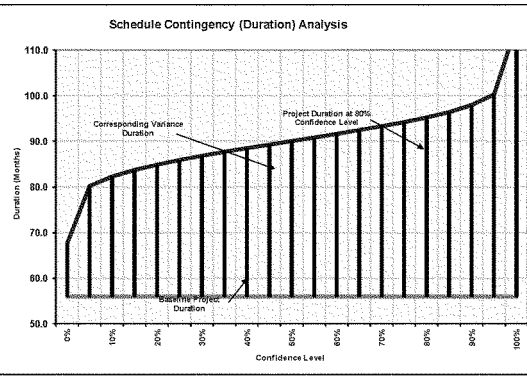



**Figure 2**

**- SCHEDULE CONTINGENCY (DURATION) DEVELOPMENT -**

Contingency Analysis

| Baseline Project Duration Estimate | 56.0 Months | |
|---|---|---|
| Confidence Level | Contingency | Contingency (%) |
| 0% | 11.6 Months | 20.70% |
| 5% | 24.2 Months | 43.30% |
| 10% | 26.3 Months | 46.96% |
| 15% | 27.7 Months | 49.49% |
| 20% | 28.9 Months | 51.55% |
| 25% | 29.9 Months | 53.39% |
| 30% | 30.8 Months | 55.04% |
| 35% | 31.7 Months | 56.59% |
| 40% | 32.5 Months | 58.11% |
| 45% | 33.3 Months | 59.41% |
| 50% | 34.1 Months | 60.82% |
| 55% | 34.8 Months | 62.16% |
| 60% | 35.6 Months | 63.59% |
| 65% | 36.5 Months | 65.10% |
| 70% | 37.3 Months | 66.58% |
| 75% | 38.2 Months | 68.14% |
| **80%** | **39.2 Months** | **70.04%** |
| 85% | 40.4 Months | 72.22% |
| 90% | 42.0 Months | 74.97% |
| 95% | 44.3 Months | 79.15% |
| 100% | 59.3 Months | 105.96% |

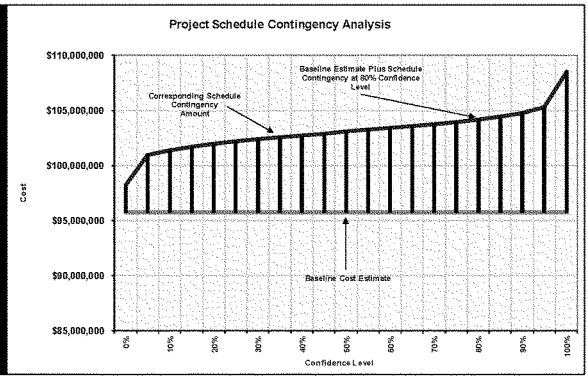


## Figure 3

**- SCHEDULE CONTINGENCY (AMOUNT) DEVELOPMENT -**

Contingency Analysis

| Baseline Cost Estimate | $95,722,097 | |
|---|---|---|
| Confidence Level | Contingency ($) | Contingency (%) |
| 0% | $2,500,585 | 2.61% |
| 5% | $5,230,980 | 5.46% |
| 10% | $5,675,895 | 5.93% |
| 15% | $5,979,201 | 6.25% |
| 20% | $6,227,850 | 6.51% |
| 25% | $6,449,516 | 6.74% |
| 30% | $6,649,261 | 6.95% |
| 35% | $6,835,982 | 7.14% |
| 40% | $7,020,553 | 7.33% |
| 45% | $7,177,209 | 7.50% |
| 50% | $7,347,208 | 7.68% |
| 55% | $7,508,930 | 7.84% |
| 60% | $7,682,282 | 8.03% |
| 65% | $7,864,812 | 8.22% |
| 70% | $8,043,602 | 8.40% |
| 75% | $8,231,812 | 8.60% |
| **80%** | **$8,461,640** | **8.84%** |
| 85% | $8,724,292 | 9.11% |
| 90% | $9,057,109 | 9.46% |
| 95% | $9,561,273 | 9.99% |
| 100% | $12,800,571 | 13.37% |

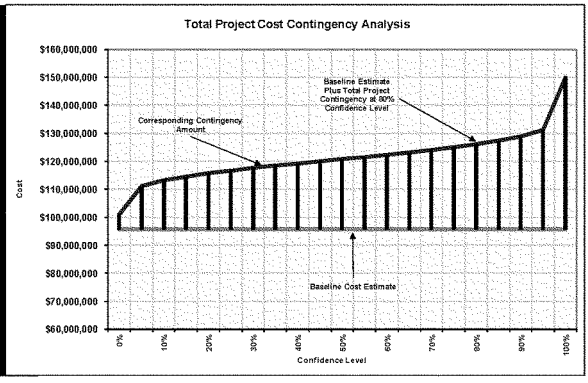



## Figure 4

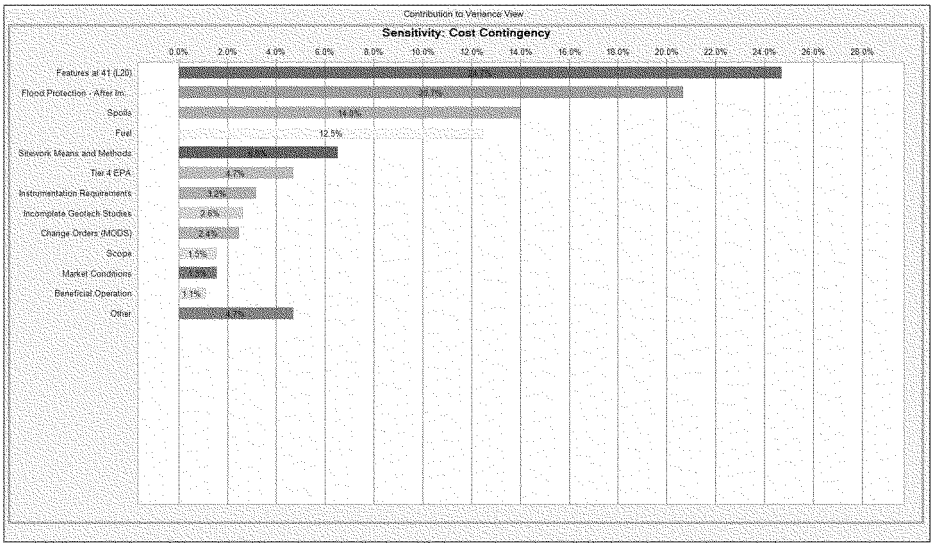
**- TOTAL PROJECT (BASE COST + SCHEDULE) CONTINGENCY DEVELOPMENT -**

Contingency Analysis

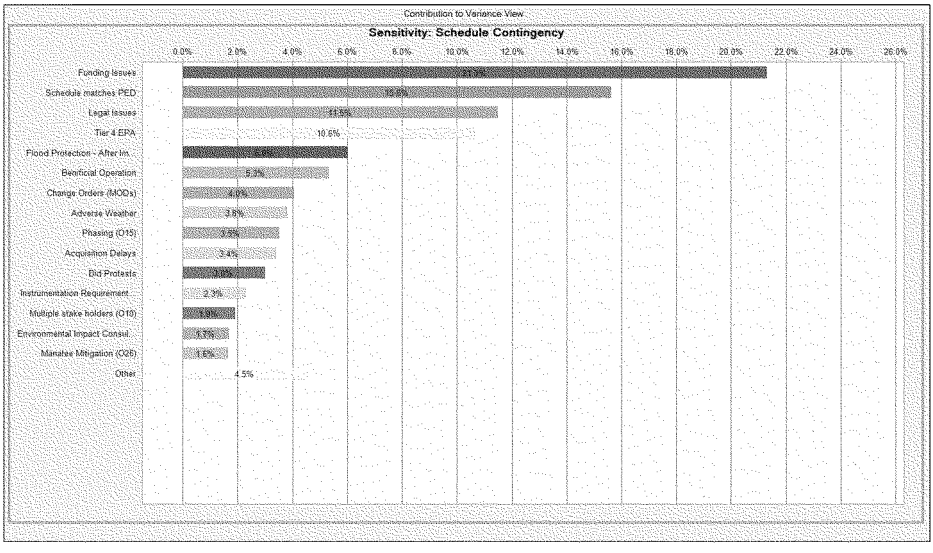
| Baseline Cost Estimate | $95,722,097 | |
|---|---|---|
| Confidence Level | Contingency ($) | Contingency (%) |
| 0% | $5,282,592 | 5.52% |
| 5% | $15,494,922 | 16.19% |
| 10% | $17,463,512 | 18.24% |
| 15% | $18,840,018 | 19.68% |
| 20% | $19,999,851 | 20.89% |
| 25% | $20,937,033 | 21.87% |
| 30% | $21,860,590 | 22.84% |
| 35% | $22,704,732 | 23.72% |
| 40% | $23,469,975 | 24.52% |
| 45% | $24,237,627 | 25.32% |
| 50% | $25,043,824 | 26.16% |
| 55% | $25,788,516 | 26.94% |
| 60% | $26,593,438 | 27.78% |
| 65% | $27,448,839 | 28.68% |
| 70% | $28,325,323 | 29.59% |
| 75% | $29,277,599 | 30.59% |
| **80%** | **$30,373,444** | **31.73%** |
| 85% | $31,677,103 | 33.09% |
| 90% | $33,173,383 | 34.66% |
| 95% | $35,403,417 | 36.99% |
| 100% | $54,370,115 | 56.80% |



## Figure 5




## Figure 6



### 4.4 Risk Register

See attached Sub-Appendix C.

## 5 DETAILED MII REPORTS

MII Cost Estimate Report – Definition of Terms

- Bare Costs: Bare costs are defined as project costs that have no markups included. Bare cost excludes direct cost markups for productivity, overtime, and any tax adjustments, along with payroll, taxes and insurance (PTI), contractor markups, special markups, or owner cost markups.

- Direct Costs: Direct costs are defined as bare costs which are marked up for productivity adjustments, overtime, taxes and/or other miscellaneous adjustments.

- Cost to Prime: Cost to prime is defined as direct costs with markups applied for PTI and any allowances such as small tools for the subcontractor work. The subcontractor markup for job office overhead (JOOH), home office overhead (HOOH), profit, bond and excise tax and/or any miscellaneous adjustment is also included. This is in effect the cost to the performing contractor. Any special markups are included in this cost but are not passed on to the owner's markup cost. Therefore, the special markups are not compounded but are treated as an additional cost.

- Contract Cost (Cost To Owner): - Contract Cost (sometimes referred to as "cost to owner") takes the cost to prime and then adds to that the cost for the contractor's PTI as well as any allowance, such as small tools, for the contractor's work. Then the contractor's own markups for JOOH, HOOH, profit, bond, and excise tax and/or any miscellaneous adjustments are included. Any special markups are included in the cost but are not passed on to the owner's markup cost. Therefore, the special markups are not compounded but are treated as an additional cost.

- Project Cost: The project cost takes the contract cost and then adds any escalation, contingencies, SIOH (supervision, inspection and overhead) and/or any miscellaneous owner costs. It should be noted that escalation factors are applied in Table 2 spreadsheet calculations and not using escalation functions in the MII cost estimating software.

See attached Sub-Appendix D for detailed MII Cost Estimate Report.

Sub-Appendix A

# WALLA WALLA COST ENGINEERING MANDATORY CENTER OF EXPERTISE

## COST AGENCY TECHNICAL REVIEW

## CERTIFICATION STATEMENT

For Project No. 112375

SAJ Picayune Strand Restoration Project - LRR

The Picayune Strand Restoration Project, as presented by Jacksonville District, has undergone a successful Cost Agency Technical Review (Cost ATR), performed by the Walla Walla District Cost Engineering Mandatory Center of Expertise (Cost MCX) team. The Cost ATR included study of the project scope, report, cost estimates, schedules, escalation, and risk-based contingencies. This certification signifies the products meet the quality standards as prescribed in ER 1110-2-1150 Engineering and Design for Civil Works Projects and ER 1110-2-1302 Civil Works Cost Engineering.

As of December 5, 2013, the Cost MCX certifies the estimated total project cost:

FY 2014 Price Level: $256,229,000
Fully Funded Amount: $623,461,000 including Spent costs

It remains the responsibility of the District to correctly reflect these cost values within the Final Report and to implement effective project management controls and implementation procedures including risk management throughout the life of the project.

CALLAN.KIM.C.1231558221
2013.12.05 13:46:39 -08'00'

**Kim C. Callan, PE, CCE, PM1**
**Chief, Cost Engineering MCX**
**Walla Walla District**

US Army Corps of Engineers®

****** TOTAL PROJECT COST SUMMARY ******

PROJECT: **Picayune Strand Restoration Project**
LOCATION: Collier County, FL

DISTRICT: SAJ Jacksonville PREPARED: 10/16/2013
POC: CHIEF, COST ENGINEERING, Tracy Leeser

This Estimate reflects the scope and schedule in report; Picayune Strand Restoration Project, Revised LRR

| WBS Structure | | ESTIMATED COST | | | | PROJECT FIRST COST (Constant Dollar Basis) | | | | TOTAL PROJECT COST (FULLY FUNDED) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Program Year (Budget EC): 2014 | | | | | | | | |
| | | | | | | Effective Price Level Date: 1 OCT 13 | | | | | | | | |
| WBS NUMBER | Civil Works Feature & Sub-Feature Description | COST ($K) | CNTG ($K) | CNTG (%) | TOTAL ($K) | ESC (%) | COST ($K) | CNTG ($K) | TOTAL ($K) | Spent Thru: 30-Sep-13 ($K) | | COST ($K) | CNTG ($K) | FULL ($K) |
| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O |
| **06** | FISH & WILDLIFE FACILITIES | $15,847 | $5,028 | 31.73% | $20,875 | 0.0% | $15,847 | $5,028 | $20,875 | $0 | | $16,020 | $5,083 | $21,103 |
| **08** | ROADS, RAILROADS & BRIDGES | $7,843 | $2,204 | 28.10% | $10,047 | 0.0% | $7,843 | $2,204 | $10,047 | $23,137 | | $8,086 | $2,281 | $33,504 |
| **09** | CHANNELS & CANALS | $9,249 | $1,674 | 18.10% | $10,923 | 0.0% | $9,249 | $1,674 | $10,923 | $0 | | $9,319 | $1,696 | $11,016 |
| **11** | LEVEES & FLOODWALLS | $29,852 | $7,276 | 24.37% | $37,128 | 0.0% | $29,852 | $7,276 | $37,128 | $8,004 | | $31,194 | $7,702 | $46,899 |
| **13** | PUMPING PLANT | $80,661 | $8,554 | 10.61% | $89,215 | 0.0% | $80,661 | $8,554 | $89,215 | $98,071 | | $80,692 | $8,564 | $187,327 |
| **15** | FLOODWAY CONTROL & DIVERSION STRUCTURE | $0 | $0 | 0.00% | $0 | - | $0 | $0 | $0 | $1,877 | | $0 | $0 | $1,877 |
| **19** | BUILDINGS, GROUNDS & UTILITIES | $7,688 | $769 | 10.00% | $8,457 | 0.0% | $7,688 | $769 | $8,457 | $0 | | $7,688 | $769 | $8,457 |
| | **CONSTRUCTION ESTIMATE TOTALS:** | $151,140 | $25,505 | 16.87% | $176,645 | 0.0% | $151,140 | $25,505 | $176,645 | $131,089 | | $152,999 | $26,095 | **$310,183** |
| **01** | LANDS AND DAMAGES | $39,782 | $12,623 | 31.73% | $52,405 | 0.0% | $39,782 | $12,623 | $52,405 | $161,030 | | $39,969 | $12,682 | $213,681 |
| **30** | PLANNING, ENGINEERING & DESIGN | $8,909 | $1,816 | 20.39% | $10,725 | 0.0% | $8,909 | $1,816 | $10,725 | $59,868 | | $9,391 | $1,911 | $71,170 |
| **31** | CONSTRUCTION MANAGEMENT | $14,195 | $2,259 | 15.91% | $16,454 | 0.0% | $14,195 | $2,259 | $16,454 | $11,410 | | $14,671 | $2,345 | $28,426 |
| | **PROJECT COST TOTALS:** | $214,026 | $42,203 | 19.72% | $256,229 | | $214,026 | $42,203 | **$256,229** | $363,397 | | $217,030 | $43,033 | $623,461 |

| | |
|---|---|
| **Mandatory by Regulation** | CHIEF, COST ENGINEERING, Tracy Leeser |
| **Mandatory by Regulation** | PROJECT MANAGER, Lacy Shaw |
| **Mandatory by Regulation** | CHIEF, REAL ESTATE, xxx |
| | CHIEF, PLANNING,Stuart Appelbaum |
| | CHIEF, ENGINEERING, Laureen A. Borochaner |
| | CHIEF, OPERATIONS, Jim Jeffords |
| | CHIEF, CONSTRUCTION, Steve Duba |
| | CHIEF, CONTRACTING,xxx |
| | CHIEF, PM-PB, xxxx |
| | CHIEF, DPM, David Hobbie |

| | | |
|---|---|---|
| ESTIMATED FEDERAL COST: | **50%** | **$311,730** |
| ESTIMATED NON-FEDERAL COST: | **50%** | **$311,730** |
| **ESTIMATED TOTAL PROJECT COST:** | | **$623,461** |

**** CONTRACT COST SUMMARY ****

PROJECT: Picayune Strand Restoration Project
LOCATION: Collier County, FL
This Estimate reflects the scope and schedule in report; Picayune Strand Restoration Project, Revised LRR

DISTRICT: SAJ Jacksonville
POC: CHIEF, COST ENGINEERING, Tracy Leeser
PREPARED: 10/16/2013

| WBS Structure | | ESTIMATED COST | | | | PROJECT FIRST COST (Constant Dollar Basis) | | | | TOTAL PROJECT COST (FULLY FUNDED) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Estimate Prepared: 16-Oct-13<br>Effective Price Level: 1-Oct-13 | | | | Program Year (Budget EC): 2014<br>Effective Price Level Date: 1 OCT 13 | | | | | | | | |
| | | | | RISK BASED | | | | | | | | | | |
| WBS NUMBER | Civil Works Feature & Sub-Feature Description | COST ($K) | CNTG ($K) | CNTG (%) | TOTAL ($K) | ESC (%) | COST ($K) | CNTG ($K) | TOTAL ($K) | Mid-Point Date | INFLATED (%) | COST ($K) | CNTG ($K) | FULL ($K) |
| *A* | *B* | *C* | *D* | *E* | *F* | *G* | *H* | *I* | *J* | *P* | *L* | *M* | *N* | *O* |
| | **Merritt Pump Station** | | | | | | | | | | | | | |
| **08** | ROADS, RAILROADS & BRIDGES | $0 | $0 | 0.00% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| **09** | CHANNELS & CANALS | $1,238 | $393 | 31.73% | $1,631 | 0.0% | $1,238 | $393 | $1,631 | 2014Q2 | 0.5% | $1,244 | $395 | $1,638 |
| **11** | LEVEES & FLOODWALLS | $0 | $0 | 31.73% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| **13** | PUMPING PLANT | $611 | $194 | 31.73% | $805 | 0.0% | $611 | $194 | $805 | 2014Q2 | 0.5% | $614 | $195 | $809 |
| **19** | BUILDINGS, GROUNDS & UTILITIES | $0 | $0 | 0.00% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| | | | | | | | $0 | | | | | | | |
| | **CONSTRUCTION ESTIMATE TOTALS:** | $1,849 | $587 | 31.73% | **$2,436** | | $1,849 | $587 | $2,436 | | | $1,858 | $589 | $2,447 |
| **01** | LANDS AND DAMAGES | $39,782 | $12,623 | 31.73% | $52,405 | 0.0% | $39,782 | $12,623 | $52,405 | 2014Q2 | 0.5% | $39,969 | $12,682 | $52,651 |
| **30** | PLANNING, ENGINEERING & DESIGN | | | | | | | | | | | | | |
| 0.0% | Project Management | $0 | $0 | 0.00% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| 0.0% | Planning & Environmental Compliance | $0 | $0 | 0.00% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| 0.0% | Engineering & Design | $0 | $0 | 0.00% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| 0.0% | Engineering Tech Review ITR & VE | $0 | $0 | 0.00% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| 0.0% | Contracting & Reprographics | $0 | $0 | 0.00% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| *3.0%* | Engineering During Construction | $55 | $17 | 31.73% | $72 | 0.0% | $55 | $17 | $72 | 2014Q2 | 0.5% | $55 | $18 | $73 |
| *0.5%* | Planning During Construction | $9 | $3 | 31.73% | $12 | 0.0% | $9 | $3 | $12 | 2014Q2 | 0.5% | $9 | $3 | $12 |
| *1.0%* | Project Operations | $18 | $6 | 31.73% | $24 | 0.0% | $18 | $6 | $24 | 2014Q1 | 0.0% | $18 | $6 | $24 |
| **31** | CONSTRUCTION MANAGEMENT | | | | | | | | | | | | | |
| *8.0%* | Construction Management | $148 | $47 | 31.73% | $195 | 0.0% | $148 | $47 | $195 | 2014Q2 | 0.5% | $149 | $47 | $196 |
| *1.0%* | Project Operation: | $18 | $6 | 31.73% | $24 | 0.0% | $18 | $6 | $24 | 2014Q2 | 0.5% | $18 | $6 | $24 |
| *1.0%* | Project Management | $18 | $6 | 31.73% | $24 | 0.0% | $18 | $6 | $24 | 2014Q2 | 0.5% | $18 | $6 | $24 |
| | **CONTRACT COST TOTALS:** | $41,897 | $13,294 | | **$55,191** | | $41,897 | $13,294 | $55,191 | | | $42,094 | $13,356 | **$55,451** |

****** TOTAL PROJECT COST SUMMARY ******

****** CONTRACT COST SUMMARY ******

PROJECT: Picayune Strand Restoration Project
LOCATION: Collier County, FL
This Estimate reflects the scope and schedule in report; Picayune Strand Restoration Project, Revised LRR

DISTRICT: SAJ Jacksonville PREPARED: 10/16/2013
POC: CHIEF, COST ENGINEERING, Tracy Leeser

| WBS Structure | | ESTIMATED COST | | | | PROJECT FIRST COST (Constant Dollar Basis) | | | | TOTAL PROJECT COST (FULLY FUNDED) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Estimate Prepared: 16-Oct-13<br>Effective Price Level: 1-Oct-13 | | | | Program Year (Budget EC): 2014<br>Effective Price Level Date: 1 OCT 13 | | | | | | | | |
| WBS NUMBER | Civil Works Feature & Sub-Feature Description | COST ($K) | CNTG ($K) | CNTG (%) | TOTAL ($K) | ESC (%) | COST ($K) | CNTG ($K) | TOTAL ($K) | Mid-Point Date | INFLATED (%) | COST ($K) | CNTG ($K) | FULL ($K) |
| *A* | *B* | *C* | *D* | *E* | *F* | *G* | *H* | *I* | *J* | *P* | *L* | *M* | *N* | *O* |
| | **Faka Union Pump Station** | | | | | | | | | | | | | |
| **08** | ROADS, RAILROADS & BRIDGES | $0 | $0 | 0.00% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| **09** | CHANNELS & CANALS | $0 | $0 | 0.00% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| **11** | LEVEES & FLOODWALLS | $300 | $95 | 31.73% | $395 | 0.0% | $300 | $95 | $395 | 2014Q4 | 1.7% | $305 | $97 | $402 |
| **13** | PUMPING PLANT | $1,564 | $496 | 31.73% | $2,060 | 0.0% | $1,564 | $496 | $2,060 | 2014Q4 | 1.7% | $1,590 | $504 | $2,094 |
| **19** | BUILDINGS, GROUNDS & UTILITIES | $0 | $0 | 0.00% | $0 | 0.0% | $0<br>$0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| | **CONSTRUCTION ESTIMATE TOTALS:** | $1,864 | $591 | 31.73% | **$2,455** | | $1,864 | $591 | $2,455 | | | $1,895 | $601 | $2,496 |
| **01** | LANDS AND DAMAGES | $0 | $0 | 0.00% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| **30** | PLANNING, ENGINEERING & DESIGN | | | | | | | | | | | | | |
| 0.0% | Project Management | $0 | $0 | 0.00% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| 0.0% | Planning & Environmental Compliance | $0 | $0 | 0.00% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| 0.0% | Engineering & Design | $0 | $0 | 0.00% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| 0.0% | Engineering Tech Review ITR & VE | $0 | $0 | 0.00% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| 0.0% | Contracting & Reprographics | $0 | $0 | 0.00% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| *3.0%* | Engineering During Construction | $56 | $18 | 31.73% | $74 | 0.0% | $56 | $18 | $74 | 2014Q4 | 2.6% | $57 | $18 | $76 |
| *0.5%* | Planning During Construction | $9 | $3 | 31.73% | $12 | 0.0% | $9 | $3 | $12 | 2014Q4 | 2.6% | $9 | $3 | $12 |
| *1.0%* | Project Operations | $19 | $6 | 31.73% | $25 | 0.0% | $19 | $6 | $25 | 2014Q1 | 0.0% | $19 | $6 | $25 |
| **31** | CONSTRUCTION MANAGEMENT | | | | | | | | | | | | | |
| *8.0%* | Construction Management | $149 | $47 | 31.73% | $196 | 0.0% | $149 | $47 | $196 | 2014Q4 | 1.4% | $151 | $48 | $199 |
| *1.0%* | Project Operation: | $19 | $6 | 31.73% | $25 | 0.0% | $19 | $6 | $25 | 2014Q4 | 1.4% | $19 | $6 | $25 |
| *1.0%* | Project Management | $19 | $6 | 31.73% | $25 | 0.0% | $19 | $6 | $25 | 2014Q4 | 1.4% | $19 | $6 | $25 |
| | **CONTRACT COST TOTALS:** | $2,135 | $677 | | **$2,812** | | $2,135 | $677 | $2,812 | | | $2,170 | $689 | **$2,859** |

**** CONTRACT COST SUMMARY ****

PROJECT: Picayune Strand Restoration Project
LOCATION: Collier County, FL
This Estimate reflects the scope and schedule in report; Picayune Strand Restoration Project, Revised LRR

DISTRICT: SAJ Jacksonville PREPARED: 10/16/2013
POC: CHIEF, COST ENGINEERING, Tracy Leeser

| WBS Structure | | ESTIMATED COST | | | | PROJECT FIRST COST (Constant Dollar Basis) | | | | TOTAL PROJECT COST (FULLY FUNDED) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Estimate Prepared: 16-Oct-13<br>Effective Price Level: 1-Oct-13 | | | | Program Year (Budget EC): 2014<br>Effective Price Level Date: 1 OCT 13 | | | | | | | | |
| WBS NUMBER | Civil Works Feature & Sub-Feature Description | COST ($K) | CNTG ($K) | CNTG (%) | TOTAL ($K) | ESC (%) | COST ($K) | CNTG ($K) | TOTAL ($K) | Mid-Point Date | INFLATED (%) | COST ($K) | CNTG ($K) | FULL ($K) |
| *A* | *B* | *C* | *D* | *E* | *F* | *G* | *H* | *I* | *J* | *P* | *L* | *M* | *N* | *O* |
| | **Miller Pump Station (Future CLIN's)** | | | | | | | | | | | | | |
| **08** | ROADS, RAILROADS & BRIDGES | $2,955 | $938 | 31.73% | $3,893 | 0.0% | $2,955 | $938 | $3,893 | 2015Q3 | 2.9% | $3,041 | $965 | $4,007 |
| **09** | CHANNELS & CANALS | $2,209 | $701 | 31.73% | $2,910 | 0.0% | $2,209 | $701 | $2,910 | 2015Q3 | 2.9% | $2,274 | $721 | $2,995 |
| **11** | LEVEES & FLOODWALLS | $0 | $0 | 31.73% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| **13** | PUMPING PLANT | $72 | $23 | 31.73% | $95 | 0.0% | $72 | $23 | $95 | 2015Q3 | 2.9% | $74 | $24 | $98 |
| **19** | BUILDINGS, GROUNDS & UTILITIES | $0 | $0 | 31.73% | $0 | 0.0% | $0<br>$0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| | **CONSTRUCTION ESTIMATE TOTALS:** | $5,236 | $1,661 | 31.73% | **$6,897** | | $5,236 | $1,661 | $6,897 | | | $5,389 | $1,710 | $7,099 |
| **01** | LANDS AND DAMAGES | $0 | $0 | 0.00% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| **30** | PLANNING, ENGINEERING & DESIGN | | | | | | | | | | | | | |
| 0.0% | Project Management | $0 | $0 | 31.73% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| 0.0% | Planning & Environmental Compliance | $0 | $0 | 31.73% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| 0.0% | Engineering & Design | $0 | $0 | 31.73% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| 0.0% | Engineering Tech Review ITR & VE | $0 | $0 | 31.73% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| 0.0% | Contracting & Reprographics | $0 | $0 | 31.73% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| *3.0%* | Engineering During Construction | $157 | $50 | 31.73% | $207 | 0.0% | $157 | $50 | $207 | 2015Q3 | 5.8% | $166 | $53 | $219 |
| *0.5%* | Planning During Construction | $26 | $8 | 31.73% | $34 | 0.0% | $26 | $8 | $34 | 2015Q3 | 5.8% | $28 | $9 | $36 |
| *1.0%* | Project Operations | $52 | $16 | 31.73% | $68 | 0.0% | $52 | $16 | $68 | 2014Q1 | 0.0% | $52 | $16 | $68 |
| **31** | CONSTRUCTION MANAGEMENT | | | | | | | | | | | | | |
| *8.0%* | Construction Management | $419 | $133 | 31.73% | $552 | 0.0% | $419 | $133 | $552 | 2015Q3 | 2.9% | $431 | $137 | $568 |
| *1.0%* | Project Operation: | $52 | $16 | 31.73% | $68 | 0.0% | $52 | $16 | $68 | 2015Q3 | 2.9% | $53 | $17 | $70 |
| *1.0%* | Project Management | $52 | $16 | 31.73% | $68 | 0.0% | $52 | $16 | $68 | 2015Q3 | 2.9% | $53 | $17 | $70 |
| | **CONTRACT COST TOTALS:** | $5,994 | $1,902 | | **$7,896** | | $5,994 | $1,902 | $7,896 | | | $6,173 | $1,959 | **$8,131** |

****** TOTAL PROJECT COST SUMMARY ******

****** CONTRACT COST SUMMARY ******

PROJECT: Picayune Strand Restoration Project
LOCATION: Collier County, FL
This Estimate reflects the scope and schedule in report; Picayune Strand Restoration Project, Revised LRR

DISTRICT: SAJ Jacksonville PREPARED: 10/16/2013
POC: CHIEF, COST ENGINEERING, Tracy Leeser

| WBS Structure | | ESTIMATED COST | | | | PROJECT FIRST COST (Constant Dollar Basis) | | | | TOTAL PROJECT COST (FULLY FUNDED) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Estimate Prepared: 16-Oct-13<br>Effective Price Level: 1-Oct-13 | | | | Program Year (Budget EC): 2014<br>Effective Price Level Date: 1 OCT 13 | | | | FULLY FUNDED PROJECT ESTIMATE | | | | |
| WBS NUMBER | Civil Works Feature & Sub-Feature Description | COST ($K) | CNTG ($K) | CNTG (%) | TOTAL ($K) | ESC (%) | COST ($K) | CNTG ($K) | TOTAL ($K) | Mid-Point Date | INFLATED (%) | COST ($K) | CNTG ($K) | FULL ($K) |
| *A* | *B* | *C* | *D* | *E* | *F* | *G* | *H* | *I* | *J* | *P* | *L* | *M* | *N* | *O* |
| | **Environmental Monitoring** | | | | | | | | | | | | | |
| **06** | FISH & WILDLIFE FACILITIES | $9,185 | $2,914 | 31.73% | $12,099 | 0.0% | $9,185<br>$0 | $2,914 | $12,099 | 2014Q2 | 0.5% | $9,228 | $2,928 | $12,156 |
| | **CONSTRUCTION ESTIMATE TOTALS:** | $9,185 | $2,914 | 31.73% | **$12,099** | | $9,185 | $2,914 | $12,099 | | | $9,228 | $2,928 | $12,156 |
| **01** | LANDS AND DAMAGES | $0 | $0 | 0.00% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| **30** | PLANNING, ENGINEERING & DESIGN | | | | | | | | | | | | | |
| *0.0%* | Project Management | $0 | $0 | 31.73% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| *0.0%* | Planning & Environmental Compliance | $0 | $0 | 31.73% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| *0.0%* | Engineering & Design | $0 | $0 | 31.73% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| *0.0%* | Engineering Tech Review ITR & VE | $0 | $0 | 31.73% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| *0.0%* | Contracting & Reprographics | $0 | $0 | 31.73% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| *0.0%* | Engineering During Construction | $0 | $0 | 31.73% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| *0.0%* | Planning During Construction | $0 | $0 | 31.73% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| *0.0%* | Project Operations | $0 | $0 | 31.73% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| **31** | CONSTRUCTION MANAGEMENT | | | | | | | | | | | | | |
| *0.0%* | Construction Management | $0 | $0 | 31.73% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| *0.0%* | Project Operation: | $0 | $0 | 31.73% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| *0.0%* | Project Management | $0 | $0 | 31.73% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| | **CONTRACT COST TOTALS:** | $9,185 | $2,914 | | **$12,099** | | $9,185 | $2,914 | $12,099 | | | $9,228 | $2,928 | **$12,156** |

****** TOTAL PROJECT COST SUMMARY ******

****** CONTRACT COST SUMMARY ******

PROJECT: Picayune Strand Restoration Project
LOCATION: Collier County, FL
This Estimate reflects the scope and schedule in report; Picayune Strand Restoration Project, Revised LRR

DISTRICT: SAJ Jacksonville PREPARED: 10/16/2013
POC: CHIEF, COST ENGINEERING, Tracy Leeser

| WBS Structure | | ESTIMATED COST | | | | PROJECT FIRST COST (Constant Dollar Basis) | | | | TOTAL PROJECT COST (FULLY FUNDED) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Estimate Prepared: / Effective Price Level: | | | 16-Oct-13 / 1-Oct-13 | Program Year (Budget EC): / Effective Price Level Date: | | | 2014 / 1 OCT 13 | FULLY FUNDED PROJECT ESTIMATE | | | | |
| WBS NUMBER | Civil Works Feature & Sub-Feature Description | COST ($K) | CNTG ($K) | CNTG (%) | TOTAL ($K) | ESC (%) | COST ($K) | CNTG ($K) | TOTAL ($K) | Mid-Point Date | INFLATED (%) | COST ($K) | CNTG ($K) | FULL ($K) |
| *A* | *B* | *C* | *D* | *E* | *F* | *G* | *H* | *I* | *J* | *P* | *L* | *M* | *N* | *O* |
| | **Manatee Mitigation** | | | | | | | | | | | | | |
| **06** | FISH & WILDLIFE FACILITIES | $6,662 | $2,114 | 31.73% | $8,776 | 0.0% | $6,662<br>$0 | $2,114 | $8,776 | 2015Q1 | 1.9% | $6,792 | $2,155 | $8,947 |
| | **CONSTRUCTION ESTIMATE TOTALS:** | $6,662 | $2,114 | 31.73% | **$8,776** | | $6,662 | $2,114 | $8,776 | | | $6,792 | $2,155 | $8,947 |
| **01** | LANDS AND DAMAGES | $0 | $0 | 0.00% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| **30** | PLANNING, ENGINEERING & DESIGN | | | | | | | | | | | | | |
| *1.0%* | Project Management | $67 | $21 | 31.73% | $88 | 0.0% | $67 | $21 | $88 | 2014Q3 | 1.5% | $68 | $22 | $90 |
| *0.5%* | Planning & Environmental Compliance | $33 | $10 | 31.73% | $43 | 0.0% | $33 | $10 | $43 | 2014Q3 | 1.5% | $34 | $11 | $44 |
| *6.0%* | Engineering & Design | $400 | $127 | 31.73% | $527 | 0.0% | $400 | $127 | $527 | 2014Q3 | 1.5% | $406 | $129 | $535 |
| *0.5%* | Engineering Tech Review ITR & VE | $33 | $10 | 31.73% | $43 | 0.0% | $33 | $10 | $43 | 2014Q3 | 1.5% | $34 | $11 | $44 |
| *0.5%* | Contracting & Reprographics | $33 | $10 | 31.73% | $43 | 0.0% | $33 | $10 | $43 | 2014Q3 | 1.5% | $34 | $11 | $44 |
| *3.0%* | Engineering During Construction | $200 | $63 | 31.73% | $263 | 0.0% | $200 | $63 | $263 | 2015Q1 | 3.7% | $207 | $66 | $273 |
| *0.5%* | Planning During Construction | $33 | $10 | 31.73% | $43 | 0.0% | $33 | $10 | $43 | 2015Q1 | 3.7% | $34 | $11 | $45 |
| *1.0%* | Project Operations | $67 | $21 | 31.73% | $88 | 0.0% | $67 | $21 | $88 | 2014Q3 | 1.5% | $68 | $22 | $90 |
| **31** | CONSTRUCTION MANAGEMENT | | | | | | | | | | | | | |
| *8.0%* | Construction Management | $533 | $169 | 31.73% | $702 | 0.0% | $533 | $169 | $702 | 2015Q1 | 1.9% | $543 | $172 | $715 |
| *1.0%* | Project Operation: | $67 | $21 | 31.73% | $88 | 0.0% | $67 | $21 | $88 | 2015Q1 | 1.9% | $68 | $22 | $90 |
| *1.0%* | Project Management | $67 | $21 | 31.73% | $88 | 0.0% | $67 | $21 | $88 | 2015Q1 | 1.9% | $68 | $22 | $90 |
| | **CONTRACT COST TOTALS:** | $8,195 | $2,600 | | **$10,795** | | $8,195 | $2,600 | $10,795 | | | $8,356 | $2,651 | **$11,007** |

****** TOTAL PROJECT COST SUMMARY ******

****** CONTRACT COST SUMMARY ******

PROJECT: Picayune Strand Restoration Project
LOCATION: Collier County, FL
This Estimate reflects the scope and schedule in report; Picayune Strand Restoration Project, Revised LRR

DISTRICT: SAJ Jacksonville PREPARED: 10/16/2013
POC: CHIEF, COST ENGINEERING, Tracy Leeser

| WBS Structure | | ESTIMATED COST | | | | PROJECT FIRST COST (Constant Dollar Basis) | | | | TOTAL PROJECT COST (FULLY FUNDED) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Estimate Prepared: / Effective Price Level: | | | 16-Oct-13 / 1-Oct-13 | Program Year (Budget EC): / Effective Price Level Date: | | | 2014 / 1 OCT 13 | FULLY FUNDED PROJECT ESTIMATE | | | | |
| WBS NUMBER | Civil Works Feature & Sub-Feature Description | COST ($K) | CNTG ($K) | CNTG (%) | TOTAL ($K) | ESC (%) | COST ($K) | CNTG ($K) | TOTAL ($K) | Mid-Point Date | INFLATED (%) | COST ($K) | CNTG ($K) | FULL ($K) |
| A | B | C | D | E | F | G | H | I | J | P | L | M | N | O |
| | **Six L's Ranch** | | | | | | | | | | | | | |
| **11** | LEVEES & FLOODWALLS | $19,445 | $6,170 | 31.73% | $25,615 | 0.0% | $19,445<br>$0 | $6,170 | $25,615 | 2017Q3 | 6.9% | $20,782 | $6,594 | $27,376 |
| | **CONSTRUCTION ESTIMATE TOTALS:** | $19,445 | $6,170 | 31.73% | **$25,615** | | $19,445 | $6,170 | $25,615 | | | $20,782 | $6,594 | $27,376 |
| **01** | LANDS AND DAMAGES | $0 | $0 | 0.00% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| **30** | PLANNING, ENGINEERING & DESIGN | | | | | | | | | | | | | |
| *1.0%* | Project Management | $194 | $62 | 31.73% | $256 | 0.0% | $194 | $62 | $256 | 2015Q1 | 3.7% | $201 | $64 | $265 |
| *0.5%* | Planning & Environmental Compliance | $97 | $31 | 31.73% | $128 | 0.0% | $97 | $31 | $128 | 2015Q1 | 3.7% | $101 | $32 | $132 |
| *6.0%* | Engineering & Design | $1,167 | $370 | 31.73% | $1,537 | 0.0% | $1,167 | $370 | $1,537 | 2015Q1 | 3.7% | $1,210 | $384 | $1,594 |
| *0.5%* | Engineering Tech Review ITR & VE | $97 | $31 | 31.73% | $128 | 0.0% | $97 | $31 | $128 | 2015Q1 | 3.7% | $101 | $32 | $132 |
| *0.5%* | Contracting & Reprographics | $97 | $31 | 31.73% | $128 | 0.0% | $97 | $31 | $128 | 2015Q1 | 3.7% | $101 | $32 | $132 |
| *3.0%* | Engineering During Construction | $583 | $185 | 31.73% | $768 | 0.0% | $583 | $185 | $768 | 2017Q3 | 15.0% | $671 | $213 | $883 |
| *0.5%* | Planning During Construction | $97 | $31 | 31.73% | $128 | 0.0% | $97 | $31 | $128 | 2017Q3 | 15.0% | $112 | $35 | $147 |
| *1.0%* | Project Operations | $194 | $62 | 31.73% | $256 | 0.0% | $194 | $62 | $256 | 2015Q1 | 3.7% | $201 | $64 | $265 |
| **31** | CONSTRUCTION MANAGEMENT | | | | | | | | | | | | | |
| *8.0%* | Construction Management | $1,556 | $494 | 31.73% | $2,050 | 0.0% | $1,556 | $494 | $2,050 | 2017Q3 | 6.8% | $1,662 | $527 | $2,189 |
| *1.0%* | Project Operation: | $194 | $62 | 31.73% | $256 | 0.0% | $194 | $62 | $256 | 2017Q3 | 6.8% | $207 | $66 | $273 |
| *1.0%* | Project Management | $194 | $62 | 31.73% | $256 | 0.0% | $194 | $62 | $256 | 2017Q3 | 6.8% | $207 | $66 | $273 |
| | **CONTRACT COST TOTALS:** | $23,915 | $7,588 | | **$31,503** | | $23,915 | $7,588 | $31,503 | | | $25,554 | $8,108 | **$33,662** |

****** TOTAL PROJECT COST SUMMARY ******

****** CONTRACT COST SUMMARY ******

PROJECT: Picayune Strand Restoration Project
LOCATION: Collier County, FL
This Estimate reflects the scope and schedule in report; Picayune Strand Restoration Project, Revised LRR

DISTRICT: SAJ Jacksonville PREPARED: 10/16/2013
POC: CHIEF, COST ENGINEERING, Tracy Leeser

| WBS Structure | | ESTIMATED COST | | | | PROJECT FIRST COST (Constant Dollar Basis) | | | | TOTAL PROJECT COST (FULLY FUNDED) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Estimate Prepared: 16-Oct-13<br>Effective Price Level: 1-Oct-13 | | | | Program Year (Budget EC): 2014<br>Effective Price Level Date: 1 OCT 13 | | | | FULLY FUNDED PROJECT ESTIMATE | | | | |
| WBS NUMBER | Civil Works Feature & Sub-Feature Description | COST ($K) | CNTG ($K) | CNTG (%) | TOTAL ($K) | ESC (%) | COST ($K) | CNTG ($K) | TOTAL ($K) | Mid-Point Date | INFLATED (%) | COST ($K) | CNTG ($K) | FULL ($K) |
| *A* | *B* | *C* | *D* | *E* | *F* | *G* | *H* | *I* | *J* | *P* | *L* | *M* | *N* | *O* |
| | **Road Removal North of Tiebacks** | | | | | | | | | | | | | |
| **08** | ROADS, RAILROADS & BRIDGES | $3,577 | $1,135 | 31.73% | $4,712 | 0.0% | $3,577<br>$0 | $1,135 | $4,712 | 2016Q2 | 4.4% | $3,734 | **$1,185** | **$4,919** |
| | **CONSTRUCTION ESTIMATE TOTALS:** | $3,577 | $1,135 | 31.73% | **$4,712** | | $3,577 | $1,135 | $4,712 | | | $3,734 | **$1,185** | **$4,919** |
| **01** | LANDS AND DAMAGES | $0 | $0 | 0.00% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| **30** | PLANNING, ENGINEERING & DESIGN | | | | | | | | | | | | | |
| *1.0%* | Project Management | $36 | 11 | 31.73% | $47 | 0.0% | $36 | $11 | $47 | 2014Q1 | 0.0% | $36 | $11 | $47 |
| *0.5%* | Planning & Environmental Compliance | $18 | 6 | 31.73% | $24 | 0.0% | $18 | $6 | $24 | 2014Q1 | 0.0% | $18 | $6 | $24 |
| *6.0%* | Engineering & Design | $215 | 68 | 31.73% | $283 | 0.0% | $215 | $68 | $283 | 2014Q1 | 0.0% | $215 | $68 | $283 |
| *0.5%* | Engineering Tech Review ITR & VE | $18 | 6 | 31.73% | $24 | 0.0% | $18 | $6 | $24 | 2014Q1 | 0.0% | $18 | $6 | $24 |
| *0.5%* | Contracting & Reprographics | $18 | 6 | 31.73% | $24 | 0.0% | $18 | $6 | $24 | 2014Q1 | 0.0% | $18 | $6 | $24 |
| *3.0%* | Engineering During Construction | $107 | 34 | 31.73% | $141 | 0.0% | $107 | $34 | $141 | 2016Q2 | 9.1% | $117 | $37 | $154 |
| *0.5%* | Planning During Construction | $18 | 6 | 31.73% | $24 | 0.0% | $18 | $6 | $24 | 2016Q2 | 9.1% | $20 | $6 | $26 |
| *1.0%* | Project Operations | $36 | 11 | 31.73% | $47 | 0.0% | $36 | $11 | $47 | 2014Q1 | 0.0% | $36 | $11 | $47 |
| **31** | CONSTRUCTION MANAGEMENT | | | | | | | | | | | | | |
| *8.0%* | Construction Management | $286 | 91 | 31.73% | $377 | 0.0% | $286 | $91 | $377 | 2016Q2 | 4.3% | $298 | $95 | $393 |
| *1.0%* | Project Operation: | $36 | 11 | 31.73% | $47 | 0.0% | $36 | $11 | $47 | 2016Q2 | 4.3% | $38 | $12 | $49 |
| *1.0%* | Project Management | $36 | 11 | 31.73% | $47 | 0.0% | $36 | $11 | $47 | 2016Q2 | 4.3% | $38 | $12 | $49 |
| | **CONTRACT COST TOTALS:** | 4,401 | 1,396 | | **$5,797** | | $4,401 | $1,396 | $5,797 | | | $4,585 | **$1,455** | **$6,039** |

****** TOTAL PROJECT COST SUMMARY ******

****** CONTRACT COST SUMMARY ******

PROJECT: Picayune Strand Restoration Project
LOCATION: Collier County, FL
This Estimate reflects the scope and schedule in report; Picayune Strand Restoration Project, Revised LRR

DISTRICT: SAJ Jacksonville PREPARED: 10/16/2013
POC: CHIEF, COST ENGINEERING, Tracy Leeser

| WBS Structure | | ESTIMATED COST | | | | PROJECT FIRST COST | | | (Constant | TOTAL PROJECT COST (FULLY FUNDED) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Estimate Prepared: | | | 16-Oct-13 | Program Year (Budget EC): | | | 2014 | | | | | |
| | | Effective Price Level: | | | 1-Oct-13 | Effective Price Level Date: | | | 1 OCT 13 | FULLY FUNDED PROJECT ESTIMATE | | | | |
| WBS NUMBER | Civil Works Feature & Sub-Feature Description | COST ($K) | CNTG ($K) | CNTG (%) | TOTAL ($K) | ESC (%) | COST ($K) | CNTG ($K) | TOTAL ($K) | Mid-Point Date | INFLATED (%) | COST ($K) | CNTG ($K) | FULL ($K) |
| *A* | *B* | *C* | *D* | *E* | *F* | *G* | *H* | *I* | *J* | *P* | *L* | *M* | *N* | *O* |
| | **Obligated and Unexpended Expendatures (All Current Contracts)** | | | | | | | | | | | | | |
| **06** | FISH & WILDLIFE FACILITIES | $0 | $0 | 10.00% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| **08** | ROADS, RAILROADS & BRIDGES | $1,311 | $131 | 10.00% | $1,442 | 0.0% | $1,311 | $131 | $1,442 | 2014Q1 | 0.0% | $1,311 | $131 | $1,442 |
| **09** | CHANNELS & CANALS | $5,802 | $580 | 10.00% | $6,382 | 0.0% | $5,802 | $580 | $6,382 | 2014Q1 | 0.0% | $5,802 | $580 | $6,382 |
| **11** | LEVEES & FLOODWALLS | $10,107 | $1,011 | 10.00% | $11,118 | 0.0% | $10,107 | $1,011 | $11,118 | 2014Q1 | 0.0% | $10,107 | $1,011 | $11,118 |
| **13** | PUMPING PLANT | $78,414 | $7,841 | 10.00% | $86,255 | 0.0% | $78,414 | $7,841 | $86,255 | 2014Q1 | 0.0% | $78,414 | $7,841 | $86,255 |
| **15** | FLOODWAY CONTROL & DIVERSION STRUCTURE | $0 | $0 | 10.00% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| **19** | BUILDINGS, GROUNDS & UTILITIES | $7,688 | $769 | 10.00% | $8,457 | 0.0% | $7,688 | $769 | $8,457 | 2014Q1 | 0.0% | $7,688 | $769 | $8,457 |
| | | | | | | | $0 | | | | | | | |
| | **CONSTRUCTION ESTIMATE TOTALS:** | $103,322 | $10,332 | 10.00% | **$113,654** | | $103,322 | $10,332 | $113,654 | | | $103,322 | $10,332 | $113,654 |
| **01** | LANDS AND DAMAGES | $0 | $0 | 0.00% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| **30** | PLANNING, ENGINEERING & DESIGN | | | | | | | | | | | | | |
| *0.0%* | Project Management | $0 | 0 | 10.00% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| *0.0%* | Planning & Environmental Compliance | $0 | 0 | 10.00% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| *0.0%* | Engineering & Design | $0 | 0 | 10.00% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| *0.0%* | Engineering Tech Review ITR & VE | $0 | 0 | 10.00% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| *0.0%* | Contracting & Reprographics | $0 | 0 | 10.00% | $0 | 0.0% | $0 | $0 | $0 | 0 | 0.0% | $0 | $0 | $0 |
| *3.0%* | Engineering During Construction | $3,100 | 310 | 10.00% | $3,410 | 0.0% | $3,100 | $310 | $3,410 | 2015Q3 | 5.8% | $3,280 | $328 | $3,608 |
| *0.5%* | Planning During Construction | $517 | 52 | 10.00% | $569 | 0.0% | $517 | $52 | $569 | 2015Q3 | 5.8% | $547 | $55 | $602 |
| *1.0%* | Project Operations | $1,033 | 103 | 10.00% | $1,136 | 0.0% | $1,033 | $103 | $1,136 | 2015Q3 | 5.8% | $1,093 | $109 | $1,202 |
| **31** | CONSTRUCTION MANAGEMENT | | | | | | | | | | | | | |
| *8.0%* | Construction Management | $8,266 | 827 | 10.00% | $9,093 | 0.0% | $8,266 | $827 | $9,093 | 2015Q3 | 2.9% | $8,503 | $850 | $9,353 |
| *1.0%* | Project Operation: | $1,033 | 103 | 10.00% | $1,136 | 0.0% | $1,033 | $103 | $1,136 | 2015Q3 | 2.9% | $1,063 | $106 | $1,169 |
| *1.0%* | Project Management | $1,033 | 103 | 10.00% | $1,136 | 0.0% | $1,033 | $103 | $1,136 | 2015Q3 | 2.9% | $1,063 | $106 | $1,169 |
| | **CONTRACT COST TOTALS:** | 118,304 | 11,830 | | **$130,134** | | $118,304 | $11,830 | $130,134 | | | $118,871 | $11,887 | **$130,758** |

Sub-Appendix B

| Activity ID | Activity Name | Duration | Start | Finish | Predecessors | Successors |
|---|---|---|---|---|---|---|
| **112375 C&SF:CERP:Picayune Strand** | | 2109 | 18-Dec-09 A | 15-May-18 | | |
| **112375.1 PROJECT MANAGEMENT PLAN (PMP)** | | 40 | 01-Apr-14 | 27-May-14 | | |
| 112375.1.4 Construction PMP Revision | | 40 | 01-Apr-14 | 27-May-14 | | |
| 30-11491 | PMP Update | 40 | 01-Apr-14* | 27-May-14 | | 30-11496 |
| 30-11496 | PMP Updated | 0 | | 27-May-14 | 30-11491 | |
| **112375.5 P & S** | | 1526 | 10-May-10 A | 07-Jun-16 | | |
| 112375.5.2 Advanced Planning / Field Work | | 509 | 25-Apr-13 A | 05-May-15 | | |
| 112375.5.2.5 H&H Analysis | | 393 | 28-Jun-13 A | 23-Jan-15 | | |
| 112375.5.2.5.1 Scope/Contracting/Award | | 393 | 28-Jun-13 A | 23-Jan-15 | | |
| 30-11490 | H&H Analysis - Revise Modeling EDR to include ground water modeling | 368 | 28-Jun-13 A | 16-Dec-14 | 30-11485 | 30-11565 |
| 30-11565 | H&H Analysis - Sponsor Review of Modeling EDR | 15 | 17-Dec-14 | 08-Jan-15 | 30-11465, 30-10640, | 30-11470 |
| 30-11470 | H&H Analysis - Revise Modeling EDR to include ground water modeling | 5 | 09-Jan-15 | 15-Jan-15 | 30-11565 | 30-11475 |
| 30-11475 | H&H Analysis - Revise Modeling EDR | 5 | 16-Jan-15 | 23-Jan-15 | 30-11470 | |
| 112375.5.2.5.2 H&H Analysis/Protection Feature Option Development | | 41 | 10-Feb-14 | 08-Apr-14 | | |
| **112375.5.2.5.2.4 US 41** | | 41 | 10-Feb-14 | 08-Apr-14 | | |
| 30-10660 | US 41 - Modeling (Structures Hydraulics) | 21 | 10-Feb-14 | 11-Mar-14 | 30-10655, 30-11190 | 30-11605 |
| 30-11605 | US 41 - Coordinate with FDOT | 20 | 12-Mar-14 | 08-Apr-14 | 30-10660 | |
| 112375.5.2.7 Data Collection | | 509 | 25-Apr-13 A | 05-May-15 | | |
| 112375.5.2.7.1 Geotechnical Investigation | | 401 | 25-Apr-13 A | 28-Nov-14 | | |
| **112375.5.2.7.1.3 6Ls** | | 401 | 25-Apr-13 A | 28-Nov-14 | | |
| 30-11190 | Road Bed Analysis (US41) | 198 | 25-Apr-13 A | 07-Feb-14 | 30-11595 | 30-10660 |
| 30-10675 | 6Ls - Geotechnical Investigation, Analysis and Review | 401 | 25-Apr-13 A | 28-Nov-14 | 30-10655, 30-11595 | 30-10935 |
| 112375.5.2.7.2 Survey | | 120 | 12-Nov-14 | 05-May-15 | | |
| **112375.5.2.7.2.3 6Ls** | | 120 | 12-Nov-14 | 05-May-15 | | |
| 30-10690 | 6Ls - Survey | 120 | 12-Nov-14 | 05-May-15 | 30-10655, 30-11595, | 30-10935, 30-11175 |
| 112375.5.2.7.3 Cultural Reources Survey | | 101 | 12-Nov-14 | 08-Apr-15 | | |
| **112375.5.2.7.3.3 6Ls** | | 101 | 12-Nov-14 | 08-Apr-15 | | |
| 30-10705 | 6Ls - Cultural Resources Survey | 101 | 12-Nov-14 | 08-Apr-15 | 30-10655, 30-11595, | 30-10935, 30-11175 |

| Activity ID | Activity Name | Duration | Start | Finish | Predecessors | Successors |
|---|---|---|---|---|---|---|
| 112375.5.3 Preliminary P& S | | 476 | 01-Oct-13 | 24-Aug-15 | | |
| 112375.5.3.4 Manatee Mitigation | | 39 | 01-Oct-13 | 26-Nov-13 | | |
| 30-11845 | Manatee Mitigation - Design Preliminary P&S New Alternative (By SFWMD) | 19 | 01-Oct-13* | 28-Oct-13 | | 30-11840 |
| 30-11840 | Manatee Mitigation - USACE Review | 10 | 29-Oct-13 | 12-Nov-13 | 30-11835, 30-11845 | 30-11842 |
| 30-11842 | Manatee Mitigation - Resolve Comments | 10 | 13-Nov-13 | 26-Nov-13 | 30-11840 | 30-11690 |
| 112375.5.3.2 Protection Features | | 77 | 05-May-15 | 24-Aug-15 | | |
| 112375.5.3.2.3 6Ls | | 77 | 05-May-15 | 24-Aug-15 | | |
| 30-11175 | 6Ls - Start P&S | 0 | | 05-May-15 | 30-10705, 30-12080, | 30-10935 |
| 30-10935 | 6Ls - Design Preliminary P&S | 42 | 06-May-15 | 06-Jul-15 | 30-10675, 30-10690, | 30-10940 |
| 30-10940 | 6Ls - USACE Review | 15 | 07-Jul-15 | 27-Jul-15 | 30-10935 | 30-10945, 30-10936 |
| 30-10936 | 6Ls - Sponsor Review | 15 | 28-Jul-15 | 17-Aug-15 | 30-10940 | 30-10945 |
| 30-10945 | 6Ls - TRB | 5 | 18-Aug-15 | 24-Aug-15 | 30-10940, 30-10936 | 30-10950 |
| 30-10950 | 6Ls - TRB (MS) | 0 | | 24-Aug-15 | 30-10945 | 30-10955 |
| 112375.5.4 Intermediate P & S | | 262 | 12-Nov-14 | 27-Nov-15 | | |
| 112375.5.4.4 Manatee Mitigation | | 48 | 12-Nov-14 | 22-Jan-15 | | |
| 30-11690 | Manatee Mitigation - Design Intermediate P&S (by SFWMD) | 12 | 12-Nov-14 | 28-Nov-14 | 30-11842, 30-12085 | 30-11695 |
| 30-11695 | Manatee Mitigation - USACE Review Intermediate | 21 | 01-Dec-14 | 30-Dec-14 | 30-11690 | 30-11715 |
| 30-11715 | Manatee Mitigation USACE Review - Resolve Comments Intermediate | 15 | 31-Dec-14 | 22-Jan-15 | 30-11695 | 30-12115, 30-11720 |
| 112375.5.4.5 Road Degrading North of Leavees (by SFWMD) | | 99 | 12-Nov-14 | 06-Apr-15 | | |
| 30-12406 | Intermediate P&S Completed by SFWMD | 84 | 12-Nov-14* | 16-Mar-15 | 30-12080 | 30-12411 |
| 30-12411 | USACE Reviews Intermediate P&S | 15 | 17-Mar-15 | 06-Apr-15 | 30-12406 | 30-12416 |
| 112375.5.4.2 Protection Features | | 65 | 25-Aug-15 | 27-Nov-15 | | |
| 112375.5.4.2.3 6Ls | | 65 | 25-Aug-15 | 27-Nov-15 | | |
| 30-10955 | 6Ls - Design Intermediate P&S | 30 | 25-Aug-15 | 06-Oct-15 | 30-10950 | 30-10965, 30-11230 |
| 30-10965 | 6Ls - USACE Review | 15 | 07-Oct-15 | 28-Oct-15 | 30-10955 | 30-10960, 30-11335 |
| 30-11230 | 6Ls - CWE | 21 | 07-Oct-15 | 05-Nov-15 | 30-10955 | |
| 30-10960 | 6Ls - ATR | 15 | 29-Oct-15 | 19-Nov-15 | 30-10965 | |

| Activity ID | Activity Name | Duration | Start | Finish | Predecessors | Successors |
|---|---|---|---|---|---|---|
| 30-11335 | 6Ls - Sponsor Review | 15 | 29-Oct-15 | 19-Nov-15 | 30-10965 | 30-10970, 30-12245 |
| 30-10970 | 6Ls - TRB | 5 | 20-Nov-15 | 27-Nov-15 | 30-11335 | 30-10975 |
| 30-10975 | 6Ls - TRB (MS) | 0 | | 27-Nov-15 | 30-10970 | 30-10980, 30-11005 |
| 112375.5.5 Final P & S | | 303 | 23-Jan-15 | 06-Apr-16 | | |
| 112375.5.5.6 Road Degrading North of Leavees (by SFWMD) | | 57 | 07-Apr-15 | 25-Jun-15 | | |
| 30-12416 | Final P&S Completed by SFWMD | 42 | 07-Apr-15 | 04-Jun-15 | 30-12411 | 30-12421 |
| 30-12421 | USACE Reviews Final P&S | 15 | 05-Jun-15 | 25-Jun-15 | 30-12416 | 30-12426 |
| 112375.5.5.5 Manatee Mitigation | | 25 | 23-Jan-15 | 27-Feb-15 | | |
| 30-11720 | Manatee Mitigation - Design Pre-Final P&S (by SFWMD) | 15 | 23-Jan-15 | 12-Feb-15 | 30-11715 | 30-11725, 30-11910 |
| 30-11910 | Manatee Mitigation - Draft P&S Complete (by SFWMD) [MS] | 0 | | 12-Feb-15 | 30-11720 | 30-8620 |
| 30-11725 | Manatee Mitigation - USACE Review | 5 | 13-Feb-15 | 20-Feb-15 | 30-11720 | 30-11730, 30-11735 |
| 30-11730 | Manatee Mitigation - USACE Resolution of Comments | 5 | 23-Feb-15 | 27-Feb-15 | 30-11725 | 30-11735 |
| 30-11735 | Manatee Mitigation - Backcheck | 5 | 23-Feb-15 | 27-Feb-15 | 30-11725, 30-11730 | 30-12385 |
| 30-12385 | Manatee Mitigation - P&S Approved [MS] | 0 | | 27-Feb-15 | 30-11735 | 30-8620, 30-11740, |
| 112375.5.5.2 Protection Features - Pre-Final Design | | 53 | 30-Nov-15 | 16-Feb-16 | | |
| 112375.5.5.2.3 6Ls | | 53 | 30-Nov-15 | 16-Feb-16 | | |
| 30-10980 | 6Ls - Design Pre-Final P&S | 21 | 30-Nov-15 | 29-Dec-15 | 30-10975 | 30-11350, 30-12405 |
| 30-12405 | 6Ls - Draft P&S Complete | 0 | | 29-Dec-15 | 30-10980 | |
| 30-11350 | 6Ls - USACE Review | 17 | 30-Dec-15 | 25-Jan-16 | 30-10980 | 30-10985, 30-10995 |
| 30-10985 | 6Ls - ATR | 15 | 26-Jan-16 | 16-Feb-16 | 30-11350 | 30-10995 |
| 30-10995 | 6Ls - Sponsor Review | 15 | 26-Jan-16 | 16-Feb-16 | 30-10985, 30-11350 | 30-11000, 30-10315, |
| 112375.5.5.4 Protection Features - Final P&S | | 36 | 17-Feb-16 | 06-Apr-16 | | |
| 112375.5.5.4.3 6Ls | | 36 | 17-Feb-16 | 06-Apr-16 | | |
| 30-12365 | 6Ls & US41 - Prepare Final P&S | 21 | 17-Feb-16 | 16-Mar-16 | 30-10995 | 30-11000, 30-12230 |
| 30-11000 | 6Ls & US41 - BCOE Final P&S | 15 | 17-Mar-16 | 06-Apr-16 | 30-10995, 30-12365 | 30-11550, 30-12415 |
| 30-11550 | 6Ls & US41 - P&S BCOE Certification | 0 | | 06-Apr-16 | 30-11000 | 30-11020, 30-12476 |

| Activity ID | Activity Name | Duration | Start | Finish | Predecessors | Successors |
|---|---|---|---|---|---|---|
| 30-12415 | 6Ls & US41 - P&S Approved | 0 | | 06-Apr-16 | 30-11000 | 30-11005 |
| 112375.5.6 | Source Selection Plans | 298 | 02-Mar-15 | 04-May-16 | | |
| 112375.5.6.5 | Source Selection Plan - Manatee Mitigation | 21 | 02-Mar-15 | 30-Mar-15 | | |
| 30-11740 | Manatee Mitigation - Determine Contract Aquisition Strategy (by SFWMD) | 21 | 02-Mar-15 | 30-Mar-15 | 30-12385 | |
| 112375.5.6.4 | Source Selection Plan - Protection Features | 20 | 07-Apr-16 | 04-May-16 | | |
| 112375.5.6.4.2 | 6Ls | 20 | 07-Apr-16 | 04-May-16 | | |
| 30-11005 | 6Ls - Determine Contract Aquisition Strategy | 10 | 07-Apr-16 | 20-Apr-16 | 30-10975, 30-12415 | 30-11010 |
| 30-11010 | 6Ls - Source Selection Plan | 10 | 21-Apr-16 | 04-May-16 | 30-11005 | 30-11020, 30-12476 |
| 112375.5.7 | Permits/WQ Cert. | 346 | 23-Jan-15 | 07-Jun-16 | | |
| 112375.5.7.7 | 1502 WQC Permit - Protection Features MOD | 346 | 23-Jan-15 | 07-Jun-16 | | |
| 112375.5.7.7.5 | 1502 WQC Permit - Manatee Mitigation | 117 | 23-Jan-15 | 09-Jul-15 | | |
| 30-12115 | 1502 WQC Pre-Application (CERPRA) Mtg (Reasonable Assurances) - Manatee Mitigation (by SFWMD) | 1 | 23-Jan-15 | 23-Jan-15 | 30-11715 | 30-12130 |
| 30-12130 | Prepare 1502 Application Package/WQC - Manatee Mitigation | 22 | 23-Jan-15 | 24-Feb-15 | 30-12115 | 30-12145 |
| 30-12095 | Submit State WQC/Permits Application (L299) - Manatee Mitigation | 0 | | 25-Feb-15 | 30-12145 | 30-12150 |
| 30-12145 | Submit 1502 WQC Permit Applications - Manatee Mitigation | 1 | 25-Feb-15 | 25-Feb-15 | 30-12130 | 30-12095 |
| 30-12110 | Receive Request for Additional Information (RAI)/Completeness Letter - Manatee Mitigation | 0 | | 27-Mar-15 | 30-12150 | 30-12135 |
| 30-12150 | 1502 Application Completeness Review - Manatee Mitigation | 22 | 26-Feb-15 | 27-Mar-15 | 30-12095 | 30-12110, 30-12135 |
| 30-12135 | Prepare and Submit Response to RAI - Manatee Mitigation | 22 | 30-Mar-15 | 28-Apr-15 | 30-12150, 30-12110 | 30-12155 |
| 30-12155 | 1502 Application Completeness Review - Manatee Mitigation | 20 | 29-Apr-15 | 27-May-15 | 30-12135 | 30-12140 |
| 30-12105 | Receipt of Intent and Public Notice - Manatee Mitigation | 0 | | 10-Jun-15 | 30-12140 | 30-12120 |
| 30-12140 | Corps Review of Draft WQC Permit - Manatee Mitigation | 10 | 28-May-15 | 10-Jun-15 | 30-12155 | 30-12105 |
| 30-12120 | Publish Notice of Intent of Draft WQC Permit - Manatee Mitigation | 15 | 11-Jun-15 | 01-Jul-15 | 30-12105 | 30-12100 |
| 30-12100 | Issue Final Agency Action (if no petitions are filed) - Manatee Mitigation | 5 | 02-Jul-15 | 09-Jul-15 | 30-12120 | 30-12125 |
| 30-12125 | State WQC/Permits Received (300) - Manatee Mitigation | 0 | | 09-Jul-15 | 30-12100 | 30-8620 |

| Activity ID | Activity Name | Duration | Start | Finish | Predecessors | Successors |
|---|---|---|---|---|---|---|
| 112375.5.7.7.2 | 1502 WQC Permit - 6Ls | 137 | 20-Nov-15 | 07-Jun-16 | | |
| 30-12245 | 1502 WQC Pre-Application (CERPRA) Mtg (Reasonable Assurances) - 6Ls | 1 | 20-Nov-15 | 20-Nov-15 | 30-11335 | 30-12260 |
| 30-12260 | Prepare 1502 Application Package/WQC - 6Ls | 22 | 20-Nov-15 | 22-Dec-15 | 30-12245 | 30-12275 |
| 30-12225 | Submit State WQC/Permits Application (L299) - 6Ls | 0 | | 23-Dec-15 | 30-12275 | 30-12280 |
| 30-12275 | Submit 1502 WQC Permit Applications - 6Ls | 1 | 23-Dec-15 | 23-Dec-15 | 30-12260 | 30-12225 |
| 30-12240 | Receive Request for Additional Information (RAI)/Completeness Letter - 6Ls | 0 | | 27-Jan-16 | 30-12280 | 30-12265 |
| 30-12280 | 1502 Application Completeness Review - 6Ls | 22 | 24-Dec-15 | 27-Jan-16 | 30-12225 | 30-12240, 30-12265 |
| 30-12265 | Prepare and Submit Response to RAI - 6Ls | 22 | 28-Jan-16 | 29-Feb-16 | 30-12240, 30-12280 | 30-12285 |
| 30-12285 | 1502 Application Completeness Review - 6Ls | 40 | 01-Mar-16 | 25-Apr-16 | 30-12265 | 30-12270 |
| 30-12235 | Receipt of Intent and Public Notice - 6Ls | 0 | | 09-May-16 | 30-12270 | 30-12250 |
| 30-12270 | Corps Review of Draft WQC Permit - 6Ls | 10 | 26-Apr-16 | 09-May-16 | 30-12285 | 30-12235 |
| 30-12250 | Publish Notice of Intent of Draft WQC Permit - 6Ls | 15 | 10-May-16 | 31-May-16 | 30-12235 | 30-12230 |
| 30-12230 | Issue Final Agency Action (if no petitions are filed) - 6Ls | 5 | 01-Jun-16 | 07-Jun-16 | 30-12250, 30-12365 | 30-12255 |
| 30-12255 | State WQC/Permits Received (300) - 6Ls | 0 | | 07-Jun-16 | 30-12230 | 30-8620 |
| 112375.5.9 | Limited Re-evaluation Report (LRR) | 488 | 03-Dec-12 A | 10-Nov-14 | | |
| 30-12815 | Cost Certification of Updated Cost by Walla Walla | 27 | 03-Sep-13 A | 09-Oct-13 | 30-12730 | 30-12030, 30-12820 |
| 30-12820 | Incorporate Cost Certification into LRR, DQC, and OC Review | 10 | 10-Oct-13 | 24-Oct-13 | 30-12815 | 30-12005, 30-12030 |
| 30-12005 | IPR with HQ and SAD | 10 | 25-Oct-13 | 07-Nov-13 | 30-11945, 30-12030, | 30-11905 |
| 30-11935 | FWS Prepare Biological Opinion (BO) | 247 | 03-Dec-12 A | 25-Nov-13 | 30-11930 | |
| 30-12030 | SAD Review of Draft Final LRR/EA | 22 | 25-Oct-13 | 26-Nov-13 | 30-12730, 30-12740, | 30-11995, 30-12005 |
| 30-11900 | Submit Draft Final LRR/EA | 0 | | 13-Dec-13 | 30-11995 | 30-11905 |
| 30-11995 | Incorporate SAD Comments into Draft Final LRR/EA | 12 | 27-Nov-13 | 13-Dec-13 | 30-12030 | 30-11905, 30-11900, |
| 30-12485 | DE Transmittal Letter/SAD Transmits Draft Final LRR/EA to HQ | 5 | 16-Dec-13 | 20-Dec-13 | 30-11995 | 30-12495 |
| 30-12495 | DE Transmittal Letter | 0 | | 20-Dec-13 | 30-12485 | 30-11905 |
| 30-11905 | HQ Review of Draft Final LRR/EA | 27 | 23-Dec-13 | 31-Jan-14 | 30-12005, 30-12730, | 30-12035 |

| Activity ID | Activity Name | Duration | Start | Finish | Predecessors | Successors |
|---|---|---|---|---|---|---|
| 30-12035 | HQ Comments incorporated into Final LRR/EA | 5 | 03-Feb-14 | 07-Feb-14 | 30-11905 | 30-12040, 30-12735, |
| 30-12735 | Final LRR/EA Approved | 0 | | 24-Feb-14 | 30-12035, 30-12810 | 30-12040 |
| 30-12810 | HQ Review and Approve Final LRR/EA | 10 | 10-Feb-14 | 24-Feb-14 | 30-12035 | 30-12735 |
| 30-12040 | ASA (CW) Review of Final LRR/EA | 30 | 25-Feb-14 | 07-Apr-14 | 30-12035, 30-12735 | 30-12050 |
| 30-12045 | ASA (CW) Memo to OMB [MS] | 0 | | 06-May-14 | 30-12050 | 30-12055 |
| 30-12050 | ASA (CW) Memo to OMB | 21 | 08-Apr-14 | 06-May-14 | 30-12040 | 30-12045 |
| 30-12055 | OMB Review | 40 | 07-May-14 | 02-Jul-14 | 30-12045 | 30-12060, 30-11955 |
| 30-11955 | FONSI SIgned | 1 | 03-Jul-14 | 03-Jul-14 | 30-12055 | 30-12375 |
| 30-12375 | FONSI Signed [MS] | 0 | | 03-Jul-14 | 30-11955 | 30-8620 |
| 30-12060 | ASA (CW) Letter Submitted to Congress | 15 | 03-Jul-14 | 24-Jul-14 | 30-12055 | 30-12065 |
| 30-12065 | ASA (CW) Letter Submitted to Congress [MS] | 0 | | 24-Jul-14 | 30-12060 | 30-12070 |
| 30-12070 | Congressional Authorization | 15 | 25-Jul-14 | 14-Aug-14 | 30-12065 | 30-12075 |
| 30-12075 | Congressional Review | 50 | 15-Aug-14 | 27-Oct-14 | 30-12070 | 30-12080 |
| 30-12080 | President SIgns WRDA | 10 | 28-Oct-14 | 10-Nov-14 | 30-12075 | 30-12085, 30-11175, |
| 30-12085 | President Signs Authorization | 0 | | 10-Nov-14 | 30-12080 | 30-10690, 30-10705, |
| 112375.5.8 Transfer Agreement | | 1467 | 10-May-10 A | 15-Mar-16 | | |
| 30-10305 | Update Transfer Faka Union | 874 | 10-May-10 A | 30-Oct-13 | 30-8405 | 30-8620 |
| 30-10310 | Update Transfer Agreement Miller | 160 | 15-Oct-13* | 04-Jun-14 | 30-8310 | 30-8620 |
| 30-10315 | Update Transfer Agreement Protection Feature | 20 | 17-Feb-16 | 15-Mar-16 | 30-10995 | 30-8620 |
| **112375.7 RE** | | 1044 | 01-Feb-13 A | 30-Mar-17 | | |
| 112375.7.3 Land Certification & Credit | | 1044 | 01-Feb-13 A | 30-Mar-17 | | |
| 112375.7.3.2 Flow Easements and Permissions for Operations Merritt, Faka Uni | | 1044 | 01-Feb-13 A | 30-Mar-17 | | |
| 30-12760 | RE Acquisition and Certfication of All Operational Lands | 1044 | 01-Feb-13 A | 30-Mar-17 | | |
| **112375.8 CONS** | | 2073 | 18-Dec-09 A | 26-Mar-18 | | |
| 112375.8.1 PM | | 251 | 01-Oct-13 | 30-Sep-14 | | |
| 30-11756 | Project Management FY14 | 251 | 01-Oct-13 | 30-Sep-14 | 30-11751 | |
| 30-11757 | Project Management CADD FY14 | 251 | 01-Oct-13 | 30-Sep-14 | 30-11751 | |
| 112375.8.2 Solicitation / Award | | 1469 | 22-Nov-10 A | 27-Sep-16 | | |
| 112375.8.2.1 Solicitation/Award Picayune Strand Pump Station Contracts | | 1469 | 22-Nov-10 A | 27-Sep-16 | | |

| Activity ID | Activity Name | Duration | Start | Finish | Predecessors | Successors |
|---|---|---|---|---|---|---|
| 112375.8.2.1.2 | Solicitation/Award Picayune Strand - Faka Union Pump Station | 922 | 22-Nov-10 A | 24-Jul-14 | | |
| 30-8341 | Award Contract - Faka Union | 922 | 22-Nov-10 A | 24-Jul-14 | 30-10350 | 30-8345, 30-10405 |
| 112375.8.2.1.3 | Solicitation/Award Picayune Strand - Miller Pump Station | 769 | 05-Sep-13 A | 27-Sep-16 | | |
| U104 | Miller Pump Station Contract Award | 769 | 05-Sep-13 A | 27-Sep-16 | 30-10360, 30-8315 | |
| 112375.8.2.1.4 | Solicitation/Award Picayune Strand Manatee Mitigation | 68 | 02-Mar-15 | 04-Jun-15 | | |
| 30-11750 | Manatee Mitigation - SFWMD Develope Procurement Package (by SFWMD) | 5 | 02-Mar-15 | 06-Mar-15 | 30-12385 | 30-11755 |
| 30-11755 | Manatee Mitigation - Ready to Advertise (by SFWMD)(RTA) | 0 | | 06-Mar-15 | 30-11750 | 30-11770 |
| 30-11765 | Manatee Mitigation - Construction Contract Advertised (by SFWMD) | 0 | | 09-Mar-15 | 30-11770 | |
| 30-11770 | Manatee Mitigation - Advertisement Period (by SFWMD) | 45 | 09-Mar-15 | 08-May-15 | 30-11755 | 30-11765, 30-11775 |
| 30-11775 | Manatee Mitigation - Bid Opening (by SFWMD) | 0 | | 08-May-15 | 30-11770 | 30-11780 |
| 30-11780 | Manatee Mitigation - Bid Review (by SFWMD) | 13 | 11-May-15 | 28-May-15 | 30-11775 | 30-11785 |
| 30-11785 | Manatee Mitigation - Award Construction Contract (by SFWMD) | 5 | 29-May-15 | 04-Jun-15 | 30-11780 | 30-11790 |
| 30-11790 | Manatee Mitigation - Construction Contract Awarded (by SFWMD) | 0 | | 04-Jun-15 | 30-11785 | 30-11805 |
| 112375.8.2.1.5 | Road Degrading North of Leavees (by SFWMD) | 106 | 26-Jun-15 | 27-Nov-15 | | |
| 30-12426 | Award Road Degrading North of Leeves (by SFWMD) | 106 | 26-Jun-15 | 27-Nov-15 | 30-12421 | 30-12431 |
| 112375.8.2.2 | Solicitation/Award Picayune Strand Protection Features | 73 | 05-May-16 | 17-Aug-16 | | |
| 112375.8.2.2.2 | 6Ls | 73 | 05-May-16 | 17-Aug-16 | | |
| 30-11020 | 6Ls - EN Div Procurement Package to CT-C | 10 | 05-May-16 | 18-May-16 | 30-11010, 30-11550 | 30-11015, 30-11025 |
| 30-11015 | 6Ls - Post FedBiz Synopsis | 15 | 19-May-16 | 09-Jun-16 | 30-11020 | 30-11025, 30-11035 |
| 30-11025 | 6Ls - Ready to Advertise (RTA) | 0 | | 09-Jun-16 | 30-11015, 30-11020 | 30-11035 |
| 30-11030 | 6Ls - Construction Contract Advertised | 0 | | 10-Jun-16 | 30-11035 | |
| 30-11035 | 6Ls - Advertisement Period | 21 | 10-Jun-16 | 11-Jul-16 | 30-11015, 30-11025 | 30-11030, 30-11040 |
| 30-11040 | 6Ls - Bid Opening | 0 | | 11-Jul-16 | 30-11035 | 30-11045 |
| 30-11045 | 6Ls - Bid Review | 22 | 12-Jul-16 | 10-Aug-16 | 30-11040 | 30-11050 |
| 30-11050 | 6Ls - Award Construction Contract | 5 | 11-Aug-16 | 17-Aug-16 | 30-11045 | 30-11055, 30-10325 |
| 30-11055 | 6Ls - Construction Contract Awarded | 0 | | 17-Aug-16 | 30-11050 | 30-11060 |

| Activity ID | Activity Name | Duration | Start | Finish | Predecessors | Successors |
|---|---|---|---|---|---|---|
| 112375.8.2.2.4 | US41 (If Needed) | 73 | 05-May-16 | 17-Aug-16 | | |
| 30-12476 | US41 - EN Div Procurement Package to CT-C | 10 | 05-May-16* | 18-May-16 | 30-11010, 30-11550 | 30-12470, 30-12465 |
| 30-12470 | US41 - Post FedBiz Synopsis | 15 | 19-May-16 | 09-Jun-16 | 30-12476 | 30-12465, 30-12436 |
| 30-12465 | US41 - Ready to Advertise (RTA) | 0 | | 09-Jun-16 | 30-12470, 30-12476 | 30-12436 |
| 30-12510 | US41 - Construction Contract Advertised | 0 | | 10-Jun-16* | 30-12436 | |
| 30-12436 | US41 - Advertisement Period | 21 | 10-Jun-16 | 11-Jul-16 | 30-12470, 30-12465 | 30-12510, 30-12441 |
| 30-12441 | US41 - Bid Opening | 0 | | 11-Jul-16 | 30-12436 | 30-12446 |
| 30-12446 | US41 - Bid Review | 22 | 12-Jul-16 | 10-Aug-16 | 30-12441 | 30-12530 |
| 30-12530 | US41 - Award Construction Contract | 5 | 11-Aug-16 | 17-Aug-16 | 30-12446 | 30-12535 |
| 30-12535 | US41 - Construction Contract Awarded | 0 | | 17-Aug-16 | 30-12530 | 30-12491 |
| 112375.8.3 | Construction Contract | 763 | 06-Sep-13 A | 20-Sep-16 | | |
| 112375.8.3.6 | Contract - Protection Features | 23 | 18-Aug-16 | 20-Sep-16 | | |
| 112375.8.3.6.3 | Contract - 6Ls | 23 | 18-Aug-16 | 20-Sep-16 | | |
| 30-11060 | 6Ls - Prepare Notice to Proceed | 22 | 18-Aug-16 | 19-Sep-16 | 30-11055 | 30-11065 |
| 30-11065 | 6Ls - Construction Contract Notice to Proceed Issued | 0 | | 19-Sep-16 | 30-11060 | 30-11070 |
| 30-11070 | 6Ls - Contractor Prepares NTP Acknowledgement | 1 | 20-Sep-16 | 20-Sep-16 | 30-11065 | 30-11075 |
| 30-11075 | 6Ls - Construction NTP Acknowledged | 0 | | 20-Sep-16 | 30-11070 | 30-11080, 30-11640 |
| 112375.8.3.6.4 | Contract - US41 (If Needed) | 23 | 18-Aug-16 | 20-Sep-16 | | |
| 30-12491 | US41 - Prepare Notice to Proceed | 22 | 18-Aug-16 | 19-Sep-16 | 30-12535 | 30-12496 |
| 30-12496 | US41 - Construction Contract Notice to Proceed Issued | 0 | | 19-Sep-16 | 30-12491 | 30-12481 |
| 30-12481 | US41 - Contractor Prepares NTP Acknowledgement | 1 | 20-Sep-16 | 20-Sep-16 | 30-12496 | 30-12486 |
| 30-12486 | US41 - Construction NTP Acknowledged | 0 | | 20-Sep-16 | 30-12481 | 30-12540 |
| 112375.8.3.7 | Contract - Miller Pump Station | 24 | 06-Sep-13 A | 09-Oct-13 | | |
| 30-8455 | Issue Notice to Proceed - Miller Pump Station | 23 | 06-Sep-13 A | 08-Oct-13 | 30-8315 | 30-8460 |
| 30-8460 | Construction Contract Notice to Proceed - Miller Pump Station | 0 | | 08-Oct-13 | 30-8455 | 30-8435 |
| 30-8435 | NTP Acknowledged - Miller | 1 | 09-Oct-13 | 09-Oct-13 | 30-8460 | 30-8440 |
| 30-8440 | Construction NTP Acknowledged - Miller | 0 | | 09-Oct-13 | 30-8435 | 30-8475, 30-9370, |
| 112375.8.3.9 | Contract - Manatee Mitigation | 24 | 05-Jun-15 | 09-Jul-15 | | |

| Activity ID | Activity Name | Duration | Start | Finish | Predecessors | Successors |
|---|---|---|---|---|---|---|
| 30-11800 | Manatee Mitigation - Construction Contract Notice to Proceed Issued (by SFWMD) | 0 | | 08-Jul-15 | 30-11805 | 30-11815 |
| 30-11805 | Manatee Mitigation -Construction Contract Notice to Proceed Issued (by SFWMD) | 23 | 05-Jun-15 | 08-Jul-15 | 30-11790 | 30-11800, 30-12460 |
| 30-12460 | Manatee Mitigation -Construction Contract Notice to Proceed Acknowledged (by SFWMD) | 1 | 09-Jul-15 | 09-Jul-15 | 30-11805 | 30-12480 |
| 30-12480 | Manatee Mitigation -Construction Contract Notice to Proceed Acknowledged (by SFWMD) | 0 | | 09-Jul-15 | 30-12460 | |
| **112375.8.3.10 Road Degrading North of Leavees (by SFWMD)** | | 160 | 30-Nov-15 | 18-Jul-16 | | |
| 30-12431 | Road Degrading North of the Levees Construction (by SFWMD) | 160 | 30-Nov-15 | 18-Jul-16 | 30-12426 | |
| **112375.8.4 Construction Management** | | 2049 | 18-Dec-09 A | 20-Feb-18 | | |
| **112375.8.4.5 Manatee Mitigation** | | 212 | 09-Jul-15 | 11-May-16 | | |
| 30-11815 | Manatee Mitigation - Construction | 185 | 09-Jul-15 | 04-Apr-16 | 30-11800 | 30-11820, 30-12560 |
| 30-11820 | Manatee Mitigation - Construction Complete | 0 | | 04-Apr-16 | 30-11815 | 30-11825, 30-12565, |
| 30-12560 | Manatee Mitigation - Construction Required Completion | 0 | | 04-Apr-16 | 30-11815 | |
| 30-11825 | Manatee Mitigation - Complete Construction & Clear Punchlists | 10 | 05-Apr-16 | 18-Apr-16 | 30-11820 | 30-11830 |
| 30-11830 | Manatee Mitigation - Physical Completion | 0 | | 18-Apr-16 | 30-11825 | 30-8555, 30-10325, |
| 30-12565 | Manatee Mitigation - Prepare As-Builts | 22 | 05-Apr-16 | 04-May-16 | 30-11820 | 30-12570 |
| 30-12570 | Manatee Mitigation - As-Built Drawings Complete | 0 | | 04-May-16 | 30-12565 | 30-12580 |
| 30-12575 | Manatee Mitigation - Pre-Final Inspection (Develop Punchlist) | 25 | 05-Apr-16 | 09-May-16 | 30-11820 | |
| 30-12580 | Manatee Mitigation - Contractor Evaluation | 5 | 05-May-16 | 11-May-16 | 30-12570 | 30-12585, 30-H8605 |
| 30-12585 | Manatee Mitigation - Contractor Evalution Date | 0 | | 11-May-16 | 30-12580 | |
| 30-H8605 | Manatee Mitigation - Contract Transfer Documents | 0 | | 11-May-16 | 30-12580 | 30-12715 |
| **112375.8.4.1 Merritt Pump Station** | | 1329 | 18-Dec-09 A | 07-Apr-15 | | |
| U102 | C&SF:CERP:PIC STRAND QA Personnel FY13 Merritt - CD | 252 | 01-Oct-12 A | 01-Oct-13 | 30-11675, 30-11680 | |
| 30-8495 | Physical Completion - Merritt | 0 | | 03-Dec-13 | 30-2621 | 30-H2630, 30-11647, |
| 30-1343 | Construction Pump Station - Merritt | 993 | 18-Dec-09 A | 03-Dec-13 | 30-1455, 30-8430, 30-P805, 30-9690, | 30-9695, 30-8490 |
| 30-8490 | Complete Construction & Clear Punchlists - Merritt | 9 | 04-Dec-13 | 16-Dec-13 | 30-10170, 30-1343 | ARRA400 |

| Activity ID | Activity Name | Duration | Start | Finish | Predecessors | Successors |
|---|---|---|---|---|---|---|
| 30-1612 | Evaluate A/E Contractor - Merritt | 21 | 04-Dec-13 | 03-Jan-14 | 30-8495 | 30-1617 |
| 30-1617 | A/E Contractor Evaluated - Merritt | 0 | | 03-Jan-14 | 30-1612 | |
| 30-8485 | Construction Complete - Merritt | 0 | | 06-Mar-14 | 30-10320 | 30-8486, 30-1597 |
| 30-8655 | Construction Required Completion - Merritt | 0 | | 06-Mar-14 | 30-10320 | |
| 30-1597 | Prepare As-Builts - Merritt | 22 | 07-Mar-14 | 07-Apr-14 | 30-8485 | 30-1598 |
| 30-1598 | As-Built Drawings Complete - Merritt | 0 | | 07-Apr-14 | 30-1597 | 30-1602, 30-H2620 |
| 30-8486 | Pre-Final Inspection (Develop Punchlist) - Merritt | 25 | 07-Mar-14 | 10-Apr-14 | 30-8485 | |
| 30-1602 | Contractor Evaluation - Merritt | 5 | 08-Apr-14 | 14-Apr-14 | 30-1598 | 30-1607 |
| 30-1607 | Contractor Evalution Date - Merritt | 0 | | 14-Apr-14 | 30-1602 | |
| 30-H2635 | Contract Transfer Documents - Merritt | 0 | | 07-Apr-15 | 30-H2620 | |
| **112375.8.4.3 Faka Union Pump Station** | | 503 | 01-Oct-13 | 01-Oct-15 | | |
| 30-11510 | Construction Pump Station Faka Union FY14 | 208 | 01-Oct-13 | 30-Jul-14 | 30-10435 | 30-2622 |
| 30-8515 | Construction Substantially Complete - Faka Union | 0 | | 28-Aug-14 | 30-2622 | 30-8520, 30-8635, 30-8521 |
| 30-12420 | Construction Required Completion - Faka Union | 0 | | 28-Aug-14 | 30-2622 | 30-8520 |
| 30-8521 | Pre-Final Inspection (Develop Punchlist) - Faka Union | 1 | 29-Aug-14 | 29-Aug-14 | 30-8515 | 30-8520 |
| 30-8520 | Complete Construction & Clear Punchlists - Faka Union Pump Station & Road Removal | 22 | 02-Sep-14 | 01-Oct-14 | 30-8515, 30-10530, | 30-8525, 30-12435 |
| 30-8525 | Physical Completion - Faka Union | 0 | | 01-Oct-14 | 30-8520 | 30-8550, 30-12425, |
| 30-12425 | Evaluate A/E Contractor - Faka Union | 21 | 02-Oct-14 | 31-Oct-14 | 30-8525 | 30-12430 |
| 30-12430 | A/E Contractor Evaluated - Faka Union | 0 | | 31-Oct-14 | 30-12425 | |
| 30-12435 | Prepare As-Builts - Faka Union | 22 | 02-Oct-14 | 03-Nov-14 | 30-8520 | 30-12440 |
| 30-12440 | As-Built Drawings Complete - Faka Union | 0 | | 03-Nov-14 | 30-12435 | 30-12445 |
| 30-12445 | Contractor Evaluation - Faka Union | 5 | 04-Nov-14 | 10-Nov-14 | 30-12440 | 30-12450 |
| 30-12450 | Contractor Evalution Date - Faka Union | 0 | | 10-Nov-14 | 30-12445 | |
| 30-H8595 | Contract Transfer Documents - Faka Union | 0 | | 01-Oct-15 | 30-8635 | |
| **112375.8.4.4 Protection Features** | | 317 | 21-Sep-16 | 27-Dec-17 | | |
| **112375.8.4.4.3 Protection Features - 6Ls** | | 317 | 21-Sep-16 | 27-Dec-17 | | |
| 30-11080 | 6Ls - 6Ls Levee Construction | 290 | 21-Sep-16 | 16-Nov-17 | 30-11075 | 30-11105, 30-12650, |
| 30-11105 | 6Ls - Construction Complete | 0 | | 16-Nov-17 | 30-11080 | 30-11110, 30-12655, |
| 30-12650 | 6Ls - Construction Required Completion | 0 | | 16-Nov-17 | 30-11080 | |
| 30-12655 | 6Ls - Prepare As-Builts | 22 | 17-Nov-17 | 19-Dec-17 | 30-11105 | 30-12660 |
| 30-12660 | 6Ls - As-Built Drawings Complete | 0 | | 19-Dec-17 | 30-12655 | 30-12670 |

| Activity ID | Activity Name | Duration | Start | Finish | Predecessors | Successors |
|---|---|---|---|---|---|---|
| 30-11110 | 6Ls - Complete Construction & Clear Punchlists | 23 | 17-Nov-17 | 20-Dec-17 | 30-11105 | 30-11115 |
| 30-11115 | 6Ls - Physical Completion | 0 | | 20-Dec-17 | 30-11110 | 30-8555 |
| 30-12665 | 6Ls - Pre-Final Inspection (Develop Punchlist) | 25 | 17-Nov-17 | 22-Dec-17 | 30-11105 | |
| 30-12670 | 6Ls - Contractor Evaluation | 5 | 20-Dec-17 | 27-Dec-17 | 30-12660 | 30-12675, 30-H8620 |
| 30-12675 | 6Ls - Contractor Evalution Date | 0 | | 27-Dec-17 | 30-12670 | |
| 30-H8620 | 6Ls - Contract Transfer Documents | 0 | | 27-Dec-17 | 30-12670 | 30-8555 |
| 112375.8.4.4.4 | Protection Features - US41 (If Needed) | 257 | 21-Sep-16 | 28-Sep-17 | | |
| 30-12540 | US41 - Construction | 230 | 21-Sep-16 | 21-Aug-17 | 30-12486 | 30-12545, 30-12680 |
| 30-12545 | US41 - Construction Complete | 0 | | 21-Aug-17 | 30-12540 | 30-12550, 30-12685, |
| 30-12680 | US41 - Construction Required Completion | 0 | | 21-Aug-17 | 30-12540 | |
| 30-12685 | US41 - Prepare As-Builts | 22 | 22-Aug-17 | 21-Sep-17 | 30-12545 | 30-12690 |
| 30-12690 | US41 - As-Built Drawings Complete | 0 | | 21-Sep-17 | 30-12685 | 30-12700 |
| 30-12550 | US41 - Complete Construction & Clear Punchlists | 23 | 22-Aug-17 | 22-Sep-17 | 30-12545, 30-11640 | 30-12555 |
| 30-12555 | US41 - Physical Completion | 0 | | 22-Sep-17 | 30-12550 | 30-8555 |
| 30-12695 | US41 - Pre-Final Inspection (Develop Punchlist) | 25 | 22-Aug-17 | 26-Sep-17 | 30-12545 | |
| 30-12700 | US41 - Contractor Evaluation | 5 | 22-Sep-17 | 28-Sep-17 | 30-12690 | 30-12705, 30-H8625 |
| 30-12705 | US41 - Contractor Evalution Date | 0 | | 28-Sep-17 | 30-12700 | |
| 30-H8625 | US41 - Contract Transfer Documents | 0 | | 28-Sep-17 | 30-12700 | 30-8555 |
| 112375.8.4.2 | Miller Pump Station | 1092 | 10-Oct-13 | 20-Feb-18 | | |
| 30-8475 | Construction Pump Station - Miller | 795 | 10-Oct-13 | 12-Dec-16 | 30-8440 | 30-8500, 30-9755, |
| 30-8500 | Construction Substatially Complete - Miller | 0 | | 12-Dec-16 | 30-8475 | 30-8506 |
| 30-12456 | Construction Required Completion - Miller | 0 | | 12-Dec-16 | 30-8475 | |
| 30-9370 | Miller Pump Station S&A and S&I - Miller | 804 | 11-Oct-13 | 27-Dec-16 | 30-8440 | |
| 30-8506 | Pre-Final Inspection (Develop Punchlist) - Miller | 10 | 13-Dec-16 | 27-Dec-16 | 30-8500 | 30-8505 |
| 30-8505 | Complete Construction & Clear Punchlists - Miller | 10 | 28-Dec-16 | 11-Jan-17 | 30-8506 | 30-8510, 30-12461 |
| 30-8510 | Physical Completion - Miller | 0 | | 11-Jan-17 | 30-8505 | 30-8545 |
| 30-12461 | Prepare As-Builts - Miller | 15 | 12-Jan-17 | 02-Feb-17 | 30-8505 | 30-12466 |
| 30-12466 | As-Built Drawings Complete - Miller | 0 | | 02-Feb-17 | 30-12461 | 30-12471 |
| 30-12471 | Contractor Evaluation - Miller | 5 | 03-Feb-17 | 09-Feb-17 | 30-12466 | 30-12475 |
| 30-12475 | Contractor Evalution Date - Miller | 0 | | 09-Feb-17 | 30-12471 | |
| 30-H8600 | Contract Transfer Documents - Miller | 0 | | 20-Feb-18 | 30-8630, 30-10330 | |

| Activity ID | Activity Name | Duration | Start | Finish | Predecessors | Successors |
|---|---|---|---|---|---|---|
| 112375.8.5 | Construction Monitoring | 1074 | 01-Oct-13 | 12-Jan-18 | | |
| 30-10285 | Hydrogical / Meteorological Monitoring FY14 | 251 | 01-Oct-13 | 30-Sep-14 | 30-10280 | 30-10290 |
| 30-9715 | Cultural Resources Monitoring FY14 During Construction | 251 | 01-Oct-13 | 30-Sep-14 | 30-9710 | 30-9720 |
| 30-10565 | Implementation and Coordination of Project Monitoring Plan (Pre, During and Post) FY14 | 251 | 01-Oct-13 | 30-Sep-14 | 30-10560 | 30-10570 |
| 30-10520 | WQC Monitoring Merritt | 251 | 08-Apr-14 | 07-Apr-15 | 30-H2620 | 30-8620 |
| 30-10290 | Hydrogical / Meteorological Monitoring FY15 | 251 | 01-Oct-14 | 30-Sep-15 | 30-10285 | 30-10295 |
| 30-9720 | Cultural Resources Monitoring FY15 During Construction | 251 | 01-Oct-14 | 30-Sep-15 | 30-9715 | 30-9725 |
| 30-10770 | WQC Monitoring Faka | 251 | 02-Oct-15 | 30-Sep-16 | 30-8635 | 30-8620 |
| 30-9725 | Cultural Resources Monitoring FY16 During Construction | 295 | 01-Oct-15 | 05-Dec-16 | 30-9720 | |
| 30-10295 | Hydrogical / Meteorological Monitoring FY16 | 438 | 01-Oct-15 | 29-Jun-17 | 30-10290 | |
| 30-10570 | Implementation and Coordination of Project Monitoring Plan (Pre, During and Post) FY15 | 689 | 01-Oct-14 | 29-Jun-17 | 30-10565 | |
| 30-10915 | WQC Monitoring Miller | 251 | 13-Jan-17 | 12-Jan-18 | 30-8630 | 30-8620 |
| 112375.8.5.1 | FWS Monitoring During Construction | 510 | 01-Oct-13 | 13-Oct-15 | | |
| 30-9775 | FWS Monitoring - Faka Union FY14 | 251 | 01-Oct-13 | 30-Sep-14 | 30-9765 | |
| 30-9326 | FWS FY14 | 251 | 01-Oct-13* | 30-Sep-14 | | |
| 30-9755 | FWS Monitoring - Miller FY14 | 251 | 11-Oct-13 | 10-Oct-14 | 30-8475 | 30-9770 |
| 30-9770 | FWS Monitoring - Miller FY15 | 251 | 14-Oct-14 | 13-Oct-15 | 30-9755 | |
| 112375.8.5.2 | Exotic Plant Control and Assessmen | 325 | 01-Oct-13 | 20-Jan-15 | | |
| 30-10490 | Exotic Plant Control Construction Footprint - Merritt FY14 | 42 | 01-Oct-13 | 02-Dec-13 | 30-10485 | 30-H2620 |
| 30-9805 | Exotic Plant Control Construction Footprint - Miller | 251 | 01-Oct-13 | 30-Sep-14 | 30-8310 | |
| 30-10505 | Exotic Plant Control Construction Footprint - Faka Union FY14 | 325 | 01-Oct-13 | 20-Jan-15 | 30-10500 | 30-8635 |
| 112375.8.6 | Engr During Const | 1227 | 01-Oct-12 A | 21-Aug-17 | | |
| U103 | C&SF:CERP:PIC STRAND EDC TO AE Contractor FY13 Faka - EN | 252 | 01-Oct-12 A | 01-Oct-13 | 30-10410 | 30-8620 |
| 30-11635 | Engineering During Construction - Protection Features (PL's) | 220 | 21-Sep-16 | 07-Aug-17 | 30-11425, 30-11080 | |
| 30-11640 | Engineering During Construction - Protection Features (6L's) | 230 | 21-Sep-16 | 21-Aug-17 | 30-11075 | 30-12550 |
| 112375.8.6.1 | Picayune Strand Pump Station Contracts | 251 | 01-Oct-13 | 30-Sep-14 | | |
| 112375.8.6.1.1 | Merritt Pump Station | 251 | 01-Oct-13 | 30-Sep-14 | | |
| 30-12765 | EDC - Merritt Pump Station FY14 | 251 | 01-Oct-13 | 30-Sep-14 | 30-12395 | |
| 112375.8.6.1.2 | Faka Union Pump Station | 251 | 01-Oct-13 | 30-Sep-14 | | |
| 30-12770 | EDC - Faka Union Pump Station FY14 | 251 | 01-Oct-13 | 30-Sep-14 | 30-10400 | |
| 112375.8.6.1.3 | Miller Pump Station | 251 | 01-Oct-13 | 30-Sep-14 | | |
| 30-12775 | EDC - Miller Pump Station FY14 | 251 | 01-Oct-13* | 30-Sep-14 | | |

| Activity ID | Activity Name | Duration | Start | Finish | Predecessors | Successors |
|---|---|---|---|---|---|---|
| 112375.8.7 | Interim OPS During Constr | 1163 | 01-Jul-13 A | 20-Feb-18 | | |
| 30-2621 | Pump Functional Test - Merritt | 107 | 01-Jul-13 A | 03-Dec-13 | | 30-9316, 30-10320, |
| 30-10395 | Pump Endurance Test - Merritt | 21 | 04-Dec-13 | 03-Jan-14 | 30-2621 | 30-10320 |
| 30-10320 | Downstream Plugging - Merritt | 42 | 06-Jan-14 | 06-Mar-14 | 30-2621, 30-10395 | 30-8620, 30-8485, 30-8655 |
| 30-2622 | Pump Endurance Test - Faka Union Pump Station | 21 | 31-Jul-14 | 28-Aug-14 | 30-11510 | 30-8635, 30-10325, |
| 30-8600 | Prepare O&M Post Construction Plan & Budget - Protection Features | 86 | 01-May-14* | 02-Sep-14 | | 30-8635 |
| 30-8595 | Prepare O&M Post Construction Plan & Budget - Faka Union | 103 | 01-May-14* | 25-Sep-14 | 30-8405 | 30-8635 |
| 30-H2620 | OTMP/ Operational Testing and Monitoring Period - Merritt | 251 | 08-Apr-14 | 07-Apr-15 | 30-1345, 30-8585, 30-9015, 30-9316, | 30-8610, 30-8635, |
| 30-8635 | OTMP/ Operational Testing and Monitoring Period - Faka Union | 251 | 02-Oct-14 | 01-Oct-15 | 30-8595, 30-9110, 30-8515, 30-2622, | 30-8960, 30-10770, |
| 30-11505 | Downstream Plugging Option East/West Canals - Merritt | 30 | 19-Apr-16 | 31-May-16 | 30-2621, 30-2622, 30-11830 | |
| 30-9510 | Pump Endurance Test - Miller | 21 | 13-Dec-16 | 12-Jan-17 | 30-8475 | 30-8630, 30-10330 |
| 30-8590 | Prepare O&M Post Construction Plan & Budget - Miller | 555 | 01-May-15* | 17-Jul-17 | 30-8215 | |
| 30-8630 | OTMP/ Operational Testing and Monitoring Period - Miller | 251 | 13-Jan-17 | 12-Jan-18 | 30-9510 | 30-8965, 30-10915, |
| 30-10325 | Downstream Plugging - Faka Union | 63 | 17-Nov-17 | 20-Feb-18 | 30-2622, 30-11820, | 30-8620 |
| 30-10330 | Downstream Plugging - Miller | 63 | 17-Nov-17 | 20-Feb-18 | 30-9510, 30-11105, | 30-8620, 30-H8600 |
| 112375.8.7.3 | Draft Project Operations Manual - Miller | 210 | 02-Jun-14 | 02-Apr-15 | | |
| 30-9155 | Prepare Draft DPOM - Miller | 65 | 02-Jun-14* | 02-Sep-14 | 30-9150, 30-8310 | 30-9115 |
| 30-9115 | Draft DPOM - Miller Review Period | 17 | 03-Sep-14 | 25-Sep-14 | 30-9155 | 30-9120, 30-9790 |
| 30-9120 | Preparations of Responses to Draft DPOM Comments - Miller | 32 | 26-Sep-14 | 12-Nov-14 | 30-9115 | 30-9125 |
| 30-9125 | BackCheck Draft DPOM Comments - Miller | 15 | 13-Nov-14 | 04-Dec-14 | 30-9120 | 30-9130 |
| 30-9130 | Corps Responses to BackCheck Comments - Miller | 18 | 05-Dec-14 | 31-Dec-14 | 30-9125 | 30-9135 |
| 30-9135 | Issue Resolution Comments - Miller | 4 | 02-Jan-15 | 07-Jan-15 | 30-9130 | 30-9140 |
| 30-9140 | Final Entries into DrChecks - Miller | 12 | 08-Jan-15 | 26-Jan-15 | 30-9135 | 30-9145 |
| 30-9790 | Respond to FWS Comments and Concerns re DPOM - Miller | 83 | 26-Sep-14 | 28-Jan-15 | 30-9115 | 30-9145 |

| Activity ID | Activity Name | Duration | Start | Finish | Predecessors | Successors |
|---|---|---|---|---|---|---|
| 30-9145 | Prepare Final Draft DPOM - Miller | 26 | 29-Jan-15 | 06-Mar-15 | 30-9140, 30-9790 | 30-9285 |
| 30-9285 | QC Review/Finalize DPOM- Miller | 19 | 09-Mar-15 | 02-Apr-15 | 30-9145 | |
| 112375.8.9 Contract Close-Out | | 1080 | 04-Dec-13 | 26-Mar-18 | | |
| 30-H2630 | Contract Close-out Activities - Merritt | 199 | 04-Dec-13 | 17-Sep-14 | 30-1155, 30-1110, 30-1120, 30-1140, | 30-8560 |
| 30-8550 | Contract Close-out Activities - Faka Union | 150 | 02-Oct-14 | 08-May-15 | 30-8525, 30-10180, | 30-8570 |
| 30-12715 | Contract Close-out Activities - Manatee Mitigation (by SFWMD) | 150 | 12-May-16 | 15-Dec-16 | 30-H8605 | 30-12710 |
| 30-8545 | Contract Close-out Activities - Miller | 150 | 12-Jan-17 | 15-Aug-17 | 30-8510 | 30-8565 |
| 30-8555 | Contract Close-out Activities - Protection Features | 60 | 28-Dec-17 | 26-Mar-18 | 30-11115, 30-11135, | 30-8575 |
| **112375.3 Supervision & Admin (S&A)** | | 251 | 01-Oct-13 | 30-Sep-14 | | |
| 112375.3.1 Picayune Strand Pump Station Contracts | | 251 | 01-Oct-13 | 30-Sep-14 | | |
| 112375.3.1.1 Merritt Pump Station | | 251 | 01-Oct-13 | 30-Sep-14 | | |
| 30-12780 | S&A - Merritt Pump Station FY14 | 251 | 01-Oct-13 | 30-Sep-14 | 30-12400 | |
| 30-12785 | S&I - Merritt Pump Station FY14 | 251 | 01-Oct-13 | 30-Sep-14 | 30-12400 | |
| 112375.3.1.2 Faka Union Pump Station | | 251 | 01-Oct-13 | 30-Sep-14 | | |
| 30-12795 | S&I - Faka Union Pump Station FY14 | 251 | 01-Oct-13 | 30-Sep-14 | 30-10545 | |
| 30-12790 | S&A - Faka Union Pump Station FY14 | 251 | 01-Oct-13 | 30-Sep-14 | 30-10530 | |
| 112375.3.1.3 Miller Pump Station | | 227 | 10-Oct-13 | 05-Sep-14 | | |
| 30-9385 | Miller Pump Station S&A and S&I FY13 - Miller | 1 | 10-Oct-13 | 10-Oct-13 | 30-8440 | 30-12805, 30-12800 |
| 30-12805 | S&I - Miller Pump Station FY14 | 226 | 11-Oct-13 | 05-Sep-14 | 30-9385 | |
| 30-12800 | S&A - Miller Pump Station FY14 | 226 | 11-Oct-13 | 05-Sep-14 | 30-9385 | |
| **112375.9 Operations and Maitenance (O&M)** | | 86 | 04-Dec-13 | 08-Apr-14 | | |
| 30-11647 | Merritt - O&M FY13 | 86 | 04-Dec-13 | 08-Apr-14 | 30-8495 | 30-8620 |
| **112375.B PIM** | | 329 | 10-Oct-13 | 04-Feb-15 | | |
| 112375.B.1 PM | | 329 | 10-Oct-13 | 04-Feb-15 | | |
| 30-9316 | Cultural Resource Coordination Merritt Operation | 250 | 04-Dec-13 | 02-Dec-14 | 30-2621 | 30-H2620 |
| 30-9320 | Cultural Resources Coordination - Miller | 329 | 10-Oct-13 | 04-Feb-15 | 30-8440 | 30-8620 |
| **112375.C CLOSE OUT** | | 917 | 17-Sep-14 | 15-May-18 | | |
| 112375.C.1 Fiscal Closure | | 891 | 17-Sep-14 | 09-Apr-18 | | |
| 30-8560 | ARRA - C&SF:CERP:Picayune Strand - Merritt Contract Fiscal Completion | 0 | | 17-Sep-14 | 30-H2630 | 30-8610 |

| Activity ID | Activity Name | Duration | Start | Finish | Predecessors | Successors |
|---|---|---|---|---|---|---|
| 30-8570 | Contract Fiscal Completion - Faka Union | 0 | | 08-May-15 | 30-8550 | 30-8960 |
| 30-12710 | Contract Fiscal Completion - Manatee Mitigation | 0 | | 15-Dec-16 | 30-12715 | 30-8965 |
| 30-8565 | Contract Fiscal Completion - Miller | 0 | | 15-Aug-17 | 30-8545 | 30-8965 |
| 30-8575 | Contract Fiscal Completion - Protection Features | 0 | | 26-Mar-18 | 30-8555 | 30-8965 |
| 30-8685 | Project Fiscally Complete | 0 | | 09-Apr-18 | 30-8965 | |
| 112375.C.3 Transfer | | 780 | 08-Apr-15 | 15-May-18 | | |
| 30-8610 | Acceptance by Customer (Transfer O&M Authority) - Merritt | 10 | 08-Apr-15 | 21-Apr-15 | 30-8560, 30-8605, 30-H2620 | 30-8960 |
| 30-8960 | Acceptance by Customer (Transfer O&M Authority) - Faka Union | 10 | 02-Oct-15 | 16-Oct-15 | 30-8570, 30-8635, 30-8610 | 30-8965 |
| 30-8660 | Project Physically Complete | 0 | | 12-Jan-18 | 30-8630 | |
| 30-8965 | Acceptance by Customer (Transfer O&M Authority) - Miller | 10 | 27-Mar-18 | 09-Apr-18 | 30-8565, 30-8630, 30-9030, 30-9045, | 30-8685 |
| 30-8615 | Notice of Project Complete/Assumption of OMRR&R | 0 | | 15-May-18 | 30-8620 | |
| 30-8620 | Project Close-out & Transfer to O&M Authority | 60 | 21-Feb-18 | 15-May-18 | 30-F1000, 30-F1010, | 30-8615 |

| Risk No. | Risk/Opportunity Event | Project Cost | | | Project Schedule | | | Variance Distribution |
|---|---|---|---|---|---|---|---|---|
| | | Likelihood* | Impact* | Risk Level* | Likelihood* | Impact* | Risk Level* | |
| **PROJECT & PROGRAM MGMT** | | | | | | | | |
| PPM-1 | Funding Issues | Likely | Critical | HIGH | Likely | Critical | HIGH | Triangular |
| PPM-2 | Multiple stake holders | Unlikely | Significant | MODERATE | Likely | Critical | HIGH | Uniform |
| PPM-5 | Scope | Likely | Marginal | MODERATE | Likely | Negligible | LOW | Triangular |
| **CONTRACT ACQUISITION RISKS** | | | | | | | | |
| CA-1 | Acquisition Strategy - Other Remaining Features | Very Likely | Marginal | MODERATE | Very Unlikely | Negligible | LOW | Triangular |
| CA-3 | Bid Protests | Likely | Negligible | LOW | Unlikely | Significant | MODERATE | Triangular |
| CA-5 | Phasing | Very Likely | Marginal | MODERATE | Very Likely | Significant | HIGH | Uniform |
| **TECHNICAL RISKS** | | | | | | | | |
| TL-1 | Incomplete Geotechnical Studies | Likely | Marginal | MODERATE | Unlikely | Negligible | LOW | Triangular |
| TL-2 | Instrumentation Requirements | Likely | Marginal | MODERATE | Likely | Significant | HIGH | Triangular |
| TL-3 | Flood Protection - After Implementation | Unlikely | Significant | MODERATE | Unlikely | Crisis | HIGH | Triangular |
| TL-4 | Features at 41 | Unlikely | Significant | MODERATE | Unlikely | Significant | MODERATE | Triangular |
| TL-5 | Spoils | Likely | Marginal | MODERATE | Likely | Negligible | LOW | Triangular |
| **LANDS AND DAMAGES RISKS** | | | | | | | | |
| LD-1 | Acquisition Delays | Likely | Negligible | LOW | Unlikely | Significant | MODERATE | Uniform |

| Risk No. | Risk/Opportunity Event | Project Cost | | | Project Schedule | | | Variance Distribution |
|---|---|---|---|---|---|---|---|---|
| | | Likelihood* | Impact* | Risk Level* | Likelihood* | Impact* | Risk Level* | |
| **REGULATORY AND ENVIRONMENTAL RISKS** | | | | | | | | |
| RE-1 | Environmental Impact Consultation | Very Likely | Significant | HIGH | Very Likely | Marginal | MODERATE | Uniform |
| RE-2 | Manatee Mitigation | Unlikely | Significant | MODERATE | Unlikely | Significant | MODERATE | Triangular |
| RE-6 | Beneficial Operation | Likely | Significant | HIGH | Likely | Significant | HIGH | Uniform |
| RE-7 | Cultural Resources - 1 | Very Unlikely | Negligible | LOW | Likely | Marginal | MODERATE | Triangular |
| RE-9 | Additional Mitigation Efforts | Likely | Marginal | MODERATE | Likely | Negligible | LOW | Triangular |
| **CONSTRUCTION RISKS** | | | | | | | | |
| CON-1 | Change Orders (MODS) during Construction | Very Likely | Significant | HIGH | Likely | Marginal | MODERATE | Triangular |
| CON-6 | Inefficient Contractor | Unlikely | Marginal | LOW | Likely | Marginal | MODERATE | Triangular |
| CON-7 | Inefficient Subcontractor | Likely | Negligible | LOW | Likely | Marginal | MODERATE | Triangular |
| CON-8 | Critical Fabrication and Delivery | Likely | Marginal | MODERATE | Very Likely | Marginal | MODERATE | Triangular |
| CON-10 | Tier 4 EPA | Likely | Marginal | MODERATE | Likely | Marginal | MODERATE | Yes-No |

| Risk No. | Risk/Opportunity Event | Project Cost | | | Project Schedule | | | Variance Distribution |
|---|---|---|---|---|---|---|---|---|
| | | Likelihood* | Impact* | Risk Level* | Likelihood* | Impact* | Risk Level* | |
| **ESTIMATE AND SCHEDULE RISKS** | | | | | | | | |
| EST-1 | Variation in Est'd Quantities | Likely | Marginal | MODERATE | Unlikely | Marginal | LOW | Triangular |
| EST-4 | Fuel | Very Likely | Marginal | MODERATE | Very Unlikely | Negligible | LOW | Uniform |
| EST-6 | Contract Markups | Likely | Marginal | MODERATE | Very Unlikely | Negligible | LOW | Triangular |
| EST-7 | Sitework Means & Methods | Likely | Marginal | MODERATE | Unlikely | Negligible | LOW | Triangular |
| EST-8 | Schedule matches PED | Likely | Negligible | LOW | Likely | Significant | HIGH | Triangular |
| EST-9 | Importing Borrow | Unlikely | Marginal | LOW | Likely | Marginal | MODERATE | Uniform |
| **EXTERNAL RISKS** | | | | | | | | |
| EXT-3 | Severe Adverse Weather | Likely | Negligible | LOW | Likely | Marginal | MODERATE | Uniform |
| EXT-5 | Outstanding NEPA | Likely | Negligible | LOW | Likely | Marginal | MODERATE | Triangular |
| EXT-6 | Market Conditions | Likely | Marginal | MODERATE | Very Unlikely | Negligible | LOW | Triangular |
| EXT-7 | Legal Issues | Unlikely | Significant | MODERATE | Unlikely | Significant | MODERATE | Triangular |

Picayune Strand Restoration Project

The Picayune Strand Restoration Project Implementation Report (PIR) and Environmental Impact Statement (EIS) was completed in September of 2004 under the authority of Section 309(l) of the Water Resources Development Act (WRDA) of 1992 and two resolutions of the Committee on Public Works and Transportation of the U.S. House of Representatives, dated September 24, 1992, authorized studies of the Central and Southern Florida (C&SF) Project and Florida Bay to determine the advisability of modifying the C&SF project in the interest of environmental quality, water supply, and other purposes. The Picayune Strand Restoration Project (PSRP) was formerly referred to as the Southern Golden Gate Estates Hydrologic Restoration Project, an "Other Project Element" of the Comprehensive Everglades Restoration Program, authorized as part of WRDA 2000 on December 11, 2000. The final PSRP PIR/EIS was approved by the Office of the Chief of Engineers on September 15, 2005. The project was authorized for construction by WRDA 2007. The report presents the results and recommendations of investigations into restoration of natural water flow across 85 square miles of western Collier County that were drained for an extensive residential development. Preconstruction, engineering, and design (PED) work for the authorized restoration project was initiated in 2003 and is scheduled for completion in 2015.

This Limited Reevaluation Report presents a revised cost estimate and updated economic analysis of the authorized project. It evaluates the authorized project within the context of the existing socioeconomic conditions of the study area and the refined detailed design developed during PED since (PED start date). This project is projected to reach the current Section 902 limit in FY15. It is aniticipated that additional funding will be required from both federal and non-federal sponsor to complete the project by 2017.



| | |
|---|---|
| Estimated by | CELRC |
| Designed by | CESAJ |
| Prepared by | |
| Preparation Date | 11/1/2013 |
| Effective Date of Pricing | 11/1/2013 |
| Estimated Construction Time | Days |

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| Description | UOM | Quantity | ProjectCost |
|---|---|---|---|
| **Folder Level Project Costs** | | | **577,423,097.26** |
| **Completed (Obligated and Unexpended)** | **LS** | **1.0000** | **118,304,000.00** |
| **Lands & Damages** | **LS** | **1.0000** | **0.00** |
| **Roads, Railroads & Bridges** | **LS** | **1.0000** | **1,311,000.00** |
| **Channels & Canals** | **LS** | **1.0000** | **5,802,000.00** |
| **Levees & Floodwalls** | **LS** | **1.0000** | **10,107,000.00** |
| **Pumping Plants** | **LS** | **1.0000** | **78,414,000.00** |
| **Floodway Control & Diversion Structures** | **EA** | **1.0000** | **0.00** |
| **Buildings, Grounds & Utilities** | **LS** | **1.0000** | **7,688,000.00** |
| **Planning, Engineering & Design** | **LS** | **1.0000** | **4,650,000.00** |
| **Construction Managment** | **LS** | **1.0000** | **10,332,000.00** |
| **Completed (Expended Funds )** | **LS** | **1.0000** | **363,397,000.00** |
| **Lands & Damages** | **LS** | **1.0000** | **161,030,000.00** |
| **Roads, Railroads & Bridges** | **LS** | **1.0000** | **21,598,000.00** |
| **Channels & Canals** | **LS** | **1.0000** | **1,787,000.00** |
| **Levees & Floodwalls** | **LS** | **1.0000** | **8,206,000.00** |
| **Pumping Plants** | **LS** | **1.0000** | **97,621,000.00** |
| **Floodway Control & Diversion Structures** | **EA** | **1.0000** | **1,877,000.00** |
| **Buildings, Grounds & Utilities** | **LS** | **1.0000** | **0.00** |
| **Planning, Engineering & Design** | **LS** | **1.0000** | **59,868,000.00** |
| **Construction Managment** | **LS** | **1.0000** | **11,410,000.00** |
| **Remaining Work** | **LS** | **1.0000** | **95,722,097.26** |
| **Under Construction** | **LS** | **1.0000** | **50,026,000.00** |
| **Merritt Pump Station** | **LS** | **1.0000** | **41,897,000.00** |
| **Lands & Damages** | **LS** | **1.0000** | **39,782,000.00** |
| **Channels & Canals** | **LS** | **1.0000** | **1,238,000.00** |
| **Pumping Plants** | **LS** | **1.0000** | **611,000.00** |
| **Planning, Engineering & Design** | **LS** | **1.0000** | **82,000.00** |
| **Construction Management** | **LS** | **1.0000** | **184,000.00** |
| **Faka Union Pump Station** | **LS** | **1.0000** | **2,135,000.00** |

| Description | UOM | Quantity | ProjectCost |
|---|---|---|---|
| Levees & Floodwalls | LS | 1.0000 | 300,000.00 |
| Pumping Plants | LS | 1.0000 | 1,564,000.00 |
| Planning, Engineering & Design | LS | 1.0000 | 84,000.00 |
| Construction Management | LS | 1.0000 | 187,000.00 |
| Miller Pump Station | LS | 1.0000 | 5,994,000.00 |
| Future Award | EA | 1.0000 | 5,994,000.00 |
| Roads, Railroads & Bridges | LS | 1.0000 | 2,955,000.00 |
| Channels & Canals | LS | 1.0000 | 2,209,000.00 |
| Pumping Plants | LS | 1.0000 | 72,000.00 |
| Planning, Engineering & Design | LS | 1.0000 | 235,000.00 |
| Construction Management | LS | 1.0000 | 523,000.00 |
| Future | LS | 1.0000 | 45,696,097.26 |
| Manatee Mitigation | LS | 1.0000 | 8,195,000.00 |
| Fish and Wildlife Facilities | LS | 1.0000 | 6,662,000.00 |
| Planning, Engineering & Design | LS | 1.0000 | 866,000.00 |
| Construction Management | LS | 1.0000 | 667,000.00 |
| Six L's Ranch | LS | 1.0000 | 23,915,383.72 |
| Lands & Damages | LS | 1.0000 | 0.00 |
| Levees & Floodwalls | LF | 46,200.0000 | 19,445,383.72 |
| Clearing, Grubbing, and Burning | ACR | 212.1212 | 642,873.80 |
| Levee Construction | ECY | 426,066.6667 | 14,070,388.50 |
| Seepage Ditch | LF | 46,200.0000 | 2,619,804.58 |
| Toe Ditch | LF | 46,200.0000 | 200,052.38 |
| Topsoil & Seeding | LS | 1.0000 | 1,216,291.80 |
| Access Road | LF | 46,200.0000 | 595,751.51 |
| Culverts at Tomato Rd & Tamami Trail | LS | 1.0000 | 100,221.14 |
| Planning, Engineering & Design | LS | 1.0000 | 2,526,000.00 |
| Construction Management | LS | 1.0000 | 1,944,000.00 |
| Road Removal North of Tieback Levees | LS | 1.0000 | 4,400,713.53 |
| Lands & Damages | LS | 1.0000 | 0.00 |

| Description | UOM | Quantity | ProjectCost |
|---|---|---|---|
| Roads, Railroads & Bridges | LF | 110,595.0000 | 3,576,713.53 |
| West Property Line to Miller Canal | LS | 1.0000 | 1,739,208.64 |
| Miller Canal to Faka Union Canal | LS | 1.0000 | 1,332,373.77 |
| Faka Union Canal to Merritt Canal | LS | 1.0000 | 505,131.12 |
| Planning, Engineering & Design | LS | 1.0000 | 466,000.00 |
| Construction Management | LS | 1.0000 | 358,000.00 |
| Environmental Monitoring | EA | 1.0000 | 9,185,000.00 |
| Fish and Wildlife Facilities | LS | 1.0000 | 9,185,000.00 |

# APPENDIX C – REAL ESTATE PLAN

## Limited Reevaluation Report

## March 2015

U.S. Army Corps of Engineers

Addendum to
REAL ESTATE PLAN
Appendix "F" in 2004 Final Project Implementation Report
and Environmental Impact Statement
For
Central & Southern Florida Project, Comprehensive Everglades Restoration
Plan, Picayune Strand Restoration Project
Limited Reevaluation Report
Prepared by:

Department of the Army Jacksonville District Corps of Engineers

Real Estate Division

May 2014

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## F.1 STATEMENT OF PURPOSE OF THE REAL ESTATE PLAN (REP)

***[December 2013 Update]*** The purpose of this addendum to the Real Estate Plan (REP) for the Picayune Strand Restoration Project (PSRP) (formerly SGGE), Final Project Implementation Report (PIR) and Environmental Impact Statement (EIS) September 2004 (PIR 2004) is to present the modifications to the real estate requirements, costs, acquisition schedules, and other requirements necessary for the Central and Southern Florida (C&SF), Comprehensive Everglades Restoration Plan (CERP; Restudy), PSRP which were originally set forth in Appendix F of the 2004 Final PIR/EIS. This REP also details the modifications to the Project features. This REP also presents the results of revised takings and savings clause analyses that have been completed using the Gridded Surface Subsurface Hydrologic Analysis (GSSHA) version 6.0 model and both the final real property acquisition lines and estimates of value are subject to change after approval of the Limited Reevaluation Report to which this plan is appended.

**This report reflects the original language in the 2004 Final PIR/EIS. Revisions are identified at the beginning and end with [*December 2013 Update*].**

The modifications to the 2004 REP are as set forth below in paragraphs F.2, F.5, F.8, F.12, F,13, F.15, F.16, F.19, F.21, F.24, F.26, Figure F-5 and the addition of Figures F-6 and F-7, and Tables F-1 and F-2. ***[End December 2013 Update]***

## F.2 PROJECT AUTHORIZATION

Along with the C&SF Restudy, the PSRP PIR is authorized by *Section 309(l)* of the *Water Resources Development Act of 1992* (Public Law 102-580) which states:

> "(1) CENTRAL AND SOUTHERN FLORIDA (C&SF) - The Chief of Engineers shall review the report of the Chief of Engineers on central and southern Florida, published as House Document 643; 80th Congress, 2nd Session, and other pertinent reports, with a view to determining whether modifications to the existing project are advisable at the present time due to significantly changed physical, biological, demographic, or economic conditions, with particular reference to modifying the project or its operation for improving the quality of the environment, improving protection of the aquifer, and improving the integrity, capability, and conservation of urban water supplies affected by the project or its operation."

This study is also authorized by two resolutions of the Committee on Transportation and Infrastructure, United States House of Representatives, dated September 24, 1992. The first resolution states:

> "Resolved by the Committee on Public Works and Transportation of the United States House of Representatives, That the Board of Engineers for Rivers and Harbors, is requested to review the report of the Chief of Engineers on Central and Southern Florida, published as House Document 643, Eightieth Congress, Second Session, and other pertinent reports, to determine whether modifications of the recommendations contained therein are

advisable at the present time, in the interest of environmental quality, water supply and other purposes."

The second resolution states:

"Resolved by the Committee on Public Works and Transportation of the United States House of Representatives, That the Board of Engineers for Rivers and Harbors, is requested to review the report of the Chief of Engineers on Central and Southern Florida, published as House Document 643, Eightieth Congress, Second Session, and other pertinent reports, to determine whether modifications of the recommendations contained therein are advisable at the present time, in the interest of environmental quality, water supply and other purposes for Florida Bay, including a comprehensive, coordinated ecosystem study with hydrodynamic modeling of Florida Bay and its connections to the Everglades, the Gulf of Mexico, and the Florida Keys Coral Reef ecosystem."

The *Water Resources Development Act of 1996* was enacted on October 12, 1996. *Section 528* of the Act (Public Law 104-303) entitled "Everglades and South Florida Ecosystem Restoration" authorizes a number of ecosystem restoration activities and also provides specific direction and guidance for the CERP.

(b) RESTORATION ACTIVITIES- (1) COMPREHENSIVE PLAN-
(A) DEVELOPMENT-
(i) PURPOSE - The Secretary shall develop, as expeditiously as practicable, a proposed Comprehensive Plan for the purpose of restoring, preserving, and protecting the South Florida ecosystem. The Comprehensive Plan shall provide for the protection of water quality in, and the reduction of the loss of fresh water from, the Everglades. The Comprehensive Plan shall include such features as are necessary to provide for the water-related needs of the region, including flood control, the enhancement of water supplies, and other objectives served by the Central and Southern Florida Project.
(ii) CONSIDERATIONS - The Comprehensive Plan shall—
(I) Be developed by the Secretary in cooperation with the non-Federal project sponsor and in consultation with the Task Force; and
(II) Consider the conceptual framework specified in the report titled ''Conceptual Plan for the Central and Southern Florida Project Restudy," published by the Commission and approved by the Governor.
(B) SUBMISSION - Not later than July 1, 1999, the Secretary shall
(i) Complete the feasibility phase of the Central and Southern Florida Project comprehensive review study as authorized by section
309(l) of the Water Resources Development Act of 1992 (106 Statue.4844), and by two resolutions of the Committee on Public Works and Transportation of the House of Representatives, dated September 24, 1992; and
(ii) Submit to Congress the plan developed under subparagraph (A)(i) consisting of a feasibility report and a programmatic environmental impact statement covering the proposed Federal action set forth in the plan.
(C) ADDITIONAL STUDIES AND ANALYSES- Notwithstanding the completion of the feasibility report under subparagraph (B), the Secretary shall continue to conduct such studies and analyses as are necessary, consistent with subparagraph (A)(i).

A design agreement to perform project engineering and design (PED) activities including adaptive assessment and monitoring in support of CERP was executed on May 12, 2000 between the U.S. Army Corps of Engineers (USACE) and South Florida Water Management District (SFWMD). This agreement provides for the SFWMD to receive in-kind credit for design work. A Master Program Management Plan (MPMP) for the CERP was executed on August 24, 2000, outlining the protocols and procedures by which project management plans for all projects included in the agreement would be completed. This document conforms to the guidance provided within the MPMP.

In *Section 601* of the *Water Resources Development Act of 2000* (PL 106-541), Congress approved the C&SF Project Comprehensive Review Study Integrated Feasibility Report and Programmatic EIS (also known as the "Restudy" and "Yellow Book"), which describes and outlines the CERP:

(b) Comprehensive Everglades Restoration Plan – (1) Approval -
(A) IN GENERAL. — Except as modified by this section, the plan is approved as a framework for modifications and operational changes to the C&SF Project that are needed to restore, preserve, and protect the South Florida ecosystem while providing for other water-related needs of the region, including water supply and flood protection. The plan shall be implemented to ensure the protection of water quality in, the reduction of the loss of fresh water from, and the improvement of the environment of the South Florida ecosystem and to achieve and maintain the benefits to the natural system and human environment described in the plan, and required pursuant to this section, for as long as the project is authorized.

WRDA 2000 requires that a PIR:

(4) PROJECT-SPECIFIC ASSURANCES-
(A) PROJECT IMPLEMENTATION REPORTS-
(i) IN GENERAL - The Secretary and the non-Federal sponsor shall develop project implementation reports in accordance with section 10.3.1 of the Plan.
(ii) COORDINATION - In developing a project implementation report, the Secretary and the non-Federal sponsor shall coordinate with appropriate Federal, State, tribal, and local governments.
(iii) REQUIREMENTS - A project implementation report shall--
(I) be consistent with the Plan and the programmatic regulations promulgated under paragraph (3);
(II) describe how each of the requirements stated in paragraph (3)(B) is satisfied;
(III) comply with the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.);
(IV) identify the appropriate quantity, timing, and distribution of water dedicated and managed for the natural system; (V) identify the amount of water to be reserved or allocated for the natural system necessary to implement, under State law, subclauses (IV) and (VI);
(VI) comply with applicable water quality standards and applicable water quality permitting requirements under subsection (b)(2)(A)(ii);
(VII) be based on the best available science; and

(VIII) include an analysis concerning the cost- effectiveness and engineering feasibility of the project.

***[December 2013 Update]*** The PSRP 2004 Final PIR/EIS was approved by the Office of the Chief of Engineers on September 15, 2005. The project was authorized for construction in Section 1001(15) of the WRDA 2007. The Project Partnership Agreement for the Project was executed on August 13, 2009. ***[End December 2013 Update]***

### F.3 PICAYUNE STRAND RESTORATION PROJECT (FORMERLY KNOWN AS SOUTHERN GOLDEN GATE ESTATES PROJECT) AS DESCRIBED IN THE OTHER PROJECT ELEMENTS OF THE CENTRAL AND SOUTHERN FLORIDA PROJECT COMPREHENSIVE REVIEW STUDY DATED APRIL 1999

In the C&SF Project, Comprehensive Restudy, SGGE Project (now known as the PSRP) was discussed in the Section 9.1.9.1 as part of the recommended CERP, in Appendix A6, section A6.3.4.2, and on page F-78 of the Real Estate Appendix for the 2004 Final PIR/EIS (Appendix F). The description in Section 9.1.9.1 provides as follows:

"9.1.9.1 Southern Golden Gate Estates Restoration (OPE)

This feature includes a combination of spreader channels, canal plugs, road removal and pump stations in the western basin and Big Cypress, Collier County, south of I-75 and north of U.S. 41 between the Belle Meade Area and the Fakahatchee Strand State Preserve.

The purpose of this feature is to restore and enhance the wetlands in SGGE and in adjacent public lands by reducing over drainage. Implementation of the restoration plan would also improve the water quality of coastal estuaries by moderating the large salinity fluctuations caused by freshwater point discharge of the Faka Union Canal. The plan would also aid in protecting the City of Naples' eastern Golden Gate well field by improving groundwater recharge (Restudy, page 9-26)."

At the time the Restudy went to publication in March 1999, the exact description of what the SGGE Project would entail and the exact acreage required for the SGGE component had not been determined. The FDEP had received $25 million from the Department of Interior (DOI) to acquire 20,250 acres of land. The FDEP had already acquired over 17,000 acres in SGGE Conservation and Recreational Lands (CARL) area. It was assumed that $50 million ($25 million Federal/$25 million non-Federal) would cover all lands required for the PSRP; therefore the cost included in the appendix had a real estate cost of zero (0).

### F.4 PROJECT LOCATION AND DESCRIPTION

The SGGE CARL area encompasses approximately 55,247 acres of land in Collier County, Florida. It is located about 12 to 15 miles in an easterly direction from downtown Naples. Access to the project area is from Interstate 75 at County Road 951, from County Road 951 onto Golden Gate Boulevard then onto Everglades Boulevard to Miller Boulevard. The SGGE CARL area is located in all of Township 50 South and all of Township 51 South except

Section 36; and in Township 52 South, in Sections 4, 5, and 6; Ranges 27 and 28 East, Collier County, Florida. It is bounded to the north by Interstate 75, to the northeast by the Florida Panther National Wildlife Refuge, to the east by the Fakahatchee Strand State Preserve, to the south by U.S. Highway 41 and Ten Thousand Islands National Wildlife Refuge and Aquatic Preserve, and to the west by Collier Seminole State Park and Belle Meade State CARL project (**Figure 1**).

The Belle Meade State CARL project is comprised of 27,200 acres of which approximately 17,670 acres are state owned and is located west of the SGGE CARL area.

Before development, the project area was characterized by seasonal flooding several months of the year and broad slow moving sheet flow sustained wetland vegetation and rejuvenated freshwater aquifers. The development of the SGGE CARL area included a network of roads that intercepts the natural flow ways, and four major drainage/flood control canals which drain the landscape, resulting in the reduction of aquifer storage, increased freshwater shock load discharges to the estuary, invasion of upland vegetation and increased frequency of forest fires.

The objectives for the PSRP include reestablishing natural freshwater flows to the estuary, restoring pre-drainage hydro patterns, including sheet flow and flow ways, reestablishing natural plant distribution and composition, increasing surface aquifer recharge, increasing fish and wildlife resources, restoring habitat for listed species, restoring ecological connectivity and providing contiguous habitat protection to adjacent public lands, providing resource based recreational opportunities compatible with the protection of the natural systems, and restoring the natural fire regime.

## F.5 RECOMMENDED PLAN –ALTERNATIVE 3D

### F.5.1 ROADS

The recommended plan includes the removal and demolition of approximately 227 miles of the 279 miles of the existing roads. The roads would be ripped-up with heavy equipment. The demolished roads would then generally be impassable by vehicles. Some of the material would be used for construction of the canal plugs and levees. The remaining material would be spread across the landscape so that it would be flat. The asphalt material removed from the roads would be placed in a storage area within the SGGE CARL area for future road maintenance purposes.

Approximately 52 miles of existing roads would remain in the SGGE CARL area. Stewart Boulevard would remain to connect Jane's Scenic Parkway and Everglades Boulevard. Everglades Boulevard would remain to provide access between Stewart Boulevard and Interstate 75. ***[December 2013 Update]*** Stewart Boulevard to the west of Everglades Boulevard would be degraded to adjacent ground elevations. ***[End December 2013 Update]*** . Benson Boulevard west of the Merritt Canal would remain. These roads would be modified with low water crossings to allow water to flow over them and with culverts to allow water to flow under them.

They would also serve for operations and maintenance of the project. Portions of the north-south Miller, Desoto, Merritt, and Patterson Boulevards would be degraded to adjacent ground elevations, but remain available for use during the dry season.

Approximately four miles of new, unpaved roads would be constructed from Benson Boulevard southward to the sites of the three proposed pump stations.

***[December 2013 Update]*** In addition to the vehicular roads, approximately 56.3 miles of abandoned tram roads used for logging operation were identified during subsequent field surveys. Since the elevated tram roads will disturb the natural restoration sheet flows as outlined in the PIR/EIS, a decision was made to degrade the tram roads in the Merritt and Fak Union Pump Station contracts to match natural ground elevations. Approximately 4.8 miles of old tram roads used for logging operation were identified for removal in the Miller Pump Station Project. ***[End December 2013 Update]***

### F.5.2 EXISTING STRUCTURES

The Miller-2, FU-3 and Lucky Lake weir structures will be removed. These existing structures are fixed concrete weirs. The Lucky Lake weir has steel plated sluice gates mounted to the crest, which will require additional demolition work.

### F.5.3 PUMP STATIONS

There will be three pump stations constructed on the existing canals, one on the Miller Canal, one on the Faka Union Canal and one on the Merritt Canal. ***[December 2013 Update]*** The Miller Pump Station will be constructed on the Miller Canal near 64th Avenue SE and have a total capacity of 1,250 cfs. The Faka Union Pump Station will be constructed on the Faka Union Canal near 66th Avenue SE and have a total capacity of 2,630 cfs. The Merritt Pump Station will be constructed on the Merritt Canal near 54th Avenue SE and have a total capacity of 810 cfs. The capacities of those pump stations were designed to not adversely impact the existing levels of flood protection up to the 100-year five day synthetic storm event. These pump stations have been optimized to meet the environmental restoration demands of the PSRP. ***[End December 2013 Update]***

### F.5.4 SPREADER BERMS

***[December 2013 Update]*** In the 2004 Final PIR/EIS, the recommended plan had three spreader channels to be constructed and which would run in an east-west direction, across the Miller Canal at 64th Avenue, the Faka Union Canal at 66th Avenue, and the Merritt Canal at 54th Avenue. The spreader canals were to be located immediately downstream of the proposed pump stations. The pumps were designed to have discharge pipe free fall into the spreader channels, which would act as a plunge pool for energy dissipation and to aerate the water. The discharge waters would then be conveyed overland to the downstream project area. The spreader canals lengths were optimized for restoration pumping rates. For the Miller, Faka Union and Merritt pump stations the spreader canal lengths were to be approximately 4,500 feet, 7,000 feet and 1,400 feet, respectively. They would serve to distribute the flows along the overland areas to emulate the historic sheet flow of the area.

During the engineering and design phase the function of these spreader channels as described in the PIR/EIS was replaced with 21,000 feet of spreader berms with plunge pool/basins with

strategically placed weirs. The SFWMD Basis of Design Report for the Levees, Canals, and Roads (LCR BODR) completed in 2006 provides explanation for the change from spreader channels to the spreader berm, which will hold water above grade, and weir configuration that releases water into the natural system at strategic points.

The Merritt and Faka Union Pump Stations have been designed with a plunge pool/basin for energy dissipation and aeration of the discharge waters. The basins are bounded by a spreader berm located south of each pump station that ties into the tieback levee system. Each spreader berm conveys water from the basin, through weirs, along the length of the berm, and over land to the downstream project area. To distribute the flows evenly and remove the point source discharge, the spreader berm lengths were optimized to handle restoration pumping rates. The length of the spreader berms for the Merritt and Faka Union Pump Stations are approximately 4500 feet and 9300 feet, respectively.

The Miller Pump Station has been designed with a plunge pool/basin for energy dissipation and aeration of the discharge waters. The basin is bounded by a spreader berm located south of the pump station that ties into the tieback levee system. Each spreader berm conveys water from the basin, through weirs, along the length of the berm, and over land to the downstream project area. To distribute the flows evenly and remove the point source discharge, the spreader berm lengths were optimized to handle restoration pumping rates. The Miller Pump Station spreader berm is approximately 7,200 feet in length. ***[End December 2013 Update]***

### F.5.5 CANAL PLUGS

There will be 83 canal plugs installed in the four canals. The source material for the canal plugs and swale blocks will be from the material dredged from the original canals and swale excavations and the demolition and degradation of the roads. There should be sufficient material available for the canal plugs work.

### F.5.6 CULVERTS

***[December 2013 Update]*** Culvert structures are required to provide interior drainage to the protected lands. The 6L Ranch levee has a series of existing culverts through US 41 that allows for the existing drainage to be conveyed downstream and away from the site. However, six 72 inch corrugated metal pipe culverts and two 48 inch culverts with flap gate controls will be require to convey flow on the north side of US 41 (Tamiami Trail) through the 6L Levee. ***[End December 2013 Update]***

### F.5.7 TAMIAMI TRAIL CULVERTS

New culverts will be constructed under U.S. Highway 41. The culverts will supplement the bridges and culverts that exist today. The culverts are identified as 42A, 46A, 51A, 51B, 51C, 55A and 62A in the Letter Report and Environmental Assessment (EA) for the Tamiami Trail Culverts Critical Project.

### F.5.8 TIEBACK LEVEES

***[December 2013 Update]*** The 2004 Final PIR/EIS proposed 12,900 feet of berms associated with the spreader canals to force the restorative water downstream and avoid recirculation of the pump station discharge. The analysis conducted for the SFWMD LCR BODR showed that these berms needed to be more robust, so approximately 54,000 feet of tieback levee system

was added to the design. The tieback levee, part of the current design, provides the same function as the berms proposed in the PIR/EIS. The function would prevent the water discharge from the pump stations from flowing north and affecting I-75 and the North Golden Gate Estates (NGGE) residential area. The design of the tieback levee proposed in the SFWMD LCR BODR is based on the results of the H&H Phase 1 modeling for the 100 year design storm event.

The H&H modeling results showed that the tieback levee would need to extend from a point near the western limits of the Private Lands (South Belle Meade) to a point at the eastern limits of the project site approximately 1.6 miles east of the proposed Merritt Pump Station. The design of tieback levee has been further refined with subsequent H&H analyses. Subsequent modeling results completed by USACE in 2013 determined that approximately 5,000 feet of levee at the western most extent of the tieback levee was no longer required to prevent end-around flanking at the western end of the levee. Therefore, the current design length of the tieback levee system is approximately 49,000 linear feet.

Currently 39,000 feet of the tieback levee system is under construction in association with the Merritt and Faka Union Pump Station Projects. Approximately 10,000 linear feet of tieback levee system remains to be constructed in association with Miller Pump Station Project. This will complete the tieback levee system, preventing the discharge waters from short circuiting around the pump stations. ***[End December 2013 Update]***

### F.5.9 LEVEES

***[December 2013 Update]*** In the 2004 Final PIR/EIS, there was to be five project levee segments, which would be constructed around residential and agricultural areas. Four of the levees were to be adjacent to US Highway 41. Based on analysis of the revised H&H modeling using the GSSHA model, four of the levee systems have been eliminated,

The only levee system remaining is the 6L Farm Levee, will be near the 6L Ranch in Belle Meade. This site was selected due to the existing levee system in place. However, site investigations to the area determined that the existing levee system would be difficult to rehabilitate. Therefore, a new levee system will be constructed adjacent to the restored lands and a seepage collection system will be incorporated between the proposed levee and the existing levee. This levee will protect the lands to the west of that levee from the 100-year flooding due to the proposed project.

The Private Lands Levee designed to protect the Private Lands northwest of Southern Golden Gate Estates, and the 41N Levee, 41W Levee and 41 E Levee designed to protect the Port of the Islands are not longer required.

The proposed material to build the 6L Farm Levee is the material from the degradation of the existing roads. After the canal plugs are constructed, the quantity of material remaining from these roads appears, from the available data, to be close to the quantity required for construction of the levees. ***[End December 2013 Update]***

## F.6 EXISTING FEDERAL PROJECTS

No existing Federal projects lie fully or partially within the lands required for construction, operation, maintenance, repair, replacement and rehabilitation of the PSRP. Ten Thousand Islands National Wildlife Refuge and Aquatic Preserve are federally owned lands, located directly south of the PSRP area and south of US Highway 41. The Tamiami Trail Culvert Critical Restoration Project is partially located within the PSRP. Seven of the 54 culverts approved for this critical project will be constructed for the PSRP.

## F.7 FEDERALLY OWNED LANDS

Ten Thousand Islands National Wildlife Refuge and Aquatic Preserve are federally owned lands, located directly south of the PSRP and south of US Highway 41. The Ten Thousand Islands National Wildlife Refuge and Aquatic Preserve is comprised of 35,000 acres. Approximately 8,000 acres are mangrove forest. Approximately 16,000 acres are marine water and the remaining approximately 11,000 acres are freshwater marshland or other habitat. This area is managed by the U.S. Fish and Wildlife Service (USFWS). The USFWS has agreed in principle to allow the additional water and to negotiate and execute an agreement or provide a letter for consent to the non-Federal sponsor for such additional waters.

## F.8 NON-FEDERAL SPONSOR OWNED LANDS

***[December 2013 Update]*** The state of Florida through the FDEP has acquired fee title to all 55,247 acres in the SGGE CARL area. In addition, the state of Florida owns most of the surrounding Fakahatchee Strand State Preserve, comprised of approximately 80,300 acres of which approximately 61,400 acres are owned by the State. The remaining 18,900 acres are in private ownership. In the sections or portions of sections of the Fakahatchee Strand State Preserve required for the project, FDEP or SFWMD have acquired and owns fee to approximately 97 percent of the approximately 1,866.59 acres. The Collier Seminole State Park, also owned by the State, is comprised of 6,430 acres. The Belle Meade State CARL project is comprised of 27,200 acres of which approximately 17,670 acres are state owned. In the sections or portions of sections of the Belle Meade CARL area required for the project, FDEP has acquired and owns fee to approximately 83 percent of the approximately 6,894.55 acres. ***[End December 2013 Update]***

## F.9 FEDERAL AGRICULTURE IMPROVEMENT AND REFORM ACT OF 1996 (FARM BILL)

The state of Florida through the FDEP has been acquiring lands since 1985 from willing sellers for the Save Our Everglades Florida Forever Project, SGGE, Collier County, Florida. The acquisition of lands within SGGE CARL area was funded by the state's CARL program. By the end of December 1997, FDEP had acquired approximately 17,000 acres of the total of 55,247 acres contained within the project area or roughly 31 percent of the project lands.

On April 4, 1996, Congress enacted the Federal Agriculture Improvement and Reform Act of 1996 (Public Law 104-127, 110 Stat. 1022). Section 390 of the Federal Agriculture Improvement and Reform Act of 1996 provided:

SEC. 390. EVERGLADES ECOSYSTEM RESTORATION.
(a) IN GENERAL.-On July 1, 1996, out of any funds in the Treasury not otherwise appropriated, the Secretary of the Treasury shall provide $200 million to the Secretary of the Interior to carry out this section.
(b) ENTITLEMENT.-The Secretary of the Interior (referred to in this section as the "Secretary")-
(1) shall be entitled to receive the funds made available under subsection (a);
(2) shall accept the funds; and
(3) shall use the funds to:
(A) conduct restoration activities in the Everglades ecosystem in South Florida, which shall include the acquisition of real property and interests in real property located within the Everglades ecosystem; and
(B) fund resource protection and resource maintenance activities in the Everglades ecosystem.

In June of 1996, the SGGE CARL area was listed as the fourth priority for receipt of the Federal Farm Bill funds authorized pursuant to the Federal Agriculture Improvement and Reform Act of 1996. The estimated total cost of the first three priority projects for Federal Farm Bill funds totaled over $490 million. In June 1996, it was not determined which of the land acquisition projects would receive Federal funds.

On October 3, 1996, a framework agreement was signed between the DOI, Department of the Army, and the state of Florida (FDEP and SFWMD). The framework agreement was written to provide a framework for the Secretary of Interior to provide Section 390 funds to the other parties for Everglades ecosystem restoration for both the acquisition of real property and the construction of features that were intended to become part of existing or future USACE projects. The agreement provided that except as otherwise provided by law or agreed to by the Secretary of Interior, all Section 390 funds expended would be matched by non-Federal funds on a dollar-for-dollar basis. The agreement also provides: "Section 390 funds disbursed for the acquisition of real property or the construction of features shall count as Federal funds for cost sharing purposes for Army projects. Funds provided by the non-Federal parties to match Federal funds provided under Section 390 will be treated as non-Federal funds for cost-sharing purposes for Army projects. The value of real estate acquired pursuant to this Article shall be the acquisition cost of such real property for credit purposes under applicable cost-sharing principles."

In April 1998, DOI and FDEP executed a Federal grant in which DOI provided $25 million to FDEP for the acquisition of approximately 20,250 acres. In December 1999, an amendment was signed to add an additional $13 million making the total Federal funding received by FDEP $38 million. FDEP was not required to provide non-Federal matching funds for receipt of the $38 million. Since the signing of the framework and grant agreements, land acquisition was accelerated by the state of Florida through FDEP.

FDEP has acquired 17,549.87 acres in the SGGE CARL area with Farm Bill funds. All lands acquired with Section 390 funds required for the project will be credited toward the Federal share of project costs. The remaining 37,697.13 acres has been or will be acquired with state funds.

## F.10 UNIFORM RELOCATION ASSISTANCE ACT, PL 91-646

The information provided by FDEP indicated that there were originally 47 owners or tenants that qualified as displacees for the Uniform Relocation Assistance Benefits, Public Law (PL) 91-646, as amended. The 47 displacees consisted of 41 single residence owners and six apartment tenants. There remains a single residence owner to be relocated. It is anticipated that due to limited availability of comparable replacement housing and rapidly rising real estate values in the area last resort housing may be required. The grant agreement between DOI and FDEP stipulated that FDEP must comply with applicable laws, regulations, policies, guidelines, and requirements governing Federal grants and land acquisition. In Belle Meade CARL lands, there are approximately three owners that may require relocation benefit payments, estimated relocation payments for the three owners is a total of $500,000.

## F.11 NAVIGATIONAL SERVITUDE AND OTHER LANDS

The navigation servitude is not applicable to the PSRP.

## F.12 ACCESS TO PROJECT AREA

***[December 2013 Update]*** Ingress and egress will be via Federal, state, municipal, county roads, and roads available to the non-Federal Sponsor for project purposes. ***[End December 2013 Update]***

## F.13 BORROW AND DISPOSAL SITES

The borrow material or excavated material from the SGGE CARL area will be utilized for construction of the 83 canal plugs and for construction of the five levees. No borrow or disposal sites outside the project boundary will be required.

## F.14 TEMPORARY WORK AREAS

Lands within the SGGE CARL area will be used for temporary work areas, as required.

## F.15 INDUCED FLOODING

On December 11, 2000 the WRDA of 2000 was signed into law by the President of the United States (Public Law No.106-541, of the 106th Congress). Section 601(h)(5) contains a Savings Clause that provides protection for existing legal sources of water that will be eliminated or transferred due to project implementation and no significant and adverse reduction in the level of service for flood protection that was in existence on the date of enactment and in accordance with applicable law. The Programmatic Regulations for the Everglades (33 CFR §§ 385.5 and 385.35-37) require a programmatic guidance memorandum on existing legal sources of water, and a determination of the pre-CERP baseline conditions and direction about what constitutes "levels of service for flood protection in accordance with applicable law" existing on date of enactment of WRDA 2000. These formal processes will involve extensive coordination with Federal, state and local agencies, the SFWMD, tribes, stakeholders in CERP, and the public. Both of these processes also require concurrence by the Secretary of Interior and the Governor of the state of Florida. The guidance memorandum, the pre-CERP baseline, and direction about what constitutes "levels of service for flood protection" are still being developed. As discussed in Section 6, Plan Formulation, potential Savings Clause impacts were one of the considerations analyzed when evaluating each alternative plan.

***[December 2013 Update]*** The goal of the project is to restore the hydrology of SGGE CARL area. Restoring the hydrology will restore wildlife and vegetative communities, including habitat for protected species (Florida panther and others), and the downstream estuary conditions to a more historic, less degraded state. The purposes of the project include increasing habitat areas for threatened and endangered species such as the Florida panther, increasing sheet flow throughout the project area, restoration of a more natural hydroperiod throughout the study area, water quality improvement and management for a more natural fire regime. In the SGGE CARL area approximately 90% of the 55,247 acres are hydrologically impacted in the average wet season with increases in water depth from 0.5 to over 2.0 feet. The 2013 modeling using the GSSHA model confirmed that all 55,247 acres will be hydrologically impacted during the 5, 10, 25, and 100 year storm events.

In 2013, additional more detailed hydraulic and hydrologic analysis for Port of Islands, Private Lands area, Belle Meade area, and Fakahatchee Strand State Preserve using more recent lidar and the Gridded Surface Subsurface Hydrologic Analysis (GSSHA) model platform is completed. Below is a discussion of each area.

The Private Lands Protection Feature was intended to protect the private lands on the boundary with Belle Meade at the northwest corner of the project. It was envisioned that the levee and seepage collection system would encircle those private lands. The preliminary Hydraulic &Hydrologic (H&H) analysis used for the 2004 Final PIR/EIS showed an increase in water levels that could impact these lands. More detailed H&H analysis was performed in 2013 using more recent lidar and the GSSHA model platform. The analysis was completed to verify the land acquisition and protection features prescribed in the 2004 Final PIR/EIS to mitigate a reduction in the level of service for flood protection as required in Section 601(h)(5) or "Savings Clause" of WRDA 2000. The results of the 2013 detailed H&H analysis determined that the Private Lands Protection Feature and Pump Station included in the 2004 Final PIR/EIS are not necessary. Therefore the lands required for this feature are not required.

The preliminary H&H analysis used for the 2004 Final PIR/EIS showed an increase in water levels that could impact the Port of the Islands housing development. The Port of the Island Protection Feature was intended to protect the private lands in the Port of the Islands area shown to have an increase in surface water levels. More detailed H&H analysis was performed in 2013 using more recent lidar and the GSSHA model platform. The analysis was completed to verify the land acquisition and protection features prescribed in the 2004 Final PIR/EIS to mitigate a reduction in the level of service for flood protection as required in Section 601(h)(5) or "Savings Clause" of the WRDA 2000. The results of the 2013 detailed H&H analysis determined that the Port of the Islands Protection Features included in the 2004 Final PIR/EIS are not necessary. Therefore the lands required for this feature are not required.

In the 2004 Final PIR/EIS, no lands in the Fakahatchee Strand State Preserve, lying east of the SGGE, were identified as being required for Project operations; therefore, there was no real estate cost estimate for any lands within this area. Detailed H&H analysis was performed in 2013 using more recent lidar and the GSSHA model platform, concluded that approximately 1,864.62 acres will be hydrologically impacted by the Project operations during the 5, 10, 25 and 100 year storm events. Additionally the MIKE SHE model used during the 2004 Final

PIR/EIS showed hydrological impacts to the same areas in the Fakahatchee Strand State Preserve. Increases in hydrologic impacts greater than 0.5 feet occurred in these areas in the wet, dry and average years.

In the 2004 Final PIR/EIS, the preliminary H&H analysis used for the 2004 Final PIR/EIS showed that approximately 8,868 acres would be inundated by the Project and therefore a perpetual flowage easement was required over the approximately 9,021 acres. in the Belle Meade State Conservation and Recreation Land (CARL) Area. More detailed H&H analysis was performed in 2013 using more recent lidar and the GSSHA model platform. The analysis was completed to verify the land acquisition and estates required in the Belle Meade Area. Results from the 2013 H&H Analysis has indicated that the required acreage in the Belle Meade Area impacted by the Project was reduced to approximately 6,894.55. The takings analysis for the 2004 Final PIR/EIS did not consider that removal of the roads in SGGE would remove all access to the lands required in the Belle Meade Area. Impacting the properties both hydrologically and by removal of access would result in the requirement for fee title versus a perpetual flowage easement. ***[End December 2013 Update]***

## F.16 REAL ESTATE INTEREST REQUIRED FOR PROJECT

***[December 2013 Update]*** The real estate acreage requirements for the project have changed slightly since 2004. Based on new GSSHA modeling data, a revised takings and savings analysis has been completed for the Belle Meade area to determine the hydrologic impacts of the project to these areas. This analysis reduced the amount of lands required in this area. A takings and savings analysis was also completed for the Fakahatchee Strand State Preserve are as well which showed hydrological impacts to lands in this area. Lands required for the Manatee mitigation features are addressed in this REP. In September 2004, when the 2004 Final PIR/EIS was completed, the Six Program-Wide Guidance Memoranda required by the Programmatic Regulations for the CERP, 33 Code of Federal Regulations (CFR) 385, Part 385.5 was not drafted. The estate analysis completed in the 2004 Final PIR/EIS and set forth in Paragraph F.16 of Appendix F.-Real Estate Appendix for the Southern Golden Gate Estate Carl Area is not modified even though certain features within the area have changed. The 55,247 acres is still required in fee as approved. The recommendation of the modification of the estate required in the Belle Meade State Conservation and Recreation Land Area is discussed in Subparagraphs F.16.2 below. The recommendation of inclusion of lands in the Fakahatchee Strand State Preserve is discussed in Subparagraph F.16.3 below. And the inclusion of lands for the Manatee mitigation features is discussed in Subparagraph F.16.4 below. ***[End December 2013 Update]***

### F.16.1 SOUTHERN GOLDEN GATE ESTATES CARL AREA

The recommended estate for the SGGE CARL area is fee based on the following analysis. This analysis to determine the minimum real estate interests required for the PSRP is completed in accordance with the draft CECW-P/CERE memorandum SUBJECT: Determining Land Requirements and Real Estate Interests on Ecosystem Restoration Projects. The draft guidance requires an analysis to determine the real estate interests required for the project utilizing the following:

a. Identify all construction features and determine the minimum interest required to support construction and operation, maintenance, repair, and replacement (OMR&R).

Construction includes such items as dredging, digging or filling canals, altering contours, depositing materials and erecting structures.

b. Evaluate any affirmative rights the Government must secure over benefited lands to meet the defined restoration objectives. These are in areas where ecosystem functions and processes are being restored or lands that are required as a buffer to protect the restored lands. Examples of such activities include the right to plant or remove vegetation, erect signs, or conduct periodic prescribed burns.

c. Evaluate any restrictions on the existing landowner's use of benefited lands that are necessary to meet specifically defined restoration objectives for the project. Examples include limiting grazing or placing prohibitions on plowing, alteration of contours, placement of structures for human habitation, and use of pesticides or fertilizers.

d. Determine whether a Takings Analysis is appropriate in instances where there will be an increase in flooding over or other hydrologic alteration to private lands that may have risen to the level of a taking of property. This is particularly significant where the impacted lands are not otherwise needed for construction or OMR&R of the project or where only a minimal interest is needed. A Takings Analysis is not required in all cases, such as those in which fee or a significant interest is already justified for construction or OMR&R.

e. When any of the above analyses indicate that less than a fee interest is required for the project, sound real estate practices traditionally dictate that fee acquisition is typically appropriate when the cost of easements are estimated at 75% of fee or higher. Ultimately, the decision of fee or easement needs to be fully supported, taking all factors into consideration.

The SGGE CARL area is comprised of 55,247 acres located in Collier County, Florida. Alternative 3D, the recommended plan, consists of the construction of three pump stations, three spreader canals and 83 canal plugs. It also requires the removal and demolition of 227 miles of road and construction of 52 miles of road to provide access to the project area and to adjacent areas.

Pursuant to the Framework Agreement, all Section 390 funds (Farm Bill funds) spent by FDEP for lands with the project will be credited toward the Federal share of project costs. The 17,549.87 acres acquired with Federal Farm Bill funds will be required in fee.

Construction features in the SGGE CARL area for which fee title would be minimum estate required include: (a) the areas covered by the three pump stations; (b) the areas covered by the eighty three canal plugs located within the canals in the SGGE CARL area; (c) the area covered by the 227 miles of road to be removed and demolished. (These roads were owned by Collier County and have been abandoned for the project construction); (d) the area covered by 52 miles of roads to be constructed; and (e) the areas covered by the three spreader canals. Fee would be required over approximately 23,200 acres of the 55,247 acres within SGGE.

The minimum real estate interest for the remainder of the approximately 32,047 acres in the SGGE CARL area, including lands north of the pump station and south of I-75, was defined after determining the affirmative rights required by the Government to meet the defined restoration objectives and the determination of the restrictions and prohibitions on the use of the lands by the current owners were determined and by determining what hydrological impact the project was having on these lands. The constraints, prohibitions and restrictions on private use include, but are not limited to, the following:

a) A prohibition of livestock is required. The negative effects of allowing cattle, horses, or other livestock on the natural areas will result in continued grazing on desirable upland and wetland plants and the production of manure which can degrade surface and ground water quality on site and off site. Restrictions would allow landowners to use low-density livestock on a temporary basis to control exotic species. Only temporary fencing would be allowed. Assistance from a grazing professional would be required to determine for each parcel the timing and number of livestock. The small size of each parcel would require very short-term use probably measured in terms of days in order to not devastate the native vegetation. Providing road or trail access to each of the grazed parcels would in itself be very detrimental to the ecosystem. Wetlands created by the project would have to be fenced off to exclude livestock. Permanent fencing like roads reduces ecosystem values. No public agency could take on the management of this number of separate grazing plans. Cattle could still impact upland habitats if they had access and potential expected habitat units may be not realized over existing conditions.

b) A prohibition of all agricultural activity is required. High intensity farming activities, such as row or field crops, sod, citrus, ornamental plants, etc are inconsistent with wetland or upland restoration and would be prohibited. These types of land cover provide poor wildlife habitat. The unrestricted use of pesticides and fertilizers can negatively affect habitat units both on site and off site and would therefore be prohibited. Some low intensity type lumbering or other forestry related activities might be appropriate to promote vegetative restoration. Planting and eventual thinning of native pine seedlings and saplings could enhance the restoration of historic pine flatwoods. Activities such as removal and even commercial sale for landscaping of invasive species such as the cabbage palm might be incorporated into a restoration plan without significantly altering upland habitat units gained. However, managing programs for logging or farming with easements on privately held estates would be daunting for any land management agency.

c) A prohibition of new construction activity is required. The habitat units were calculated assuming that the infrastructure of the subdivision would be removed leaving behind only those structures necessary for the requirements of the managing agency and to provide for acceptable public recreational use. Providing access to any of the parcels would require the maintenance of some portion of the 279 miles of roads. The elimination of the road system, easy vehicle access, and human presence on both the wetlands and uplands provide the most important ecosystem benefits with which the habitat units were calculated. The maintenance of existing structures and the construction of new structures (homes, buildings, roads, parking lots, and utilities) on any of the parcels would cause a significant reduction of the calculated habitat units. By allowing homes or other buildings to remain or to be constructed within SGGE CARL area, access to the sites would have to be maintained.

Removal of 227 miles of the total of 279 of existing roads is imperative to restoration under the tentatively recommended plan.

d) A prohibition on the extraction of minerals or water, or the application of municipal sludge on site. These are generally inconsistent with restoration activities planned for the natural areas. The extraction of minerals or water, are generally inconsistent with the restoration activities planned for the SGGE. Habitat units were calculated assuming that no further mineral, surface, or ground water extraction would occur. If build out on easement parcels occurred, the need for fill material and well water would contribute to as much as a 100% loss of habitat units in affected wetlands and a 50% loss in potential habitat units in affected uplands. The managing agency might be able to allow restricted groundwater withdrawals for surrounding communities without affecting the calculated habitat units.

e) Some restriction of public and private access would be required. Some activities, like hiking and fishing, would be allowed with the assumption that they would only have minimal impacts on calculated habitat units. Intensive unfettered public access is likely to have detrimental effects on the ecosystem. Habitat units were calculated on the assumption that 227 of the 279 miles of public roadway would be removed and much of the remaining 52 would be restricted. Only 18 miles of road would be maintained as all season gravel access. The remaining secondary roads would be restricted seasonally to motorized vehicles. Off road vehicle use would be prohibited. Easements on the private land would need to account for this restricted public access.

There is a requirement for land management activities for restoration under the tentatively recommended plan. These types of activities are necessary for full restoration of the SGGE CARL area as envisioned. If the activities were not conducted then there would be a loss of potential habitat units that would have been gained. These activities include contaminant remediation, fire management, and exotic species control.

After consideration of all the affirmative rights required by the government and the restrictions on the landowner(s) use of the properties, it was determined that the conservation easement would generally be the minimum real estate interest required over the remaining lands within SGGE CARL area. However, for Alternative 3D, approximately 90% of the remaining 32,047 acres are hydrologically impacted by the construction of the project in the average wet season. Construction of the project causes an increase in depth of water on the lands ranging from 0.5 feet to over 2.0 feet. To provide for both the increases in hydrological impacts in this acreage and to maintain these areas as wetlands, fee is the recommended estate. ***[December 2013 Update]*** The total estimated fee cost of lands within the SGGE CARL area in the 2004 Final PIR/EIS was $128,707,026 utilizing FDEP's actual acquisition costs for 53,463 acres acquired and the estimated land costs for the 1,604 acres remaining to be acquired. The 2013 total estimated fee cost of these lands has risen to $138,098,525. See Figure F-6. ***[End December 2013 Update]***

### F.16.2 BELLE MEADE STATE CONSERVATION AND RECREATION LAND (CARL) AREA

***[December 2013 Update]*** **In** the REP for the 2004 Final PIR/EIS, a perpetual flowage easement was required over 8,868 acres in the Belle Meade CARL area due to increased

inundation caused by construction of the PSRP. Based on new GSSHA modeling data as well as use of the modeling data in the REP for the 2004 Final PIR/EIS, the acreage required in Belle Meade Area was reduced to approximately 6,894.55 acres. The analysis to determine the perpetual flowage easement nestate recommended in the REP for the 2004 Final PIR/EIS did not consider that removal and degrading of the roads in Southern Golden Gate Estates cut off access to the Belle Meade Area. The MIKE SHE model used in the 2004 Final PIR/EIS and the 2013 GSSHA modeling show greater hydrological impacts in the Belle Meade Area. Based on the hydrological impacts as well as removal of access to the area, fee is the recommended estate. ***[End December 2013 Update]*** The roads are much more primitive than in SGGE CARL area and the access is through SGGE CARL area. The state of Florida's Belle Meade State CARL project is comprised of the 27,200 acres of which approximately 17,670 acres are currently state owned. The only improvements are a number of dwellings and weekend cabins in the area. Wet conditions prohibit nearly all access. Only about one mile of eastern portion of Southern Belle Meade adjoining the SGGE CARL area is improved with some type of primitive traversable road system. There is no public service or utilities in this area. Improvements are on generators, septic tanks and wells. There is a very limited amount of electrical service in Southern Belle Meade. Further development of electrical service is very expensive and requires demand of which there is none. There are no water and sewer services to any of the subject properties. Wells and septic systems are the norm. Most of Southern Belle Meade is inundated with water. There can be no permanent structures in most of the area.

All subject lands are zoned "A" Agricultural, by Collier County and also are subject to subject to an Agricultural/Rural designation of the Comprehensive Land Use Plan. This zoning regulation is intended to create an area of predominantly agricultural usage with very low-density housing based on a maximum density of one unit per forty acres. ***[December 2013 Update]*** In the REP for the 2004 Final PIR/EIS, it was estimated that the highest and best use of land in the Southern Belle Meade in its present condition, is limited residential or recreation use with limited agricultural uses. In the after scenario there will be hydrologic impacts, (with the margin of error identified as + or – 0.5 feet of water) as well as increases of over 4 inches during the 5, 10, 25 and 50 year storm events.

The State of Florida, FDEP, has acquired fee title to 5,696.75 acres of the total of 6,894.55 acres required at a total estimated real estate cost of approximately $10,854,807, excluding administrative costs and PL91-646 costs. The remaining 1,197.80 acres required in Belle Meade area will be acquired by the SFWMD. SFWMD has estimated per acre value at $6,000 per acres for an estimated real estate cost of $7,222,659. See Figure F-6.

### F.16.3 FAKAHATCHEE STRAND STATE PRESERVE

In the 2004 Final PIR/EIS, no lands in the Fakahatchee Strand State Preserve, lying east of the SGGE, were identified as being required for Project operations; therefore, there was no real estate cost estimate for any lands within this area. Detailed H&H analysis was performed in 2013 using more recent lidar and the GSSHA model platform, concluded that approximately 1,864.62 acres will be hydrologically impacted by the Project operations during the 5, 10, 25 and 100 year storm events. Additionally the MIKE SHE model used during the 2004 Final PIR/EIS showed hydrological impacts to the same areas in the Fakahatchee Strand State Preserve. Increases in hydrologic impacts greater than 0.5 feet occurred in these areas in the

wet, dry and average years. Therefore a perpetual flowage easement is recommended over this 1,864.62 acres in Fakahatchee Strand State Preserve. The State of Florida, FDEP has acquired fee title to 1,813.62 acres at an esitmated cost of approximately $757,785, excluding administrative costs and PL91-646 costs.. With only a perpetual flowage easement estimated at 90% of fee value, the credit for the FDEP owned land would not exceed $688,895. The remaining approximately 51 acres will be acquired by the SFWMD with an estimated value of $108,000. See Figure F-6.

## F.16.4 MANATEE MITIGATION AREA

The Biological Opinion, as part of the 2004 Final PIR/EIS, identified a warm water manatee refugium in the Port of the Islands marina and basin. Analysis from the US Geological Survey (USGS) concluded the refugium will likely be impacted by the change in the post project discharge flows verses the pre-construction condition. An interagency team with representatives from USACE, SFWMD, U.S. Fish and Wildlife Service, Florida Fish and Wildlife Conservation Commission, and the Florida Department of Environmental Protection are analyzing alternatives that will mitigate for the impact to the refugium.

The design and construction of the Manatee Mitigation Feature will be completed by SFWMD. The current design is a feature in the spoil area located on the west side of the Faka Union Canal south of the Port of the Islands Basin (See Figure F-7). The Manatee Mitigation Feature will include a "pool" or multiple "pools" that are two acres in total area at a depth of 20 feet in an effort to provide the manatees a connection to the warm ground water in the winter months. The current preliminary layout has a small shelf surrounding the pools to allow a place for aquatic vegetation to grow and two separate connections to adjacent shallow oxbows to encourage water flow through the area.

Construction of the Manatee Mitigation features will require approximately 2 to 6 acres for the refugium (perpetual channel easement) and approximately 12.3 acres of disposal area (perpetual disposal easement). The area required for construction of both the refugium and the disposal areas are on lands owned by the Board of Trustees of the Internal Improvement Trust Fund of the State of Florida and conveyed to the State of Florida by patent from the United States of America in 1845 at no cost. Therefore there is no real estate cost associated with the provision of these lands. See Figure F-7. ***[End December 2013 Update]***

## F.17 MINERAL AND TIMBER ACTIVITIES

***[December 2013 Update]***There are no known present or anticipated mineral or subsurface mineral extraction activities within the vicinity of the proposed SGGE CARL area that may affect construction, operation, or maintenance of the project. There are currently no timber harvesting activities. ***[End December 2013 Update]*** Since the basis for the construction of the project is to restore the ecosystem within the PSRP area, such activities will be restricted.

## F.18 NON-FEDERAL AUTHORITY TO PARTICIPATE IN THE PROJECT

The SFWMD was created by virtue of Florida Statutes, Chapter 373, Section.069 to further the state policy of flood damage prevention, preserve natural resources of the state including fish and wildlife and to assist in maintaining the navigability of rivers and harbors (there are other enumerated purposes but they are not directly applicable to this project). The SFWMD is specifically empowered to cooperate with the United States in the manner provided

by Congress for flood control, reclamation, conservation, and allied purposes in protecting the inhabitants, the land, and other property within the SFWMD from the effects of a surplus or a deficiency of water when the same may be beneficial to the public health, welfare, safety, and utility (Section 373.103).

To carry out the above purposes, the SFWMD is empowered to hold, control, and acquire by donation, lease, or purchase, or to condemn any land, public or private, needed for rights-of-way or other purposes, and may remove any building or other obstruction necessary for the construction, maintenance, and operation of the works; and to hold and have full control over the works and rights-of-way of the SFWMD.

The term *works of the district* is defined by Section 373.019 to be those projects and works, including, but not limited to, structures, impoundments, wells, and other water courses, together with the appurtenant facilities and accompanying lands, which have been officially adopted by the governing board of the district as works of the district.

Section 373.139 specifically empowers the SFWMD to acquire fee title to real property and easements therein by purchase, gift, devise, lease, eminent domain, or otherwise for flood control, water storage, water management, and preservation of wetlands, streams and lakes, except that eminent domain powers which may be used only for acquiring real property for flood control and water storage.

and

FLORIDA STATUTES
TITLE XXVIII. NATURAL RESOURCES; CONSERVATION, RECLAMATION, AND USE
CHAPTER 373. WATER RESOURCES
PART I. STATE WATER RESOURCE PLAN

373.1501. South Florida Water Management District as local sponsor

(1) As used in this section and s. 373.026(8), the term:

(b) "Department" means the Florida Department of Environmental Protection. (c) "District" means the South Florida Water Management District.

(f) "Project" means the Central and Southern Florida Project.

(g) "Project Component" means any structural or operational change, resulting from the restudy, to the Central and Southern Florida Project as it existed and was operated as of January 1, 1999.

(h) "Restudy" means the Comprehensive Review Study of the Central and Southern Florida Project, for which federal participation was authorized by the federal Water Resources Development Acts of 1992 and 1996 together with related Congressional resolutions and for which participation by the South Florida Water Management District is authorized by this section. The term includes all actions undertaken pursuant to the aforementioned authorizations which will result in recommendations for modifications or additions to the Central and Southern Florida Project.

(2) The Legislature finds that the restudy is important for restoring the Everglades ecosystem and sustaining the environment, economy, and social well- being of South Florida. It is the intent of the Legislature to facilitate and support the restudy through a

process concurrent with Federal Government review and Congressional authorization. Nothing in this section is intended in any way to limit federal agencies or Congress in the exercise of their duties and responsibilities. It is further the intent of the Legislature that all project components be implemented through the appropriate processes of this chapter and be consistent with the balanced policies and purposes of this chapter, specifically s. 373.016.

(4) The district is authorized to act as local sponsor of the project for those project features within the district as provided in this subsection and subject to the oversight of the department as further provided in s. 373.026. The district may:

(a) Act as local sponsor for all project features previously authorized by Congress;

(b) Continue data gathering, analysis, research, and design of project components, participate in preconstruction engineering and design documents for project components, and further refine the Comprehensive Plan of the restudy as a guide and framework for identifying other project components;

(c) Construct pilot projects that will assist in determining the feasibility of technology included in the Comprehensive Plan of the restudy; and

(d) Act as local sponsor for project components.

(5) In its role as local sponsor for the project, the district shall comply with its responsibilities under this chapter and implement project components through appropriate provisions of this chapter. In the development of project components, the district shall:

(a) Analyze and evaluate all needs to be met in a comprehensive manner and consider all applicable water resource issues, including water supply, water quality, flood protection, threatened and endangered species, and other natural system and habitat needs;

(b) Determine with reasonable certainty that all project components are feasible based upon standard engineering practices and technologies and are the most efficient and cost-effective of feasible alternatives or combination of alternatives, consistent with restudy purposes, implementation of project components, and operation of the project;

(c) Determine with reasonable certainty that all project components are consistent with applicable law and regulations, and can be permitted and operated as proposed. For purposes of such determination:

1. The district shall convene a pre-application conference with all state and federal agencies with applicable regulatory jurisdiction;

2. State agencies with applicable regulatory jurisdiction shall participate in the pre-application conference and provide information necessary for the district's determination; and

3. The district shall request that federal agencies with applicable regulatory jurisdiction participate in the pre-application conference and provide information necessary for the district's determination;

(d) Consistent with this chapter, the purposes for the restudy provided in the Water Resources Development Act of 1996, and other applicable federal law, provide reasonable assurances that the quantity of water available to existing legal users shall not be diminished by implementation of project components so as to adversely impact existing legal users, that existing levels of service for flood protection will not be diminished outside the geographic area of the project component, and that water management practices will continue to adapt to meet the needs of the restored natural environment.

(e) Ensure that implementation of project components is coordinated with existing utilities and public infrastructure and that impacts to and relocation of existing utility or public infrastructure are minimized.
(6) The department and the district shall expeditiously pursue implementation of project modifications previously authorized by Congress or the Legislature, including the Everglades Construction Project. Project components should complement and should not delay project modifications previously authorized.
(7) Notwithstanding any provision of this section, nothing herein shall be construed to modify or supplant the authority of the district or the department to prevent harm to the water resources as provided in this chapter.
(8) Final agency action with regard to any project component subject to s.373.026(8)(b) shall be taken by the department. Actions taken by the district pursuant to subsection (5) shall not be considered final agency action. Any petition for formal proceedings filed pursuant to ss. 120.569 and 120.57 shall require a hearing under the summary hearing provisions of s. 120.574, which shall be mandatory. The final hearing under this section shall be held within 30 days after receipt of the petition by the Division of Administrative Hearings.

## F.19 PROPOSED ESTATES

### F.19.1 STANDARD ESTATES - FEE

The fee simple title to (the land described in Schedule A)/(Tracts Nos. _____, ___,_and ____), subject; however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

### F.19.1.1 FLOOD DAMAGE REDUCTION LEVEE EASEMENT

A perpetual and assignable right and easement in (the land described in Schedule A) (Tracts Nos.___, ___ and ____) to construct, maintain, repair, operate, patrol and replace a flood damage reduction levee, including all appurtenances thereto; reserving, however, to the owners, their heirs and assigns, all such rights and privileges in the land as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

### F.19.1.2 TEMPORARY WORK AREA EASEMENT

A temporary easement and right-of-way in, on, over and across (the land described in Schedule A) (Tracts Nos. ____ and ____), for a period not to exceed _____ years, beginning with date possession of the land is granted to the local sponsor, for use by the United States, its representatives, agents, and contractors as a (borrow area) (work area), including the right to (borrow and/or deposit fill, spoil and waste material there on) (move, store and remove equipment and supplies), and erect and remove temporary structures on the land and to perform any other work necessary and incident to the construction of the PSRP, together with the right to trim, cut, fell and remove there from all trees, underbrush, obstructions, and any other vegetation, structures, or obstacles within the limits of the right-of-way; reserving, however, to the landowners, their heirs and assigns, all such rights and privileges as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

F.19.1.3 **FLOWAGE EASEMENT (Permanent Flooding)**

The perpetual right, power, privilege and easement permanently to overflow, flood and submerge (the land described in Schedule A) (Tracts Nos. _____, _____ and _____), (and to maintain mosquito control) in connection with the operation maintenance of the PSRP as authorized by the Act of Congress approved _____, and the continuing right to clear and remove any brush, debris and natural obstructions which, in the opinion of the representative of the SFWMD in charge of the project, may be detrimental to the project, together with all right, title and interest in and to the timber, structures and improvements situate on the land; provided that no structures for human habitation shall be constructed or maintained on the land, that no other structures shall be constructed or maintained on the land except as may be approved in writing by the representative of the SFWMD in charge of the project, and that no excavation shall be conducted and no landfill placed on the land without such approval as to the location and method of excavation and/or placement of landfill; taken subject to existing easements for public roads and highways, public utilities, railroads and pipelines; reserving, however, to the landowners, their heirs and assigns, all such rights and privileges as may be used and enjoyed without interfering with the use of the project for the purposes authorized by Congress or abridging the rights and easement hereby acquired; provided further that any use of the land shall be subject to Federal and state laws with respect to pollution.

F.19.1.4 **FLOWAGE EASEMENT (Occasional Flooding)**

The perpetual right, power, privilege and easement occasionally to overflow, flood and submerge (the land described in Schedule A) (Tract No._____) and to maintain mosquito control in connection with the operation and maintenance of the PSRP as authorized by the Act of Congress approved _____, together with all right, title and interest in and to the structure; and improvements now situate on the land, except fencing (and also excepting (here identify those structures not designed for human habitation which the SFWMD determines may remain on the land)) or provided that no structures for human habitation shall be constructed or maintained on the land, that no other structures shall be constructed or maintained on the land except as may be approved in writing by the representative of the SFWMD in charge of the project, and that no excavation shall be conducted and no landfill placed on the land without such approval as to the location and method of excavation and/or placement of landfill; the above estate is taken subject to existing easements for public roads and highways, public utilities, railroads and pipelines; reserving, however, to the landowners, their heirs and assigns, all such rights and privileges as may be used and enjoyed without interfering with the use of the project for the purposes authorized by Congress or abridging the rights and easement hereby acquired; provided further that any use of the land shall be subject to Federal and State laws with respect to pollution.

F.19.1.5 **TEMPORARY ACCESS ROAD EASEMENT**

A temporary and assignable easement and right-of-way in, on, over, and across (the land described in schedule A) for a period not to exceed _____, for the location, construction, operation, maintenance, alteration, replacement and use of (an) access road(s) and appurtenances thereto; together with the right to trim, cut, fell and remove there from all trees, underbrush, obstructions and other vegetation, structures, or obstacles within the limits of the right-of-way; (reserving however, to the owners, their heirs and assigns, the right to cross over or under the right-of- way as access to their adjoining land at the locations indicated in schedule B);

subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

F.19.1.6 **PERPETUAL CHANNEL IMPROVEMENT EASEMENT**

***[December 2013 Update]*** A perpetual and assignable right and easement to construct, operate, and maintain channel improvement works on, over and across (the land described in schedule A) (Tracts Nos. _____, _____ and _____) for the purposes as authorized by the Act of Congress approved_____, including the right to clear, cut, fell, remove and dispose of any and all timber, trees, underbrush, buildings, improvements and/or other obstructions there from; to excavate: dredge, cut away, and remove any or all of said land and to place thereon dredge or spoil material; and for such other purposes as may be required in connection with said work of improvement; reserving, however, to the owners, their heirs and assigns, all such rights and privileges as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however, to existing easements far public roads and highways, public utilities, railroads and pipelines.

F.19.1.7 **PERPETUAL DISPOSAL EASEMENT**

A perpetual and assignable easement and right-of-way in, on, over, and across the land, to construct, operate, maintain, repair, replace, and remove pipelines used in connection with the transmission of dredged materials to or across said tract of land, and for the purpose of depositing waste material or excavated materials on said land; the right to excavate ditches and construct dikes, mounds and control works to provide for drainage of the easement areas at all times and prevent creation of a flooding condition to adjacent areas in connection with the construction and operation of said project as described in said congressional authorization and to use for the future maintenance and any future enlargement of said project as may be authorized by Congress; together with the right to clear, cut, fell, remove, and dispose of any and all timber, trees, underbrush, buildings, improvements and/or other obstructions therefrom; the right to alter the grade of said land from time to time; to plant thereon trees, grass, shrubs, and other vegetation with the right to cut and remove, protect, maintain and otherwise control vegetation and prevent the construction of or maintenance of structures; to install, maintain and service aids to navigation together with the right to install and maintain electric power lines to serve the same, and for such other purposes as may be required in connection with the use of said tract as a disposal area; reserving, however, to the owners, their heirs and assigns all such rights and privileges as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however, to existing easements for public roads and highways, public utilities, railroads, and pipelines. ***[End December 2013 Update]***

F.20 **ZONING ORDINANCES**

Preliminary investigation indicates that no enactments of zoning ordinances are proposed in lieu of, or to facilitate, acquisition in connection with the project. The eastern portion of the Belle Meade area is designated under the future land use maps of Collier County as being in an area identified as Agricultural/Rural Designation and have been also designated under the Ordinance as Sending Lands for the Transfer of Development Rights (TDR) program. The primary purpose of the TDR process within the Rural Fringe Mixed Use District is to establish an equitable method of protecting and conserving the most valuable environmental lands, including large connected wetland systems and significant areas of habitat for listed species, while allowing property owners of such lands to recoup lost value and development potential

through an economically viable process of transferring such rights to other more suitable lands. Sending Lands are those lands that have the highest degree of environmental value and sensitivity and generally include significant wetlands, uplands, and habitat for listed species. Private property owners of lands designated as Sending Lands may transfer density to Receiving Lands within the Rural Fringe Mixed Use District, and to lands within the Urban Designated Area subject to limitations set forth in the Density Rating System. Permitted uses are limited to the following:

a) Agricultural uses consistent with Chapter 823.14(6) Florida Statutes (Florida Right to Farm Act).

b) Detached single-family dwelling units, including mobile homes where the Mobile Home Zoning Overlay exists, at a maximum density of one dwelling unit per 40 acres or one dwelling unit per lot or parcel of less than 40 acres, which existed on or before June 22, 1999. For the purpose of this provision, a lot or parcel which is deemed to have been in existence on or before June 22, 1999 is: 1) a lot or parcel which is part of a subdivision recorded in the public records of Collier County, Florida; 2) a lot or parcel which has limited fixed boundaries, described by metes and bounds or other specific legal description, the description of which has been recorded in the public records of Collier County, Florida on or before June 22, 1999; or 3) a lot or parcel which has limited fixed boundaries, for which an agreement for deed was executed prior to June 22, 1999.

c) Habitat preservation and conservation uses.

d) Passive parks and other passive recreational uses.

e) Sporting and recreational camps, within which the lodging component shall not exceed 1 unit per five gross acres.

f) Essential services necessary to serve permitted uses identified in Section 5.a) through 5.e) such as the following: private wells and septic tanks; utility lines, except sewer lines; sewer lines and lift stations, only if located within non-NRPA Sending Lands, and only if located within already cleared portions of existing rights-of-way or easements, and if necessary to serve the Rural Transition Water and Sewer District; and, water pumping stations necessary to serve the Rural Transition Water and Sewer District.

g) Essential services necessary to ensure public safety.

h) Oil extraction and related processing. Where practicable, directional- drilling techniques and/or previously cleared or disturbed areas shall be utilized to minimize impacts to native habitats.

## F.21 ACQUISITION SCHEDULES

***[December 2013 Update]*** FDEP has completed the acquisition of the lands in the SGGE CARL area with approximately 300 parcels awaiting final judgments in condemnation. Acquisition of lands within Belle Meade CARL project and the Fakahatchee Strand State Preserve will be completed prior to completion of construction of the PSRP. ***[End December 2013 Update]***

## F.22 FACILITY, UTILITY RELOCATIONS

Final investigation indicates that the only utility companies that provide services in the SGGE CARL area are Florida Power and Light Company (power) and Sprint (telephone). Due to the development patterns in the SGGE CARL area, service is limited primarily to the northwest portion of SGGE CARL area. Most of their facilities are located within the rights of way of the local road network in SGGE CARL area. No major utility corridors or easements

traverse the SGGE CARL area. Some of the local distribution lines are used to provide service to areas east of SGGE CARL area. Time Warner, the cable provider in the NGGE area, does not provide any service south of Interstate 75. The roads within the SGGE CARL area were owned and maintained by Collier County, Florida.

The state of Florida, through the Board of Trustees of the Internal Improvement Trust Fund and the SFWMD executed an agreement with Collier County, Florida in September 2003. The agreement provides that Collier County would adopt a resolution vacating and releasing its interest in all certain roadways with the SGGE CARL area and would release, terminate or disclaim any interest in the rights-of-way of portions of Jane's Scenic Drive and Miller Boulevard. In exchange for Collier County vacating, releasing, terminating or disclaiming its interests in these roads, the State and SFWMD agreed to the following: (1) SFWMD would dedicate annually $1 million to the operation, maintenance and repair of secondary canal system in Collier County for a period of 20 years; (2) SFWMD would convey at no cost to the county 640 contiguous acres of unimproved land for recreational purposes; (3) the state and SFWMD will maintain the roadways in the SGGE CARL area in manners prescribed in the agreement; (4) the state and SFWMD will provide access to Sprint and Florida Power and Light from roadways designated as "primary, all weather roads" to all telephone and electric facilities located within the rights of way and if requested would provide a replacement easement to Sprint and Florida Power and Light; and (5) the general public will be given access for recreational use on the lands within the SGGE CARL area. FDEP and SFWMD have agreed in writing that they will not receive any credit for the expenditure of funds related to the terms, provisions, and conditions set forth in this agreement.

The SFWMD has executed an agreement with the Florida Department of Transportation (FDOT) for the construction of the Tamiami Trail Culvert Critical Restoration Project. This agreement allows SFWMD to construct the culverts within the FDOT right of way of U.S. Highway 41. After completion, maintenance of the roadway culverts and roadway facilities become the responsibility of FDOT. FDOT is participating in the project by providing $10,698,614 for design, construction engineering, and construction costs. FDOT has granted SFWMD a permit to complete the work within the right-of-way.

### F.23 HAZARDOUS TOXIC OR RADIOLOGICAL WASTE (HTRW)

The SFWMD contracted with URS Corporation for Hazardous, Toxic, and Radioactive Waste (HTRW) Phase I, II, & III assessments on the PSRP site and immediate surrounding area. The contract was completed on September 30, 2003 by delivery of the report entitled *Phase I/II Environmental Site & Ecological Risk Assessment*. An executive summary, including instructions for accessing a copy of the three volume report, can be located in Appendix D of the 2004 Final PIR/EIS. The URS report delineates the project area into four zones. High levels of selenium, chlordane and dieldrin were found on several locations in the SGGE CARL area. The following is a brief overview of the potential HTRW remediation solutions within each zone. ***[December 2013 Update]*** The Non-Federal sponsor is responsible for the costs of remediation or removal of all HTRW at no cost to the Government. SFWMD has addressed the outstanding HTRW issues at the FASE, FANE, and FAW sites discussed below. The SFWMD addressed these issues through a combination of remediation actions and additional sampling and analysis to evaluate ecological risks to USFWS trust species. The SFWMD has received correspondence from the USFWS indicating that the USFWS was

satisfied with the associated actions. At present, no previously conducted on-site remediation was done in areas coincident with completed, planned or pending Corps construction activities. As such, Corps contractors have not "touched" impacted soils to date. SAJ has requested that SFWMD review their records to determine if on-site remediation of residual agricultural chemical has been done since the effective date of the CEPR Ag-chem policy. Prior remediation was done in accordance with Corps HTRW policy ER 1165-2-132. SAJ has instructed the SFWMD that in the event that soils impacted with residual agricultural chemicals have been or will be remediated (all required remediation has been completed) on PSRP project lands since September 14, 2011, the SFWMD will send a formal request to the Corps indicating their desire to have the Corps apply the CERP Ag-Chem policy to this project. SAJ and the SFWMD will prepare an amendment to the PSRP PIR that addresses the requirements of the Ag-chem policy memo subsequent to a formal request by the SFWMD. This PIR addendum will be routed through the EMCX and HQ and the Project Partnership Agreement will be amended to address the SFWMD's responsibilities related to residual agricultural chemicals. The Federal Government will not accept lands for the project until they are certified free of contamination. This is a general procedure applied to all Federal construction projects, and is not unique to CERP. ***[End December 2013 Update]***

(1) Interior Area: The URS report identified no significant HTRW impacts that would inhibit the proposed restoration activities within this zone. It recommended that the homesteads in the interior area be surveyed for potential asbestos containing materials, the potable wells abandoned, and the septic systems decommissioned.

(2) Former Agricultural Area – Southeast: (FASE) Soil sampling in this zone identified selenium above the USFWS interim guideline concentration. The results of the URS ERA indicate that levels of selenium in soils found within these two areas may pose a minimal risk potential for small ground foraging mammals; however, it is unlikely that the contamination will affect any threatened or endangered species. Based on the results of the selenium desorption tests, the statistical review, and groundwater analytical results, it was recommended in the Phase III ERA that no additional assessments or corrective activities be conducted in the FASE. This zone within PSRP should be acceptable for the SFWMD proposed future use of the property. It is important to note that the USFWS has not completed their review of this section of the property. At sites where selenium has been found in high concentrations in the FASE (Grids 25 and 29) it is recommended that remediation or capping actions be conducted.

(3) Former Agricultural Area – Northeast (FANE): Soil sampling within the FANE identified toxaphene areas above the Sediment Quality Assessment Guideline (SQAG). Based on the results of the ERA, soils impacted with selenium in the FANE may pose a minimal risk potential for certain small ground foraging mammals; however, it is unlikely that these selenium concentrations will affect the USFWS trustee species. According to the URS Phase III report the FANE is acceptable for the SFWMD proposed future use pending USFWS final review and concurrence.

(4) Former Agricultural Area – West (FAW): Soil sampling within the FAW indicated that organochlorine pesticides chlordane and dieldrin were detected above the SQAG. Therefore, the URS report recommends that the SFWMD project manager and project design team

(PDT) consider implementing a final design to minimize the ecological risk associated with inundating the contaminated areas. Design modifications consistent with minimizing this ecological risk may include shifting the southwestern project boundary to exclude the impacted area, site grading, and changing the depth/time interval of flooding by manipulating pump operations. In the event that these design modifications are not reasonable alternatives, one or more of the following five corrective actions may be required to minimize the potential risks to ecological receptors. Prior to conducting any corrective actions chlordane and dieldrin impacted soils will need to be further delineated. The USFWS recommends that follow-up sampling for selenium be conducted on 8 grids (Grids 23-30) in Area 64W in the FAW. Depending on the results of this re-sampling effort, remediation or capping may be required. The USFWS also recommends that remediation or capping be conducted in areas where high concentrations of chlordane (Grids 1, 13, 16, 21, 27 and 30) and dieldrin (Grid 1) have been reported in the FAW.

[May 2014 Update] SFWMD has addressed the outstanding Ag-Chem/HTRW issues at the FASE, FANE, and FAW sites discussed above. The SFWMD addressed these issues through a combination of remediation actions and additional sampling and analysis to evaluate ecological risks to USFWS trust species. The SFWMD has received correspondence from the USFWS indicating that the USFWS was satisfied with the associated actions. The Federal Government will not accept lands for the project until they are certified free of contamination. This is a general procedure applied to all Federal construction projects, and is not unique to CERP. [End May 2014 Update]

## F.24 PROJECT SUPPORT

***[December 2013 Update]*** In September 2004, there were two remaining landowners in the PSRP area that had not entered into a contract for acquisition or been acquired by eminent domain by the state of Florida: one is a private individual and the other is the Miccosukee Tribe of Indians of Florida.

The private landowner agreed to a Stipulated Order of Taking and Final Settlement Agreement in April 2005.

The State of Florida, Department of Environmental Protection acquired title to the Miccosukee Tribe of Indians of Florida lands by Order of Taking in May 2005. To date a Final Judgment has not been finalized. ***[End December 2013 Update]***

## F.25 CREDITING FOR INCIDENTAL COSTS AND REVIEW AND RETENTION OF CREDIT DOCUMENTATION

USACE proposes the following streamlined method for crediting for incidental costs and review and retention of credit documentations for those lands required for the project in the SGGE CARL area.

### F.25.1 FDEP ADMINISTRATIVE COSTS FOR LAND ACQUISITION IN SGGE CARL AREA

Pursuant to WRDA 2000, regardless of the date of acquisition, the non-Federal sponsor is entitled to credit for "the value of lands or interests in lands and incidental costs for land acquired by a non-Federal sponsor in accordance with a project implementation report for

any project included in the plan and authorized by Congress shall be (i) included in the total cost of the project; and (ii) credited toward the non-Federal share of the cost of the project." The USACE, SFWMD and FDEP are recommending that FDEP and SFWMD be credited an amount not to exceed $29,158,914 for the administrative/incidental costs associated with the acquisition of the 19,992 parcels in the SGGE CARL area. This amount would include, but not be limited to, the following past, present and future administrative/incidental costs: (1) all FDEP salaries, other personnel services, and contract labor; (2)(a) all FDEP contractor expenses, including all American Government services task assignments or contracts, (2)(b) all First Title & Abstract task assignments or contracts past, present and future, and (2)(c) all PBS&J contract services; (3) all costs associated with the services of state of Florida Attorney; (4) all costs associated with the services of the state of Florida Office of General Counsel; (5) all costs associated with contract appraisals and review of appraisal; (6) all costs associated with environmental site observations; (7) all costs associated with closings, title commitments, title insurance, recording fees, and documentary stamps; (8) all costs associated with surveys or legal descriptions; (9) all the following costs associated with relocation assistance payments, including moving costs, tenant relocation benefits, business relocation benefits, closing costs for replacement housing, and administrative settlement fees; (10) all attorneys fees; and (11) all costs of eminent domain, except land and improvement costs.

Prior to execution of the Project Partnership Agreement (PPA), a review of FDEP's administrative/incidental costs associated with the administrative/incidental costs associated with the acquisition of the 19,992 parcels in the SGGE CARL area by a party approved by the Deputy Assistant Secretary of the Army (Civil Works). The party conducting the review will submit a report to the Deputy Assistant Secretary of the Army (Civil Works) for approval. FDEP will be required to provide necessary supporting documents for the review report, including any credit claimed for P.L. 91-646 relocation housing payments.

### F.25.2 CERTIFICATION OF LANDS FOR THE 19,992 PARCELS IN SGGE CARL AREA

Normally, for land certifications, the non-Federal sponsor provides a land certification signed by the non-Federal Sponsor and an Attorney's Opinion of Title for the parcels being certified together with either legal descriptions of the parcels or a map of the parcels attached to both the land certification and Attorney's Opinion. The USACE will be provided two certifications for lands required for the project in the SGGE CARL area signed by both SFWMD and FDEP. The first certification will contain all lands required for construction in SGGE CARL area (the 55,247 acres) the second will contain all remaining lands in SGGE CARL area (55,247 acres). For each certification, a map will be attached which will show all the parcels in the SGGE CARL area being certified. Those parcels will be color coded versus the rest of the SGGE CARL area that will not be color-coded. The certification will state that fee title is the estate being provided in this certification for these lands in the SGGE CARL area. No Attorney's Opinion of Title will be provided by either FDEP or SFWMD for these lands in the SGGE CARL area. This will reduce SFWMD and USACE administrative costs associated with the crediting of FDEP's administrative/incidental costs.

### F.25.3 CREDIT FOR SGGE CARL AREA LANDS

Normally, to receive credit for the value of lands required for the project, FDEP and SFWMD would have to submit appraisals to the USACE for review and approval prior to a final

determination of credit. For FDEP to provide copies of all the appraisals on the 19,992 parcels within the PSRP and for the USACE to review and approve all the material would be a tremendous undertaking. The time (estimate of 10 man-years) and costs for the USACE and sponsor would be unrealistically high and would not be in the best interest of either party. The USACE, FDEP and SFWMD are proposing that FDEP receive credit for its actual land and improvement acquisition costs for the 36,092.55 acres in the SGGE CARL area acquired as of May 31, 2004 in an amount not to exceed $75,394,333. The actual acquisition costs for the lands in the SGGE CARL area acquired as of May 31, 2004 will be the subject of a review of by a party approved by the Deputy Assistant Secretary of the Army (Civil Works) conducted prior to execution of the Project Partnership Agreement. The party conducting the review will submit a report to the Deputy Assistant Secretary of the Army (Civil Works) for approval. FDEP will be required to provide necessary supporting documents for the review report. FDEP has acquired 17,549.87 acres in the SGGE CARL area with Farm Bill funds. The remaining acreage will be acquired with state funds.

The proposed streamlined credit and certification process for the lands in the SGGE CARL area provides opportunities for expediting the crediting and certification process and reducing administrative costs associated with the review of crediting packages. Such opportunities will allow for an expedited reimbursement for credit to the SFWMD and reduce costs expended in duplication of documents, transportation delivery fees, and storage. It will also reduce the person-hours required to assemble the documents for each tract, reduce person-hours and personnel required to perform the review, and obviate the need for maintenance of such records by the USACE, FDEP and the SFWMD.

### F.25.4 CREDIT AND CERTIFICATION OF LANDS NOT AQUIRED IN THE SGGE CARL AREA AS OF MAY 31, 2004 AND FOR LANDS OUTSIDE THE SGGE CARL AREA

Normal crediting and certification procedures will be followed for lands in the SGGE CARL area not acquired as of May 31, 2004 and for land required for the project not within the SGGE CARL area, except that in the Southern Belle Meade CARL area, FDEP and SFWMD will provide a perpetual flowage easement over the FDEP owned lands and will be credited for the value of the easement required on these FDEP lands based on the percentage of the actual fee acquisition cost of the lands.

The proposals above are reduced as follows:

a. For any lands or acreage within the former SGGE subdivision comprised of 55,247 acres acquired by the non-Federal sponsor or the FDEP prior to May 31, 2004, the creditable value shall be a sum not to exceed $75,394,333, subject to a peer review report by a party designated by the Deputy Assistant Secretary of the Army (Civil Works) and approval of the peer review report by the Deputy Assistant Secretary of the Army (Civil Works) and subject to a determination that the lands are required for the project.

b. For lands, easements and rights-of-way within the former SGGE subdivision comprised of 55,247 acres acquired by the non-Federal sponsor or the FDEP after May 31, 2004, the creditable value shall be the actual acquisition cost of such real property interests at the time

the interests are acquired, subject to a determination that the lands are required for the project and that the costs are reasonable, allowable and allocable.

c. Subject to a peer review report by a party designated by the Deputy Assistant Secretary of the Army (Civil Works) and approval of the peer review report by the Deputy Assistant Secretary of the Army (Civil Works), the incidental/administrative costs incurred by the FDEP for the acquisition of all lands, easements, and rights-of-way within the former SGGE subdivision shall not exceed the sum of $29,158,914.

d. If the lands, easements and rights-of-way which lie outside the boundaries of the former SGGE subdivision were acquired prior to execution of the Project Partnership Agreement, the creditable value shall be their purchase price, subject to a determination that the lands are required for the project and that the costs are reasonable, allowable and allocable, together with their reasonable and necessary incidental costs of acquisition.

e. The value of lands, easements, or rights-of-way required for the project which lie outside the boundaries of the former SGGE subdivision acquired by the non-Federal sponsor after the effective date of the Project Partnership Agreement executed for this project shall be the actual acquisition cost of such real property interests at the time the interests are acquired, subject to a determination that the lands are required for the project and that the costs are reasonable, allowable and allocable, together with their reasonable and necessary incidental costs of acquisition.

## F.26 BASELINE COST ESTIMATES

***[December 2013 Update]*** As part of the 2004 Final PIR/EIS, a 35% contingency of $13,067,931 was placed on the real estate costs that were estimated but not on those in the former Southern Golden Gate Estates where actual costs were used.

A Risk Analysis was conducted according to the procedures outlined in the following documents and sources:

- Cost and Schedule Risk Analysis Process guidance prepared by the USACE Cost Engineering MCX.
- Engineer Regulation (ER) 1110-2-1302 Civil Works Cost Engineering, dated September 15, 2008.
- Engineer Technical Letter (ETL) Construction Cost Estimating Guide for Civil Works, dated September 30, 2008.

The risk register is a tool being used in the Planning Program as a means to identify, discuss and document issues early in the process. A risk register was developed by the study team to identify significant risks attributed to the shortened study period and to project success. In addition, a Cost and Schedule Risk Analysis was conducted specific to the project costs and schedule, that is separate from the study risk register and that results in contingency values that are applied to the project costs to set a total project cost. The risk analysis process for this study is intended to determine the probability of various cost outcomes and quantify the required contingency needed in the cost estimate to achieve the desired level of cost confidence. Two

cost risk workshops were held to begin the process of Cost and Schedule Risk Analysis. The entire PDT participated in a risk analysis brainstorming session to identify risks associated with the recommended plan. The risks were listed in the risk register, which is a tool commonly used in project planning and risk analysis, and evaluated by the PDT.

Assumptions were made as to the likelihood and impact of each risk item, as well as the probability of occurrence and magnitude of the impact if it were to occur. Separate risk models are also being developed for the initial construction and other co-main events using the Oracle Crystal Ball Risk Analysis software using the Monte Carlo Model in order to develop contingencies to apply to the project cost. The models were structured based on the CWWBS for the project and provide a contingency for each of the feature codes.

After the Risk models were run, the results were reviewed and all parameters were reevaluated by the PDT as a sanity check of assumptions and inputs. Adjustments were made to the analyses accordingly and the final contingencies were established. The contingencies were applied to the recommended plan estimate in the Total Project Cost Summary in order to obtain the Fully Funded Cost.

Risk analysis results are intended to provide project leadership with contingency information for scheduling, budgeting, and project control purposes, as well as to provide tools to support decision making and risk management as projects progress through planning and implementation.

The contingency developed by the Risk Register of 31.73% was applied on only $39,782,414 or $39,782,000 (rounded) of the total real estate costs. The contingency was applied on the following costs: (a) Lands in Belle Meade already acquired by the State; (b) Lands in Belle Meade to be acquired by SFWMD; (c) Lands in Fakahatchee Strand already acquired by the State; (d) Lands in Fakahatchee Strand to be acquired by SFWMD; (e) Remaining lands in former Southern Golden Gate Estate still to be acquired by the State; (f) lands required for the Tamiami Trail Culvert Relocations; (g) past and future Non-Federal administrative costs for lands in Belle Meade and Fakahatchee Strand by both the State and SFWMD; (h) future PL91-646 costs associated with lands in Belle Meade and Fakahatchee Strand; and (i) future Federal administrative costs. THE TOTAL CONTINGENCY APPLIED IS $12,622,960 or $12,623,000 (rounded).

**Table F-1** is the revised baseline cost estimate which shows an increase from the $193,043,100 in the 2004 Final PIR/EIS to $213,435,000 (rounded). The current real estate cost estimates for the 55,247 acre former SGGE lands are based on the actual FDEP acquisition costs provided by FDEP. The total 55,247 acres has been acquired by FDEP. The real estate cost estimate for the lands outside the SGGE are based on the 2013 cost estimates obtained via the Florida Department of Environmental Protection land database and appraisals obtained by SFWMD. The lands outside the SGGE area have been acquired by or are being acquired by the FDEP or SFWMD. Credit for the lands outside of SGGE will be based on the purchase price for lands acquired prior to the Project Partnership Agreement and the actual acquisition cost for lands acquired after execution of the PPA. This total cost captures actual and estimated costs from 1984 to the current period. Improved properties that existed within the study area consisted of pole buildings, mobile homes, and single-family residences. The highest and best uses for the

lands are recreation or rural residential uses. The takings and saving analyses for the Port of the Islands and the private lands flood protection features has reduced the amount of acreage required for the berms. **Table F-2** is the revised MCACES Cost estimate. ***[End December 2013 Update]***

***[November 2014 Update]***

**Table F-1. Baseline Cost Estimate**

| PROJECT: Picayune Strand Hydrologic Restoration | | | | | DATE: November 2014 | |
|---|---|---|---|---|---|---|
| **LANDS AND DAMAGES:** | | | | | | |
| | | | | | | |
| ESTATE | Parcels | ACRES | COST-LAND & IMPROVEMENT | FEDERAL | NON-FEDERAL | |
| **LANDS INSIDE FORMER SOUTHERN GOLDEN GATES ESTATES** | | | | | | |
| FEE - Farm Bill Direct Acquisition | 2883 | 17181.63 | $29,795,440 | $29,795,440 | | |
| FEE - Farm Bill condemnation | 82 | 368.24 | $1,517,253 | $1,517,253 | | |
| FEE - State of Florida Acquired-CARL | 5210 | 14911.39 | $14,169,590 | | $14,169,590 | |
| FEE - State of Florida Acquired-CARL Tax sales | 1676 | 2716.43 | $1,078,660 | | $1,078,660 | |
| FEE - State of Florida Condemnation-CARL | 0 | 0.00 | $84,119 | | $84,119 | |
| FEE - State of Florida Acquired-P2000 | 3790 | 12057.34 | $25,191,966 | | $25,191,966 | |
| FEE - State of Florida Condemnation-P2000 | 528 | 1930.91 | $13,180,640 | | $13,180,640 | |
| FEE - State of Florida Acquired-Florida Forever | 244 | 676.73 | $5,050,673 | | $5,050,673 | |
| FEE - State of Florida Condemnation-Florida Forever | 1210 | 3784.25 | $16,638,685 | | $16,638,685 | |
| FEE-State of Florida donations | 7 | 15.50 | $0 | | $0.00 | |
| TOTAL acquired prior to May 2004 | **15630** | **53642.42** | **$106,707,026** | | | |
| FEE-State of Florida acquired after June-1-2004 Judgments in condemnation through 2011 | 479 | | $18,391,500 | | $18,391,500 | |
| FEE-lands still in Condemnation Proceedings with no Final Judgmen-estimated based on amount of deposit versus Final Judgments on cases settled from June 2004 thru 2011 | 320 | | $13,000,000 * | | $13,000,000 | |
| TOTAL acquired or to be acquired after June 2004 | 799 | 0.00 | $31,391,500 | | | |
| **SUBTOTAL** | **16429** | **53642.42** | **$138,098,526** | | | |
| **LANDS OUTSIDE FORMER SOUTHERN GOLDEN GATES ESTATES** | | | | | | |
| TAMIAMI TRAIL CULVERTS | 1 | 20.00 | $40,000* | | $40,000 | |
| FEE BERMS-State acquired | 14 | 225.00 | $550,000* | | $550,000 | |
| FEE-Belle Meade-State Acquired-Estimated | 130 | 5471.75 | $10,304,807* | | $10, 304,807 | |
| FEE-Belle Meade-to be acquired by SFWMD | 55 | 1197.80 | $7,222,659* | | $7,222,659 | |
| PFE-Fakahatchee Strand State owned-Perpetual Flowage Easement-estimated | 109 | 1813.62 | $688,895* | | $688,895 | |
| FEE-acquired or being acquired by SFWMD | 29 | 51.00 | $108,000* | | $108,000 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| SUBTOTAL lands outside of SGGE | 338 | 8779.17 | $18,914,361 | | | |
| | | | | | | |
| SGGE | 16429 | 53642.42 | **$138,098,526** | | | |
| OUTSIDE | 338 | 8779.17 | $18,914,361 | | | |
| SEVERANCE: | 0 | 0.00 | $0 | | | |
| MINERALS | | | | | | |
| TOTAL LANDS AND DAMAGES | | | $157,012,887 | $31,312,693 | $125,700,194 | |
| | | | | | | |
| ACQ/ADMIN | | | | | | |
| FED FUTURE | | | $4,500,000* | $4,500,000 | | |
| NON-FED Former SGGE | | | $29,158,914 | | $29,158,914 | |
| NON FED FUTURE-Belle Meade | 200 | | $2,350,071* | | $2,350,071 | |
| NON FED FUTURE-Fakahatchee | 138 | | $517,982* | | $517,982 | |
| FED PRIOR FEDERAL FUNDS | | | $3,761,290 | $3,761,290 | | |
| | | | | | | |
| PL 91-646 FUTURE STATE | | | $500,000* | | $500,000 | |
| PL 91-646 PRIOR FEDERAL | | | $3,010,982 | $3,010,982 | | |
| | | | | | | |
| SUBTOTAL EXPENDED THRU SEPT 2013 | | | | $38,085,965 | $122,944,747 | $161,029,712 |
| SUBTOTAL FUTURE ESTIMATED | | | | $4,500,000 | $35,282,414 | $39,782,414 |
| | | | | | | |
| SUBTOTAL EXPENDED THRU SEPT 2013 (RD) | | | | $38,085,000 | $122,945,000 | $161,030,000 |
| SUBTOTAL FUTURE ESTIMATED (RD) | | | | $4,500,000 | $35,282,000 | $39,782,000 |
| CONTINGENCY ON $39,782,414-$4,500,000 on estimated Federal costs and $35,282,000 on estimated non-Federal costs (RD) | | | | $1,428,000 | $11,195,000 | $12,623,000 |
| TOTAL ESTIMATED RE COSTS (RD) | | | | $44,013,000 | $169,422,000 | $213,435,000 |

## F.27 **PROJECT MAPS**

Map labeled as **Figure F-1** is the PSRP planning area map and shows the general location of the project. Map labeled **Figure F-2** is the SGGE Study area map and shows the location of SGGE CARL area and the other state and private lands surrounding the SGGE CARL area. Map labeled **Figure F-3** and entitled "Save Our Everglades (SGGE), Collier County, Florida, Ownership Map" shows the Townships, Ranges, Sections, landmarks and roads, and other information for the SGGE CARL area. **Figure F-4** shows the Townships, Ranges, Sections, and other information for the FDEP Belle Meade area. **Figure F-5** shows the location of the project features. ***[December 2013 Update]*** **Figure F-6** shows the Required Lands in SGGE, Belle Meade and Fakahatchee Strand. **Figure F-7** shows the lands required for the Manatee Mitigation area. ***[End December 2013 Update]***

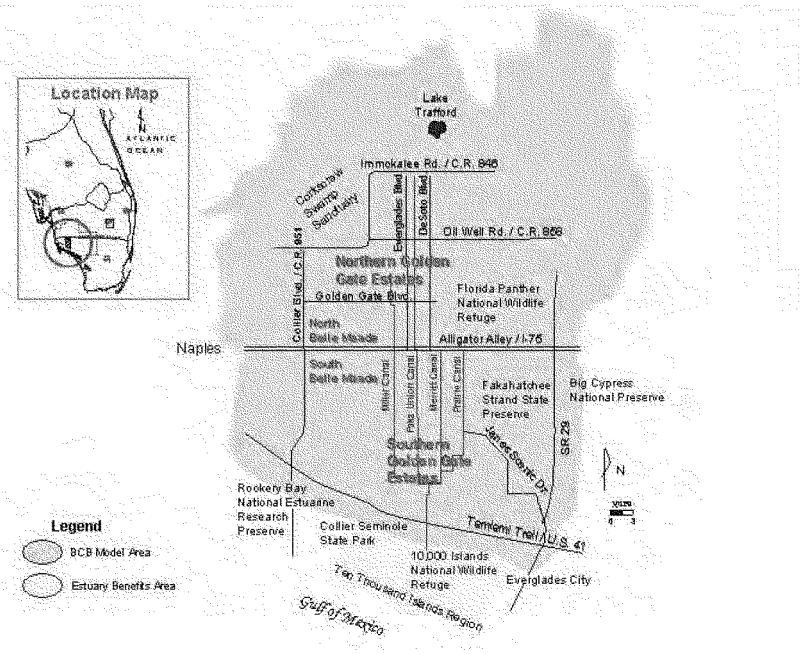



**Figure F-1. Picayune Strand Restoration Project Planning Area**

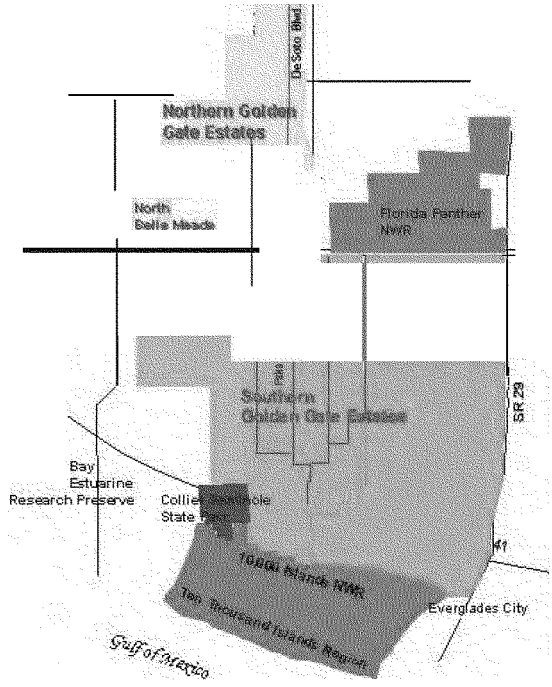
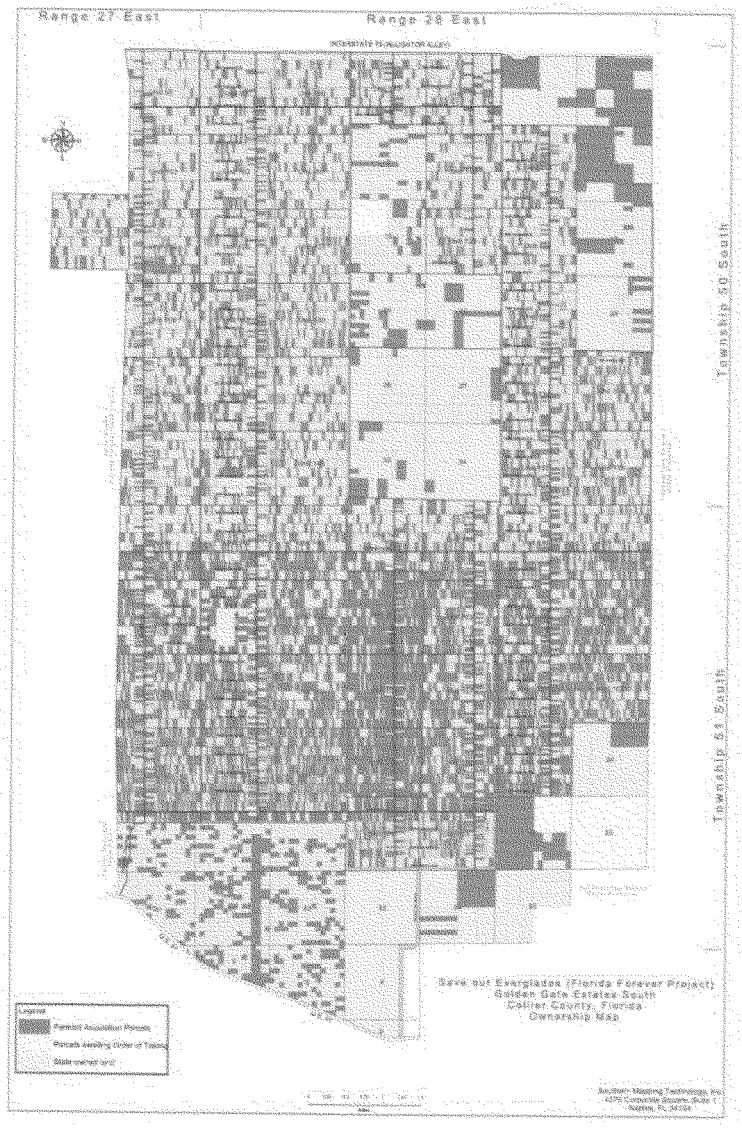
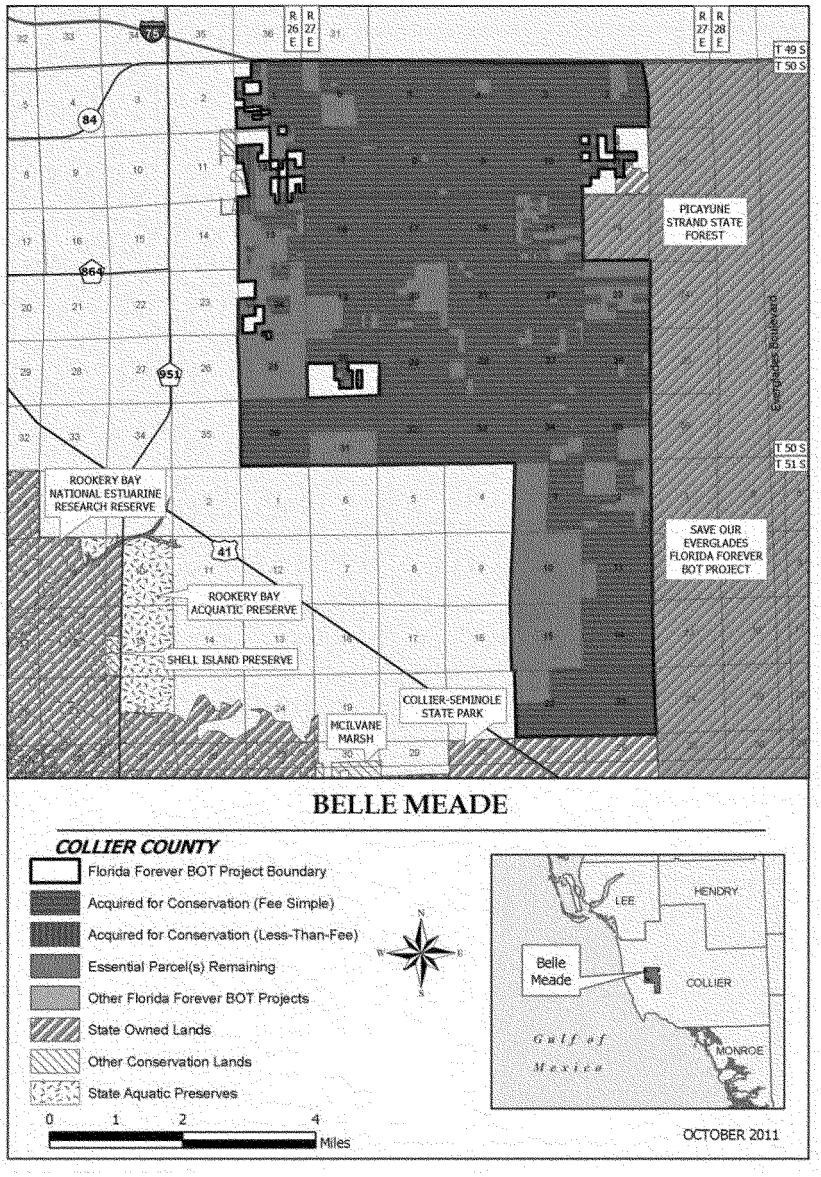


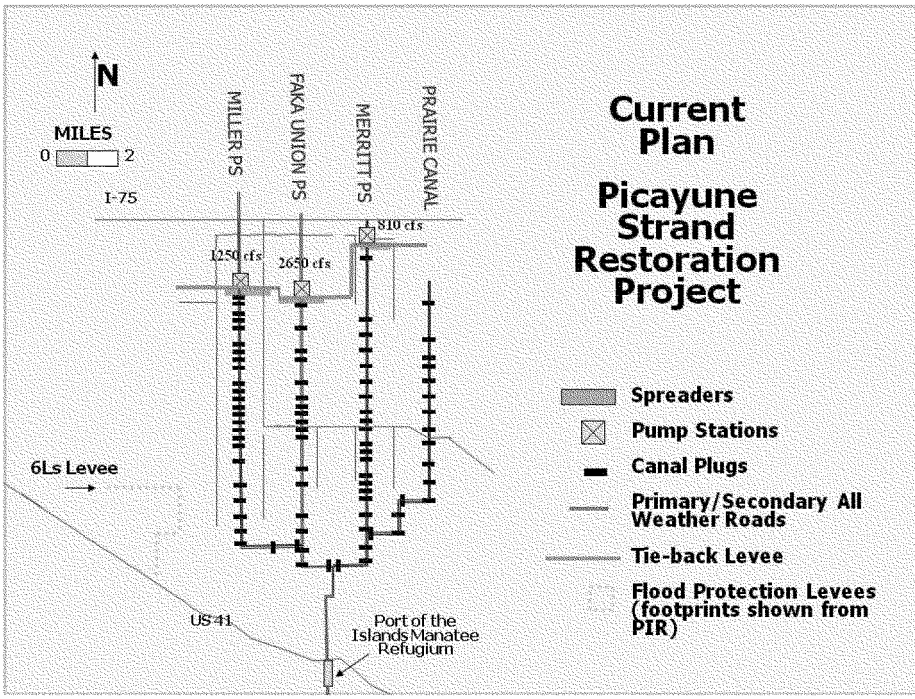

**Figure F-2. Picayune Strand Study Area**



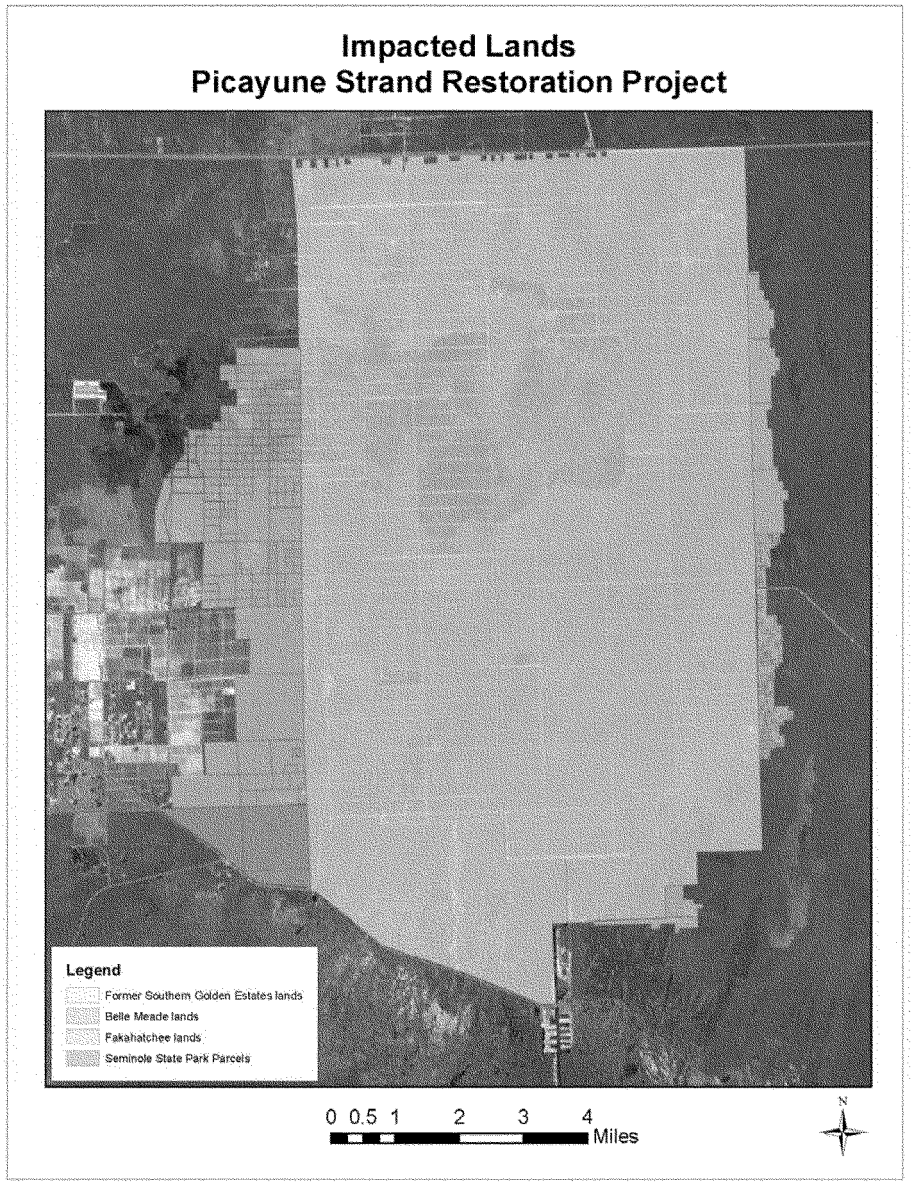

***[December 2013 Update]*** **Figure F-3. Southern Golden Gates Estates CARL (FDEP)** ***[End December 2013 Update]***



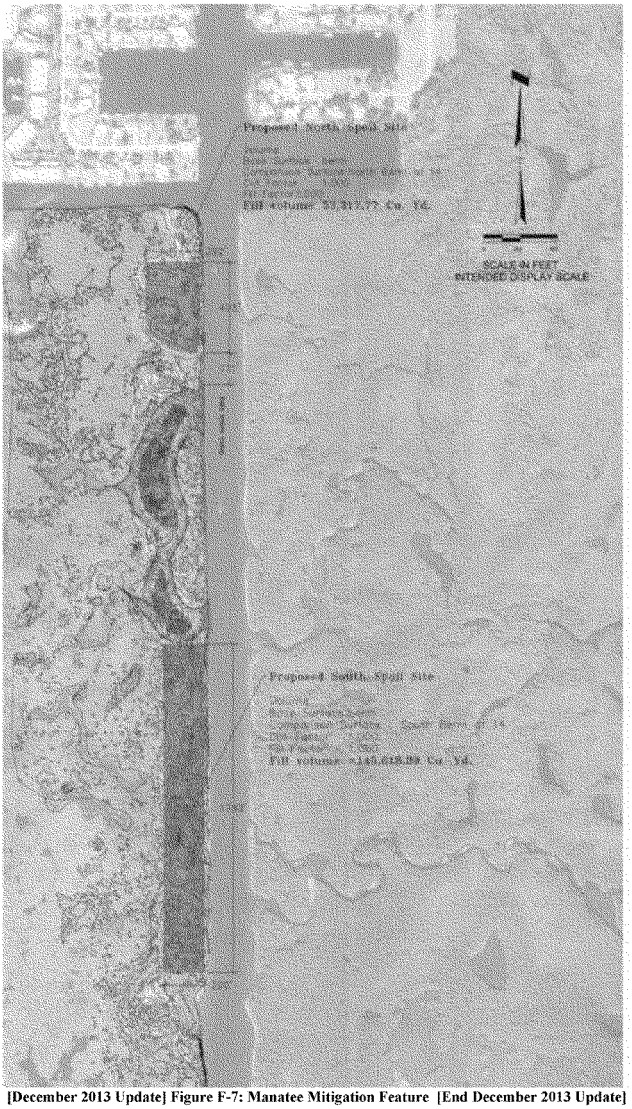

***[December 2013 Update]* Figure F-4. Belle Meade Area *[End December 2013 Update]***




***[December 2013 Update]*** **Figure F-5. Map Showing PSRP Project Features in SGGE and Belle Meade** ***[End December 2013 Update]***




*[December 2013 Update]* **Figure F-6. Map Showing Required Lands in SGGE, Belle Meade and Fakahatchee Strand** *[End December 2013 Update]*




**[December 2013 Update] Figure F-7: Manatee Mitigation Feature [End December 2013 Update]**

*[November 2014 Update]*

## Table F-2. MCASES Cost Estimate

| ESTIMATED PROJECT REAL ESTATE COSTS | | | | | |
|---|---|---|---|---|---|
| PROJECT: Picayune Strand Hydrologic Restoration | | | | DATE: November 2014 | |
| 1 | LANDS AND DAMAGES | | FEDERAL | NON-FED | |
| 01AA | PROJECT PLANNING | $200,000 * | $200,000 | | |
| | | | | | |
| 01B-- | ACQUISITIONS | | | | |
| 01B20 | BY LOCAL SPONSOR (LS) PRIOR | $29,158,914 | | $29,158,914 | |
| | BY LOCAL SPONSOR FUTURE | $1,039,053 * | | $1,039,053 | |
| | BY LOCAL SPONSOR (LS) PRIOR FED | $3,761,290 | $3,761,290 | | |
| 01B40 | REVIEW OF LS | $1,800,000 * | $1,800,000 | | |
| | | | | | |
| 01C-- | CONDEMNATIONS | | | | |
| 01C20 | BY LOCAL SPONSOR FUTURE | $1,260,000 * | | $1,260,000 | |
| 01C40 | REVIEW OF LS | $400,000 * | $400,000 | | |
| | | | | | |
| 01E-- | APPRAISALS | | | | |
| 01E30 | BY LOCAL SPONSOR FUTURE | $519,000 * | | $519,000 | |
| 01E50 | REVIEW OF LS | $2,000,000* | $2,000,000 | | |
| | | | | | |
| 01F-- | PL 91-646 ASSISTANCE | | | | |
| 01F20 | BY LOCAL SPONSOR FUTURE | $50,000 * | | $50,000 | |
| 01F40 | REVIEW OF LS | $90,000 * | $90,000 | | |
| | | | | | |
| 01G-- | TEMPORARY PERMITS/RIGHTS-OF-ENTRY | | | | |
| 01G20 | BY LS | $0 | | $0 | |
| 01G40 | REVIEW OF LS | $0 | $0 | | |
| 01G60 | DAMAGE CLAIMS | $0 | | $0 | |
| | | | | | |
| 01M00 | PROJECTED RELATED ASMINISTRATION | | | | |
| | REAL ESTATE REVIEW OF PCA | $10,000 * | $10,000 | | |
| | | | | | |
| 01R-- | REAL ESTATE PAYMENTS | | | | |
| 01R1 | LAND PAYMENTS | | | | |
| 01R1B | BY LS OUTSIDE OF SGGE-ACTUAL | $11,543,702 * | | $11,543,702 | |
| | BY LS OUTSIDE OF SGGE-FUTURE PAYMENTS | $7,370,659 * | | $7,370,659 | |
| | BY LS ACTUAL PRE MAY 2004 | $75,394,332 | | $75,394,332 | |
| | BY LS ACTUAL POST MAY 2004 | $18,391,500 * | | $18,391,500 | |
| | BY LS FUTURE PAYMENTS | $13,000,000 * | | $13,000,000 | |
| | BY LS FEDERAL FUNDS | $31,312,693 | $31,312,693 | | |
| | | | | | |
| 01R2 | PL 91-646 ASSISTANCE PAYMENTS | | | | |
| 01R2B | BY LS FUTURE | $500,000 * | | $500,000 | |
| | BY LS FEDERAL FUNDS | $3,010,982 | $3,010,982 | | |
| SUBTOTAL | | | $42,584,965 | $158,227,161 | $200,812,126 |
| | | | | | |
| SUBTOTAL EXPENDED THRU SEPT 2013 | | | $38,085,965 | $122,944,747 | $161,029,712 |
| SUBTOTAL FUTURE ESTIMATED | | | $4,500,000 | $35,282,414 | $39,782,414 |

| | | | |
|---|---|---|---|
| SUBTOTAL EXPENDED THRU SEPT 2013 (RD) | $38,085,000 | $122,945,000 | $161,030,000 |
| SUBTOTAL FUTURE ESTIMATED (RD) | $4,500,000 | $35,282,000 | $39,782,000 |
| CONTINGENCY ON $39,782,414-$4,500,000 on estimated Federal costs and $35,282,000 on estimated non-Federal costs (RD) | $1,428,000 | $11,195,000 | $12,623,000 |
| TOTAL ESTIMATED RE COSTS (RD) | $44,013,000 | $169,422,000 | $213,435,000 |

# Appendix D

# Environmental

# D.0 ENVIRONMENTAL APPENDIX

## D.1 BENEFITS ACHIEVED THROUGH PRAIRIE CANAL PHASE

The first canal filled was Prairie Canal, the easternmost canal in SGGE, which did not require construction of a pump station. The upper two miles of Prairie Canal were filled with adjacent spoil in spring 2004. The lower five miles of the north-south portion of Prairie Canal were plugged in fall 2006, with substantial amounts of additional fill added from fall 2006 through June 2007 as the roads east of Merritt Canal were degraded. Additional degrading of fill along the roads east of Merritt Canal and along Prairie Canal was completed in winter-spring 2012. The logging trams east of Merritt Canal were degraded during winter-spring 2011.

While there are portions of the PSRP area that have already shown significant hydrologic improvement, most of these improvements to date are near Prairie Canal and in Fakahatchee Strand to the east of the PSRP. Based on 26 years of monthly water level monitoring documenting the effects of Prairie Canal across Fakahatchee Strand, we know that the effects of the SGGE canals can extend 1-1.5 miles from the canal during the wet season and 2-3 miles during the dry season. The SGGE canals are only 2 miles apart. Thus, even though Prairie Canal has been mostly filled since 2007, lands to the west of the canal are still being affected by drainage from Merritt Canal, and lands to the south are still being affected by the unfilled East-West Stair-Step Canal. In addition, the natural main flow-way through SGGE enters from the north in the vicinity of Merritt Canal, and arcs close to Prairie Canal in the north-south middle of the project area before curving west again to where the Faka Union Canal crosses Tamiami Trail. Thus, when Merritt Canal is filled, we expect to see additional hydrologic restoration along Prairie Canal, and there will be additional improvement in the southern portion of the area when the East-West Stair-Step Canal is plugged. While plugging Prairie Canal is providing some benefits to the inland portion of the project area, few if any of these benefits are reaching the estuarine areas because most of the newly created overland flow is being recaptured by the East-West Stair-Step Canal from which it is routed as point discharge into Faka Union Bay.

Hydrologic restoration began when most of Prairie Canal was filled in fall 2006 (Figure D-1). Prior to this time, water levels in wells near and between Merritt and Prairie Canals fluctuated in a similar range around each other. After fall 2006, water levels in the wells near Prairie Canal and between the two canals were consistently higher than those in the well near the unfilled Merritt Canal; usually by about 2 ft during the dry season and by 1-2 ft in the wet season. As described earlier, the natural main flow-way through Picayune enters from the north at Merritt Canal, arcs to the east near Prairie Canal midway through the project area, and then turns back west to cross Tamiami Trail at the Faka Union Canal. Thus, water levels in the well near Prairie Canal are expected to be substantially higher during the wet season following the plugging of Merritt Canal. Dry season water levels should also be somewhat higher, since 26 years of monitoring data from a 6.5-mile transect across Fakahatchee Strand show that dry season water level drawdowns can extend two to three miles from a SGGE canal, and the well near Prairie Canal is approximately two miles east of Merritt Canal and only 1.25 miles north of the unfilled East-West Stair-Step Canal. Water levels in a well located about one mile from Prairie Canal in Fakahatchee Strand had fairly consistent high wet season water levels from 2003 through 2012 and a range of annual water level fluctuation of about 5-6 ft. Its seasonal water levels were

consistently higher than the other three wells, even after Prairie Canal had been mostly filled. We expect that following plugging of Merritt Canal, water levels in the three SGGE wells will fluctuate within the same range as the Fakahatchee well.

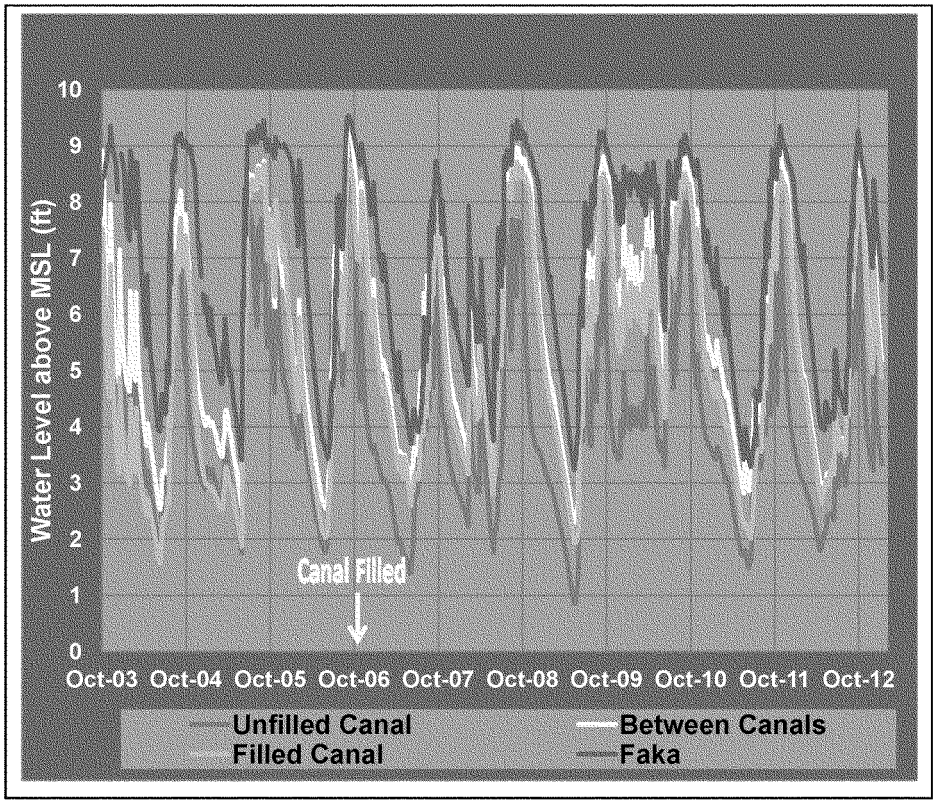



**Figure D-1. Water levels in four wells next to filled and unfilled canals, approximately midway between a filled and unfilled canal, and about a mile into Fakahatchee Strand from the easternmost PSRP canal.**

Monthly water table profiles across Fakahatchee Strand showed dramatic drawdowns associated with Prairie Canal and a lesser drawdown associated with the ditch along SR 29. During the severe dry season of 2000, the water table was lowered by up to 5 ft next to Prairie Canal, and the drawdown effect extended out to 2-3 miles from Prairie Canal (Figure E-2). Wet season drawdowns in 2000 lowered the water table by about 2 ft next to the canal, and the effects could be detected out to 1-1.5 miles.

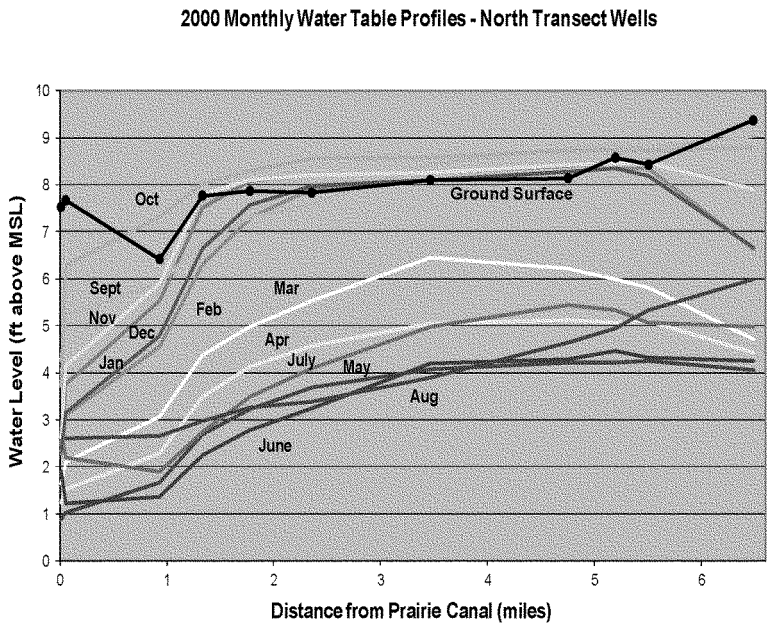



**Figure D-2. Monthly water table profiles in 2000 across Fakahatchee Strand from Prairie Canal on the left to SR 29 on the right.**

The dots along the black ground surface profile indicate locations of the monitoring wells. Water flow direction is out of the figure towards the observer. The portions of the transect showing the water table profile paralleling the ground surface indicate natural unaltered sheetflow, while along those portions of the transect where the monthly water table profiles deviate from the ground surface profile indicate drainage effects of Prairie Canal or the ditch along SR 29. The depression on the left end of the ground surface profile is a deep cypress dome and the high elevation at the right end is in an elevated hardwood hammock.

Water level data were selected from 1987 to 2012 for one well next to Prairie Canal and another well about 2.5 miles from Prairie Canal (Figure D-3) to illustrate the long-term pattern of water level effects of Prairie Canal on Fakahatchee Strand hydrology at the most drained site and at a site showing little or no evidence of drainage. The relatively undrained site had fairly consistent wet season water levels and more variable dry season water levels. The site next to Prairie Canal always had lower water levels, and sometimes much lower water levels, that could not be accounted for based on differences in ground surface elevations.

A further comparison was made by looking at the differences between the water levels at these two sites (Figure D-4). There appeared to be four distinct periods associated with four distinct

types of management of Prairie Canal. The first period from 1987 to about 1992 was when Collier County was responsible for management of the Golden Gate Estates canals, and was doing little aquatic weed control. During this period, wet season water levels were typically about 1 ft below those in the interior of Fakahatchee Strand and dry season water levels would drop to about 4 ft lower. The second period was from about 1992 until the late 1990s when the responsibility for management of the canals was transferred to the South Florida Water Management District and they instituted a very effective aquatic weed management program. During this period, wet season water levels were about 4 ft lower than the interior of Fakahatchee Strand and dry season water levels were about 5.5 ft lower. These very low wet and dry season water levels concerned the District, and stimulated them to install control structures in the canals to reduce drainage impacts. The third period showed the beneficial effects of the control structures during the wet season, but it also demonstrated how ineffectual the structures were during the dry season when water just passed through the very permeable surrounding bedrock. During this period, wet season water levels were often raised to within about 2 ft of the water level in the interior of Fakahatchee Strand, while dry season water levels remained at about 5.5 ft below those in the interior of Fakahatchee Strand. During the fourth period, most of Prairie Canal had been filled, and water levels rose significantly. During the wet season, they could reach elevations similar to those in the interior of Fakahatchee Strand. However, during the dry season, they were still about 3.5 ft lower than the water levels in the interior of Fakahatchee Strand. This is partially explained by the fact that the Merritt Canal is still not plugged, but probably more importantly by the fact that the East-West Stair-Step Canal is not yet filled and it is only 0.5 miles from the North Transect well adjacent to Prairie Canal.

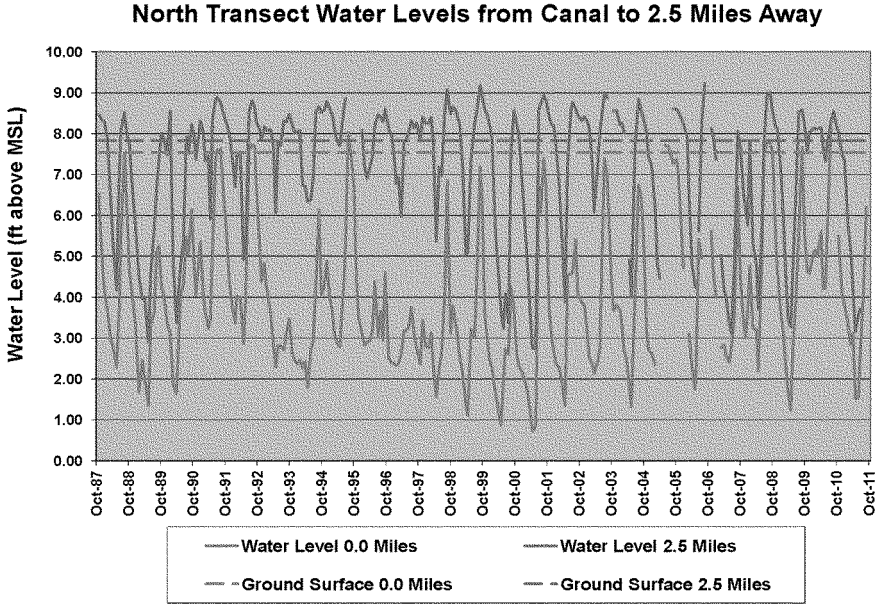



**Figure D-3. Water levels for a well next to Prairie Canal and another 2.5 miles from Prairie Canal from 1987 through 2011. The dashed lines at the top are the ground surface elevations at each of the wells.**

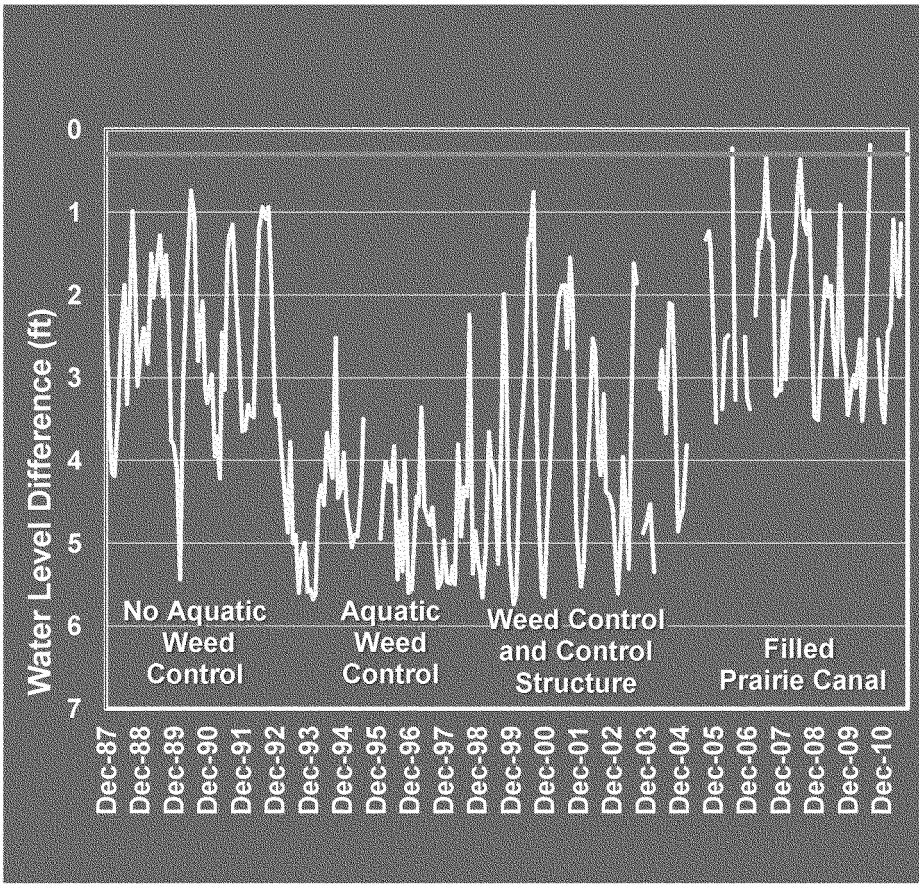



**Figure D-4. Differences in water levels between well #1 next to Prairie Canal and well #6, which was 2.5 miles east of Prairie Canal into Fakahatchee Strand, under different management conditions from 1987 to 2011. The red line at the top of the figure is the difference in ground surface elevations between the two wells.**

Plant Communities:

Sampling for the Year 4 post-restoration plant community monitoring of the Prairie Canal and the Reference plots was conducted between May and July 2011. Sampling was completed on a total of 36 transects, including 11 reference plots. Ten previously monitored plots were not sampled in 2011 because they burned in a wildfire on May 12. Sampling methods included belt transects, line-intercepts, and quadrats to identify and quantify plants within the canopy, sub-canopy, shrub, and groundcover strata. Comparisons were made of data collected in 2011 with

data collected during the dry seasons of 2008 and 2009, as well as incomplete data sets in the fall of 2005 and spring of 2004.

In order to analyze data for changes over time, as well as differences between Reference and restoration sites, transects were classified into three major pre-drainage habitat groupings: cypress, pine flatwoods, and wet prairie. An additional subset, labeled "less-drained", was created for four plots located in a transition zone between Reference and restoration conditions near the far east end of the middle and south transects. Statistical analyses emphasized comparisons of 2011 data with data sets from 2008 and 2009 because the latter data are directly comparable, with no differences in seasonality or the timing of field monitoring activities.

Hydroperiods, or the number of days per year water stands at or above the ground surface, have lengthened since Prairie Canal was filled in 2006, despite drought conditions during four of the six years between 2007 and 2012 when there was relatively low rainfall.

Dominant tree species show minimal changes in basal area and density indicative of hydrologic alteration from 2008 to 2011. Changes in this stratum are expected to be slow, with the exception of mortality of species sensitive to inundation. The dual effects of prolonged drought and as yet incomplete hydrologic restoration likely contributed to the lack of changes in this stratum. Density and basal area of cypress (Taxodium ascendens) in cypress habitats remains lower at restoration sites than at Reference sites, which is thought to indicate increased mortality rates in the drained communities prior to restoration. Relative growth rates were lower for cypress and pop ash (Fraxinus caroliniana) at restoration transects, while pine (Pinus elliottii) growth rates are significantly higher at restoration transects, which is consistent with known ecology of these species. When hydrologic restoration is complete, we expect these trends to reverse.

To date, restoration has not altered the densities of cabbage palm (Sabal palmetto), a major nuisance native species in the drained Picayune, with the exception of some mortality of seedlings and young cabbage palm in cypress plots close to the Prairie Canal footprint. The overall trend for cabbage palm density at both reference and restoration plots since 2004 has been a slow and steady increase. This increase may have been exacerbated by drought conditions, although the densities and rates of change vary considerably by habitat and land management regime. High cabbage palm densities and rates of increase were recorded in pinelands within both restoration and Reference plots. Cypress habitats had high cabbage palm densities in restoration plots, but not in Reference plots. All wet prairie plots remain low in cabbage palm densities. Variability in cabbage palm densities from year to year is greatest in the younger strata (seedlings and pre-trunk palms) in cypress habitats, suggesting that fluctuating water levels and varying hydroperiods cause some mortality in the restoration plots. Mortality of middle-stratum cabbage palm (with trunks <4.5') caused by Florida black bear depredation was observed frequently.

Differences in overall shrub cover, as measured using the line intercept method, primarily reflected recent fire history. A notable exception is mortality of invasive Brazilian-pepper (Schinus terebinthifolius) due to flooding in plot PC26, which is adjacent to the canal footprint and thus hydrologically more affected by restoration. We expect changes in shrub cover to be

slow, but eventually species sensitive to flooding should be eliminated from plots at relatively low elevations.

Quadrat sampling (groundcover) resulted in the identification of 2,340 individuals, with identification to species or variety level at 97-98%. When weighted by percent cover, identification level exceeded 99%. Evaluation of percent cover and frequency included various statistical analyses, including species richness. Wetland Affinity Index (WAI), calculated using 1996 US Fish & Wildlife Service wetland indicator values, proved most relevant for evaluating changes due to hydrologic restoration.

In the cypress plots, WAI values in restoration plots are increasing and converging with WAI values in Reference plots, while in the wet prairies both Reference and restoration plots have maintained relatively constant WAI values from 2008 through 2011 (Figure D-5). WAI values for pineland plots show greater variability, possibly due to the plots occurring over an elevation range from mesic to hydric pinelands, with Reference plot WAI mean values decreasing, and the restoration WAI mean values increasing and surpassing Reference values. Considering recent drought conditions, it is encouraging that all restoration plots have exhibited increases in WAI, suggesting hydrologic restoration is having a positive effect on groundcover vegetation. Plots closest to the canal footprint exhibited the greatest increases.

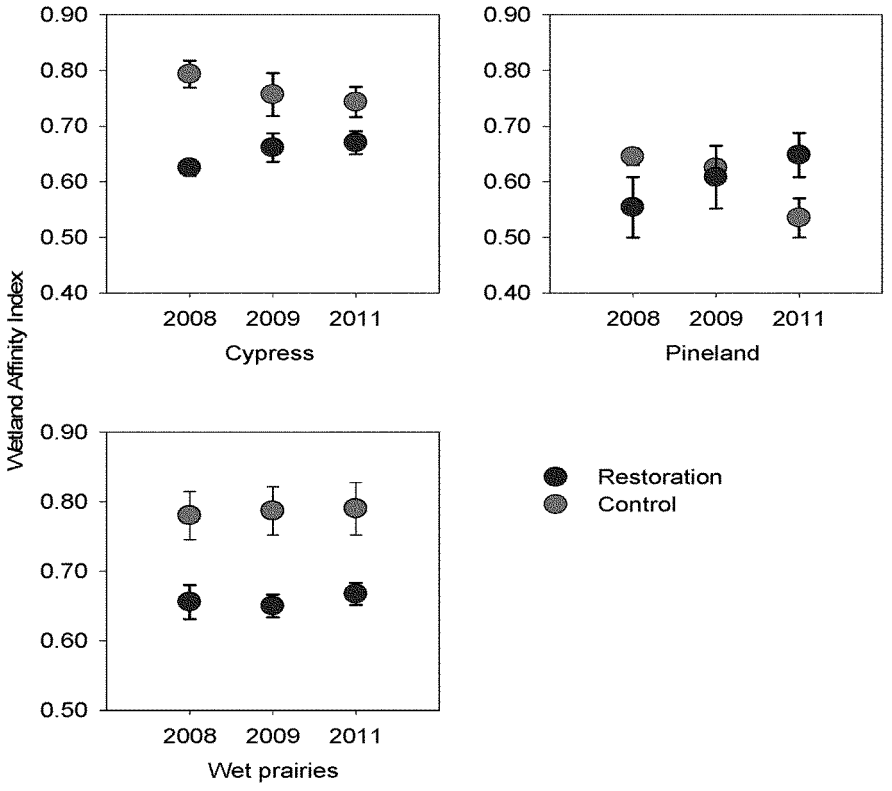



**Figure D-5. Wetland Affinity Index by Habitat Group**

Classification and ordination analyses for most plots show no discernible trend relating to hydrologic restoration. However, data reveal that groundcover strata in restoration plots adjacent to the Prairie Canal footprint are becoming more similar to the Reference plots. These plots, being closest to the canal, were more severely drained. As analyzed separately by habitat groupings, plots in cypress and wet prairie showed greatest similarity to plots within the same management regime (reference versus restoration). Pineland plots also showed similarity within a management regime, particularly for sites that had burned within the past seven years. Plots that had not burned in more in seven years were less similar to the other pineland sites. Hydrological restoration of Picayune is expected to create conditions more favorable for green and squirrel treefrogs. However, any shift in the populations of these two native species will also be contingent on their ability to compete with a well-established population of Cuban treefrogs, which look upon native treefrogs as prey. This transition could take a long time in those portions of Picayune where the native plant communities have been devastated by many years of drainage and fires that have severely altered them. However, post-restoration treefrog monitoring will

provide a means of determining the success of the Picayune restoration project with respect to an increase in the abundance and distribution of green and squirrel treefrogs and a decline in numbers of Cuban treefrogs. The return of other native species of treefrogs would also be expected, even if only in low numbers compared to the populations of squirrel and green treefrogs.

## D.2 ADAPTIVE MANAGEMENT STRATEGIES

The goal of the restoration of those portions of the Picayune Strand Restoration Project (PSRP) below the pump stations is the reestablishment of the natural pre-development plant and animal communities. This requires the reestablishment of the natural hydrologic and fire regimes, as well as control of nuisance native and exotic vegetation that has invaded much of the PSRP and currently dominates large portions of it. There is reason to believe that a variety of factors could adversely affect the successful restoration of a completely natural hydrologic regime in parts of the PSRP. One uncertainty about the success of the restoration of the original hydrologic regime throughout the PSRP is what the original watershed boundaries were and how the Golden Gate Estates canal system may have altered these boundaries. Other influences associated with flows in the canal system include the operation of control structures on the canals and groundwater withdrawals by several large well fields in North Golden Gate Estates.

Post-construction monitoring data from the 26 PSRP water level monitoring wells and the associated 54 plant community monitoring sites is intended to evaluate whether a natural hydrology is being achieved at representative locations throughout the PSRP with the current construction design. The proposed delineation of the original PSRP watershed boundaries in relation to the watershed of the current Golden Gate Estates canal system is intended to evaluate one of these potential factors. The comparison would provide an estimate of whether canal flows passing through each of the three pump stations are likely to approximate the original pre-development water flows to the lands downstream of the pump stations. If long-term post-construction water levels and hydroperiods in the monitored plant communities are significantly different from those predicted on the basis the natural hydrologic regimes of these plant communities, an understanding of differences in watershed boundaries before and after construction of the Golden Gate Estates canal system could help explain the reasons for the differences. This could then provide a basis for adaptive management to minimize alterations to the hydrologic regimes of the affected sites.

There are a number of considerations relevant to the PSRP Monitoring and Adaptive Assessment and Management efforts. The most important consideration is that we are trying to restore natural hydrologic and fire regimes, including the seasonal, annual, and short multi-year and very long term temporal variability in these dominant processes, which created and maintained the original Picayune Strand ecosystem. Picayune Strand is fortunate in that it is mostly surrounded by federal and state conservation land, which significantly increases our ability to meet our restoration objectives.

### D.2.1 Monitoring

As the monitoring plan was developed, parameters were identified that would represent a variety of perspectives on the restoration, including short and long term response parameters, inland

terrestrial and aquatic parameters, saline estuarine and freshwater parameters, and rare and endangered species and/or their surrogates parameters.

Selection of Monitoring Parameters:

Specific parameters were selected that could detect change directly and indirectly attributable to the PSRP. Thus pre- and post-restoration monitoring protocols were established that would allow us to utilize similar methods at the same or comparable locations. Monitoring sites were also established within selected dominant habitat types in reference areas near the PSRP to allow accounting of environmental conditions that could change over time independent of actions taken as part of the PSRP.

Because of its proposed construction schedule, the design of the PSRP monitoring program began in 2003 before the Restoration Coordination and Verification (RECOVER) team had put together their monitoring or adaptive assessment plans for CERP. Also, at that time RECOVER was focusing on regional monitoring and the PSRP had to develop its own design and find its own funding to implement it. However, SFWMD staff working on the PSRP were regular participants on several of the RECOVER planning teams, so the Picayune Project Delivery Team was aware of the direction the RECOVER planning teams were going, which allowed for a high degree of compatibility between the regional and the PSRP project-specific monitoring plans.

The inland monitoring was designed to be relatable to local surface and shallow groundwater hydrology and how it was being changed by the PSRP. Thus, an approximation of an east-west and north-south grid of 26 wells was established in the PSRP area and immediately downstream in the brackish coastal marshes. The grid did not involve regular spacing of the monitoring wells because we wanted them located in multiple examples of all of the major habitat types to provide a basis for documenting how the plant and animal communities, including the exotic components, were responding to the restored hydrologic and fire regimes.

The Monitoring and Assessment Group (MAG) was intended to be a technical advisory group made up of representatives of the various government agencies, most of which were originally involved with the Picayune Project Delivery Team (PDT) that produced the conceptual design for the PSRP, including the monitoring program. The lead agencies for the original PDT and the current MAG have been the SFWMD, USACE, and USFWS. An important aspect of MAG's role is to review and integrate the monitoring results as the reports are completed and to make recommendations as to needed adjustments to the design of the PSRP. The monitoring contractors, after the initial baseline monitoring, are required to include a comparison of their current data with the baseline monitoring data and those data from any intervening years. They also frequently utilize data for other monitoring parameters to help interpret the changes they are seeing in the current and earlier monitoring data for their parameters.

Monitoring in the Big Cypress and Everglades:

A significant difference to monitoring between the Big Cypress and Everglades is that access to the forested environments of the Big Cypress is a very different consideration from access to marsh environments of the Everglades. Airboats and helicopters cannot access many, if not

most, potential sampling sites in the Big Cypress Swamp. Thus, pre-and post-restoration access were significant considerations determining the monitoring locations.

Another difference relevant to Picayune is that once restoration of the PSRP is complete; there will be a limited number of major human influences on the area since most of the surrounding landscapes are in federal or state conservation ownership. Future environmental alterations that will affect the post-construction PSRP area are primarily associated with upstream canals that will be conveying increased wet season flows into the area resulting in slightly higher-than-pre-development water levels in the PSRP area. This will also result in slightly drier conditions during the dry season because of the loss of upstream wet season hydrologic storage. Drier dry season conditions could result in a slightly higher frequency of more severe fires.

### D.2.2 Adaptive Management

As described in Picayune Project Implementation Report (PIR), establishment of a natural fire regime and an exotic vegetation management program, not just hydrologic restoration, are necessary to meet the project targets. The PDT created a plan for controlling nuisance native and exotic vegetation throughout the project area. The highest priority portions of the plan have been implemented and are ongoing. Funding is not currently available for the remainder of the work at this time, although it is expected that hydrologic restoration will be a significant ally in dealing with or at least reducing populations of a number of the problem species. Once the effects of hydrologic restoration are realized, a long term plan for nuisance native and exotic vegetation can be developed for the PSRP.

Full restoration is not expected in all parts of the PSRP. In some segments of the project area restoration of the original ecosystem is unlikely, and other desirable targets can be established for these areas. Adaptive Management in this case would involve setting alternative goals for the long-term restoration of these areas. Recapitulating the general project goals, connectivity can be restored with adjacent conservation lands; but some areas will not be completely rehydrated, and disturbances like fire, reduced flows and disturbances from activities on private, adjoining lands will always occur.

Not all Adaptive Management triggers can be absolute, but rather need to be tied to environmental conditions and natural variability, and they must be thought about in a long term context. While active management is inevitably a part of most restoration projects, the more systems are designed to be driven by natural process, the more likely they will succeed, the less they will cost to maintain, and the greater their long term viability.

#### D.2.2.1 Constraints

Maintenance of flood mitigation functions on private lands. One of the most significant constraints is that we cannot increase flooding of private lands around the PSRP. The project must accept existing drainage outflows from upstream sources, although new additional drainage outflows do not have to be accepted from these sources. The project also cannot send more than existing flows downstream onto adjacent private lands, which typically have some degree of flood protection. This can result in locally higher or lower water levels and longer or shorter periods of inundation in adjacent project areas. The other side of this restriction is that the

project cannot unnaturally lower water levels on adjacent lands, virtually all of which contain at least some wetlands, which cannot legally be impacted by actions associated with this restoration project. There are numerous other constraints on local sites within the PSRP area. Northern portions of the project are located above the pump stations and tieback levees, and will not be hydrologically restored.

A large number of cultural resource sites exist on the PSRP area and have limited our ability to remove roads and logging trams, which will continue to influence hydrology in the vicinity of these sites. Monitoring of the environment around these sites will assure that these sites are not adversely affected by the project, and some actions may be required to address any adverse effects that are detected.

D.2.2.2 Examples of Uncertainties and Associated Adaptive Management

There will be overland flows above the tieback levee. An uncertainty is the location and significance of upstream impoundment caused by the tieback levee, although the most likely problem area is the portion of the Levee extending east of the Merritt pump station. Standing water above the tieback levee in comparison to water levels below and at other locations along the levee should be monitored post construction. Solutions could be flap gates in the levee or possibly reductions in its length.

Everglades and Miller Boulevards do not have culverts under their elevated portions. Surface water flows in the project are generally to the south, which is parallel to these roads. However, many of the shallow, natural flowways in the PSRP tend to meander, and in some locations cross Everglades and Miller Boulevards. Observations of locations where flows are impeded would be appropriate locations for culverts to alleviate the impoundment.

Distribution ditches have been constructed along portions of the Tieback Levee to facilitate the movement of outflows from the spreader berm weirs to the east and west of the pump stations to reestablish sheet flow across as broad a front as possible as quickly as possible. There is uncertainty about how readily water crossing the weirs will get to the distribution ditches and about the ability of the ditches to move enough water to reestablish sheet flow to all points along or at least not far below the Tieback Levee.

Some of the road and tram structures were not removed because they were within a required buffer around a cultural resource site. Post-construction hydrologic monitoring will determine whether there are unacceptable hydrologic impacts from the PSRP and whether modifying these structures or creating new structures could alleviate these impacts.

There are approximately ten weirs where outflows from the pump stations enter the downstream natural environment. There is some uncertainty about the location and height of the weirs to optimize water flows to natural downstream flowways. Observations of water levels at existing water level and plant community monitoring stations could evaluate potential concerns that could lead to adjustments in the design of the spreader berm.

Natural hydrologic regimes are expected in natural plant communities downstream of the pump stations. However, there is uncertainty over what distance downstream will be required before a

natural hydrologic regime is established along the whole length of the Tieback Levee. This may require some structural changes or possibly the acceptance of a different hydrologic regime and new plant and animal communities in portions of these areas.

Because of the very porous limestone substrates that dominate the project area, there will be some groundwater movement north under at least portions of the Tieback Levee as a result of creating sheetflow below the Levee. It is uncertain how far north this effect will extend, whether it may create ponding in depressions, and its effect on plant communities. This information should influence decisions about how to manage the plant and animal communities in the affected areas.

There is uncertainty about availability of funds for ongoing PSRP management. Some other long term uncertainties include the ability to maintain an appropriate fire regime, the degree and timing of sea level rise in the region, and regional changes in groundwater use.

The PSRP monitoring plan has determined biological targets to measure the success of the hydrologic restoration. If the targets are not met, adaptive management measures can be utilized to achieve the anticipated results; however, the PSRP was authorized prior to the requirement for each project to have an Adaptive Management Plan with specific targets and ranges. Additional details concerning the reference sites and potential adaptive management strategies are being formulated to address unexpected monitoring results. It is anticipated, based on similar restoration studies in South Florida, that the cost of adaptive management strategies will be approximately one percent of the total project cost.

# Appendix E:

# Picayune Strand Restoration Project

# Adaptive Management Plan

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## 1.0 PURPOSE

An Adaptive Management Plan is required by U.S. Army Corps of Engineers (USACE) implementation guidance for the Water Resources Development Act (WRDA) 2007 Section 2039[1], the 2003 Programmatic Regulations for the Comprehensive Everglades Restoration Plan (CERP) and CERP Guidance Memorandum 56[2]. This Adaptive Management Plan will be used for implementation of the Picayune Strand Restoration Project (PSRP), a component of CERP, located on Florida's southwestern coast. This Adaptive Management Plan provides strategies to address prioritized project uncertainties that will be faced as PSRP progresses toward achieving restoration goals and objectives while remaining within identified constraints. Each strategy follows a scientific approach that uses performance measures, monitoring, triggers and/or thresholds to inform restoration progress and support decisions regarding the need to adjust PSRP to improve restoration performance.

## 2.0 INTRODUCTION

Uncertainty exists in every natural resource management and restoration effort due to the fact that many processes in the ecosystem are not linear, they work synergistically and will unfold in a future climate that is likely different than the one used to formulate PSRP plan. The PSRP Adaptive Management Plan will address key uncertainties identified during PSRP's planning that relate to achieving restoration success and making adjustments of project features and operations if determined to be necessary to improve performance.

Congress understood that there were uncertainties in CERP and therefore required CERP to include adaptive management for its individual projects (WRDA 2000). The 2003 Programmatic Regulations outlined an adaptive management program that would provide the tools needed to gather new information from the REstoration COordination and VERification (RECOVER) monitoring and assessment plan (MAP) (RECOVER 2009) and incorporate these so that CERP could be adjusted to ensure restoration success. The National Research Council's Committee on the Independent Scientific Review of Everglades Restoration Progress (CISRERP) endorsed CERP adaptive management program (NRC 2007) and concluded that "uncertainties remain about the degree to which a resilient, self-sustaining ecosystem can be restored under the dramatically changed environment of South Florida" (NRC 2008). The CISRERP noted that adaptive management is essential for "...designing management strategies for dealing with complex ecosystem projects for which probable ecosystem responses are poorly known and hence, difficult to predict" (NRC 2007). The CISRERP further reinforced its view regarding the importance of adaptive management in CERP project planning and implementation by stating that, "Given the enormous scope and complexity of the restoration effort, the success of the

[1] USACE, 2009. USACE HQ Implementation Guidance on Section 2039 of Water Resources Development Act. http://cw-environment.usace.army.mil/pdfs/09sep2-wrda-monitor.pdf

[2] PSRP PIR USACE and SFWMD 2011. CERP Guidance Memorandum 56: Integration of Adaptive Management into Program and Project Management. http://www.cerpzone.org/documents/cgm/CGM_56_Adaptive_Management.pdf

CERP depends on strategic, high-quality, responsive, and sustained science and an effective adaptive management framework" (NRC 2010).

Per the 2003 Programmatic Regulations, CERP produced guidance for project teams to develop adaptive management plans and integrate adaptive management activities into all phases of a project lifecycle, e.g., planning, design, construction, and operations (USACE and SFWMD, 2011; RECOVER, 2011b). These are appropriate to the large scale and complexity of CERP and its projects, with its changing context of new non-CERP water infrastructure projects, and the shifting nature of its ecosystems. The intent of the detailed guidance is to improve restoration performance and reduce costs by increasing certainty throughout project implementation. The CERP guidance is consistent with the Everglades adaptive management WRDA 2000 authorization, as well as follows the more general 2009 adaptive management guidance from USACE Headquarters on implementing Section 2039 of WRDA 2007.

The original PSRP Project Implementation Report (PIR) was authorized in 2007 before USACE Headquarters and CERP guidance required adaptive management plans for ecosystem restoration projects. While an adaptive management plan was not developed at that time, a monitoring plan for restoration performance was included, along with a vegetation management plan to address invasive species management issues that were the primary uncertainty effecting restoration success at the time. New information gained from permit monitoring discussions related to endangered species, from recent PSRP monitoring data of the Prairie Canal backfill, from RECOVER monitoring data of estuarine restoration indicators and from new information gained from the detailed design of the remainder of the project has identified some additional uncertainty and risk related to meeting project restoration goals and objectives. The PSRP Limited Reevaluation Report (LRR) presented an opportunity to develop an Adaptive Management Plan and comply with the new guidance on adaptive management to identify strategies to address uncertainty by linking project monitoring and success criteria to management options to be implemented if deemed necessary to improve restoration performance.

Definitions that will help the reader in understanding PSRP Adaptive Management Plan include the following. Additional definitions, specific to the adaptive management strategies that make up the bulk of this adaptive management plan, can be found in **Table E-2**. Concepts and definitions are described in more detail in CERP Guidance Memorandum 56 (2010) and in the CERP Adaptive Management Integration Guide (RECOVER 2011b).

- **Adaptive Management** – A scientific process for continually improving management policies and practices by learning from their outcomes; Adaptive Management links science to decision making to improve restoration performance, efficiency, and probability of success. In the context of Everglades restoration, adaptive management is a structured approach for addressing uncertainties by testing hypotheses about the best project designs and operations to achieve restoration goals and objectives, linking science to decision making, and adjusting implementation, as necessary, to improve the probability of restoration success.
- **Uncertainty** – A question faced during planning or implementation regarding the best actions to achieve desired goals and objectives within constraints, which cannot be fully answered with available data or modeling.

- **Management Options** – Potential structural, non-structural, and operational alternatives to be undertaken to improve restoration performance. In the CERP planning process, management actions are grouped into alternative plans. Adaptive management plans contain potential management actions "options" that may be taken to improve performance if project/program goals and objectives are not met.
- **Strategies** – A plan to address one or more uncertainties identified in the adaptive management Plan. The adaptive management strategies fit into the following approaches:
  - *Active Adaptive Management* (See **Figure E-1**) – Multiple pilot projects or design tests are implemented to test designs or operational criteria to achieve desired goals and objectives. Each design or operational action is monitored, assessed, and results are used to inform implementation of the best design for a PSRP project component or operations. Pilot projects or design tests are usually conducted before implementing the full project component that they are intended to inform.

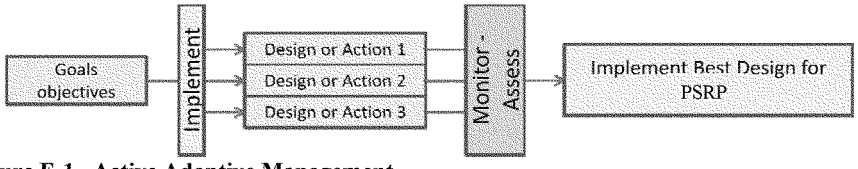



**Figure E-1. Active Adaptive Management.**
**Project goals and objectives are evaluated to determine multiple designs or management actions to test by implementing them with associated monitoring, assessing results, and determining the best design of a particular PSRP component to move forward.**

  - *Passive Adaptive Management* (see **Figure E-2**) – Most of the PSRP Adaptive Management Plan strategies are considered passive adaptive management approaches. One project component or set of operational criteria is implemented to test its ability to achieve desired goals and objectives. Results are monitored, assessed and communicated to implementing agencies and the appropriate participating agencies to determine how best to adjust project component designs, operations, PSRP contingency options, or inform future CERP projects.

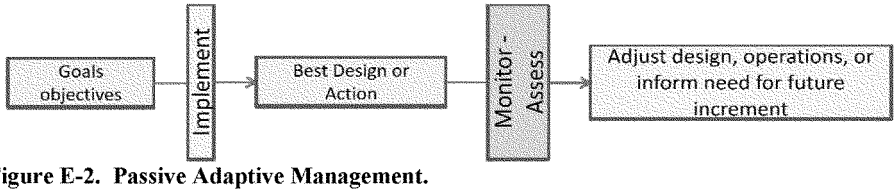



**Figure E-2. Passive Adaptive Management.**
**Diagram illustrates that the best design or management action is implemented to achieve project goals and objectives with associated monitoring and results are assessed to adjust other PSRP project component designs, adjust operations and inform the need for a future CERP increment.**

Prior to development of this adaptive management plan, existing monitoring funded by RECOVER, other agencies, and required for PSRP to undertake for other project purposes, e.g., operating new structures, compliance with water quality permits or biological opinions was reviewed. The monitoring recommended in this adaptive management plan is what is needed beyond the other sources to address key PSRP uncertainties (key questions) identified during the LRR planning that relate to achieving project goals and objectives. Project specific adaptive management activities will be implemented as necessary in coordination with PSRP Monitoring and Assessment Group (MAG), RECOVER (interagency system-wide science team) and partner agency monitoring activities. This adaptive management plan will be updated based on the new knowledge gained and key questions being addressed to ensure the adaptive management options proposed in this Plan are refined to what is needed to improve restoration success. Therefore, items included in this Plan are not guaranteed to be funded as-is, but will be considered again based on actual restoration project performance related to future project components being constructed and operated. Funding decisions regarding adaptive management strategies will be made commensurate with available funding at that time.

## 3.0 PSRP ADAPTIVE MANAGEMENT UNCERTAINTIES, STRATEGIES AND MANAGEMENT OPTIONS

The PSRP uncertainties in this section target prioritized needs and opportunities to learn in order to make scientifically sound recommendations to refine PSRP design, construction, and operations; the strategies and management options provided to address each uncertainty are intended to guide PSRP performance in the face of inevitable uncertainties, with existing knowledge and knowledge that will be gained through monitoring and assessment. The strategies are focused on PSRP, but designed to contribute to future increments of CERP restoration as well in order to maximize 'return on investment' for resources invested in pursuing the adaptive management activities. Suggestions of future increments of CERP that may be useful are the best current understanding of needs that may be considered in the future to further improve restoration beyond PSRP and are not intended to be authorized as part of the PSRP LRR. As with the other monitoring plans in Appendix A, the monitoring proposed in the adaptive management strategies was guided in part by two objectives: to be complete from a PSRP perspective by providing the monitoring required to address PSRP-specific uncertainties; and to integrate with other Everglades monitoring to take advantage of existing monitoring efforts, knowledge and information and thereby leverage dollars committed and spent elsewhere to avoid redundancies and insure cost-effectiveness. *Where possible, the PSRP adaptive management strategies rely on existing monitoring resources such as physical instrumentation, stations, locations, servicing and analysis efforts funded by RECOVER, CERP sponsors, and partner agencies. Therefore, the monitoring requirements described here are limited to the additional, marginal increase in monitoring resources and analysis efforts needed to address PSRP-specific adaptive management questions.*

### 3.1 PSRP Uncertainties

The PSRP Project Implementation Report, Ecological Monitoring Plan, Vegetation Management Plan and RECOVER 2014 System Status Report were reviewed to identify key uncertainties related to achieving project goals and objectives. The project objectives and constraints are

described in detail in 2004 PSRP Project Implementation Report and 2014 Limited Reevaluation Report and PSRP objectives are listed in **Table E-1**.

**Table E-1. PSRP Project Objectives**

| |
|---|
| A. Reestablish natural freshwater flows to estuary |
| B. Restore natural hydro-patterns, including sheet flow and flow-ways |
| C. Reestablish natural plant distribution and composition |
| D. Increase surface aquifer recharge |
| E. Restore habitat for listed species |
| F. Increase fish and wildlife resources |
| G. Restore ecological connectivity and provide contiguous habitat protection to adjacent public lands |
| H. Provide resource-based recreational opportunities compatible with the protection of the natural systems |
| I. Restore natural fire regime |

The uncertainties, their identification numbers (ID#), and the PSRP project objective and/or constraint are listed here for reference. As the PSRP MAG learns from PSRP implementation the list of PSRP adaptive management uncertainties will be updated to identify which have been addressed and where the risks to achieving PSRP restoration success have been lowered.

1. *How will PSRP influence the introduction and growth of non-native invasive and native nuisance species populations with the project area and will the species influence the predicted landscape and performance of PSRP? (ID#1; PSRP Objectives C,E,G,I)*
2. *To what extent will the reduction in the frequency and magnitude of freshwater flows from the Faka Union Canal stabilize conditions enough to improve benthic habitat in Pumpkin Bay and Faka Union Bay? (ID#2; PSRP Objectives A,B,C,E,F)*
3. *To what extent will the reduction in the frequency and magnitude of point source freshwater discharge from the Faka Union Canal help reestablish oyster beds within Pumpkin Bay and Faka Union Bay? (ID#3; PSRP Objective A,F)*
4. *Will PSRP improve flows to Pumpkin Bay and Faka Union Bay resulting in more natural salinity patterns (magnitude, spatial distribution and timing)? (ID#4; PSRP Objective A)*
5. *If salinity is affected by overland flow increases through PSRP to Pumpkin Bay and Faka Union Bay, how much benefit is generated for SAV, sportfish, prey, coastal wading birds, and crocodiles? Can operations be adjusted to improve estuarine performance in Pumpkin Bay and Faka Union Bay? (ID#5; PSRP Objectives A,B,E,F)*
6. *Are inundation and hydroperiod sufficient to reestablish historical vegetation patterns within PSRP? (ID#6; PSRP Objectives B,C,E,F)*
7. *How much will hydrologic restoration and vegetation management result in increases in prey densities (aquatic fauna)? (ID#7; PSRP Objective B,C,E,F)*
8. *How much will hydrologic restoration and vegetation management result in increases in wading bird foraging conditions and increased nest number and success of Wood Storks? (ID#8;PSRP Objective B,C,E,F)*

### 3.2 PSRP Adaptive Management Strategies

Adaptive management strategies are provided in this section to describe and address each PSRP adaptive management uncertainty and inform PSRP implementation and operations based on the body of existing scientific knowledge in Everglades restoration. This section comprises the bulk of the PSRP Adaptive Management Plan. It provides 1-2 page strategy descriptions for each uncertainty (sometimes combined, where appropriate) and summary tables of suggested management actions to improve restoration performance, as illustrated in **Table E-2.** The 1-2 page strategy write-ups include information on drivers of the uncertainty, restoration targets and PSRP targets for particular attributes of the ecosystem associated with the uncertainty (such as a key species or ecological features), how these attributes will be monitored to track progress toward the targets, the timeframe in which changes in these attributes will be measurable, and identification of a trigger or threshold that would give early warning that PSRP performance is veering from restoration expectations. The "timeframe in which changes will be measurable" does not imply that changes will be *complete* in that timeframe; rather, the timeframes provide an estimate of time needed to *begin* to be able to distinguish PSRP effects. For practicality, the PSRP AM Plan screening criteria included the need to have attributes measurable within the time of the AM Plan, which in some cases necessitated a 'proxy' attribute to be measured that would represent expected changes on a longer time scale. In addition, the triggers and thresholds were identified with the best available information, but the MAG recognizes that these should be updated to keep current with best available science. Second, following the strategies, tables of suggested management options are provided, called management option matrices (MOMs). These provide suggestions of paths forward and adjustments that can be made in order to keep PSRP progressing toward the targets, based on specific decision-criteria, e.g., a trigger or threshold is crossed (reflecting unintended effects related to a constraint) or is not crossed (reflecting lack of restoration progress towards restoration goals and objectives). The purpose of the two formats is to provide A) background and detail of each strategy in the 1-2 page write-ups and B) a table reference summary and crosswalk that relates monitoring to specific decision-criteria and potential actions for multiple strategies in a specific area. The detailed write-up descriptions are referred to as the "strategies" and the summary tables are referred to as MOMs (**Table E-2**). The strategies and MOMs provide synopses of the best available information, which in some cases is sparse and will need to be developed further as PSRP moves toward implementation and the adaptive management plan is updated based on new information gained to achieve restoration goals.

**Table E-2. PSRP Adaptive Management Strategies: Template and Definitions.**

**PSRP Adaptive Management Uncertainty and ID#.** *The uncertainty is a question faced during planning or implementation regarding the best restoration actions to achieve desired goals and objectives within constraints, which cannot be fully answered with available data or modeling.*

**PSRP Objective or Constraint:** *Uncertainties need to be related to PSRP objectives or constraints, among other criteria, to be included in the Adaptive Management Plan. This rule helped to focus the scope of the AM Plan.*

**Associated PSRP features:** *Structures or measures to which the uncertainty and strategy pertain.*

**What is expected to be learned by addressing this uncertainty, i.e., how will PSRP benefit from addressing this uncertainty?** *Why the uncertainty needs to be addressed in PSRP.*

**Expectations or hypotheses to be tested to address the uncertainty, and attribute(s) that will be measured to test each.** *A scientific approach begins with a well-informed, pointed, detailed statement that will be tested. For the purposes of PSRP's Adaptive Management Plan the statement can be referred to as an expectation or hypothesis. Approaching uncertainties scientifically is efficient because it is targeted; a properly identified hypothesis statement is the most important step to lead to effective, efficient methodology to address an uncertainty. It leads to proper identification of what to measure, how, how often, how to analyze, etc.*

**More Information on attributes to be measured:**

- What is the time frame in which changes to this attribute are expected to be measurable?
- Is this attribute complimented by other monitoring programs within and/or outside of PSRP? If so, provide reference to other monitoring.
- When during PSRP's life cycle should this monitoring begin and end?

**Methodology for testing each expectation or hypothesis (including frequency of monitoring) and for reporting:** *More information on what to measure, how, how often, how to analyze, and when and how to report results. PLEASE NOTE: the PSRP Adaptive Management Plan varies in the level of methodology detail provided; methodology will be reviewed, updated and adjusted if needed by agency subject experts, before initiation, to best meet the intent of the Adaptive Management Plan.*

**Triggers/thresholds that indicate good PSRP performance or need for adaptive management action.** *Triggers or thresholds are a point, range, or limit that signifies when restoration performance is veering away from expectations and is trending toward an unintended outcome. Triggers/thresholds should be described per attribute to be monitored because each should result in an outcome that informs management decisions.*

**Management options that may be chosen based on test results.** *Management Options are provided in case a performance trigger or threshold is crossed, which would indicate that PSRP performance needs to be adjusted. The Management Options are suggested paths forward and adjustments that can be made to keep PSRP progressing toward objectives and within constraints.*

The management options included in the PSRP Adaptive Management Plan can be described as the following:

1. *Informing PSRP Implementation*- results of monitoring a project component may inform next phase of project component construction sequencing,
2. *Inform Project Operations*- results inform project operations or system operating manuals,
3. *PSRP Adaptive Management Contingency Options*- monitoring results may suggest a need to implement additional restoration actions, called adaptive management options, pending all required and applicable coordination, policies, and permitting,
4. *Additional CERP Projects*- additional projects maybe needed to fully achieve restoration goals and objectives in the whole project area.

The MOMs are provided as a quick reference to the adaptive management options and to link monitoring, triggers and thresholds, and the management options. The descriptions and summary matrices are intended to inform decision-makers, PSRP partner agencies, and the public on potential actions to improve restoration performance. ***Implementation of adaptive management options is not automatic; the options are suggestions that capture current understanding of potential future issues and solutions. While the AM Plan and its suggested options are considered part of the PSRP recommended plan, all applicable policies, permitting, and coordination requirements apply to implementing AM Options.***

### 3.3 Invasive and Nuisance Species in the PSRP Footprint

The introduction and expansion of invasive and nuisance plant and animal species has the potential to alter the predicted PSRP restoration landscape pattern and species composition. Such species can alter plant community structure, species composition, fire frequency and intensity, habitat quality, compete with and displace native species, threaten endangered species, and alter trophic dynamics and food webs. The high profile floral and faunal invasives (e.g. *Melaleuca*, Brazilian Pepper, Burmese python) and their impacts to the landscape are well documented. However, these species are but a fraction of the invasive and nuisance species in the Everglades ecosystem. Many of the other species' life histories and responses to disturbance and treatments are insufficiently understood.

The PSRP adaptive management invasive species strategy described here focuses on consolidating species data that is existing and proposed to be collected, in order to improve PSRP's ability to target species management resources most effectively in the specific conditions that will be created by PSRP and thereby prevent invasive and nuisance species impacts on the performance of PSRP. This adaptive management strategy has been coordinated with the PSRP Invasive and Nuisance Species Management Plan (INSMP, Appendix A).

This topic is included in the Adaptive Management Plan because of its level of uncertainty and risk to PSRP outcomes, its ability to be addressed through management options, and to ensure that it remains part of PSRP discussions as lessons are learned throughout the implementation of the project.

**PSRP adaptive management Uncertainty #1:** *How will PSRP influence the introduction and growth of non-native invasive and native nuisance species populations with the project area and will the species influence the predicted landscape and performance of PRSP? (ID#1; PSRP Objectives C,E,G,I)* (Driver or type: Ecological)

This uncertainty is related to PSRP objective of reestablishing natural plant distribution and composition relates to all features of PSRP.

**What is expected to be learned by addressing this uncertainty, i.e., how will PSRP benefit from addressing this uncertainty?** It is anticipated that addressing this uncertainty will improve the understanding and ability to predict how invasive and nuisance species influence the ecosystem function and structure within the footprint of PSRP and potentially influence the outcome of PSRP's restoration activities. Improved species profiles and prediction/risk assessment abilities can help target resources to the most effective species management activities and can inform future design and operations of PSRP and other restoration projects to avoid expensive trial-and-error attempts to reduce the impacts of invasive and nuisance species. The proposed activities will reduce the possibility of invasive and nuisance species hindering PSRP from achieving its restoration objectives.

**Expectations and hypotheses to be tested to address uncertainty, and attribute(s) that will be measured to test each.** Some additional monitoring is proposed in this adaptive management strategy to improve predictions and risk assessment. The 2014 RECOVER System Status Report indicated a disconnect between the 2009 PSRP INSMP and the 2009 Transfer Agreement with SFWMD regarding limiting nuisance and exotic vegetation management to the immediate project construction footprint. Based upon the recent focus on exotic and invasive species within the South Florida ecosystem and their effect on ecological restoration (refer to South Florida Ecological Restoration Task Force and Natural Resource Council 2014 Fifth Biennial Review), development of PSRP Adaptive Management Plan afforded the opportunity to promote additional adaptive management strategies to address non-native invasive and native nuisance species populations within PSRP. In addition, RECOVER Monitoring and Assessment Plan is currently not monitoring any parameters within the freshwater areas within PSRP. This Adaptive Management Plan presents another opportunity to fill the gap outside of the direct project footprint and look at the project affected area to make the proposed strategy a reality. There is also an opportunity to augment the vegetation monitoring outlined within the 2009 Ecological Monitoring Plan. There would be some additional costs associated with additional sampling, identification and analysis, but these costs are not considered to be significant. Finally, data from PSRP INSMP and Ecological Monitoring Plan, RECOVER MAP, other CERP INSMPs and ecological monitoring plans, historic and current databases and aerial photos may be used to develop and/or refine risk assessment tools to direct species management decisions. This data will be consolidated in order to develop the needed species profiles and tools to formulate testable hypotheses specific to project invasive species management actions.
It is recommended that the causal relationship between invasive or nuisance species to restoration activities and outcomes should be investigated as the data is consolidated. For example, the following PSRP-specific questions may be pursued: Does plugging of canals increase or reduce abundance of invasive fish? Does removal of roads reduce spread of terrestrial invasive species that use these roads as primary corridors? Do changes in hydrology

promote growth or spread of some invasive species? As PSRP Adaptive Management Plan implementation approaches, the invasive and nuisance species experts among the agencies and interested stakeholders should be consulted to identify the most relevant species and questions to investigate and methods to follow. Species should be chosen based in part on their ability to represent a broader group of species in order to maximize the knowledge gained from monitoring their responses.

**Methodology for testing each expectation or hypothesis.** Please refer to the PSRP INSMP for details about species and surveillance methodology. In addition, the PSRP Ecological Monitoring Plan includes vegetation change monitoring. During this monitoring plant species will be documented in locations that will be deemed sentinel sites by invasive and nuisance species agency experts for measuring PSRP's restoration success. If invasive or nuisance plant species are found at these sites the PSRP vegetation management teams at the implementing agencies will be notified and will address the presence of the species as specified in the PSRP INSMP. Regarding fauna, USACE contracts include a requirement to report invasive or nuisance animal species to the project's environmental lead and the Invasive Species Management Branch. Consolidation of existing information and refinement or development of Invasive Risk Assessment Tools are suggested prior to PSRP completion to better define triggers for when management actions should be taken and avoid expensive negative impacts through a reactive management approach.

**How results will be reported and the triggers/thresholds that indicate good PSRP performance or need for adaptive management action:** Lessons learned will be provided as feedback to the next stages of PSRP design, construction, and implementation by the invasive and nuisance species agency experts during interactions with PSRP Design Team, Operations and others as appropriate. There are currently several forums for sharing this information and we anticipate similar forums in the future. The PSRP INSMP is a living document that will also be updated with lessons learned.

**Management options that may be chosen to reduce the impacts of invasive species.** Feedback to PSRP management could include informing project decisions such as timing of delivering water, or routing water through an area differently than originally specified, in addition to informing the invasive and nuisance species management team actions. Suggested adaptive management options listed below are not in any particular order and can be implemented simultaneously, as appropriate.

- Refinement or development of Invasive Risk Assessment Tools.
- Updating construction contractors on methods to prevent the spread of invasive and nuisance species due to construction activities.
- Implementation of PSRP INSMP to immediately identify and eradicate new opportunistic/highly mobile invasive exotic species in areas of concern (e.g. active construction sites).
- Implementation of PSRP INSMP Plan for a regional approach to suppress, control and/or eradicate slow-growing/less mobile species.
- Suppression of established invasive species to the lowest feasible level such that ecosystem impacts are minimized.

- Redesign of existing or planned features, as appropriate and based on lessons learned, to make them less supportive of invasive exotic species proliferation/movement.

### 3.4 Estuarine Resources within Pumpkin and Faka Union Bays

The overarching objective of PSRP is the hydrologic restoration, preservation and protection of the Southwest Florida ecosystem while providing flood protection to adjacent lands. The plan consists of constructing three pump stations, spreader basins, and levees, filling and plugging existing canals, and removing existing roadways to restore natural sheetflow to rehydrate the wetlands within Picayune Strand and reduce point source freshwater discharge to the estuary. As defined in the 2004 PSRP Project Implementation Report (PIR) and Environmental Impact Statement (EIS), three estuaries will be affected by PSRP in different ways. Resumption of sheet flow will increase freshwater delivery to Pumpkin Bay and eliminate point-source discharge and pollution in Faka Union Bay. A third Bay, Fakahatchee Bay sits just east of the effects of PRSP water management and consequently, has remained relatively pristine. Fakahatchee Bay was established as the control estuary in the 2004 PSRP PIR/EIS against which PSRP project success in Pumpkin Bay and Faka Union Bay can be measured.

As previously noted, adaptive management will be reiterated in the coming phases of PSRP and the Adaptive Management Plan will be revisited by the MAG. At such time, additional baseline data and lessons learned will be available from other monitoring programs and restoration projects. Given the new knowledge, key questions and adaptive management options proposed in this Plan may need refinement. Therefore, items included in this plan are not guaranteed to be included or funded as-is, but will be considered again once PSRP construction phases are completed and operational.

**PSRP Adaptive Management Uncertainties #2-5:** There is a group of closely related ecological uncertainties regarding restoration benefits to Pumpkin and Faka Union Bays.

- *To what extent will the reduction in the frequency and magnitude of freshwater flows from the Faka Union Canal stabilize conditions enough to improve benthic habitat in Pumpkin Bay and Faka Union Bay? (ID#2; PSRP Objectives A,B,C,E,F)*
- *To what extent will the reduction in the frequency and magnitude of point source freshwater discharge from the Faka Union Canal help reestablish oyster beds within Pumpkin Bay and Faka Union Bay? (ID#3; PSRP Objective A,F)*
- *Will PSRP improve flows to Pumpkin Bay and Faka Union Bay resulting in more natural salinity patterns (magnitude, spatial distribution and timing)? (ID#4; PSRP Objective A)*
- *If salinity is affected by overland flow increases through PSRP to Pumpkin Bay and Faka Union Bay, how much benefit is generated for SAV, sportfish, prey, coastal wading birds, and crocodiles? Can operations be adjusted to improve estuarine performance in Pumpkin Bay and Faka Union Bay? (ID#5; PSRP Objectives A,B,E,F)*

**This group of uncertainties is related to the PSRP objective** of reestablishing natural freshwater flows to the estuary; restoring natural hydro-patterns, including sheetflow and flow-ways; reestablishing natural plant distribution and composition; restoring habitat for listed species and increasing fish and wildlife resources. The associated PSRP features are pump station operations, plugging of canals and removal of existing roadways.

**What is expected to be learned by addressing this uncertainty, i.e., how will PSRP benefit from addressing this uncertainty?** PSRP benefits to Pumpkin and Faka Union Bays can be optimized if sufficient information about upstream effects of PSRP on the estuaries is gathered, analyzed, and reported.

**Expectations and hypotheses to be tested to address the uncertainties and attributes that will be measured to test each.** No new monitoring is proposed as part of the PSRP Adaptive Management Plan to address this uncertainty; please see the PSRP Ecological Monitoring Plan (Appendix A) for details about species and surveillance methodology. The hypotheses and performance expectations identified within the PSRP Ecological Monitoring Plan are supported by the modeling results and best available information from the 2004 PSRP PIR/EIS. The locations of PSRP-specific monitoring proposed will be conducted in the specific locations where PSRP planning modeling showed effects from PSRP and compared with monitoring data from Fakahatchee Bay, the reference site.

Hypothesis: Salinity range and estuarine ecological indicators species diversity, abundance/area, and health (oysters, oyster reef crabs, nekton and benthic substrate and seagrasses) in Pumpkin and Faka Union Bays will become similar to Fakahatchee Bay.

**More Information on Attributes to be measured:**

- **What is the time frame in which changes to this attribute are expected to be measurable?** See triggers and thresholds below identified in Management Options Matrix for estuarine benefits. Additional information is contained within the PSRP Ecological Monitoring Plan (refer to Table E-2 within Ecological Monitoring Plan for summary).
- **Is this attribute complimented by other monitoring programs (within and/or outside of PSRP)?** The monitoring is complimented by RECOVER MAP and restoration project monitoring as described within the PSRP Ecological Monitoring Plan (Appendix A). The locations for PSRP monitoring are focused in areas where PSRP modeling and best available information indicated the most likelihood to achieve restoration benefits in the estuary.
- **When during PSRP's life cycle should this monitoring begin?** Post-construction monitoring will follow the same methodologies used for determining baselines and will be implemented when PSRP changes flows to the estuaries through plugging of remaining canals and remaining road removal. Two years of baseline data on the state of oyster reefs in Pumpkin, Faka Union and Fakahatchee Bays are available and will be used as a comparison source. Rookery Bay National Estuarine Research Reserve has also been monitoring oyster reef crab populations since 2000 in Fakahatchee Bay and Faka Union Bay and nekton within these two areas in addition to Pumpkin Bay since 2000.

**Methodology for testing each expectation or hypothesis (include frequency of monitoring).** In addition to creek flow and salinity, four primary ecological indicators (oysters, oyster reef crabs, nekton and benthic substrate and seagrasses) will be used as multiple lines of evidence to verify ecological restoration response to improved salinities. Information will feed back into improved operations of the pump stations or needed adjustments to upstream weirs in

coordination with the MAG to further address flow to the estuaries. In addition, the monitoring will confirm whether water quality (nutrients) and/or sedimentation (total suspended solids) may be affecting restoration performance, which would need to be addressed by State water quality best management practices and or other modifications to PRSP.

**How results will be reported and the triggers/thresholds that indicate good PSRP performance or need for adaptive management action.** Fakahatchee Bay will be used as a reference site to assess the abiotic and biotic condition of the restored estuaries. Fakahatchee Bay's freshwater originates primarily as natural overland sheetflow from a relatively undisturbed watershed. Salinity, oyster density, growth and survival, nekton, and seagrasses in Fakahatchee Bay will be used to determine if changes in Faka and Pumpkin Bays are moving towards restored conditions or not given expected timing of response after restoration actions are implemented. If Faka and Pumpkin Bays do not illustrate progress towards the reference condition, then adjustments to PSRP would be considered. In addition, they may also inform future restoration projects by providing lessons learned.

**Management options that may be chosen based on monitoring results.** The following options are consistent with oysters, nekton, benthic invertebrates and seagrass indicators:

- **If there is an issue with flows:** Consider operational changes to pump stations, adjustments to weirs, potential for additional canal plugging or road removal; additional culverts under Tamiami Trail. Additional canal plugging, road removal or culverts under Tamiami Trail are not part of the PSRP recommended plan; it is provided here as a suggestion for parties to consider for a future restoration project if needed.
- **If there is an issue with sediment**: Evaluate benthic monitoring results as first indicator of issues with sediment. If results suggest that despite salinity improvements the ecological restoration is hindered by undesired sediment (potentially high organic, anoxic, high sulfide muck) then muck removal may be needed. Muck removal is not part of the PSRP recommended plan nor has it been evaluated during PSRP planning; it is provided here as a suggestion for parties to consider for a future effort if needed. The suggested methods include identifying suitable salinity areas given PSRP and other project results, then removing muck in those areas to facilitate oyster development and improvements in benthic invertebrate communities.

**The following options are specific to seagrasses and oysters**:

- If there is an issue with lack of seed source: Implement seagrass plantings, which may be a non-implementing agency restoration effort.
- If there is an issue with lack of oyster substrate: Add suitable substrate such as oyster cultch (material such as oyster shells or concrete laid down on oyster areas to provide mobile oyster spat with places to attach) or add mature oysters to increase spat production as described in the Indian River Lagoon South project.

**Table E-3. Pumpkin Bay and Faka Union Bay Management Options Matrix.**
The Management Option Matrix (MOM) shown here, and those throughout the adaptive management plan, help link monitoring identified in specific adaptive management strategies to decision criteria and suggested management options to consider for adjusting PSRP if monitoring reveals performance issues related to PSRP operations. *The "timeframe to detect changes..." does not imply that changes will be complete in that timeframe; rather, they provide an estimate of time needed to begin to be able to distinguish effects of PSRP. These time frames are indications of response speeds, not limits on how long the monitoring will be conducted.

| Uncertainty ID# | Timeframe to detect change of attributes* | Attribute or indicator | Specific Property to be Measured and Frequency | Decision Criteria: Trigger(s) for Management Action | Management Action Options (PSRP) | Management Action Options (Future Projects) |
|---|---|---|---|---|---|---|
| 2, 4 | 2-5 years | Hydrology | Upstream stage, coastal creek flow, and downstream salinity in Pumpkin, Faka Union, and Fakahatchee Bays[3] | After 2 years of operations,<br>▪ Pumpkin Bay flows increase (during wet season) and salinity decreases towards Fakahatchee Strand conditions<br>▪ Faka Union Bay flows decrease (during wet season) and salinity increases towards Fakahatchee Strand conditions | ▪ Adjust operations using pumps to improve timing and distribution of flow across project site<br>▪ Adjust weir heights to allow more/less water to be retained within project areas upstream and increase surface/groundwater flow to estuary | ▪ Explore potential to increase number of canal plugs and/or road removal;<br>▪ Explore potential for additional culverts under or bridging of Tamiami Trail |
| 2 | 5 years | Benthic | Benthic fauna and submerged aquatic vegetation in Pumpkin, Faka Union, and Fakahatchee Bays | After 5 years of operation and evidence of flows and salinities met, Marine Benthic Index should be comparable to Fakahatchee Bay. | ▪ See operational and structure changes above.<br>▪ Muck removal to improve substrate | See above |

[3] Initial sflow and salininy information can be gained from Soderqvist, L. and E. Patino. 2010. Seasonal and Spatial Distribution of Freshwater Flow and Salinity in the Ten Thousand Islands Estuary, Florida, 2007–2009. http://pubs.usgs.gov/ds/501/pdf/ds501_report.pdf
Booth, A.C., L.E. Soderqvist, and M.C. Berry. 2014. Flow Monitoring Along the Western Tamiami Trail Between County Road 92 and State Road 29 in Support of the Comprehensive Everglades Restoration Plan, 2007–2010. http://pubs.usgs.gov/ds/0831/pdf/ds831.pdf

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | 5 years | Oysters | Oyster Density, Spat Recruitment | After 5 years of operation and evidence of flows and salinities met, oyster density, reproduction and recruitment should be comparable to Fakahatchee Bay. | ▪ See operational changes above<br>▪ If there is inadequate amounts of oyster substrate, add suitable substrate such as oyster cultch (material such as oyster shells or concrete laid down on oyster areas to provide mobile oyster spat with places to attach);<br>▪ Add mature oysters to increases spat production. | See above |
| 3,4 | 5 years | Oyster Reef Crabs | Ratio of stenohaline to euryhaline crab abundance[4] | After 5 years of operation and evidence of flows and salinities met, increase ration of stenohaline to euryhaline crabs in Pumpkin and Faka Union Bays during late dry and early wet seasons comparable to Fakahatchee Bay. | See operational and structural changes above | See above |
| 4,5 | 5 years | Nekton | Species composition | After 5 years of operation and evidence of flows and salinities met, nekton species composition comparable to Fakahatchee Bay. | See operational and structural changes above | See above |

[4] Initial information to develop baseline and triggers can be found at Shirley, M., V. McGee, T. Jones, B. Anderson and J. Schmid. 2009. Relative Abundance of Stenohaline and Euryhaline Oyster Reef Crab Populations as a Tool for Managing Freshwater Inflow to Estuaries. Journal of Coastal Research 10045: 195-208. http://www.bioone.org/doi/full/10.2112/SI45-195.1

### 3.5 Plant Communities and Vegetation Patterns

In July 2001 the Natural Resources Conservation Service (NRCS) provided a detailed map, based on recent soil survey field data and aerial photographs, of the 1995 distribution of major plant community types in the PSRP. This NRCS map represents a valuable baseline of real world plant community acreages for existing conditions. Using the MIKESHE model, South Florida Water Management District produced an "existing conditions" model run of hydrologic conditions. Plant community distributions were predicted using the relationship between the hydrologic characteristics of each major community type (refer to 2004 PSRP PIR/EIS Table 3-1) and the average wet season water depths (July 1 through October 1) as predicted by the model. A more in depth assessment of the NRCS maps and the MIKESHE model can be found in the SFWMD "Resource Assessment of *the Southern Golden Gate Estates Hydrologic Restoration Plan*" (2004 PSRP PIR/EIS Appendix D).

Major changes to the hydrology and biology of PSRP landscape began between 1968 and 1971, when the four canals that comprise the Faka Union Canal system and the 279-mile road system were completed. This construction led to a significant decline in the landscape's ecology, which is still occurring to this day. Historic plant community composition changed from that of wetland and transitional vegetation to more upland, invasive, and exotic dominated systems. As historic cypress strands within PSRP became drier due to the canal-induced draw down, there was a shift in vegetative succession toward a mixed cypress-hardwood-sabal palm system. Additionally, as a result of these abnormally dry conditions, hotter fire now frequently burns farther from prairies and flatwood communities into adjacent cypress strands or other hydric forested systems. Pines, sabal palms and saw palmettos that are adapted to drier conditions and more intensive fire regimes have replaced the cypress forest communities. Often invasive exotic species like Brazilian pepper (*Schinus terebinthifolius*) and melaleuca (*M. quinquenervia*) have become dominant or co-dominant in many of these formerly hydric communities.

The combination of a restored hydrology, a more natural fire regime and an appropriate exotic vegetation control program is expected to reestablish the pre-drainage character of PSRP plant communities. This would mean that plant communities that have developed under the existing hydrologic and fire regimes, but were not present prior to drainage, would be greatly reduced or eliminated during the decades following restoration and would be replaced by communities more similar to those present prior to drainage. In addition, extant plant and animal communities that also existed in PSRP prior to construction of the canal system, but have become established in new areas as a result of drainage, would likely return to their original distribution. Vegetation monitoring of plant community structure and plant species composition and abundance will assist to determine whether these expectations are realized.

As previously noted, adaptive management will be reiterated in the coming phases of PSRP and the Adaptive Management Plan will be revisited by the MAG. At such time, additional baseline data and lessons learned will be available from other monitoring programs and restoration projects. Given the new knowledge, key questions and adaptive management options proposed in this Plan may need refinement. Therefore, items included in this plan are not guaranteed to be included or funded as-is, but will be considered again once PSRP construction phases are completed and operational.

**PSRP Adaptive Management Uncertainty #6:** *Are inundation and hydroperiod sufficient to reestablish historical vegetation patterns within PRSP? (ID#6; PSRP Objectives B,C,E,F)*

**This group of uncertainties is related to the PSRP objectives** of restoring natural hydropatterns, including sheetflow and flow-ways; reestablishing natural plant distribution and composition; restoring habitat for listed species; and increasing fish and wildlife resources. The associated PSRP features are pump station operations, plugging of canals and removal of existing roadways.

**What is expected to be learned by addressing this uncertainty, i.e., how will PSRP benefit from addressing this uncertainty?** PSRP benefits can be optimized if sufficient information about the on-the-ground effects of PSRP on vegetation patterns related to changes in hydrology is gathered and reported.

**Expectations and hypotheses to be tested to address the uncertainties and attributes that will be measured to test each.** No new monitoring is proposed as part of the PSRP Adaptive Management Plan to address this uncertainty; please see the PSRP Ecological Monitoring Plan (Appendix A) for details about transect locations and surveillance methodology. The hypotheses and performance expectations identified within the PSRP Ecological Monitoring Plan are supported by the modeling results and best available information from the 2004 PSRP PIR/EIS and initial results following the Prairie Canal backfill have been reported in the 2014 System Status Report (RECOVER, 2014)[5]. Plant community distribution post-restoration were predicted using the relationship between the hydrological characteristics of each major plant community type (2004 PRSP PIREIS Table 3-1) and the average wet season water depths as predicted by the PSRP model. The locations of PSRP-specific monitoring proposed will be conducted in the specific locations where PSRP planning modeling showed effects from PSRP backfilling of each canal and road removal. Plant species composition and abundance will be measured and compared with data from hydrologically similar reference sites within Florida Panther National Wildlife Refuge and Fakahatchee Strand Preserve State Park. Wetland affinity indices (WAI) are used to measure vegetation changes of major plant communities between PSRP sites and reference sites. WAI values are expected to trend towards reference sites in marsh areas surrounding each backfilled canal and removed road (see Prairie Canal example, RECOVER 2014). In general, vegetation changes should move from mesic pines to longer hydroperiods cypress vegetation communities in the near term and ultimately to Cypress dome forests in the long-term.

**More Information on Attributes to be measured:**

- **What is expected to be learned by measuring this attribute, i.e., how will PSRP benefit from knowledge gained about this attribute?** The attributes have been identified as indicators of restoration performance due to hydrological modifications within PSRP. They are the minimal efficient attributes to monitor PSRP performance. These attributes include plant species abundance and composition.

[5] RECOVER, 2014. 2014 System Status Report – Section 7 Southern Coastal Systems, Picayune Strand Restoration Project. C/O U.S. Army Corps of Engineers, Jacksonville, Fl and South Florida Water Management District, West Palm Beach, Fl. http://www.evergladesplan.org/pm/ssr_2014/ssr_proj_psrp_2014.aspx

- **What is the time frame in which changes to this attribute are expected to be measurable?** See triggers and thresholds below identified in Management Options Matrix for benefits. Additional information is contained within the PSRP Ecological Monitoring Plan (refer to Table E-2 within Ecological Monitoring Plan for summary).
- **Is this attribute complimented by other monitoring programs (within and/or outside of PSRP)?** The monitoring is complimented by existing monitoring programs, vegetation management practices and forestry standards within Florida Panther National Wildlife Refuge and Fakahatchee Strand Preserve State Park, (Appendix A). The locations for PSRP monitoring are focused in areas where PSRP modeling and best available information indicated the most likelihood to achieve restoration benefits.
- **When during PSRP's life cycle should this monitoring begin?** Baseline vegetation assessment has been completed. Post-construction restoration monitoring will coincide with the three PSRP construction phases and will commence in years 1, 3 and 5 after one full growing season upon completion of backfilling of the associated major canal (i.e. Merritt, Faka Union and Miller). Additional details of monitoring frequency are contained within the Ecological Monitoring Plan.

**Methodology for testing each expectation or hypothesis (include frequency of monitoring).** All vegetative strata within a given major plant community type will be monitored both in PSRP and in adjacent reference sites to determine changes in species composition and dominance, and to compare them to similar types of relatively undisturbed reference communities in nearby natural areas (i.e. Florida Panther National Wildlife Refuge and Fakahatchee Strand Preserve State Park). Two permanently marked 50 m vegetation transects have been established at each of the 27 ground water well sites (refer to Ecological Monitoring Plan, Appendix 3 for locations). One additional transect has been established at each of nine relatively undisturbed reference sites. These transects contain examples of each of the three major plant community types evaluated in the PSRP: 1) Pine Flatwoods, 2) Wet Prairie and 3) Cypress. Each vegetation transect will be located within a distinct plant community at least 25 meters from where there is likely to be any direct influence of road removal or any other disturbance during restoration. This monitoring will be used to verify ecological restoration response to improved hydrology. Information will feed back into improved operations of the pump stations in coordination with MAG to further address hydrological restoration. In addition, the monitoring will confirm whether operational, structural or mechanical (e.g. vegetation management) adjustments are needed to improve restoration performance.

**How results will be reported and the triggers/thresholds that indicate good PSRP performance or need for adaptive management action.** Florida Panther National Wildlife Refuge and Fakahatchee Strand Preserve State Park will be used as a reference site to assess the abiotic and biotic condition of the restored project site. Restoration targets for the PSRP monitoring sites will be a function of their new hydrologic regime, and should be comparable to the composition and structure of hydrologically similar reference sites. Fakahatchee Bay's freshwater originates primarily as natural overland sheetflow from a relatively undisturbed watershed. Comparisons between community structure, plant species composition and abundance are identified to help determine in the future whether adjustments to PSRP are needed. In addition, they may also inform future restoration projects by providing lessons learned.

**Management options that may be chosen based on monitoring results.** The following options are consistent with vegetation patterns (community structure, species composition and abundance:

1) **If there is an issue with flows:** Consider operational changes to pump stations, adjustments to weirs, potential for additional canal plugging or road removal; additional culverts under Tamiami Trail. Additional canal plugging, road removal or culverts under Tamiami Trail are not part of the PSRP recommended plan; it is provided here as a suggestion for parties to consider for a future effort if needed.
2) **If there is an issue with revegetation:** Consider selective harvesting of cabbage palms; selective clearing in dense stands (mechanical treatment), limited seeding or plantings. These items are not part of the PSRP selected plan but are standard forestry practices that may act as catalysts to facilitate appropriate vegetation communities once hydrology is restored.

**Table E-4. Plant Communities and Vegetation Patterns Management Options Matrix. Refer to Table E-3 caption for further information.**

| Uncertainty ID# | Timeframe to detect change of attributes* | Attribute or indicator | Specific Property to be Measured and Frequency | Decision Criteria: Trigger(s) for Management Action | Management Action Options (PSRP) | Management Action Options (Future Projects) |
|---|---|---|---|---|---|---|
| 6 | 3-5 years | Hydrology | Stage-Depth Inundation; Hydroperiod | Water depth and hydroperiods should increase to match hydrological conditions in Florida Panther national Wildlife Refuge and Fakahatchee Strand Preserve State Park reference sites. | ▪ Adjust project operations to improve timing and distribution of flow across the project site;<br>▪ Adjust weir heights to allow more/less water to be retained within project area. | Explore potential to increase number of canal plugs and/or road removal; |
| 6 | 5-20 years | Vegetation Community Structure | Plant species composition and abundance | After 10 years of completion of each construction phase (three phases), plant species composition and abundance (Wetland Affinity Index)[6] should be comparable to hydrologically similar reference sites. | ▪ See operational and structural changes above<br>▪ Selective harvesting of cabbage palms; invasive species removal;<br>▪ Selective clearing in dense stands, limited seeding or plantings.<br>▪ Prescribed fire. | See above |

[6] See Wetland Affinity Index example of Prairie Canal in 2014 System Status Report Chapter 7 – Southern Coastal Systems Picayune Strand Restoration Project: http://www.evergladesplan.org/pm/ssr_2014/docs/ssr_proj_psrp_plants_2014.pdf

### 3.6 Prey Densities, Wading Bird Foraging Conditions and Nesting

The presence and health of wildlife populations are a function of the habitats available to support them, including adequate prey resources. Given the dramatic changes in road access, hydrology, plant communities and fire regimes in PSRP over the past forty years, the current wildlife populations have undoubtedly changed from those present historically. The PSRP is expected to enhance fish and wildlife resources by restoring or reestablishing: natural hydroperiods, pre-drainage sheet flow, freshwater flowways to downstream estuaries, native plant distribution and composition, surface aquifer recharge, and the area's natural fire regime. The ecological condition of PSRP affects wildlife in the immediate project area as well as significant regional fish and wildlife resources within the region, due to its central position in a complex of nature reserves, forests and parks. Restoring habitat values in the project area is extremely important to ecosystem connectivity. In addition, the preservation and restoration of hydrology and connectivity of wetlands on an ecosystem scale is essential to the survival and reproduction of wading birds and endangered wood storks in South Florida. These other reserves include the adjacent Florida Panther National Wildlife Refuge, Fakahatchee Strand State Preserve, Collier Seminole State Park, South Belle Meade portion of the Picayune Strand State Forest and the Ten Thousand Islands Region, including the Ten Thousand Islands National Wildlife Refuge, Rookery Bay National Estuarine Research Reserve and Everglades National Park.

Completion of PRSP is expected to return the landscape to a more natural hydrology, which has obvious implications for wetland dependent wildlife species. Populations of amphibians, otters, wading birds, forage fish and aquatic invertebrates would likely increase. Although some of these elements, especially wading birds, would only utilize the area during the rainy season, restoring this habitat can be expected to benefit species that have suffered an overall loss of foraging habitat during the recent historic period, such as the endangered wood stork. Monitoring of prey density, wading bird foraging conditions and nesting within the restored PSRP vegetation communities and associated estuaries will assist to determine whether these expectations are realized.

As previously noted, adaptive management will be reiterated in the coming phases of PSRP and the Adaptive Management Plan will be revisited by the MAG. At such time, additional baseline data and lessons learned will be available from other monitoring programs and restoration projects. Given the new knowledge, key questions and adaptive management options proposed in this Plan may need refinement. Therefore, items included in this plan are not guaranteed to be included or funded as-is, but will be considered again once PSRP construction phases are completed and operational.

**PSRP Adaptive Management Uncertainty #7 and #8**: There are two closely related ecological uncertainties regarding restoration benefits to fish and wildlife resources within PSRP.

- *How much will hydrologic restoration and vegetation management result in increases in prey densities (aquatic fauna)? (ID#7; PSRP Objective B,C,E,F) (Driver or Uncertainty type: hydro-ecological)*
- *How much will hydrologic restoration and vegetation management result in increases in wading bird foraging conditions and increased nest number and success of Wood*

*Storks? (ID#8;PSRP Objective B,C,E,F)* (Driver or Uncertainty type: hydro-ecological)

These uncertainties are related to the PSRP objectives of restoring natural hydropatterns, including sheetflow and flow-ways; reestablishing natural plant distribution and composition; restoring habitat for listed species; and increasing fish and wildlife resources. The associated PSRP features are pump station operations, plugging of canals and removal of existing roadways.

**What is expected to be learned by addressing this uncertainty, i.e., how will PSRP benefit from addressing this uncertainty?** Addressing these uncertainties provides information that will enhance the ability of PSRP to improve and restore the availability of critical, food-web fish and invertebrates. Changes in the densities, availability and spatial distributions of aquatic prey are needed to restore historic food-web interactions, especially for wading birds. However, many areas within PSRP are too dry to support prey populations at significant levels. Addressing this uncertainty provides information that will enhance the ability of PSRP to restore critical, keystone populations of egrets, ibis, herons, storks, cranes and spoonbills in terms of their abundance, spatial distributions and reproductive viability.

The PSRP adaptive management plan will provide a way to determine more specifically the values of hydrological parameters (hydroperiod, depth, frequency of dry downs) and ecological parameters (prey density, vegetation, exotics) that are necessary to restore and sustain a healthy prey-base throughout the PSRP including seasonal usage by wading birds and wood storks. By addressing this uncertainty in combination with aquatic prey density, this PSRP adaptive management plan is expected to increase wading bird populations, including the endangered wood stork.

**Expectations and hypotheses to be tested to address uncertainty, and attribute(s) that will be measured:** Central to this uncertainty is the hypothesis that hydroperiod restoration will result in increased density of aquatic fauna and prey fish. More specifically, will restored hydropatterns across PSRP significantly improve density of aquatic fauna and prey fish and will this translate into a more resilient and available food base for wading birds and other large predators? In addition, will 1) restoration of multi-year hydroperiods result in increased density of aquatic prey, earlier nesting and increased fledgling success and 2) restoration of short hydroperiod wetlands result in increased dry season prey availability and promote earlier nest initiation (November/December) and nest success of wood storks in PSRP and the southwestern coast?

**Methodology for testing each expectation or hypothesis:** The testing of this hypothesis will be done in conjunction with Before-After-Control-Impact (BACI) methodology. In this approach, the "before" period is defined by data collected during baseline monitoring measurements made prior to the initiation of PSRP operations that will affect the area and the after as the period during and following feature completion. Control and impact reflect the regions not influenced and influenced by the structures and features, respectively. After monitoring data will then be compared with reference sites located within Florida Panther National Wildlife Refuge and Fakahatchee Strand Preserve State Park. Undisturbed reference sites in four major types of plant

communities (cypress, wet prairie, hydric pine, and brackish marsh) were established to provide aquatic fauna and terrestrial invertebrate restoration targets for PSRP. The monitoring will use a multidisciplinary approach that directly couples the monitoring of hydrology and aquatic fauna. Detailed methodology for assessment of prey densities is defines within the PSRP Ecological Monitoring Plan Appendix D.

Information will feed back into improved operations of the pump stations in coordination with MAG to further address hydrological restoration. In addition, the monitoring will confirm whether operational, structural or mechanical (e.g. vegetation management) adjustments are needed to improve restoration performance.

**How results will be reported, and the triggers/thresholds that indicate good PSRP performance or need for adaptive management action:** The BACI statistical design will be used to formulate conclusions, address the uncertainties and make recommendations. Results will be provided by MAG on an annual basis to PSRP Project Managers, agency leads and the general public as part of the SFER (South Florida Environmental Report).

**Management options that may be chosen to improve performance and assess the role of extended hydroperiods and flow for the restoration of aquatic prey densities.** Feedback to PSRP management will include providing information that can inform project decisions such as timing of delivering water, or routing water through an area slightly differently than originally specified. Suggested adaptive management options listed below are not in any particular order and can be implemented simultaneously, as appropriate.

**Table E-5. Prey Densities, Wading Bird Foraging Conditions and Nesting Management Options Matrix. Refer to Table E-3 caption for further information.**

| Uncertainty ID# | Timeframe to detect change of attributes* | Attribute or indicator | Specific Property to be Measured and Frequency | Decision Criteria: Trigger(s) for Management Action | Management Action Options (PSRP) | Management Action Options (Future Projects) |
|---|---|---|---|---|---|---|
| 7 | 2-5 years | Inland aquatic fauna | Macroinvertebrates, fish and amphibians[7] | After 5 years of completion of each construction phase (three phases) and evidence of hydrological improvements, macroinvertebrate, fish, and amphibian species diversity and abundance trend toward hydrologically similar reference sites at Florida Panther National Wildlife Refuge and Fakahatchee Strand Preserve State Park. | ▪ Adjust project operations to improve timing and distribution of flow across the project site;<br>▪ Adjust weir heights to allow more/less water to be retained within project area;<br>▪ Vegetation management or prescribed fire to improve flow. | ▪ Explore potential to increase number of canal plugs and/or road removal |
| 8 | 2-5 years | Wading birds/ wood storks | Number of wading bird and wading bird species composition | After 5 years of operation and evidence of hydroperiods being met, and salinities met, oyster density, reproduction and recruitment should be comparable to Fakahatchee Bay. | | |

[7] See Faunal monitoring assessment baselines in 2014 System Status Report: http://www.evergladesplan.org/pm/ssr_2014/docs/ssr_proj_psrp_fauna_2014.pdf

### 3.7 Management Action Option Suggestion Cost

Management action option for PSRP and future projects are captured within Table E-6 and Table E-7, respectively. Costs were based upon pricing of activities that are currently under construction. The assumptions were based on consensus of the PDT. Please refer to the 2009 Ecological Monitoring Plan and INSMP for full disclosure of anticipated monitoring costs.

**Table E-6. Management Action Option Costs for PSRP**

| Uncertainty ID# | Management Action Option (PSRP) | Management Action Option Cost (PSRP) |
|---|---|---|
| 1,2,3,4,5,6 7,8 | Adjust operations using pumps to improve timing and distribution of flow across project site | Changes to Project Operations Manual, including NEPA and ESA coordination **$50,000.** The assumption is that flexibility would be included in the change to the Project Operations Manual, so this would be a one time requirement/cost |
| 1,2,3,4,5,6,7,8 | Adjust weir heights to allow more/less water to be retained within project areas upstream and increase surface/groundwater flow to estuary | Change 50% of weirs to adjustable weirs in specific areas that require adjustment to flows. Miller 10 weirs Faka 20 weirs Merritt 9 weirs $10,000 per wier x 20 weirs = **$200,000** |
| 2,4 | Muck removal to improve substrate | Assume small acreage because of the high cost-4 acres $50,000 per acre x 4 acres = **$200,000** |
| 3,4 | Add suitable substrate such as oyster cultch (material such as oyster shells or concrete laid down on oyster areas to provide mobile oyster spat with places to attach) | Oyster cultch estimate based on needing shell to cover 1 acre of bay bottom for 3 estuaries at a cost of $40,000 per acre = **$120,000** |
| 3,4 | Add mature oysters to increase spat production. | 3 Enclosures = $5,000 Oysters = $10,000 Labor = $3,000 **Total= $18,000** |
| 6 | Selective harvesting of cabbage palms | **$0** (this action would be conducted by the Florida Forest Service and cabbage palms could be sold therefore there would be no cost to the project) |
| 1,6 | Invasive species removal | One retreatment of construction footprint @ $800/acre (if all species are treated) Due to the large size of the project area, the assumption is that we would only conduct prescribed burns on areas within |

| | | |
|---|---|---|
| | | the area south of the pump stations (~40,000 acres).<br>$800 x 40,000 acres = **$3,200,000** |
| 6 | Selective clearing in dense stands, limited seeding or plantings | $140/acre (estimate from Florida Forest Service)<br>Assume 10,000 acres<br>$140 x 10,000 = **$1,400,000** |
| 1,6,7,8 | Prescribed fire | $25/acre (estimate from Florida Forest Service). Due to the large size of the project area, the assumption is that we would only conduct prescribed burns on areas within the area south of the pump stations (~40,000 acres)<br>$25 x 40,000 acres = **$1,000,000** |
| | **TOTAL** | **$6,188,000** |

**Table E-7. Management Action Option Costs for Future Projects**

| Uncertainty ID# | Management Action Option (Future Projects) | Management Action Option Cost (Future Projects) |
|---|---|---|
| 1,2,3,4,5,6,7,8 | Increase number of canal plugs and/or culverts under remaining PSRP roads | These costs are not included because the scope and cost will require additional authorization. |
| 1,2,3,4,5,6,7,8 | Additional culverts under or bridging of Tamiami Trail | These costs are not included because the scope and cost will require additional authorization. |

# Picayune Strand Restoration Project
# Environmental Assessment

# ENVIRONMENTAL ASSESSMENT AND PROPOSED FINDING OF NO SIGNIFICANT IMPACT



# PICAYUNE STRAND RESTORATION PROJECT

## MARCH 2015

## DESIGN REFINEMENTS

**U.S. Army Corps of Engineers**
Jacksonville District

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
701 San Marco Boulevard
JACKSONVILLE, FLORIDA 32207-8175

REPLY TO
ATTENTION OF

JUL 12 2016

# FINDING OF NO SIGNIFICANT IMPACT

## Design Refinements for the Picayune Strand Restoration Project Collier County, Florida

Based on the information analyzed and presented in the Environmental Assessment (EA), incorporated herein by reference, dated March 2015, reflecting pertinent information obtained from agencies having jurisdiction by law and/or special expertise, I conclude that the proposed actions will not significantly impact the quality of the human environment and do not require an Environmental Impact Statement (EIS). The proposed actions are minor activities that are not similar to any action normally requiring an EIS. There are no significant effects anticipated as a result of these design refinements to the Picayune Strand Restoration Project (PSRP) as described in the 2004 PSRP Final Project Implementation Report (PIR) and EIS. Reasons for this conclusion are, in summary:

a. PIR and EIS were completed for the PSRP in 2004. The PSRP was authorized in the 2007 Water Resources Development Act. The primary purpose of the PSRP is to restore and enhance wetland habitat over approximately 55,000 acres in Southwest Florida and provide flood protection for Northern Golden Gate Estates, adjacent private lands, the 6L's agricultural area, and Port of the Islands community located near the PSRP area (per 33 C.F.R. § 385.37 Flood Protection). Although consultation under the Endangered Species Act was not complete at the time of project authorization, the project is essentially unchanged compared to the 2004 PIR and EIS.

b. The proposed actions would facilitate movement of freshwater sheetflow to the estuaries thereby improving the water quality as it passes through the restored system. The PSRP would be in compliance with the conditions of a State Water Quality Certification.

c. The U.S. Army Corps of Engineers (Corps) coordinated a consistency determination with the Florida Department of Environmental Protection under the guidelines of the Coastal Zone Management Act through the circulation of this EA. The Corps has determined that the proposed actions are consistent with the State of Florida's Coastal Management Program through compliance with all applicable chapters of the Coastal Zone Management Act (Appendix B) and the state concurred through its letter on January 20, 2015 (Appendix C, Pertinent Correspondence).

d. Endangered Species Act (ESA) consultation has been completed for the tieback levee and is described in the 2009 Biological Opinion (BO) for the PSRP. ESA and Marine Mammal Protection Act consultation for the endangered West Indian Manatee has been revisited based on new scientific information and is addressed in a supplemental Biological Assessment (Appendix E).

A manatee refugium feature to ensure the continued existence of the refugium at Port of the Islands Basin is described in this EA. USFWS issued an amended Biological Opinion on October 31, 2014 that concurred with the Corps' determination of May Affect, Not Likely to Adversely Affect manatee and its critical habitat.

e. The proposed actions would have no effect on any resources of cultural or historical significance. Monitors will be present during construction activities to ensure archeological sites are not affected by the PSRP. This project is in compliance with the National Historic Preservation Act.

f. Implementation of the proposed actions will follow the guidelines outlined in the PSRP Nuisance and Exotic Vegetation Management Plan.

g. The proposed actions would not substantially alter any other environmental or social impacts from those previously described in the 2004 PSRP Final PIR/EIS for the PSRP and in any other National Environmental Policy Act compliance documents related to the PSRP.

h. The proposed actions are consistent with the authorized purpose of the PSRP and will not adversely affect anticipated restoration benefits.

i. This finding has been coordinated with the public and agencies through a written Notice of Availability in accordance with 40 CFR 1501.4(e) and Engineer Regulation 200-2-2 (part 11 and Appendix A). The point of contact is Mrs. Stacie Auvenshine at 904-232-3694 or Stacie.J.Auvenshine@usace.army.mil.

In view of the above, and after consideration of public and agency comments received on the project, I have concluded that the proposed actions will not result in a significant effect on the human environment nor present significant environmental consequences. This finding incorporates by reference all discussions and conclusions contained in the EA attached hereto. All applicable laws, executive orders, regulations, and local government plans were considered in the evaluation of the alternatives. It is my determination that the recommended plan does not constitute a major federal action that would significantly affect the human environment; therefore, preparation of an Environmental Impact Statement is not required.

JASON A. KIRK, P.E.
Colonel, Corps of Engineers
Commanding

12 JULY 2016
Date

**PICAYUNE STRAND RESTORATION PROJECT**
**ENVIRONMENTAL ASSESSMENT**

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## 1.0 INTRODUCTION

The Picayune Strand Restoration Project (PSRP) encompasses an area of sensitive environmental land located in southwestern Collier County, Florida. It is located southwest of the Florida Panther National Wildlife Refuge, north of Ten Thousand Islands National Wildlife Refuge, east of the South Belle Meade State Conservation and Recreation Lands (CARL) project, west of the Fakahatchee Strand State Preserve, and northeast of Collier Seminole State Park. The South Belle Meade CARL project known as "Belle Meade" and the Southern Golden Gate Estates (SGGE) CARL project were combined to create the Picayune Strand State Forest. The central location of the PSRP among these nature preserves and wildlife areas reflects its importance to ecosystem connectivity of the region. For more information on the SGGE history and area, please see Section 1 of the 2004 PSRP Final Project Implementation Report (PIR) and Environmental Impact Statement (EIS) (U.S. Army Corps of Engineers [Corps] 2004). The PSRP consists of removing the infrastructure of a 55,247 acre subdivision and restoring its pre-development hydrology and ecology (Figure 1-1). The PRSP was authorized by Section 1001(15) of the Water Resources Development Act (WRDA) of 2007.

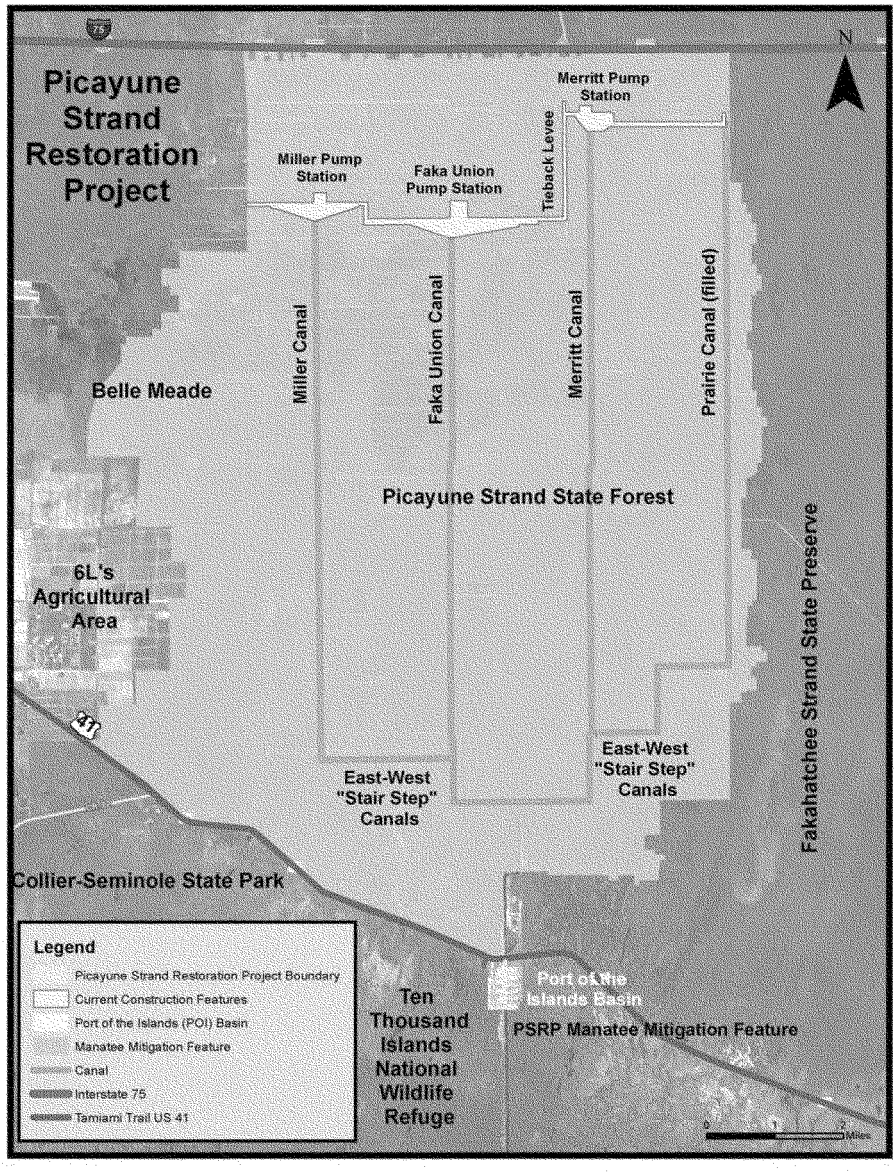



**Figure 1-1. Picayune Strand Restoration Project Features and Location**

During detailed project design, it was determined that refinements were necessary to realize benefits as described in the 2004 PSRP Final PIR/EIS. These design refinements resulted in the project infrastructure encompassing a larger area than envisioned in the 2004 PSRP Final PIR/EIS and thus further evaluation under the National Environmental Policy Act (NEPA) was warranted. However, since these refinements are necessary to achieve project goals and there will be no change in benefits as described in the 2004 PSRP Final PSRP PIR/EIS, additional Congressional authorization of the updated project design is not necessary.

This Environmental Assessment (EA) addresses components that are considered refinements of the original design as described in the 2004 PSRP Final PIR/EIS. One such component described is the replacement of individual berms for the Merritt, Faka Union and Miller Pump Stations with a single full width tieback levee for each pump station. This project component was authorized as part of the PSRP and is needed to achieve full restoration benefits. The second component described in this EA is a manatee mitigation feature located south of the PSRP near the Port of the Islands (POI) Basin. This feature has been negotiated through informal Endangered Species Act (ESA) consultation with the U.S. Fish and Wildlife Service (USFWS) to mitigate for potential adverse effects due to PSRP project implementation on the existing thermal refugium in the POI Basin.

## 1.1 STUDY AUTHORITY

The 2004 PSRP Final PIR/EIS was completed in September 2004 as part of the Comprehensive Everglades Restoration Plan (CERP) under the authority of Section 601(d) of the WRDA 2000, which states:

(d) AUTHORIZATION OF FUTURE PROJECTS –

(1) IN GENERAL–Except for a project authorized by subsection (b) or (c), any project included in the Plan shall require a specific authorization by Congress.

(2) SUBMISSION OF REPORT–Before seeking congressional authorization for a project under paragraph (1), the Secretary shall submit to Congress –

(A) a description of the project; and

(B) a project implementation report for the project prepared in accordance with subsections (f) and (h).

The 2004 PSRP Final PIR/EIS was approved by the Office of the Chief of Engineers on September 15, 2005. The project was authorized for construction by Section 1001(15) of WRDA 2007. The 2004 PSRP Final PIR/EIS presents the results and recommendations of investigations into restoration of natural water flow across 85 square miles of western Collier County that were drained for an extensive residential development.

The potential need for a manatee mitigation feature was identified in the 2004 PSRP Final PIR/EIS (Sections 9.6.8 and 11.2). At that time, it was unclear as to whether the PRSP would adversely affect the thermal refugium utilized by manatees within the POI Basin and it was recognized that additional information was needed to make this determination. Subsequent investigations conducted by the U.S. Geological Survey (USGS), funded by the Corps and South Florida Water Management District (SFWMD), determined that a feature was required to ensure the continuance of the POI Basin as a manatee thermal refugium, thereby avoiding adverse impacts to manatees as a result of PSRP implementation. Incidental take of marine mammals, in this case, manatees, is prohibited under the Marine Mammal Protection Act (MMPA) of 1972.

## 1.2 PURPOSE AND NEED

The project components portrayed in the 2004 PSRP Final PIR/EIS were conceptual and required significant refinement during detailed project design. Detailed modeling information obtained through design phase investigations provided more accurate details and highlighted the need to replace the individual berms for the Merritt, Faka Union and Miller Pump Stations with a single full width tieback levee. The changes to the pump stations were made according to the SFWMD *Major Pump Station Engineering Guidelines.* These components represent a design refinement to ensure continued flood protection level of service and were authorized under the original PSRP authority cited in Section 1.1 above. The manatee mitigation feature is required to ensure continued compliance with the MMPA and ESA. This EA describes the need for, and evaluates potential environmental effects of the tieback levees and proposed manatee mitigation feature.

As stated in the 2000 CERP, the SGGE restoration, now known as the PSRP, is "to restore and enhance the wetlands in Golden Gate Estates and in adjacent public lands by reducing over-drainage. Implementation of the restoration plan would also improve the water quality of coastal estuaries by moderating the large salinity fluctuations caused by freshwater point discharge of the Faka Union Canal. The plan would also aid in protecting the City of Naples' eastern Golden Gate well field by improving groundwater recharge." Refer to Section 1 of the 2004 PSRP Final PIR/EIS for more information on the purpose and need of the PSRP.

### 1.2.1 TIEBACK LEVEE

The 2004 PSRP Final PIR/EIS included a berm and spreader canal for each of the three pump stations, Merritt, Faka Union and Miller, to ensure movement of water southward to restore previously drained wetlands. Further hydraulic and hydrologic analyses determined that the individual berms were not sufficient to prevent recirculation of water to the north side of the pump station and an engineered levee spanning the width of the restored project area would be required (Figure 1-2). This longer tieback levee is necessary to prevent recirculation of water and ensures the restorative water is transferred south into the project area to realize the benefits envisioned in the 2004 PSRP Final

PIR/EIS. The tieback levee falls within the original project footprint, but was not part of the original design. The tieback levee runs generally east to west directly south of the pump stations. The single, redesigned tieback levee will be approximately 54,000 feet long across the width of the PSRP. The tieback levee design consists of approximately 231,000 cubic yards of excavation, 386,000 cubic yards of fill, and 1,000 acres of clearing.

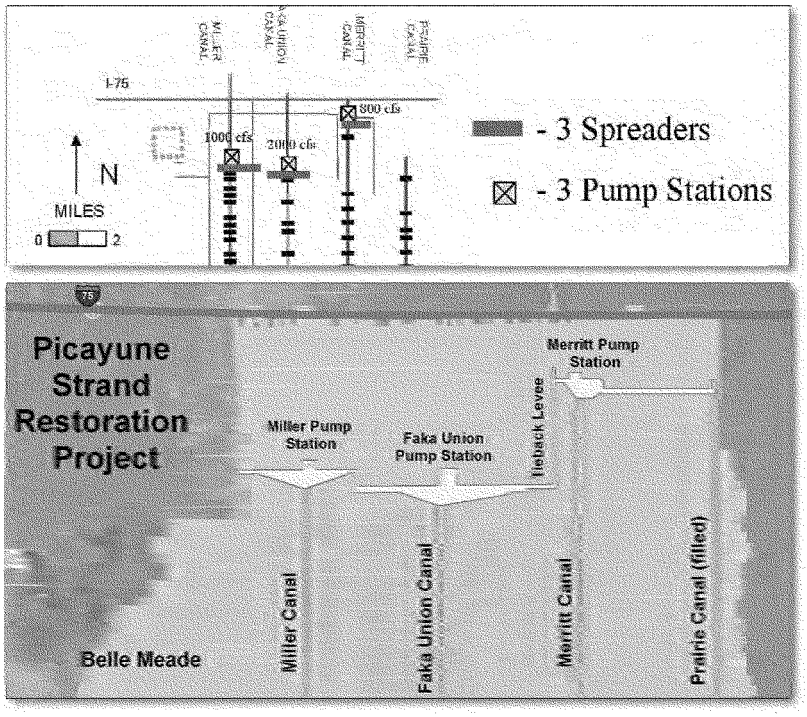



**Figure 1-2. Alternative 3D as shown in 2004 PSRP Final PIR/EIS (Top) versus Preferred Alternative (Bottom)**

### 1.2.2 MANATEE MITIGATION FEATURE

Approximately 300 manatees from the Southwest Florida manatee population currently use the POI Basin as a warm water refugium during the colder months of the year. The passive thermal refuge or "refugium" appears to be maintained by freshwater discharged from the canal system in the PSRP site that routes water through the Faka-Union Canal and over Faka Union Weir Number 1 located immediately north of US-41 (Tamiami Trail) and the POI Basin (Figure 1-1, Figure 1-3). The anticipated reduction in flow from the PSRP to the POI Basin resulting from plugging of project canals raised concern for the continued viability of the refugium under restored conditions and the potential for increased winter manatee mortality (U.S. Geological Survey, 2008). The 2004 PSRP

Final PIR/EIS acknowledged that an additional source of water, most likely groundwater, may be needed in the POI Basin to maintain the existing refugium (Section 9.6.8 and 11.12 of 2004 PSRP Final PIR/EIS).

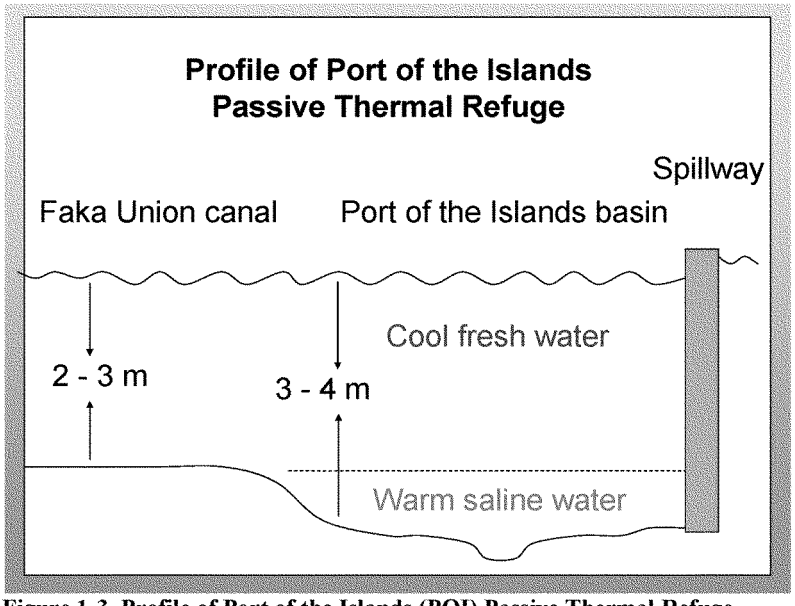



**Figure 1-3. Profile of Port of the Islands (POI) Passive Thermal Refuge**

The PSRP was authorized for construction in the WRDA 2007. Prior to construction authorization, informal consultation with the USFWS for West Indian manatee under the ESA was determined to be incomplete based on insufficient information for a manatee effects' determination. The 2009 USFWS Biological Opinion (BO) determination that the project "may affect, but was not likely to adversely affect" the manatee was contingent upon the results of detailed studies by the USGS of manatee use of the POI Basin. Subsequent analysis of best available data (Stith et al. 2011) indicated that a reduction of freshwater flow to the refugium resulting from the PSRP construction and operation may result in additional manatee stress, injury or mortality during the cold, dry season when manatees are dependent on the refugium for shelter. Based on the information provided by these studies, it was determined that the PSRP had the potential to negatively affect the existing manatee refugium at the POI Basin during the cooler winter months as a result of freshwater flow reduction to the POI Basin due to backfilling of canals within the project.

Manatees are protected under the MMPA of 1972 which prohibits "take" of marine mammals in U.S. waters. Under the MMPA "take" is defined as "*harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill.*" Manatees are also listed under the

ESA of 1973 as endangered. Under the ESA, "take" is "*to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.*" Based on the best available scientific information, the PSRP may have an adverse effect on the manatee refugium at POI Basin; therefore, the USFWS has determined that a manatee mitigation feature must be implemented to ensure continued existence of the POI Basin refugium to protect (avoid take) manatees to comply with both the MMPA and the ESA.

An interagency team with representatives from the Corps, SFWMD, USFWS, USGS, Florida Fish and Wildlife Commission (FWC), and the Florida Department of Environmental Protection (FDEP) met regularly between February 2011 and August 2014 to formulate alternatives to maintain the function of the refugium. This EA will evaluate potential environmental effects of each proposed manatee mitigation feature alternative.

The preferred alternative consists of creating a deep water oxbow in an existing spoil berm located within the POI Basin with two connections to the Faka Union Canal. Approximately 110,000 cubic yards of material would be excavated and be placed on the Faka Union Canal spoil berm both north and south of the construction feature. The excavated material will be placed appropriately on the spoil berm to prevent erosion into the adjacent canal and mangrove ecotone. Approximately eight acres of upland and two acres of wetlands would be cleared for the construction of the manatee mitigation feature.

## 1.3 LOCATION

Development of the PSRP area, previously known as SGGE, began in the early 1960's within Collier County in Southwest Florida. Private interests planned to develop a 173 square mile (111,000 acre) residential subdivision. Today this development is split into two entities by Interstate 75. Northern Golden Gate Estates (NGGE) remains a residential subdivision; SGGE had very limited development and was acquired by the State of Florida (FDEP) from private owners for restoration. The SGGE area is now known as the Picayune Strand State Forest.

The PSRP consists of approximately 94 square miles located between Interstate 75 and US Highway 41. It is situated southwest of the Florida Panther National Wildlife Refuge, north of Ten Thousand Island National Wildlife Refuge and Collier-Seminole State Park, east of the Belle Meade Conservation and Recreation Lands Project Area, and west of the Fakahatchee Strand State Preserve.

The manatee mitigation feature is on lands managed by Rookery Bay National Estuarine Research Reserve, and located just south of US-41 (Tamiami Trail), adjacent to the Faka Union Canal and the POI Basin (Figure 1-1).

## 1.4 PROJECT HISTORY

A detailed project history can be found within Section 1 of the 2004 PSRP Final PIR/EIS and is incorporated into this document by reference. The PSRP was authorized for

construction in WRDA 2007. Under the Acceler8 initiative, the SFWMD started design and construction in 2003. The upper two miles of the Prairie Canal were plugged in early 2004 and the lower five miles plugged in 2006-2007. The Corps took over the construction of the remaining project phases after the completion of Prairie Canal.

The Merritt Pump Station construction contract was awarded in October 2009 with construction beginning in December 2009. This phase includes the Merritt Pump Station, tieback levee, spreader canal, road removal, and Merritt Canal plugging. The construction on the Merritt Pump Station was completed in September 2014 with Merritt canal plugging scheduled to commence in November 2014.

The Faka Union Pump Station construction contract was awarded in November 2010 with construction starting in January 2011. The Faka Union construction phase includes the Faka Union Pump Station, tieback levee, spreader canal, and road removal. The Faka Union construction contract is scheduled to be completed in April 2015. Canal plugging will occur after the manatee mitigation features are in place.

The Miller Pump Station construction contract was awarded in September 2013. The project is currently scheduled for completion in 2017. Hydrological analyses have shown flood protection features would be needed before the Faka Union and Miller Canals could be plugged. Therefore, the Faka Union and Miller Canals will not be plugged until the completion of the western (6L's agricultural area) flood protection feature in order to maintain current levels of flood protection for adjacent lands when the project is complete. The Faka Union Canal is the largest canal within the project area and thereby conveys the largest amount of freshwater to the POI Basin. Since the majority of flows into the POI Basin are from the Faka Union Canal, the manatee mitigation feature must be complete before this canal can be plugged. Implementation of the western protection feature and the manatee mitigation feature are contingent upon approval of an increased project cost which is currently being sought through a Limited Reevaluation Report (LRR) to Congress.

## 1.5 PRIOR REPORTS AND ENVIRONMENTAL DOCUMENTS

A number of studies related to the Golden Gate Estates development and canal network, have been conducted over the past 30 years. These studies have been reviewed and were referenced for hydrological, biological, and ecological information related to the study area and the progression of this project. All of these studies assumed some limited development in SGGE. Brief summaries of these studies can be found in Section 1.5 of the 2004 PSRP Final PIR/EIS. The pertinent Corps studies are listed below:

- 1978 Authorization of Golden Gate Estates Feasibility Study by Congress, House Document No. 39, 90th Congress
- 1980 U.S. Army Corps of Engineers, Golden Gate Estates Reconnaissance Report
- 1986 U.S. Army Corps of Engineers, Golden Gate Estates Feasibility Report
- 1999 Central and Southern Florida Project Comprehensive Review Study Integrated Feasibility Report and Programmatic Environmental Impact Statement, Comprehensive Everglades Restoration Plan

- 2004 Picayune Strand Restoration Project Final Project Implementation Report and Environmental Impact Statement
- 2013 Limited Reevaluation Report and Environmental Assessment prepared in May 2013

## 1.6 DECISION TO BE MADE

This EA, meeting the requirements of the National Environmental Policy Act, describes the evaluation of alternatives for the tieback levees, which are considered design refinement to the PSRP. The tieback levees are required to prevent recycling of outfall from the pump stations. In order to determine the most appropriate and efficient design of the tieback levee, alternatives were evaluated during the design phase to determine their effectiveness.

The EA will also describe the need and conceptual design for a manatee mitigation feature south of the PSRP near the POI Basin. This feature is required to prevent adverse effects on the West Indian manatee thermal refugium in the POI Basin.

## 1.7 PERMITS, LICENSES, AND ENTITLEMENT

This section identifies some of the environmental, regulatory, construction (including blasting), and operational authorizations required for the PSRP flood protection levees, canal backfill, pump station, and road removal features. A list of currently obtained project permits is below. The SFWMD or construction contractor is ultimately responsible for identifying any and all applicable permits and for obtaining those that have not already been obtained by the Corps.

### 1.7.1 COMPREHENSIVE EVERGLADES RESTORATION PLAN REGULATION ACT (CERPRA) PERMIT FOR WATER QUALITY CERTIFICATION AND COASTAL ZONE CONSISTENCY CONCURRENCE

The construction, operation, modification or maintenance of the PSRP features requires water quality certification pursuant to 33 U.S.C. Section 1341 as well as a determination that the project is consistent to the maximum extent practicable with the Florida Coastal Zone Management Plan under 16 U.S.C. Section 1456. A Comprehensive Everglades Restoration Plan Regulation Act (CERPRA) permit pursuant to Chapter 373.1502 of the Florida Statues serves those purposes. This is a five year permit issued by the FDEP which requires that the project discharges do not pose a danger to public health, safety or welfare and provides assurances of the avoidance, minimization and mitigation of any impacts to the wetlands or endangered species realized as a result of both construction and/or operational activity. As part of the CERPRA permit application process, the design of the PSRP features are reviewed for compliance with stormwater management regulations that address flood control and water quality. These regulations are included in Part IV, Chapter 373, Florida Statutes and the program implementing the Stormwater Rule, Chapter 62-25, Florida Administrative Code. For the remaining PSRP features that the Corps will be responsible for constructing, the Corps will obtain the construction CERPRA permits and the SFWMD (project sponsor) will be responsible for obtaining the

long-term operational CERPRA permits for each phase of the project. On features where the SFWMD is doing construction activity, a Section 404, Department of the Army permit is also required to be obtained by the SFWMD. To date, a CERPRA permit has been obtained for the tieback levees, spreader canals, canal plugs and road removal features. The Corps or the SFWMD must obtain a CERPRA permit (permit number 0288313-008) from the FDEP for compliance with Section 401 of the Clean Water Act for the manatee mitigation features as well as any future planned phases.

Jurisdictional delineation of wetlands in accordance with state criteria must be performed on the areas required for construction of all PSRP features. Delineation is needed to identify areas where site specific impact could occur and establish appropriate protective construction best management practices. Due to the project size and anticipated acreage of wetlands to be restored, it is anticipated that wetland impact for construction of this project will be determined to be "self mitigating" as has been the case for the Merritt, Faka Union, and Miller project phases.

### 1.7.2 AIR PERMIT (EMISSIONS PERMIT)

The contractor(s) are responsible for obtaining the necessary permit(s) prior to construction and/or operations and pay any fees required as part of the permit process. The contractor shall become familiar with the FDEP requirements and determine which are applicable. The contractor shall submit the necessary Permit Notification Form to the FDEP according to Rule 62-210.300, Florida Administrative Code. Clean Air Act permits will be acquired for the Miller and Faka Union construction phases.

### 1.7.3 PERMIT FOR DISCHARGE OF WATER

Construction site operators and owners have a legal responsibility to comply with the Section 202 (p) of the Clean Water Act and to keep sediment and other pollutants from leaving the construction site. These materials must be kept out of onsite preserve areas and storm sewer system components. Therefore, construction of the PSRP features may require a National Pollutant Discharge Elimination System (NPDES) Generic Permit for Stormwater Discharge in accordance with Rule 62-621.300(4), Florida Administrative Code administered by FDEP.

# 2.0 ALTERNATIVES

## 2.1 MANATEE MITIGATION FEATURE

### 2.1.1 DESCRIPTION OF ALTERNATIVES

One goal of the PSRP is to reduce the point discharge from the Faka Union Canal at the POI Basin; however, by doing this, the manatee refugium at POI Basin may be threatened. An interagency team of managers and biologists, meeting regularly between February 2011 and August 2014, formulated 27 initial alternatives to consider which could potentially mitigate for impacts to the manatee refugium at the POI Basin. The initial array of alternatives is shown in Table 2-1. These alternatives evaluated different methods to mitigate for the loss of freshwater input in the POI Basin, including supplementing freshwater flows, connections with warm saline groundwater, and improving other natural refugium within the Ten Thousand Islands region. Meeting minutes, documenting discussions and decisions at the interagency meetings are included as Appendix F.

**Table 2-1. Initial Array of Alternatives**

| Alternative | Description | Screening/Reason for Screening |
|---|---|---|
| 1 | Groundwater well at POI marina site | Loss of PSRP wetland rehydration benefits if groundwater well is freshwater |
| 2 | Groundwater well north of POI site | Loss of freshwater for PSRP wetland rehydration |
| 3 | Pipe fresh water from canal north of pump station | Would require approximately 10 miles of pipelines from the pump stations to POI Marina Basin. Loss of PSRP wetland rehydration benefits |
| 4 | Construct watershed detention/retention basin (either inside PSRP project within Faka Union canal and above pumps or on previously identified parcel in SWFCWP) | Loss of freshwater for PSRP wetland rehydration, therefore eliminated from further consideration. Freshwater would be stored in a detention basin. |
| 5 | Use existing Hardy borrow pits for detention/retention basin | Loss of PSRP wetland rehydration benefits, therefore eliminated from further consideration. |
| 6 | Excavate existing canal basin above Faka Union-1 weir (at U.S. 41) to greater depth | Deepening the basin alone would not maintain the refugium in the POI Basin; freshwater would also be |

| Alternative | Description | Screening/Reason for Screening |
|---|---|---|
| | | needed to maintain halocline, therefore, eliminated from further consideration. |
| 7 | Leave east-west "T" canal open (eliminate backfill) | Loss of PSRP wetland rehydration benefits, therefore eliminated from further consideration. |
| 8 | Excavate one or more POI Basins to deeper depth | Enhances manatee habitat |
| 9 | Excavate deeper holes in existing POI Basin | Deeper areas alone may not provide adequate refugia for manatees |
| 9a | Excavate deeper holes in southeast POI Basin with restriction that would allow manatees to enter. Would still require freshwater flow. Creating smaller basin would require less flow. Pipe in Canal starting at weir | Deeper areas alone may not provide adequate refugia for manatees and preliminary modeling indicates that large amounts of freshwater would still be needed. |
| 10a | Deepen existing basin northwest of POI marina site - pipe from Faka Union Canal under us-41 to pit, may require small pump | Concerns with conveying water under US-41 and high implementation cost. |
| 10b | Deepen existing basin northwest of POI marina site - canal from Faka Union Canal to existing culvert and canal back to pit on south side of US-41 | Concerns with conveying water under US-41 and high implementation cost. |
| 11 | Excavate channel of old Faka Union River to the east of Faka Union Canal | Loss of PSRP wetland rehydration benefits, therefore, eliminated from further consideration. |
| 12 | Enlarge existing refugium in Everglades National Park or other locations | Manatees unlikely to move to other refugiums, therefore, eliminated from further consideration. |
| 13 | Artificial heaters in POI Basin | Unlikely to work therefore, eliminated from further consideration. |
| 14 | Solar Heating of POI Basin | Unlikely to work therefore, eliminated from further consideration. |
| 15 | Manatees move to smaller natural refugium in project area after restoration during cold, dry season | Manatees unlikely to move to other refugiums therefore, eliminated from |

| Alternative | Description | Screening/Reason for Screening |
|---|---|---|
| | | further consideration.. |
| 16 | Increases in post-project groundwater will be sufficient to produce enough fresh water in basin to maintain refugium | Unlikely to work therefore, eliminated from further consideration. |
| 17 | Along the remaining open section of Faka Union Canal, construct berms with control structures (gates). Open gates as needed to allow surface flow to enter Faka Union Canal to supplement winter, dry season flows at Faka Union Weir Number 1 | Included in alternatives. Minimal loss of PSRP wetland rehydration benefits if gates were closed. May also provide needed freshwater to manatees by opening gates during cold dry events. |
| 18 | Modify the plugs in Faka Union Canal by constructing weirs and gates control structures to allow for direct canal conveyance from Faka Union Pump Station to Faka Union Weir Number 1 | Included in alternatives. Minimal loss of PSRP wetland rehydration benefits if gates were closed. May also provide needed freshwater to manatees by opening gates during cold dry events. |
| 19 | Stormwater/Aquifer Storage and Recovery Well | Included in alternatives. No loss of PSRP wetland rehydration benefits and positive impact to manatees. |
| 20 | Move Faka Union Number 1 Weir North of crescent pond and create restriction at US-41 bridge to allow manatees to enter. Would still require freshwater flow. Creating smaller basin would require less flow. | Preliminary modeling indicated large amounts of freshwater would be needed to maintain refugium. |
| 21 | Replace existing FU-1 weir as operable weir and add 1.5 feet to increase storage capacity in canal. SFWMD will operate for flood protection. Gate designed to produce refugium and not impact water. | If extra capacity was released there would be no back up for the next event. |
| 22 | Deepen borrow pit in TTINWR enough so do not have to rely on freshwater flows (currently 4-5 feet deep), connect to POI marina (similar to 10 above) | Would cause loss of mangrove to create entrance canal from POI Basin. |
| 23 | Create a groundwater connection within the POI Marina Basin through excavation (southeast corner) | Area is in private ownership |
| 24 | Improve access (removal of shoal) to Big | Would not support the |

| Alternative | Description | Screening/Reason for Screening |
|---|---|---|
| | Cypress, location off of Rookery Bay (Henderson Creek), and continue with PSRP. Evaluate existing refugia | refugium in the POI Basin. |
| 25 | Create hole in southeast basin, improve access at Big Cypress and Henderson Creek. Combination of Alternatives 23 and 24 | High cost for implementation of both alternatives and southeast corner of POI Basin is in private ownership. |
| 26 | In addition to #21 - Pump water over the new operable Faka Union Weir when water no longer flows over the weir | Reduce freshwater available for hydrologic restoration and additional cost of pumping |
| 27 | Deep oxbow (20 feet) in western spoil berm along the Faka Union Canal just south of the POI Marina | Included in final array of alternatives with 3 options. These options are not dependent on freshwater flow into the POI Basin and therefore would not reduce available freshwater for hydrologic restoration within |

Alternatives were added and refined throughout the plan formulation process to ensure all alternatives were fully considered. The interagency team evaluated alternatives based on feasibility and potential impacts to PSRP restoration benefits. During the formulation efforts, the interagency team determined which alternatives to carry forward to design considering the likelihood the alternative would be successful. The final array of alternatives is shown in Table 2-2.

**Table 2-2. Final array of alternatives for manatee mitigation feature**

| Alternative | Description |
|---|---|
| No Action | Freshwater flows into the POI Basin will be significantly reduced, jeopardizing the thermal refugium in the POI Basin. |
| 27 – Option 1 | Deep oxbow (20 feet) in western spoil berm along the Faka Union Canal just south of the POI Marina (all upland) with connection to existing oxbows (Figure 2-1) |
| 27 – Option 2 | Deep oxbow (20 feet) in western spoil berm along the Faka Union Canal just south of the POI Marina (mostly upland, small mangrove loss) (Figure 2-2) |

| | |
|---|---|
| 27 – Option 3 | Deep oxbow (20 feet) in western spoil berm along the Faka Union Canal just south of the POI Marina (Larger footprint within mangroves) (Figure 2-3) |

### 2.1.2 INITIAL ALTERNATIVES ELIMINATED FROM DETAILED EVALUATION

Many of the initial alternatives were screened out early in the plan formulation process because they were unlikely to be effective (Table 2-1) due to the reasons outlined below. The remaining alternatives focused on maintaining the thermal refugium at the POI Basin while not reducing the PSRP restoration benefits through the loss of freshwater for restoration.

- Alternatives 1, 2, and 3 were eliminated from the final array due to the high cost of implementation and the loss of the PSRP benefits as a result of the loss of water that would have contributed to restored sheetflow.
- Alternative 9 consisted of excavating deeper holes in the southeast corner of the POI Basin and adding a freshwater discharge point. This alternative was eliminated based on a number of logistical issues regarding the addition of freshwater flows in the southeast corner and the estimated high cost of implementation. Water would need to be brought to the basin via pipe from the Faka Union Weir Number 1.
- Alternatives 10a and 10b, which utilized a borrow pit west of the POI Basin, were eliminated based on concerns regarding the conveyance of flows under US-41 from the Faka Union Canal and the need to create a new canal to connect with the POI Basin. Alternatives 10a and 10b also had a higher estimated cost of implementation.
- Alternatives 17 and 18 were also eliminated from the final array due to loss of PSRP restoration benefits. In addition, these two alternatives did not eliminate the point discharge in the POI Basin from the Faka Union Canal.
- Alternative 19 was eliminated from the final array because of the low feasibility associated with a stormwater/aquifer storage recovery well. For Alternative 19 to be effective, it is very likely that a large reservoir would be needed to ensure adequate storage.
- Alternative 20 consisted on relocating the Faka Union Weir Number 1 north in the Faka Union Canal and possibly deepening the area to recreate the thermal refugium in a smaller area. Preliminary analysis indicated that this method would not be effective considering the reduced flow anticipated over the Faka Union Weir.
- Alternative 21 and 26 were eliminated because they would reduce the PSRP restoration benefits and would not be guaranteed to provide freshwater when needed to maintain the refugium.
- Alternative 22 which included a groundwater connection was eliminated since it would cause a loss of mangrove habitat through the creation of a channel into the

Ten Thousand Islands National Wildlife Refuge and may also increase saltwater intrusion in the area.

- Alternative 23 and 23a, also based on a groundwater connection, were eliminated because acquisition of private property would be required.
- Alternative 24, improving other refugia in the southwest Florida, was eliminated because manatees may still seek refuge in the POI Basin and therefore, could be negatively impacted. Alternative 25, which was a combination of Alternatives 23 and 24, was eliminated due to the high cost to implement both alternatives.

The No Action Alternative and Alternative 27, Options 1, 2, and 3 were carried forward for more detailed consideration. Figure 2-1, Figure 2-2, and Figure 2-3 below depict schematics of the final array of alternatives. Each alternative consists of creation of an oxbow with two connections to the Faka Union Canal. The different colors on the figures represent increasing depth, with red being approximately 20 feet in depth.

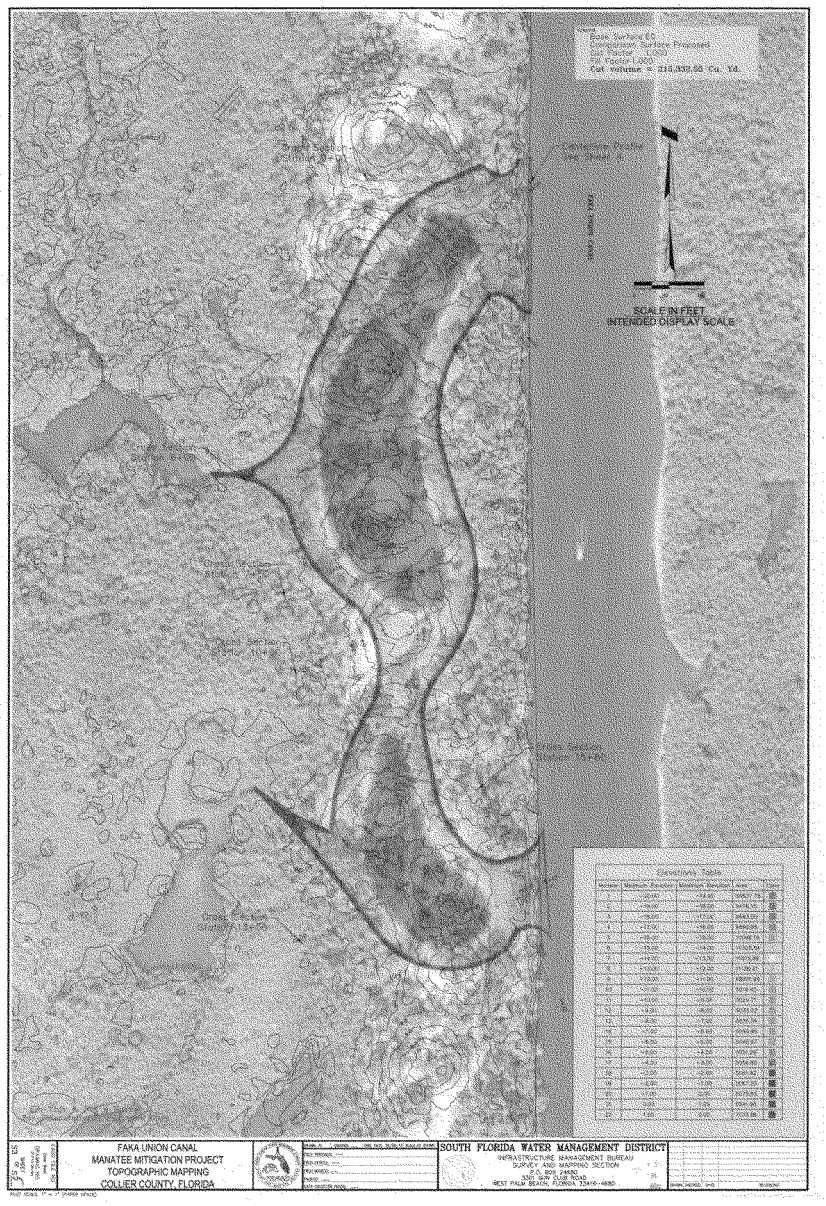



**Figure 2-1: Alternative 27 Option 1, Placement of Manatee Mitigation Feature on Upland Spoil Berm with Connection to Natural Oxbows**

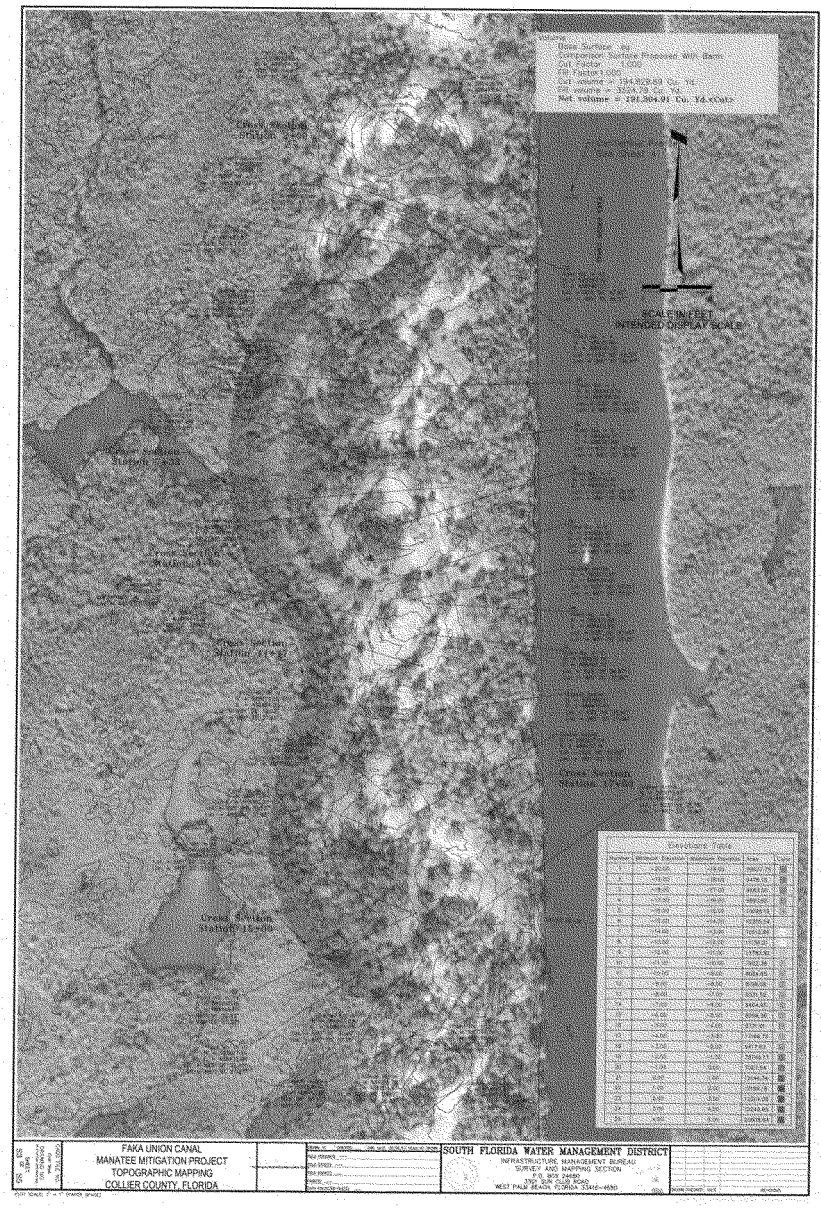



**Figure 2-2: Alternative 27 Option 2, Placement of Manatee Mitigation Feature on Upland Spoil Berm with Small Mangrove Loss (approximately 2 acres)**

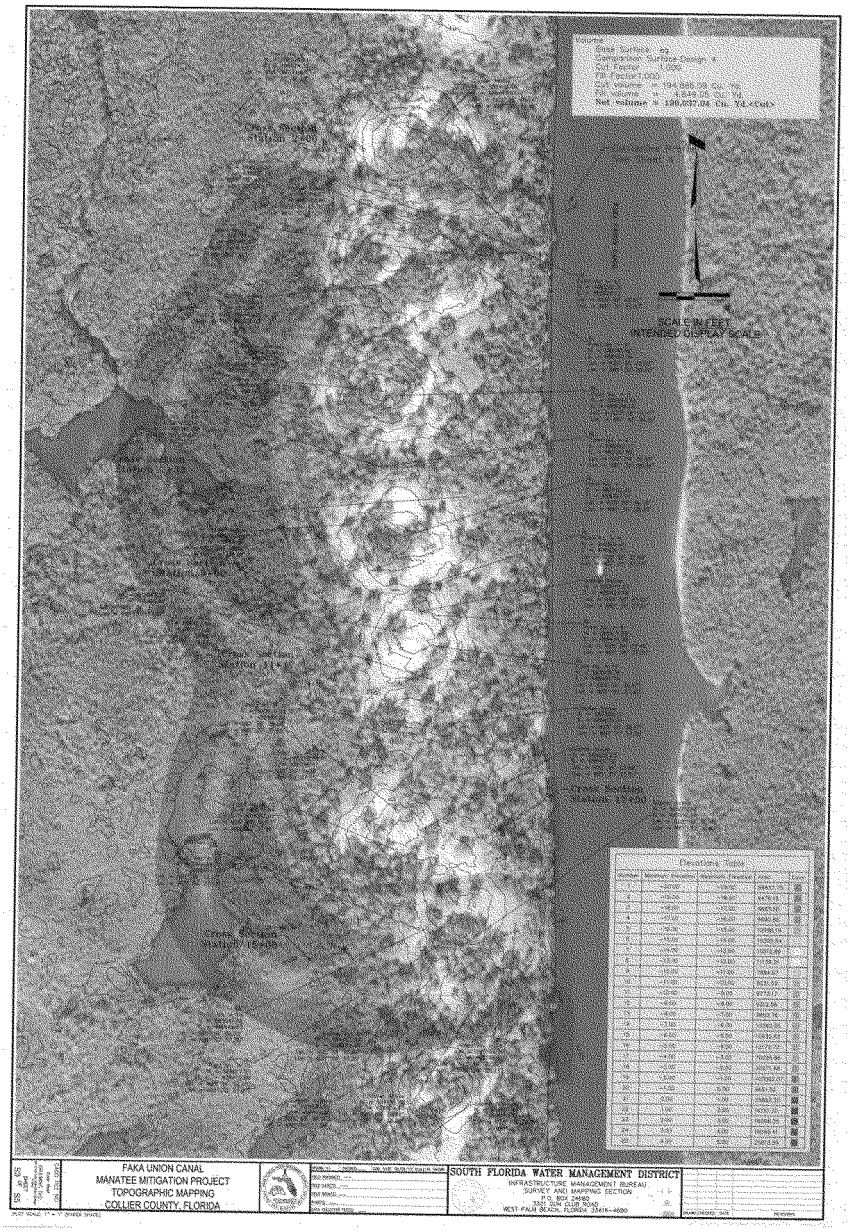



**Figure 2-3: Placement of Manatee Mitigation Feature west of Spoil Berm within Wetland Mangrove Habitat**

### 2.1.3 ISSUES AND BASIS FOR CHOICE

The alternatives were evaluated based on their ability to maintain a thermal refugium in the POI Basin as well as their ability to reduce impacts to mangrove habitat and reduce the amount of material for disposal. It was understood through coordination and alternative formulation with the interagency team that blasting would be required for the refugium construction.

### 2.1.4 PREFERRED ALTERNATIVE

Based on the analysis provided in this EA, the potential issues identified, and the ability to maintain the refugium in the POI Basin, Alternative 27, Option 2 is recommended for implementation. Alternative 27, Option 2 is preferred because it is not reliant upon the availability of freshwater to maintain the refugium in the POI Basin. The new refugium will be fed by warm saline groundwater. Of the alternatives evaluated, Alternative 27, Option 2 reduces the amount of material to be excavated and has minimal impact on surrounding mangroves and uplands. Alternative 27, Option 2 would require disposal of 191,000 cubic yards of spoil material that would be placed within the limits of the current Faka Union Canal spoil berm up to 14 feet NGVD in height. Alternative 27, Option 1 would require a greater amount of material disposal and disturb a greater area of upland habitat. Alternative 27, Option 3 would cause a greater loss of wetland mangrove habitat. Alternative 27, Option 2 is the best balance between effects to the upland and wetland mangrove habitat. Discussion of effects related to implementation of Alternative 27, Option 2 is included in Section 1.0. The footprint of the preferred manatee mitigation feature alternative is shown in Figure 2-4. The summary of environmental effects for the preferred alternative is shown in Table 2-3. The estimated cost for implementing the preferred alternative is approximately $11 million.

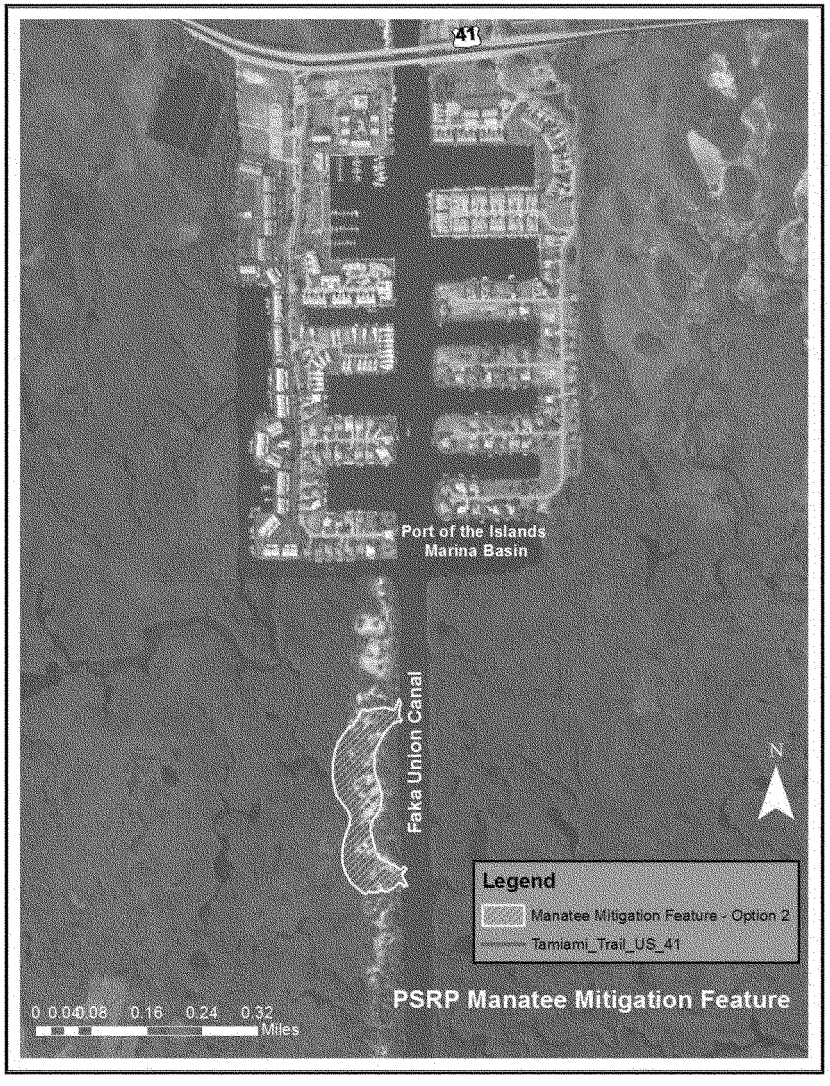



**Figure 2-4. Manatee Mitigation Preferred Alternative, Alternative 27 Option 2, Footprint**

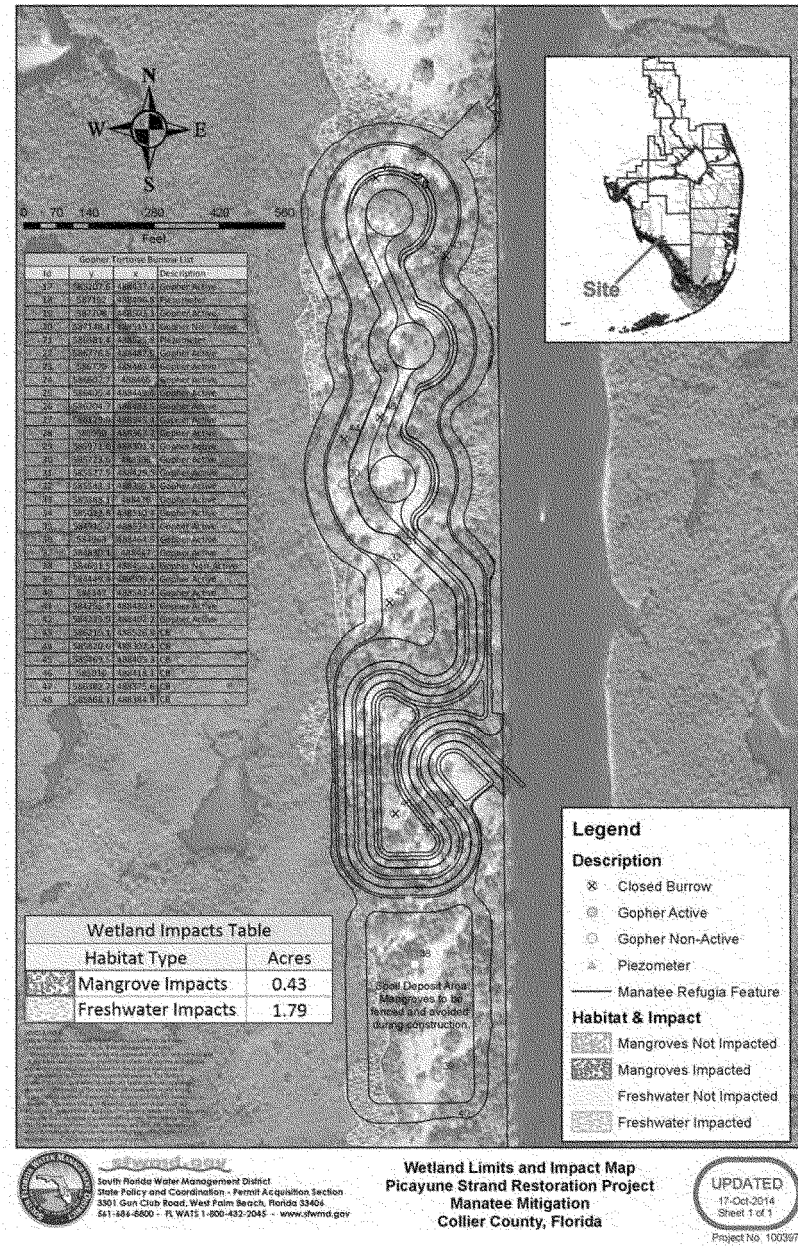



**Figure 2-5. Alternative 27 Option 2 Draft Schematic of Oxbow Manatee Refugium**

**Table 2-3. Summary of Environmental Effects for Manatee Mitigation Feature**

| Resource | No Action Alternative | Alternative 27 – Option 2 |
|---|---|---|
| Hydrology | No effect. | No effect. |
| Vegetation | No effect. | Approximately eight (8) acres of the Faka Union Canal spoil berm, consisting of upland pine flatwood habitat would be impacted. Additionally, two (2) acres of wetland mangrove habitat could potentially be impacted. |
| Wetlands | No effect. | Potential loss of two (2) acres of wetland mangrove on the west side of the Faka Union Canal spoil berm. |
| Fish and Wildlife Resources | No effect. | Potential impacts to Gopher totoises will require relocation efforts. |
| Threatened and Endangered Species | Negative effect to temperature inverted halocline in the POI Basin utilized by manatees during cold season. | Maintains thermal refugium for manatees in the POI Basin. A "may affect, but not likely to adversely affect" determination has been reached for the manatee and a "no effect" determination for the smalltooth sawfish and designated critical habitat . |
| Essential Fish Habitat | No effect. | Potential loss of two (2) acres of essential fish habitat on the west side of the Faka Union Canal spoil berm. |
| Socioeconomic | Possible impact to local manatee sightseeing companies. | Possible impact to local manatee sightseeing companies. |
| Aesthetics | No effect. | Disposal will be placed on the Faka Union Canal spoil berm, increasing the height up to 14 feet. |
| Recreation | Potential negative impact from the loss of manatee sightseeing opportunities. | Slight potential for reduction in recreational opportunities since the new refugium will be located south of POI in an oxbow restricting boat access to the new refugium. |

| | | |
|---|---|---|
| Water Quality | No effect. | May be slight effect during construction if dredging is required. |
| Hazardous, Toxic, and Radioactive Waste | No effect. | No effect. |
| Air Quality | No effect. | No effect. |
| Noise | No effect. | May be slight effect during construction. |
| Historic Properties | No effect. | When the Faka Union Canal was created, the spoil was placed over several small hammocks that have the potential to have cultural resources sites. |
| Native Americans | No effect. | When the Faka Union Canal was created, the spoil was placed over several small hammocks that have the potential to have native American artifacts. |

### 2.1.5 FINAL ALTERNATIVES ELIMINATED FROM DETAILED EVALUATION

- Alternative 27, Option 3 – This option was eliminated from detailed evaluation because it would cause a significant loss of mangrove wetland habitat adjacent to the Faka Union Spoil Berm. This habitat is considered Essential Fish Habitat (EFH) for a number of migratory fish species.
- Alternative 27, Option 1 – This option was eliminated from detailed evaluation because of the significant cost of excavating and disposing of additional upland material (approximately 216,000 cubic yards). The additional upland material to be disposed is a result of placement of the feature in the footprint of the current spoil berm.

### 2.1.6 MONITORING PLAN

A Supplemental Biological Assessment (BA) including the impacts of the PSRP on the West Indian manatee and impacts of the manatee mitigation feature on threatened and endangered species is included in this report as Appendix E. As discussed in the BA, a monitoring plan has been developed to monitor the maintenance of a thermal refugium in the POI Basin. The current monitoring proposed by the Corps and SFWMD is included in Appendix D, Manatee Monitoring Plan.

## 2.2 TIEBACK LEVEE

### 2.2.1 DESCRIPTION OF ALTERNATIVES

Tieback levees are needed to prevent pumped waters from returning to the upstream side of the pump stations, causing water to be recycled through the pump stations. In order to determine the most appropriate and efficient design of the tieback levee, alternatives were evaluated to determine their effectiveness. The following alternatives were considered:

- Alternative 1 (No Action) - Three individual berms, one for each pump station as originally shown in the 2004 PSRP FinalPIR/EIS
- Alternative 2 – A single tieback levee would extend from just east of Merritt Pump Station to the west of the Miller Pump Station measuring approximately 10 miles.
- Alternative 3 – Multiple tieback levees would run parallel (north-south) along the banks of the Merritt, Faka Union, and Miller canals from the pump stations to Interstate 75.
- Alternative 4 – Pump stations would be placed just south of Interstate 75 preventing the need for tieback levees.

The tieback levee alternatives were screened using best professional judgment by the Corps and SFWMD staff.

### 2.2.2 ISSUES AND BASIS FOR CHOICE

The alternatives were evaluated based on their ability to prevent the return of pumped water to the upstream side of the pump stations, preventing the recycling of water and ensuring the rehydration of the downstream wetland areas to achieve hydrologic restoration.

### 2.2.3 PREFERRED ALTERNATIVE

Alternative 2 is the preferred alternative to prevent the return of pumped water to the upstream side of the pump stations. The placement of the pump stations further from Interstate 75 prevents flooding impacts to the Interstate 75 roadbed and residential areas north of Interstate 75. The proposed footprint includes construction of over half of the tieback levee on existing roads, therefore effects on upland and wetland habitat due to construction will be less with this alternative. The additional habitat affected by the tieback levee with this alternative would be approximately 53 acres.

As stated above, the tieback levee would extend from just east of Merritt Pump Station to the west of the Miller Pump Station measuring approximately ten miles. The tieback levee will have crest width of 14 feet, and an average height of six feet with one vertical and three horizontal side slopes for an average width of 50 feet. The summary of environmental effects of Alternative 2 is shown in Table 2-4. In the 2004 PSRP Final PIR/EIS, the cumulative cost estimate for the individual spreader berms was approximately $2 million. The estimated cost for implementing the preferred tieback levee design, Alternative 2, is approximately $9.5 million.

**Table 2-4. Summary of Environmental Effects for Addition of Tieback Levee**

| Resource | No Action Alternative | Alternative 2 |
|---|---|---|
| Hydrology | Recirculation of pumped water to the upstream side of the pump stations. | No significant impacts. Facilitates the conveyance of pumped water to the south, restoring sheetflow through the project area. |
| Vegetation | No effect. | Loss of approximately 53 acres of upland and wetland habitat within the footprint of the tieback levees. |
| Wetlands | No effect. | No significant impacts. Over half of tieback levees will be constructed in existing roadway. Impacts to existing wetlands will be minimized. |
| Fish and Wildlife Resources | No effect. | Loss of approximately 53 acres of upland and wetland habitat within the footprint of the tieback levees. |
| Threatened and Endangered Species | No effect. | The determinations reached in the 2009 BO are maintained in this EA; however, the Corps acknowledges that more information may be required to assess the impacts of the Miller tieback levee on red-cockaded woodpecker. |
| Essential Fish Habitat | No effect. | No effect. |
| Socioeconomic | Potential for pumped water to return to the upstream side of the pump station. This could potentially affect private lands west of the Miller Pump Station. | No effect. |
| Aesthetics | No effect. | Temporary effects during construction. |
| Recreation | No effect. | Temporary effects during construction. |
| Water Quality | No effect. | No effect. |
| Hazardous, Toxic, and Radioactive Waste | No effect. | No effect. |
| Air Quality | No effect. | Temporary effects during construction. |
| Noise | No effect. | Temporary effects during blasting and construction. |

| | | |
|---|---|---|
| Historic Properties | No effect. | No effect. |
| Native Americans | No effect. | No effect. |

### 2.2.4 ALTERNATIVES ELIMINATED FROM DETAILED EVALUATION

The layout of the tieback levees in Alternative 3 is less efficient as compared with the other alternatives as more levees would be required since both banks of the canal would require tieback levees. Approximately 48,000 feet of levee would be needed for this alternative. An additional east-west levee would be required just south of Interstate 75 to prevent flooding impacts to the Interstate 75 road bed and the residential area to the north of the interstate, adding approximately 34,000 additional feet of levees. Private lands on the western border would also require levees for flood mitigation purposes. The tieback levee design in Alternative 3 would increase the downstream conditions such that water upstream could stagnate until the pumps stop discharging, allowing for downstream flows to resume. Alternative 3 would also require additional property to be impacted north of Interstate 75, since this design would require water to be stored to increase pump efficiency. One goal of the original project formulation was to avoid the need to acquire land north of Interstate 75. For the reasons stated above, Alternative 3 was eliminated from further consideration.

Alternative 4 would eliminate the need to construct a tieback levee by moving the pump stations just south of Interstate 75. To prevent impacts to Interstate 75, a 34,000 foot levee would be needed to prevent flooding impacts to the roadbed. An additional levee around the western private lands would also be needed for flood mitigation. Relocating the pump stations adjacent to Interstate 75 would likely create adverse flooding impacts north of Interstate 75 at the 100 year flood level, requiring additional flood mitigation levees north of Interstate 75 or the acquisition of additional real estate. Alternative 4 may also require additional flood protection measures on the east side of PSRP, adjacent to Fakahatchee Strand. For the reasons stated above, Alternative 4 was eliminated from further consideration.

## 2.3 MONITORING PLAN

The tieback levee is within the original project area as outlined in the 2004 PSRP Final PIR/EIS. The monitoring of the tieback levee falls within the scope of the overall PSRP Environmental Monitoring Plan developed by a multi-agency team; therefore, the original monitoring plan will be implemented during the construction of the tieback levee.

# 3.0 CULTURAL RESOURCES

## 3.1 HISTORIC PROPERTIES

As part of the PSRP planning and pre-construction process, the Corps and the SFWMD have conducted a number of cultural resource surveys and site evaluations. These were designed to provide a sampling of the cultural resources that could potentially be affected by the PSRP. Some of these surveys were designed to address specific ground disturbing activities. Others were designed to provide a representative sample of the type and distribution of cultural resources located within the PSRP. A few prehistoric sites had been identified by Florida's Bureau of Archaeological Research CARL) Cultural Resource Management Program and other archeologists prior to the PSRP planning effort. These earlier investigations were limited to identification of sites, based on surface materials. The PSRP specific cultural resource investigations used a combination of surface reconnaissance, shovel testing, and formal archeological testing in identification and evaluation of the cultural resources. During construction (specifically road removal) additional historic properties have been identified. A list of cultural resources surveys and reports related to the project area are shown in Table 3-1. A full description of historic and cultural resources can be found in the 2004 PSRP Final PIR/EIS and is incorporated by reference.

There have been 16 cultural resource investigations in the Picayune Strand Restoration Project Area. These include incidental surveys conducted by the Florida Bureau of Archaeological Research, project specific surveys and site evaluations conducted under contract to the South Florida Water Management District and the Jacksonville Corps of Engineers as well as construction monitoring. These efforts also identified two three historic sites, a mid 20$^{th}$ century farm, a 1960's saw mill, and an extensive log tram system associated with the 1960's logging of the area. The construction monitoring also identified 12 archeological occurrences. These surveys represent a small portion of the project area. As such the 71 prehistoric archeological sites which have been recorded within the PSRP area of potential effects should be considered a representative sample. Most of the 71 prehistoric sites have been determined eligible for listing on the National Register of Historic Places (NRHP). Only a few of the prehistoric sites were determined not NRHP eligible, many, including most identified as a result of monitoring, have insufficient information for a determination of eligibility. All of the historic sites were determined not NRHP eligible.

A determination of no adverse effect has been made for the construction of the PSRP Pump Stations and Road removal. This determination includes the requirement for avoiding NRHP eligible or potentially monitoring of all ground disturbing activity as well as monitoring of ground disturbing activity. Unanticipated archeological discoveries made during construction will be addressed in accordance with 36 CFR Part 800.13.

The Project is designed to restore natural hydrology to the area, as such impounding of water is not anticipated. Based on this design a no adverse effect determination has been made for the PSRP operations as long as water levels in the monitoring wells established in 2003 and 2006 does not exceed the maximum water level prior to operation. If water levels exceed the pre-operation maximum any archeological sites potentially affected will

be examined for effects. If sites are being adversely affected by high water during operations then Section 106 consultation will be re started.

Section 106 consultation has not been completed for the proposed 6Ls levee. A cultural resource survey is planned for that component of the Project.

## 3.2 NATIVE AMERICANS

Native American resources in the project area have not changed significantly from the discussion in Section 3.15 of the 2004 PSRP Final PIR/EIS. Known cultural resource sites in the project area can be found in Table 3-1 below. Cultural resource investigations and consultations were conducted prior to the construction of each project phase. Cultural resources investigations and coordination have been completed for the Merritt and Faka Union phases; however, consultation for the construction of the 6L's protection levee and manatee mitigation feature has not been completed. Proper surveys and coordination will be completed prior to the construction of these features and further consultation with Native American tribes will be conducted.

The construction of the tieback levee will have no additional effect on Native American resources than what was discussed in the 2004 PSRP Final PIR/EIS. SFWMD will complete surveys for Native American resources within the footprint of the manatee mitigation feature and coordinate with the Corps and the SHPO prior to the start of construction activities. The Corps has consulted with Federally recognized Tribes and the SHPO on the Merritt and Faka Union construction, including the tieback levees. The Corps will be conducting specific consultation on the 6L's protection levee with final design.

**Table 3-1. PSRP Cultural Resource Reports**

| TITLE | DATE | AFFILIATION | PSRP Sites discussed | FMSF Number | SPONSOR |
|---|---|---|---|---|---|
| An Archaeological Inventory of the Golden Gate State Forest | 1994 | C.A.R.L. Archeological Survey | 8CR184, 8CR185, 8CR712, 8CR713, 8CR720, 8CR721, 8CR722, 8CR723, 8CR724, 8CR729, 8CR739, 8CR740, 8CR742 | 4013 | Florida Bureau of Archaeological Research |
| Picayune Strand State Forest CARL Survey 2003 | 2003 | C.A.R.L. Archeological Survey | 8CR809, 8CR853 | 8929 | Florida Bureau of Archaeological Research |
| A Phase I Cultural Resource Assessment Survey of Miccosukee Tribal Lands, Collier County, Florida | 2003 | Janus Research | 8CR852 | 8916 | Miccosukee Tribe of Indians of Florida |
| Archaeological Survey of High Probability Areas Along Prairie Canal, Southern Golden Gates Restoration Project, Collier County, Florida | 2003 | New South Associates, Inc. | | 9669 | South Florida Water Management District |
| Survey of Miccosukee Tribal Lands: Additional Excavations at Site 8CR852 | 2004 | Janus Research | 8CR852 | 9773 | Miccosukee Tribe of Indians of Florida |
| Cultural | 2005 | R. Christopher | 8CR184, 8CR185, | 12449 | US Army |

| TITLE | DATE | AFFILIATION | PSRP Sites discussed | FMSF Number | SPONSOR |
|---|---|---|---|---|---|
| Resources Investigation of the Picayune Strand Cultural Resources Survey Project Collier County, Florida | | Goodwin & Associates, Inc. | 8CR712, 8CR713, 8CR720, 8CR721, 8CR722, 8CR723, 8CR724, 8CR729, 8CR739, 8CR740, 8CR742, 8CR780, 8CR809, 8CR853, 8CR902, 8CR903, 8CR904, 8CR905 | | Corps of Engineers, Jacksonville District |
| Cultural resource Assessment Survey for the Picayune Strand Restoration Pump Stations Project, Collier County | 2005 | Janus Research | | 11949 | South Florida Water Management District |
| Cultural Resource Assessment Survey of the Hardy Tract Project Area Collier County | 2005 | Janus Research | | 12864 | South Florida Water Management District |
| Cultural Resources Survey, Picayune Strand Restoration Project, Collier County, Florida | 2006 | New South Associates, Inc. | 8CR183, 8CR185, 8CR556, 8CR557, 8CR712, 8CR713, 8CR721, 8CR722, 8CR723, 8CR729, 8CR742, 8CR809, 8CR824, 8CR825, 8CR826, 8CR852, 8CR853, 8CR907, 8CR908, 8CR909, 8CR910, 8CR911, 8CR912, 8CR913, | 12951 | US Army Corps of Engineers, Jacksonville District |

| TITLE | DATE | AFFILIATION | PSRP Sites discussed | FMSF Number | SPONSOR |
|---|---|---|---|---|---|
| | | | 8CR914, 8CR915, 8CR916, 8CR917, 8CR918, 8CR919, 8CR920, 8CR921, 8CR922, 8CR923, 8CR924 | | |
| Cultural Resource Assessment Survey of the Picayune Geotechnical Survey Project Area Collier County | 2006 | Janus Research | | 12950 | South Florida Water Management District |
| Cultural Resource Assessment Survey of Additional Parcels for the Picayune Strand Soil Remediation areas Project Collier County | 2006 | Janus Research | | 12985 | South Florida Water Management District |
| Phase II Cultural Resources Survey, Picayune Strand Restoration Project Collier County, Florida | 2007 | New South Associates, Inc. | 8CR713, 8CR721, 8CR722, 8CR724, 8CR729, 8CR852, 8CR903, 8CR904, 8CR905, 8CR907, 8CR910, 8CR912, 8CR913, 8CR914, 8CR915, 8CR918, 8CR920, 8CR921, 8CR922, 8CR923, 8CR924, 8CR934, 8CR935, 8CR936, 8CR937, 8CR938, 8CR939, 8CR940, 8CR941, 8CR942, 8CR943, 8CR944, | 13915 | US Army Corps of Engineers, Jacksonville District |

| TITLE | DATE | AFFILIATION | PSRP Sites discussed | FMSF Number | SPONSOR |
|---|---|---|---|---|---|
| | | | 8CR945, 8CR946. 8CR971 | | |
| Determining the Elevation of Selected Sites Within The Picayune Strand Restoration Project, Collier County, Florida | 2008 | New South Associates, Inc. | 8CR824, 8CR825, 8CR855, 8CR856, 8CR867, 8CR868, 8CR712, 8CR713, 8CR721, 8CR722, 8CR723, 8CR724, 8CR780, 8CR809, 8CR852, 8CR903, 8CR905, 8CR907, 8CR910, 8CR913, 8CR914, 8CR915, 8CR916, 8CR917, 8CR918, 8CR922, 8CR923, 8CR934, 8CR935, 8CR936, 8CR937, 8CR938, 8CR939, 8CR940, 8CR941, 8CR942, 8CR943 | 15005 | US Army Corps of Engineers, Jacksonville District |
| Archaeological Reconnaissance Survey of the Picayune Strand Restoration Project, Southern Protection Feature, Collier County, Florida | 2011 | US Army Corps of Engineers, Jacksonville District | No CR | 18194 | US Army Corps of Engineers, Jacksonville District |
| Phase I Historical and Archaeological Survey of Portions of the Picayune Strand Restoration | 2012 | Panamerican Consultants, Inc. | 8CR1167, 8CR1168 | | US Army Corps of Engineers, Jacksonville District |

| TITLE | DATE | AFFILIATION | PSRP Sites discussed | FMSF Number | SPONSOR |
|---|---|---|---|---|---|
| Project and Ten Thousand Islands National Wildlife Refuge, Collier County, Florida | | | | | |
| Monitoring during construction | | Southeastern Archeological Research, Inc. | 8CR1159, 8CR1160, 8CR1297, 8CR1257, 8CR1260, 8CR1261, 8CR1298,8CR1299, 8CR1300 | | US Army Corps of Engineers, Jacksonville District |

## 4.0 AFFECTED ENVIRONMENT

The 2004 PIR/EIS and 2004 Biological Assessment included assessment of potential environmental effects, including effects to listed threatened and endangered species for this project, and are incorporated herein by reference. Any changes from the 2004 affected environment are described in the following sections.

## 4.1 GENERAL ENVIRONMENTAL SETTING

The PSRP is located in Collier County, Florida. It lies east of the city of Naples, between Interstate 75 and U.S. Highway 41. Combined with the Belle Meade State CARL area to the west, the project area constitutes the heart of what is now called the Picayune Strand State Forest (under Lease Agreement number 3927 from the Board of Trustees of the Internal Improvement Trust Fund of the State of Florida (the land owner). This forest is located south of Northern Golden Gate Estates and Interstate 75, southwest of the Florida Panther National Wildlife Refuge, north of the marine preserves and refuges that constitute the Ten Thousand Islands Region, and west of the Fakahatchee Strand State Preserve. It contains some of the most diverse plant and wildlife communities on the North American continent and provides habitat for several federally listed endangered species, including the critically endangered Florida panther.

In the late 1950s, Gulf American Corporation began purchasing an area of 173 square miles (110,620 acres) in Collier County, Florida for a vacation and retirement community. The Golden Gate Estates subdivision was approved in 1960, and included 183 miles of drainage canals with 25 water control structures and 813 miles of roads spaced at intervals of one-quarter mile. The area is characterized by nearly flat terrain with cypress wetlands, pine islands, wet and dry prairies, and several deeper wetland strands and sloughs including the adjacent Camp Keais and Fakahatchee Strands. Most of the land is inundated from at least July 1 to October 1 after the onset of the rainy season. Historically, the area drained to the downstream estuaries of the Gulf of Mexico through surface water movement in the form of shallow sheet flow. Two major canal systems, Golden Gate and Faka Union, were constructed in the early 1960s and between 1968 and 1971, respectively, to drain this area into Naples and Faka Union Bays (Corps 1980). These drainage systems channelized surface water runoff and altered each sub-basin's hydrologic response to rainfall. The canals also circumvented drainage to downstream estuaries of the Blackwater, Pumpkin, Wood, and Little Wood Rivers. On December 16, 1966, a Corps permit was issued to dredge an entrance channel connecting the Faka Union Canal with the mouth of the Faka Union River. The construction of this canal generated a major point source freshwater discharge in Faka Union Bay which has altered estuarine resources in portions of the Ten Thousand Islands.

The major effects of the drainage associated with the existing canal and water management infrastructure within the project are the loss of cypress forest and herbaceous wet prairies. Historically, small areas of pine flatwoods normally designated as uplands were located in narrow strands in elevated areas of the project and in the northwest project corner. The majority of the remaining flatwoos consisted of hydric flatwoods, which often have water at or above the ground surface for at least short

periods during wetter portions of the year. Due to the variable nature of shallow wetland hydroperiods and site topography over time, many on-site plant communities historically contained elements of both uplands and wetlands which were periodically affected by fire, freeze, drought, flood, and hurricane events. After drainage, upland pines, cabbage palms, and hardwoods invaded many of the cypress forests. Severe and frequent fires eliminated many of the pine and cypress trees, furthering the conversion of these lands to earlier successional shrubby states of upland or shallow wetland plant communities. Exotic plant species, particularly Brazilian pepper, have changed the character of many habitats, especially adjacent to the site's extensive canal and roadway network (Duever 2004).

A large portion of the Faka Union Canal watershed is part of the Golden Gate Estates development, zoned for single-family residential land use. The residential zoning in the Golden Gate Estates is low density with a minimum lot size of 1.25 acres. The remaining area is used for agriculture, predominantly vegetable farming, except in areas of persistent flooding. The most populated areas of Golden Gate Estates are north of Interstate 75 and west of Everglades Boulevard in Northern Golden Gate Estates. An exception is a small urban area, the POI, located south of the PSRP adjacent to the northern portion of the main Faka Union Canal (USFWS 2009). The manatee mitigation feature will be constructed in the Faka Union Canal just north of the POI and US-41.

The POI marina, originally known as Remuda Ranch, was initially constructed by the Gulf American Corporation, who also developed Golden Gate Estates. The construction of the Faka Union Canal began in 1966, under a dredge and fill permit issued by the Corps on December 14, 1966 under the jurisdiction of Section 10 of the Rivers and Harbors Act of 1899; however, at the time of issuance, no permitting systems were in place to issue permits for the discharge of refuse under Section 13 of the Rivers and Harbors Act of 1899.

## 4.2 GROUNDWATER AND SURFACE WATER HYDROLOGY

Hydrologic monitoring across the main Fakahatchee flowway has shown seasonal pre-restoration water table drawdowns of almost six and a half feet in the vicinity of the eastern-most canal in the PSRP that borders the western edge of Fakahatchee Strand. The water table has been significantly lowered for a distance of over one mile from the canal during the wet season when water levels are naturally above ground and to almost three miles from the canal during dry periods when the water table is naturally below ground. Filling of the upper two miles of the Prairie canal was completed in early 2004. The remaining five miles were filled in 2006-2007. During the past four wet seasons, there has been partial restoration of wet season overland flows in the eastern portion of the PSRP. Based on a comparison of data from monitoring wells near a filled canal and other wells near an unfilled canal that is approximately two miles west of the filled canal, hydroperiods have increased and groundwater levels have risen in both Fakahatchee and Picayune Strands. However, because of the distance over which canals affect water levels in this area, there will not be complete hydrologic recovery of this area until the nearby Merritt, Faka Union, and Miller Canals are filled (Duever, 2010).

## 4.3 VEGETATION

A discussion of the plant communities in the PSRP area can be found in Section 3.3 of the 2004 PSRP Final PIR/EIS and is incorporated into this document by reference.

## 4.4 WETLANDS

Wetlands within the PSRP have been severely degraded as a result of the SGGE infrastructure built in the 1960s and 70s. Some low quality wetlands exist within the project area but have been severely impacted by the canals constructed to drain the area. Areas that once supported large populations of fish and aquatic invertebrates have been severely impaired in their ability to serve as foraging habitat for wading birds. A wetland assessment performed in June 2012 identified a wetland consisting of red bay (Persea borbonia), bald cypress (*Taxodium distichum*), swamp fern (*Blechnum serrulatum*), St. John's wort (*Hypericum perforatum*), saltbush (*Baccharis halimifolia*), arrowhead (*Sagittaria* spp.), and other plant species indicative of wetland habitats located on the western side of the PSRP area near Belle Meade. Please see Figure 2-2 of the 2004 PSRP Final PIR/EIS which displays the historic flowways that cross through the PSRP area.

## 4.5 FISH AND WILDLIFE RESOURCES

A discussion of the fish and wildlife resources in the PSRP area can be found in Section 3.5 of the 2004 PSRP Final PIR/EIS and is incorporated into this document by reference.

## 4.6 THREATENED AND ENDANGERED SPECIES

In accordance with Section 7 of the ESA, the USFWS provided a BO in 2004. Since that time, coordination with the USFWS concerning Federal threatened and endangered species within PSRP has been on-going. A supplemental BO for the PSRP was completed in 2009, including determinations for the endangered Eastern indigo snake, endangered wood stork, and endangered Florida panther. The 2009 BO included the analysis of potential impacts from the addition of the manatee mitigation feature and the tieback levee. The waters of the Ten Thousand Islands region directly south of the PSRP are critical for the endangered smalltooth sawfish (*Pristis pectinata*). Critical habitat for the smalltooth sawfish was designated in 2009. Separate consultation with the National Oceanic and Atmospheric Administration National Marine Fisheries Service has been conducted through a programmatic CERP consultation (National Marine Fisheries Service 2013). A supplemental BA is included in this report that addresses the addition of the manatee mitigation feature and complete consultation on the West Indian manatee for the PSRP. The BA also includes completed consultation for the newly listed Florida bonneted bat as well as species effect determinations on listed species resulting from the construction and operation of the manatee mitigation feature (Appendix E).

Federally listed species that are known to occur or potentially occur in the vicinity of PSRP include the endangered American crocodile (*Crocodylus acutus)*, candidate species, gopher tortoise (*Gopherus polyphemus*), threatened Eastern indigo snake (*Drymarchon corais couperi*), endangered Florida panther [*Felis* (=*Puma*) *concolor*

*coryi*], endangered red-cockaded woodpecker (*Picoides borealis*), endangered Everglade snail kite *(Rostrhamus sociabilis plumbeus)*, endangered wood stork (*Mycteria Americana),* endangered Florida bonneted bat (*Eumops floridanus*) and endangered West Indian manatee (*Trichechus manatus).* The PSRP also contains designated critical habitat for the Everglade snail kite, American crocodile, and the West Indian manatee. In recent discussions with USFWS, it is recognized that critical habitat for the Florida bonneted bat is under development and it is anticipated that since PSRP is a focal area for the species, future designated critical habitat may fall within PSRP and would be coordinated with USFWS as appropriate.

A discussion of threatened and endangered species within the PSRP can be found in section 9.6 of the 2004 PSRP Final PIR/EIS and is incorporated into this document by reference. Following the 2004 PSRP Final PIR/EIS, a second supplemental BA discussing design refinements in this EA for the PSRP was completed in 2008 with the USFWS BO completion in 2009. The following sections discuss threatened and endangered species within the affected environment for the manatee mitigation feature and the tieback levee for the Merritt, Faka Union, and Miller phases.

### 4.6.1 AMERICAN CROCODILE

The USFWS and the FWC list the American crocodile as endangered. This species occurs in extreme South Florida primarily in Biscayne and Florida Bays. Crocodiles have been observed as far north as the coasts of Lee and Collier Counties, but Collier County is not thought to support a significant resident population of crocodiles. The PSRP area does not include designated American crocodile critical habitat. A description of the American crocodile is included in the 2004 PSRP Final PIR/EIS and 2004 BO and remains relevant.

### 4.6.2 GOPHER TORTOISE

The gopher tortoise, an upland dwelling reptile, is currently listed as a candidate species in the Eastern United States by the USFWS (USFWS, 2013) and is listed as threatened by the State of Florida. The gopher tortoise shell can be from 5.9 to 14.6 inches long, is dark-brown to grayish-black terrestrial turtle, has large hind feet, and shovel-like forefeet (Ernest & Barbour, 1972). In Florida, individuals from coastal areas are generally darker than more central populations. Gopher tortoises excavate deep burrows that provide shelter from weather extremes and refuge from predation (Diemer et al., 1989). The gopher tortoise commonly occupies habitats with a well-drained sandy substrate, ample herbaceous vegetation for food, and sunlit areas for nesting (Landers, 1980; Landers et al., 1980; Diemer, 1989). Diemer (1992) found that gopher tortoise activity increased in April, peaked in July, and remained high through October. Many vertebrate and invertebrates species are known to seek refuge in gopher tortoise burrows, including protected species like the Eastern Indigo snake (Franz, 1986; Jackson & Milstrey, 1989; Lips, 1991; Witz et al., 1991).

Currently less than 30 relocated individuals reside on the Faka Union Canal spoil berm, which acts as an island. Comparisons of tortoise populations on true islands with

populations on the mainland suggested that tortoises live successfully on relatively small, isolated habitats (Mushinsky & McCoy, 1994). This study found that the density of burrows decreased as area increased on the mainland, but density of burrows was not related to area on the islands. Findings suggest that tortoises have a greater selection of habitats on the mainland than on islands. Tortoises on islands are confined and may be forced to live in less than ideal conditions. The implications of these findings are profound for tortoises living in small, fragmented "habitat islands" on the mainland. As the quality of their habitat island is degraded; mature adults may be forced to abandon a site in search of better habitat quality. From a practical perspective, prior to this study (Mushinsky & McCoy, 1994), observations of large numbers of active and inactive gopher tortoise burrows in a confined area likely would have been viewed as indicators of a "healthy" population; however, these findings suggest just the opposite. Rather than a signal of a healthy population, large numbers of active and inactive gopher tortoise burrows, relative to the actual number of tortoises, may signal a stressed population (Stewart et al., 1993). If populations on small islands are moved to larger mainland sites, it is possible that they would have greater access to resources and increase the population size.

### 4.6.3 EASTERN INDIGO SNAKE

The threatened Eastern indigo snake is present throughout the state, but its abundance is reduced to a point where it is uncommon. It was listed as a threatened species due to dramatic population declines caused by over-collecting for domestic and international pet trade, as well as mortalities caused by rattlesnake collectors. Because of its relatively large home range, this snake is especially vulnerable to habitat loss, degradation, and fragmentation. Residential and commercial expansions within the PSRP study area have become very significant threats to the snake.

There is no quantitative data with which to evaluate the trend of Eastern indigo snake populations in South Florida. The population, as a whole, is most likely declining because of current rates of habitat destruction and degradation. Even with continued habitat destruction in southwest Florida, this species will probably persist in most localities where large, unfragmented pieces of natural habitat remain. Unfortunately, current and anticipated future habitat fragmentation may result in a large number of isolated small groups of indigo snakes that potentially could not support a sufficient number of individuals to ensure viable populations. A thorough description of the Eastern indigo snake is included in the 2004 PSRP Final PIR/EIs and is still relevant.

### 4.6.4 FLORIDA PANTHER

The Florida panther, listed as endangered throughout its range in 1967 (32 FR 4001), received Federal protection under the passage of the ESA of 1973, as amended (16 U.S.C. 1531 *et seq.*). The Florida panther is also listed as endangered by the State of Florida. Since the panther was designated as an endangered species prior to enactment of the ESA, there was no formal listing package identifying threats to the species as required by Section 4(a)(1) of the ESA. No critical habitat has been designated for the panther. An extensive description of life history traits of the Florida panther is included in the

2009 BO. A description of the Florida panther is included in the 2004 PSRP Final PIR/EIS and 2009 BO and is still relevant. Monitoring of the project area during construction has noted the occurrence of panthers within the project area.

### 4.6.5 RED-COCKADED WOODPECKER

The red-cockaded woodpecker was federally listed as endangered in 1970 and is currently classified as a "species of special concern" by the State of Florida. The Belle Meade area, west of the PSRP, serves as a mitigation site for private development projects which may threaten the species. In September 2012, the PSSF had 13 active red-cockaded woodpecker clusters, 10 with potential breeding groups and the remaining three with solitary birds; however, only one of these clusters occurs within the footprint of the PSRP (Sowell, 2012). A thorough description of the red-cockaded woodpecker is included in the 2004 PSRP Final PIR/EIS and is still relevant.

### 4.6.6 EVERGLADE SNAIL KITE

The Florida subspecies of snail kite was first listed as endangered pursuant to the Endangered Species Conservation Act in 1967. The common name used in the original listing was "Everglade snail kite." This remains unchanged in the USFWS Code of Federal Regulations, even though the official name for the species is now simply "snail kite" (American Ornithologists' Union [AOU], 1983). Both the USFWS and the FWC list the snail kite as endangered. Snail kite habitat consists of freshwater marshes and the shallow vegetated edges of lakes (natural and man-made), where apple snails can be found. Drainage of Florida's interior wetlands has reduced the extent and quality of habitat for both the snail and the kite. The severely altered hydrology of the present day PSRP area has drained most of the freshwater marshes that provided habitat for the snail kite. A thorough description of the Everglade snail kite is included in the 2004 PSRP Final PIR/EIS and is incorporated in to this document by reference.

### 4.6.7 WOOD STORK

The USFWS listed the wood stork population in Florida as endangered in 1984. It is also designated as endangered by State of Florida. The listing occurred because wood stork populations had declined by more than 75 percent since the 1930s. The original listing recognized the relationship between the declining wood stork population, the loss of suitable foraging habitat, and colony nesting failures, particularly in the breeding colonies in South Florida, where human actions have reduced wetland areas by about 35 percent (Ogden and Nesbitt, 1979). A thorough description of the wood stork is included in the 2004 PSRP Final PIR/EIS and is incorporated into this document by reference.

### 4.6.8 WEST INDIAN MANATEE

Both the USFWS and the FWC list the West Indian manatee as endangered. The 1960s and early 1970s development of the PSRP area disrupted the historic seasonal timing and discharge of sheetflow into Faka Union Bay. What was once a slow discharge across a broad front is now a point source surge at the mouth of the Faka Union Canal system.

Aerial surveys conducted in the mid 1970s through the early 1980s documented manatee distribution throughout the region, particularly in the Faka Union Canal below US-41 (Beeler and O'Shea, 1985). Radio tracking data for manatees shows animals traveling extensive distances (10's of miles) to and from the Faka Union Canal area to forage on offshore seagrass beds (USFWS, 2002). These animals show a pattern of multiple days of feeding on seagrass beds followed by rapid, directed movement to a distant source of freshwater, where manatees remain only briefly before moving back to offshore areas. These movements suggest that the availability of freshwater may be an important determinant of manatee distribution and abundance in this region.

The POI Basin, located within the Faka Union Canal system directly south of the last weir structure and including areas underneath and slightly north of U.S. 41, is the second largest warm water refugium in southwest Florida. This marina basin can support up to 300 manatees during periods of cold stress. The basin's freshwater input from the Faka Union Canal creates a salinity and temperature stratification. This stratification and the depth of the basin are the key features responsible for creating a "passive" thermal refugium for this species (Stith, et al., 2011). A thorough description of the West Indian manatee life history is included in the 2004 PSRP Final PIR/EIS and the 2009 BO and is incorporated in to this document by reference.

### 4.6.9 FLORIDA BONNETED BAT

The Florida bonneted bat is Florida's largest bat, weighing approximately 1.1 to 2.0 ounces, with a 19 to 21 inch wingspan, and a body length of 5.1 to 6.5 inches. The species has dark brown fur and large broad ears that join together and slant forward over the eyes. Relatively little is known regarding the ecology and habitat requirements of this species (USFWS, 2013). In general, bats will forage over ponds, streams and wetlands and require roosting habitat for daytime roosting, protection from predators and rearing of young (Marks & Marks, 2008). Florida bonneted bats roost in tree cavities, rocky outcrops and dead palm fronds. In residential communities, the bats roost in Spanish tile roofs, but have also been found in attics, rock or brick chimneys and fireplaces of old buildings (NatureServe, 2013). Colonies are small, with the largest reported as just a few dozen individuals. The bat is a nocturnal insectivore and relies upon echolocation to navigate and detect prey. Females give birth to a single pup from June through September (Marks & Marks, 2008; Florida Bat Conservency, 2005); however limited data suggests that a female may undergo a second birthing season possibly in January or February (USFWS, 2013).

The Florida bonneted bat is Florida's only endemic bat and as of November 1, 2013 was federally listed under the ESA as endangered. It is also listed by the FWC as endangered. The range of this species is limited to southern Florida, although this species was encountered in 2008 in two locations within the Kissimmee River Wildlife Management Area north of Lake Okeechobee. Records indicate that it was once common in the 1950s and early 1960s near Coral Gables and Miami (Belwood, 1992). The Florida bonneted bat has only been documented in 12 locations within Florida, including areas within Coral Gables, Homestead, Naples, Everglades City and North Fort Myers. Seven of the locations are under public ownership with the Florida bonneted bat found in discrete and

specific areas within Big Cypress National Preserve, Fakahatchee Strand Preserve State Park, Kissimmee River Wildlife Management Area, Babcock Ranch and Fred C. Babcock and Cecil M. Webb Wildlife Management Area (USFWS 2013). The capture of a juvenile male at Picayune Strand State Forest on December 17, 2009 indicated that breeding was occurring in the area (Smith 2010). Loss of suitable habitat is believed to be the primary cause of population declines. Other perceived threats include pesticide and herbicide use, which decrease populations of insects, the bats primary prey.

### 4.6.10 ESTUARINE FISHES AND SEA TURTLES

NMFS designated critical habitat for the smalltooth sawfish in September 2009. The smalltooth sawfish and its critical habitat, the goliath grouper (*Epinephelus itajara*), mangrove rivulus (*Rivulus marmoratus*), sand tiger shark (*Odontaspis taurus*), the threatened loggerhead sea turtle (*Caretta caretta*), endangered Kemp's ridley sea turtle (*Lepidochelys kempi*), endangered Atlantic green sea turtle (*Chelonia mydas mydas*), and the endangered Hawksbill sea turtle (*Eretmochelys imbricate*) are being addressed under a CERP programmatic consultation with NMFS. The Programmatic CERP Biological Assessment was submitted to NOAA-NMFS on July 2, 2013. A concurrence of determination letter was provided to the Corps on 17 December 2013.

The above listed marine species use habitats in shallow coastal areas and estuaries of the Ten Thousand Islands Region, with some species moving upriver to freshwater areas. Although these species are excluded from entering the Faka Union Canal system by a weir located just north of US-41, they are affected by the concentration of freshwater drainage from the PSRP Area into the Faka Union Canal system. This concentration lowers salinity as it discharges into Faka Union Bay. The canal system also affects the area of optimum-salinity habitat in nearby bays of the Ten Thousand Islands Region by diverting to Faka Union Bay the freshwater that otherwise would have entered these other systems as surface or groundwater flows. Browder and Wang (1989) noted a reverse salinity gradient into Pumpkin Bay (a neighboring bay to the west) during part of the year, probably due to the large amount of freshwater exiting the Ten Thousand Islands Region through Faka Union Bay. These alterations in the timing and quantity of freshwater flowing into the estuaries has an impact on natural biodiversity by affecting food availability, predation pressure, reproductive success, and most likely has caused chronic and acute stress to these fishes and turtles. A full description is included in the 2004 PSRP Final PIR/EIS and is incorporated into this document by reference.

## 4.7 ESSENTIAL FISH HABITAT

A discussion of the EFH near the PSRP is included in Section 3.6.11 of the 2004 PSRP Final PIR/EIS. These areas consist of mangroves in the Faka Union Bay and Ten Thousand Islands Region. The manatee mitigation feature, located adjacent to the Faka Union Canal south of the POI Basin, will be adjacent to mangrove wetlands, identified by the Gulf of Mexico Fishery Management Council as the EFH for postlarval, juvenile and subadult shrimp; postlarval, juvenile and adult red drum; postlarval, juvenile and adult gray snapper; juvenile red and gag groupers; and juvenile and adult yellowtail and lane snappers. The area has also been designated as the EFH by the NMFS for highly

migratory species including bull, lemon, and bonnethead sharks (NMFS, 2013). Approximately two acres of EFH, that include 0.43 acres of mangrove habitat, may be affected through the implementation of the manatee mitigation feature (Figures 2-5 and 4-1). These effects are further discussed in Section 5.1.7 of this EA.

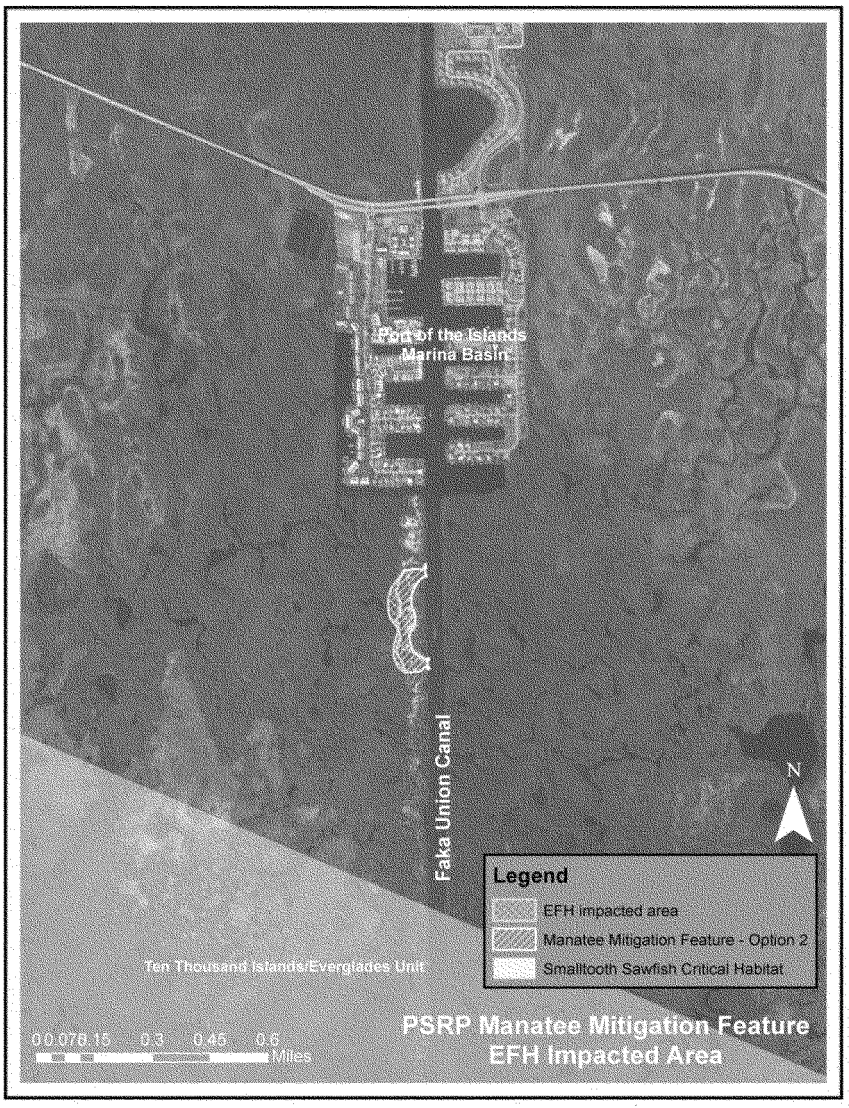



**Figure 4-1. PSRP Manatee Mitigation Feature EFH and Smalltooth Sawfish Critical Habitat Location**

Socio-economic considerations

### 4.7.1 LAND USE AND POPULATION

Collier County comprises approximately 2,032 square miles and is the second largest county in the State of Florida. In the county, rapid population growth began in the 1950s. By the 1970s, Collier County was distinguished as the fastest growing county in the state, as well as the nation.

Growth in Collier County has been much faster than in the state as a whole. The Hispanic population percentages are greater than on a statewide basis. For the census tract in the immediate area of the project site, the percentage of African Americans in residence there is greater than for the rest of the county. The census tract was located using the Census Bureau's *American Fact Finder* software.

Describing the demographic characteristics for the project site's census tract, Collier County, and the State of Florida, helps to provide a basis for understanding the existing socio-economic context. Some of these characteristics are outlined in Table 4-1 and Table 4-2.

Based on the comparative profile data delineated below, people at the poverty level make up a smaller share of the population in the PSRP area than in the State of Florida as a whole. The Hispanic population percentage is very close to the state average as a whole (higher at the county level, lower at the census tract level). The non-white population share is similar but lower in the project area.

**Table 4-1. Collier County population changes.**

| Collier County Population 1950-2010* | | |
|---|---|---|
| Year | Population | Percent (%) Increase |
| 1950 | 6,488 | ----- |
| 1960 | 15,753 | 143 % |
| 1970 | 38,040 | 141 % |
| 1980 | 85,971 | 126 % |
| 1990 | 152,099 | 77 % |
| 2000 | 251,377 | 66 % |
| 2010 | 321,520 | 28 % |

*SOURCE: U. S. Census Bureau

**Table 4-2. Florida and Collier County Population Demographics in 2010**

| | Florida | Collier County |
|---|---|---|
| Population, 2010 | 18,801,310 | 321,520 |
| Change in Population (2000-2010) | 15% | 21.90% |
| Below Poverty Level, 2010 | 13.80% | 12.20% |
| White, 2010 | 78.50% | 90.20% |
| Black, 2010 | 16.50% | 6.90% |
| Other, 2010 | 5.00% | 2.90% |
| Hispanic Origin, 2010 | 22.90% | 26.30% |

#### 4.7.2 WATER DEMAND

A discussion of water demand related to the PSRP can be found in Section 3.12.2 of the 2004 PSRP Final PIR/EIS.

### 4.8 AESTHETICS

A discussion of the aesthetics related to the PSRP can be found in Section 3.13 of the 2004 PSRP Final PIR/EIS and is incorporated by reference.

### 4.9 RECREATION

A discussion of the recreational use of the PSSF can be found in section 3.16 of the 2004 PSRP Final PIR/EIS and is incorporated by reference.

### 4.10 WATER QUALITY

A discussion of the water quality of the PSRP can be found in Section 3.10.2 of the 2004 PSRP Final PIR/EIS and is incorporated by reference.

Changes to the FDEP classification system have been made since the time the 2004 PSRP Final PIR/EIS was published. The new classification lists the PSRP project under the Faka Union Canal South Water Body Identification Number (WBID) which is listed as impaired for dissolved oxygen due to natural conditions. The Ten Thousand Islands receiving estuaries are identified under WBID 3259M and are also listed as impaired for dissolved oxygen. Considering no causative pollutant has been identified to date, no Total Maximum Daily Loads have been developed for this area.

### 4.11 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTES

A discussion of the hazardous, toxic and radioactive waste (HTRW) related to the PSRP can be found in Section 3.14 of the 2004 PSRP Final PIR/EIS.

Since 2004, the non-federal sponsor and the FDEP have continued to acquire project lands. Acquisition of these lands has generally ceased activities that might result in new

HTRW contamination that had not been identified at the time of the 2004 PSRP Final PIR/EIS. Since 2004, the SFWMD has worked, and continues to work, with the environmental agencies to complete the required environmental site investigations and remediation necessary for construction and operations of the project. To date, all remediation efforts located within the tieback levee and construction area footprints have been completed. Anticipated remediation activity still remains for the Belle Meade area, located within the project operational flowway, pending completion of ongoing Phase I/II Remediation analyses by the SFWMD.

## 4.12 AIR QUALITY

A discussion of the air quality of the PSRP can be found in Section 3.8 of the 2004 PSRP Final PIR/EIS and is incorporated into this document by reference.

## 4.13 NOISE

A discussion of noise pollution related to the PSRP can be found in Section 3.17 of the 2004 PSRP Final PIR/EIS and is incorporated by reference.

# 5.0 ENVIRONMENTAL EFFECTS

This section is the scientific and analytic basis for the comparisons of the alternatives for the features added as a result of detailed design. This section only covers potential effects that were not covered in the 2004 PSRP Final PIR/EIS for the PSRP. The cumulative impacts section will discuss the larger picture of past, present, and future potential impacts.

## 5.1 MANATEE MITIGATION FEATURE

### 5.1.1 GENERAL ENVIRONMENTAL SETTING

The objective of the manatee mitigation feature, Alternative 27, is to ensure the continuance of the existing manatee refugium at the POI Basin. This feature consists of creating a groundwater connection in an oxbow adjacent to the Faka Union Canal, just south of the POI Basin. This feature will assist in maintaining the POI Basin as a manatee refugium following the expected reduction of flows associated with plugging in the Faka Union Canal as a result of PSRP. See Table 2-3

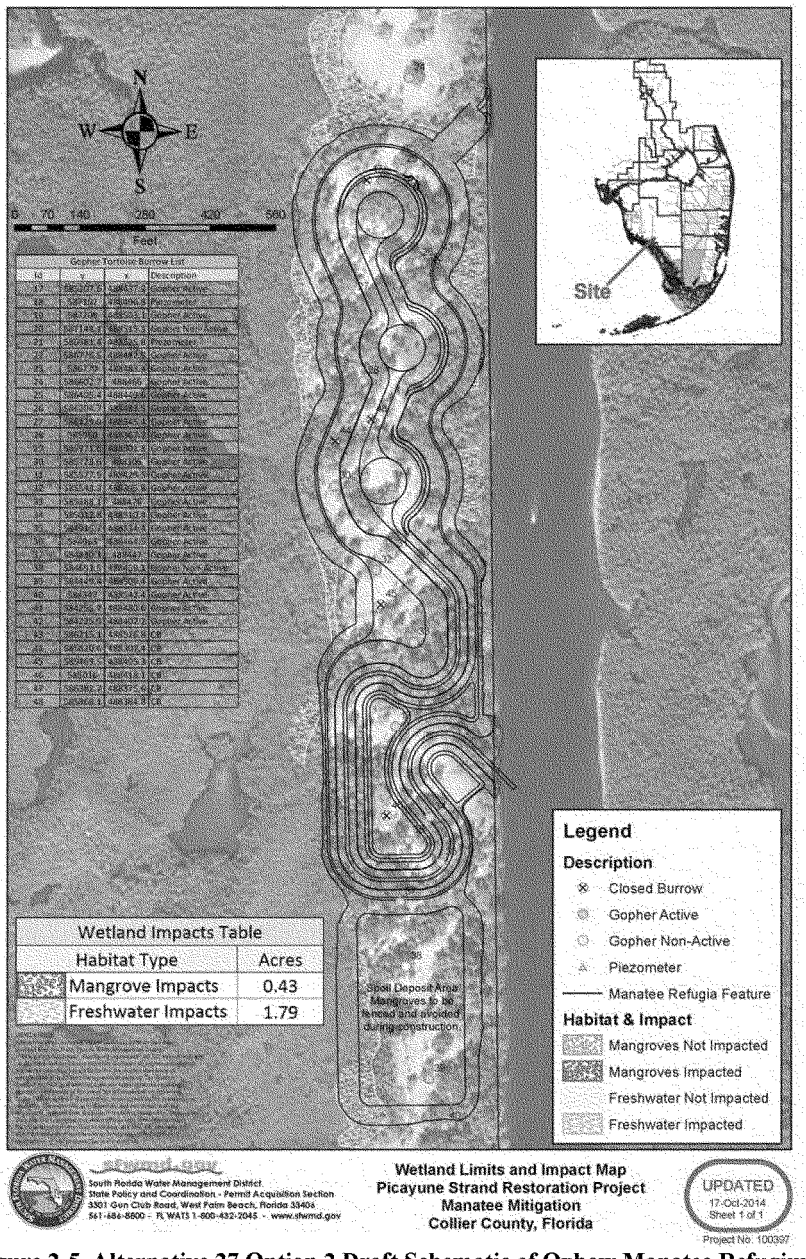



**Figure 2-5. Alternative 27 Option 2 Draft Schematic of Oxbow Manatee Refugium**

Table 2-3 for a summary of effects.

### 5.1.2 GROUNDWATER AND SURFACE WATER HYDROLOGY

#### 5.1.2.1 No Action Alternative

The implementation of the PSRP as defined in the 2004 PSRP Final PIR/EIS will reduce the amount of freshwater flows that reach the POI Basin through the Faka Union Canal. These flows will be redistributed across the PSRP area to establish wetland rehydration and eliminate point source freshwater discharge in the Faka Union Canal. Restoration will positively affect the estuarine communities in the Ten Thousand Islands region due to reduction in point source discharge. Groundwater levels will also be increased in the PSRP area due to increased sheetflow of water across the landscape. The implementation of the PSRP will cause a reduction of flows through the Faka Union Canal to the POI Basin, resulting in a negative effect on the manatee passive thermal refugium (Stith et al. 2001).

#### 5.1.2.2 Alternative 27 Option 2

Impacts to groundwater and surface water hydrology will be the same as under the No Action Alternative. The PSRP will restore the appropriate quantity, timing and distribution of flows over the project area and the estuarine communities. A connection to warm saline groundwater will be created through placement of an oxbow approximately 20 feet deep in the Faka Union Canal spoil berm to create a thermal refugium for manatees just south of the POI marina.

### 5.1.3 VEGETATION

#### 5.1.3.1 No Action Alternative

No additional impacts to vegetation in excess of those described in the 2004 PSRP Final PIR/EIS will occur under the No Action Alternative.

#### 5.1.3.2 Alternative 27 Option 2

The implementation of Alternative 27, Option 2 will have a small effect on upland vegetation and mangrove habitat. There are known uplands within the footprint of the manatee mitigation feature. Approximately eight (8) acres of uplands consisting mainly of pine flatwoods will be lost on the Faka Union Canal spoil berm. Additionally, two (2) acres of wetland mangrove habitat may also be impacted by the creation of the manatee mitigation feature. Other uplands areas along the spoil berm will serve as a disposal site for excavated material. Vegetation will be allowed to re-establish in these areas following construction, and exotics will be removed and treated to minimize recurrence.

### 5.1.4 WETLANDS

#### 5.1.4.1 No Action Alternative

No additional impacts to wetlands in excess of those described in the 2004 PSRP Final PIR/EIS will occur.

#### 5.1.4.2 Alternative 27 Option 2

The majority of the work will be performed on the Faka Union Canal spoil berm. A wetland analysis using the Uniform Mitigation Assessment Method will be performed with an interagency team prior to implementation to identify any wetlands that may be impacted by the construction of the manatee mitigation feature; however, any wetland impacts to this area will be compensated by the hydrologic restoration resulting from the PSRP. Initial analyses indicate that approximately 0.43 acres of mangrove swamp and 1.79 acrs of freshwater marsh may be affected by the creation of the manatee mitigation feature. Although these effects are expected to be mitigated by the overall improvement of mangrove conditions south of US 41 through hydrologic restoration of the PSRP area, additional mitigation of these habitats will be consistent with the Mitigation Report, Attachment 16 of the CERPRA permit application.

### 5.1.5 FISH AND WILDLIFE RESOURCES

A discussion of the fish and wildlife resources and the overall effects due to the PSRP can be found in Section 9.5 of the 2004 PSRP Final PIR/EIS and is incorporated into this document by reference. The following sections related to fish and wildlife resources will specifically address the feature being proposed.

#### 5.1.5.1 No Action Alternative

The No Action Alternative will result in a negligible impact to fish and wildlife resources in the POI Basin, with the exception of the West Indian manatee. The No Action Alternative will result in elimination of the passive thermal refugium, thereby negatively impacting manatees. However, the reduction of the freshwater point discharge into the POI Basin would be beneficial to nearby estuarine communities due to reduction in freshwater point source discharge to the Faka Union Canal.

#### 5.1.5.2 Alternative 27 Option 2

The implementation of the manatee mitigation feature will not have an adverse impact on fish and wildlife resources in the POI Basin. The Faka Union spoil berm is currently home to a number of wildlife species, including gopher tortoises, Florida black bears, and other small mammals. Gopher tortoises found within the footprint of the manatee mitigation feature will be relocated prior to construction. As stated in Section 4.2.6, large numbers of active and inactive gopher tortoise burrows, relative to the actual number of tortoises, may signal a stressed population (Stewart et al., 1993). Therefore, if populations on small islands are moved to larger mainland sites, it is possible that they would have greater access to resources and increase the population size. Additionally, wildlife surveys will be completed prior to the start of construction. The proposed manatee mitigation feature will ensure the continuance of the POI Basin as a thermal refugium for West Indian manatees, and will not negatively affect fish and wildlife resources in the area.

### 5.1.6 THREATENED AND ENDANGERED SPECIES

A discussion of threatened and endangered species within the PSRP can be found in section 9.6 of the 2004 PSRP Final PIR/EIS and the 2004 USFWS BO and is incorporated into this document by reference. Following the 2004 PSRP Final PIR/EIS, a second supplemental BA discussing design refinements in this EA, including the tieback levee, for the PSRP was completed in 2008 with the USFWS BO completion in 2009.

The USFWS in their 2009 BO determined that there was insufficient information to make a determination on potential project effects to West Indian manatee. Since the PRSP will reduce the point discharge from the Faka Union Canal at the POI Basin, the manatee refugium at POI Basin will no longer function at its current capacity. Stith et al. (2011) found that implementation of the PSRP caused a significant loss of flows over the Faka Union Weir Number 1 into the POI Basin. The reduction in freshwater flows would cause the temperature inverted halocline to be present at a much lower rate, potentially resulting in increased levels of cold-stress for manatees in the region. In accordance with Section 7 of the 1973 ESA, the Corps and the USFWS are in informal consultation to determine a manatee mitigation feature to address the potential loss of a refugium at the POI Basin. Overall effects from the PSRP on the West Indian manatee will also be addressed through this coordination.

ESA consultation on potential PSRP impacts to species within the purview of with NMFS was conducted during the formulation of the 2004 Final PIR/EIS. On October 20, 2004, the Corps requested and subsequently received concurrence from NMFS on a no effect determination to the smalltooth sawfish, green sea turtle, Kemp's ridley sea turtle, and loggerhead sea turtle. Several years later on 2 September 2009, smalltooth sawfish critical habitat was officially designated, requiring a re-initiation of consultation for potential impacts from the PSRP. In a letter dated 17 December 2013, the NMFS concurred on the Corps' no effect determination, by stating: "A recent potential project feature would remove up to two acres of mangrove habitat approximately one-half mile north of the smalltooth sawfish critical habitat along the Faka Union Canal. These effects will be discountable because the mangroves are likely located above the Mean High Water Line and inaccessible to sawfish because they are only hydrated during extreme storm events".

An interagency team with representatives from the Corps, SFWMD, USFWS, FWC and the FDEP refined potential mitigation options in order to maintain the function of the POI Basin as a manatee refugium. These options are described in this EA (refer to Section 2.1.1). The preferred alternative must be implemented prior to plugging the Faka Union Canal.

**Table 5-1. Federally listed threatened (T), endangered (E), or candidate (C) species that might occur within the manatee mitigation area under the purview of the USFWS.**

| Common Name | Scientific Name | Federal Status | Effect Determination |
|---|---|---|---|
| **Reptiles** | | | |

| | | | |
|---|---|---|---|
| **American crocodile** | ***Crocodylus acutus*** | **E** | **No effect** |
| **Gopher tortoise** | ***Gopherus polyphemus*** | **C** | **May affect, but not likely to adversely affect** |
| **Eastern indigo snake** | ***Drymarchon corais couperi*** | **T** | **May affect, but not likely to adversely affect** |
| **Birds** | | | |
| **Everglade snail kite** | ***Rostrhamus sociabilis plumbeus*** | **E** | **No effect** |
| **Red-cockaded woodpecker** | ***Picoides borealis*** | **T** | **N/A (not found in area)** |
| **Wood stork** | ***Mycteria americana*** | **E** | **No effect** |
| **Mammals** | | | |
| **Florida panther** | ***Puma concolor coryi*** | **E** | **May affect, but not likely to adversely affect** |
| **West Indian manatee** | ***Trichechus manatus*** | **E** | **May affect, but not likely to adversely affect** |
| **Florida bonneted bat** | ***Eumops floridanus*** | **E** | **May affect, but not likely to adversely affect** |

#### 5.1.6.1 West Indian Manatee

##### 5.1.6.1.1 No Action Alternative

The PSRP could have an adverse affect on the manatee thermal refugium at the POI Basin under the No Action Alternative. A determination of effect was not reached under the 2004 PSRP Final PIR/EIS due to insufficient information available. A determination of "may affect, but not likely to adversely affect" was reached in the 2009 USFWS BO contingent upon the studies conducted by the USGS. Stith et al. (2011) found that the implementation of the PSRP caused a significant loss of flows over the Faka Union Weir Number 1 into the POI Basin. The reduction in freshwater flows would cause the temperature inverted halocline to be present at a much lower rate, potentially resulting in increased levels of cold-stress for manatees in the region.

##### 5.1.6.1.2 Alternative 27 Option 2

The manatee mitigation feature, Alternative 27 Option 2, is designed to mitigate for the loss of flows over the Faka Union Weir Number 1 resulting from the implementation of the PSRP. Alternative 27 Option 2 creates an oxbow adjacent to the Faka Union Canal that would provide a warm groundwater connection for manatees to seek refuge in during cold, dry periods. With the implementation of this alternative, the Corps determined that the PSRP and manatee mitigation feature "may affect, but are not likely to adversely

affect" the West Indian manatee. In addition, the Standard Manatee Conditions for In-Water Work (2011) will be followed for all in-water activities; including coordination with FWC prior to any excavation or dredging activities. See Appendix E, Supplemental BA for more information on the effects of the preferred alternative.

#### 5.1.6.2 Everglade Snail Kite

##### 5.1.6.2.1 No Action Alternative

As discussed in the 2004 PSRP Final PIR/EIS and 2009 BO for the PSRP, effects to the Everglade snail kite are not expected within the project area.

##### 5.1.6.2.2 Alternative 27 Option 2

The implementation of the manatee mitigation feature, Alternative 27 Option 2, is unlikely to affect the Everglade snail kite since the majority of this work is located in an existing canal with nearby residential areas. However, as discussed, in the 2004 PSRP Final PIR/EIS, overall the PSRP may restore primary and secondary wetlands habitats for the Everglade snail kite. The Corps maintains the 2004 determination that there would be "no effect" on the Everglade snail kite or its critical habitat with the addition of the manatee mitigation feature, specifically, Alternative 27 Option 2.

#### 5.1.6.3 Wood Stork

##### 5.1.6.3.1 No Action Alternative

Effects to wood storks would be limited to what was previously discussed in the 2004 PSRP Final PIR/EIS and the 2009 USFWS BO under the No Action Alternative.

##### 5.1.6.3.2 Alternative 27 Option 2

The implementation of the manatee mitigation feature, Alternative 27 Option 2, will not significantly effect wetlands that may be utilized by wood storks for foraging; therefore, the Corps determined that the manatee mitigation feature "may affect, but is not likely to adversely affect" the wood stork.

#### 5.1.6.4 Florida Panther

##### 5.1.6.4.1 No Action Alternative

Effects to Florida panthers would be limited to what was previously discussed in the 2004 PSRP Final PIR/EIS and the 2009 BO under the No Action Alternative.

##### 5.1.6.4.2 Alternative 27 Option 2

The project area is known to support the Florida panther, panther prey, and to include panther habitat as discussed in the 2004 Final PIR/EIS, 2008 BA, and 2009 BO. However, the manatee mitigation feature is constructed outside of the Florida Panther Focus Area or ESA consultation area as described in the 2009 BO. The inclusion and implementation of the manatee mitigation feature will not significantly affect panther

habitat and most of the effect will be temporary. Therefore, the Corps determines the manatee mitigation feature "may affect, likely to adversely affect" the Florida panther.

#### 5.1.6.5 Florida Bonneted Bat

##### 5.1.6.5.1 No Action Alternative

No effects to Florida bonneted bats would occur as a result of the No Action Alternative for manatee mitigation.

##### 5.1.6.5.2 Alternative 27 Option 2

Due to the potential for suitable habitat for the Florida bonneted bat in the project area, the Corps has determined that construction of Alternative 27, Option 2 for the manatee mitigation feature "may affect but is not likely to adversely affect" the species. This determination applies to the manatee mitigation feature only, not the entire PSRP area, as stated in the Supplemental Biological Assessment (Appendix E).

#### 5.1.6.6 Eastern Indigo Snake

##### 5.1.6.6.1 No Action Alternative

Effects to Eastern indigo snakes would be limited to what was previously discussed in the 2004 PSRP Final PIR/EIS and the 2009 BO under the No Action Alternative.

##### 5.1.6.6.2 Alternative 27 Option 2

The 2009 BO made the determination that the overall PSRP "may affect, likely to adversely affect" the Eastern Indigo snake; and that up to 2 indigo snakes may be harmed (injury or mortality) incidental to project construction and initial re-hydration of the manatee mitigation feature. As a result, the Standard Eastern Indigo Snake Construction Guidelines will be implemented during the construction of the manatee mitigation feature and other project commitments and Terms and Conditions as contained in the 2009 BO will be in effect. Therefore, the Corps has determined that the construction of the manatee mitigation feature "may affect, but is not likely to adversely affect" the Eastern indigo snake during and following the construction of the manatee mitigation feature.

#### 5.1.6.7 Gopher Tortoise

##### 5.1.6.7.1 No Action Alternative

No additional effects to gopher tortoises or their habitat would occur as a result of the No Action Alternative.

##### 5.1.6.7.2 Alternative 27 Option 2

A small population of gopher tortoises has been relocated to the Faka Union Canal spoil berm just south of the POI Basin. These tortoises would be relocated prior to construction of the manatee mitigation feature and would be moved to suitable habitat in a nearby location. A gopher tortoise relocation plan will be coordinated with the USFWS

and FWC prior to construction. The Corps determined that the manatee mitigation feature "may affect, but is not likely to adversely affect" the gopher tortoise during and following the construction of the manatee mitigation feature and may actually benfit this isolated island population (Mushinsky & McCoy, 1994).

#### 5.1.6.8 American Crocodile

##### 5.1.6.8.1 No Action Alternative

As discussed in the 2004 PSRP Final PIR/EIS and the 2009 USFWS BO for the PSRP, effects on the American crocodile are not expected within the project area.

##### 5.1.6.8.2 Alternative 27 Option 2

The implementation of the manatee mitigation feature, Alternative 27 Option 2, will have no additional effect on the American crocodile. The Corps maintains the determination of "no effect" on the crocodile with the addition of the manatee mitigation feature.

### 5.1.7 ESSENTIAL FISH HABITAT

#### 5.1.7.1 No Action Alternative

No additional effects to the EFH would occur as a result of the No Action Alternative. Discussions of the EFH and estuarine resources can be found in Section 4 of the 2004 PSRP Final PIR/EIS and are still relevant.

#### 5.1.7.2 Alternative 27 Option 2

The manatee mitigation feature will be constructed in the Faka Union Canal spoil berm adjacent to the Faka Union Canal on the east and mangrove wetlands on the west. Approximately two (2) acres of EFH within the Ten Thousand Islands region, which include 0.43 acres of mangrove habitat, may be affected with the implementation of Alternative 27 Option 2 (Figure 5-1). However, due to the overall expected project benefits of restored wetland communities, sheetflow towards the coastal estuaries, reduction of harmful surge flows through the Faka Union Canal into Faka Union Bay, improved freshwater overland flow and seepage into other bays of the Ten Thousand Islands Region, improved aquifer recharge, improved habitat for fish and wildlife and threatened and endangered species, reduced invasion of exotic species, and increased spatial extent of wetlands; it is the conclusion of the Corps that restoring a more natural hydrology to the Study Area will have a significant positive effect on Essential Fish Habitat.

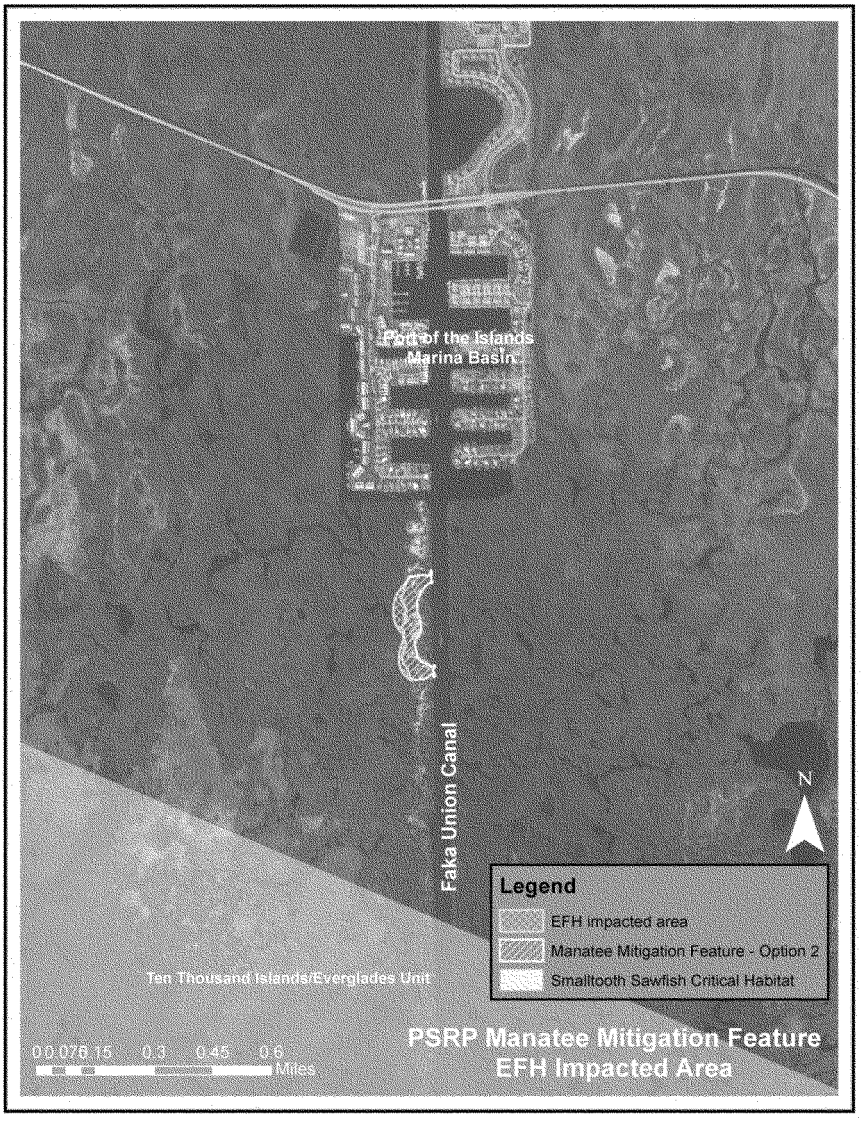



**Figure 5-1. Area of Essential Fish Habitat Lost with Implementation of Alternative 27 Option 2.**

### 5.1.8 SOCIO-ECONOMIC

#### 5.1.8.1 No Action Alternative

The population of manatees in the POI Basin could be significantly reduced under the No Action Alternative. Several manatee sightseeing tour companies that operate in the marina could be negatively effected by the loss of the refugia in the POI Basin.

#### 5.1.8.2 Alternative 27 Option 2

The implementation of the manatee mitigation feature will help ensure the continued existence of the POI Basin as a refuge for manatees in the cold season, therefore no effects to local sightseeing tour companies are anticipated with implementation of the recommended plan.

### 5.1.9 AESTHETICS

#### 5.1.9.1 No Action Alternative

Aesthetic effects would be limited to what was previously discussed in the 2004 PSRP Final PIR/EIS under the No Action Alternative.

#### 5.1.9.2 Alternative 27 Option 2

The excavated material from the construction of the manatee mitigation feature will be deposited in designated areas on the Faka Union Canal spoil berm up to 14 feet high. These areas will be allowed to reestablish vegetation and should only have a short term effect to aesthetics during construction.

### 5.1.10 RECREATION

#### 5.1.10.1 No Action Alternative

The manatee refugium at the POI Basin could be compromised under the No Action Alternative. This would reduce recreational opportunities for tourists that visit the area for manatee sightseeing tours.

#### 5.1.10.2 Alternative 27 Option 2

Alternative 27 Option 2 would assist in maintaining the current level of recreational opportunities in the POI Basin. Alternative 27 Option 2 consists of creating a manatee refugium adjacent to the Faka Union Canal which would restrict boat traffic in the manatee mitigation feature. However, manatees are still expected to occur within the POI Basin. Therefore, there may be a slight negative effect on recreational activities in the POI Basin with the restriction of public access to the manatee mitigation feature. Recreational activities within the POI Basin may be affected during construction of the manatee mitigation feature.

### 5.1.11 WATER QUALITY

#### 5.1.11.1 No Action Alternative

The water quality at the POI Basin would have no change or impairment as a result of a No Action Alternative.

#### 5.1.11.2 Alternative 27 Option 2

The water quality at the POI Basin would have no change or impairment as a result of the implementation of Alternative 27 Option 2. Only temporary construction related effects are anticipated such as elevations in turbidity readings which will be minimized through the use of best management practices as well as regulatory monitoring. Any elevation in turbidity will be required to comply with the state water quality criteria. Therefore, there will be no long-term effects from construction.

### 5.1.12 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTES

#### 5.1.12.1 No Action Alternative

The No Action Alternative would not require any remediation for HTRW substances.

#### 5.1.12.2 Alternative 27 Option 2

Implementation of Alternative 27 Option 2 may require a HTRW assessment that would recommend remediation for any sites that may be identified within the construction footprint. The SFWMD) is responsible for conducting an investigation and performing any required remediation action identified. It is not expected that there would be any HTRW substances within the proposed feature location.

### 5.1.13 AIR QUALITY

#### 5.1.13.1 No Action Alternative

The air quality at the POI Basin would have no change or impairment as a result of a No Action Alternative.

#### 5.1.13.2 Alternative 27 Option 2

The air quality at the POI Basin would have no long-term change or impairment as a result of the implementation of Alternative 27 Option 2. The only anticipated effects that may be considered are short-term particulate dust emissions from land clearing and moving operations during construction; however, best management practices will be used to control such emissions.

### 5.1.14 NOISE

#### 5.1.14.1 No Action Alternative

The noise at the POI Basin would have no change or impairment as a result of a No Action Alternative.

5.1.14.2 Alternative 27 Option 2

The air quality at the POI Basin would have no long-term change or impairment as a result of the implementation of Alternative 27 Option 2. During construction activity, short-term noise will be generated from the operation of construction equipment. All local and state noise regulations for construction will be adhered to during the construction phase.

## 5.2 TIEBACK LEVEES

### 5.2.1 GENERAL ENVIRONMENTAL SETTING

The tieback levee is located within the PSRP as shown in the 2004 PSRP Final PIR/EIS. The original design included three (3) separate berms just south of each pump station. The need for a single full project width tieback levee was identified during the detailed design phase. The environmental setting detailed in the 2004 PSRP Final PIR/EIS is still applicable and is incorporated into this EA by reference as stated in Section 4.0.

The objective of the tieback levee is to prevent pumped water from returning to the upstream side of the pump station, thus, having to be double-pumped or create "recycle pumping." The tieback levee will be constructed over several small remnant wetlands west of the Miller Pump Station and on upland habitat and existing roadway.

### 5.2.2 GROUNDWATER AND SURFACE WATER HYDROLOGY

5.2.2.1 Alternative 1 – No Action

The No Action Alternative would result in recirculation of pumped water to the upstream side of the pump stations through surface water flanking the original berm design, reducing the efficiency of the project and potentially resulting in a partial loss of restoration benefits.

5.2.2.2 Alternative 2 – East-West Tieback Levee

The addition of the full width tieback levee to the PSRP will prevent the recirculation of pumped water to the upstream side of the pump station. This will facilitate the restoration of sheetflow southward through the project area. However, implementation of the tieback levee may also create a barrier which could disrupt surface water flows from north of the pump stations, causing water to accumulate on the upstream side of the levee. If this occurs, culverts could be installed along the tieback levee to alleviate ponding on the upstream side of the levee.

### 5.2.3 VEGETATION

5.2.3.1 Alternative 1 – No Action

No additional effects to vegetation will occur in excess of those described in the 2004 PSRP Final PIR/EIS under the No Action Alternative, except as described below for wetlands.

#### 5.2.3.2 Alternative 2 – East-West Tieback Levee

Effects to vegetation with the implementation of Alternative 2 will be minimized by constructing over half of the tieback levee on existing roads. Approximately 53 additional acres will be affected by the tieback levee, most of which is upland habitat consisting of plant species such as sabal palm (*Sabel palmetto*) and south Florida slash pine (*Pinus elliotti*).

### 5.2.4 WETLANDS

#### 5.2.4.1 Alternative 1 – No Action

If the tieback levee is not implemented, the PSRP would not achieve all wetland benefits anticipated in the 2004 PSRP Final PIR/EIS since water would be recycled through the pump stations and not redistributed as sheetflow.

#### 5.2.4.2 Alternative 2 – East-West Tieback Levee

Over half of the tieback levee under Alternative 2 would be constructed on existing roadways; therefore, any effects to existing wetlands would be minimized. A wetland analysis using the Uniform Mitigation Assessment Method was performed in June 2011 by an interagency team to identify wetlands that may be affected by the construction of the tieback levee.

### 5.2.5 FISH AND WILDLIFE RESOURCES

As stated in Section 4.0, a discussion of the fish and wildlife resources for the overall PSRP can be found in Section 9.5 of the 2004 PSRP Final PIR/EIS and is incorporated into this document by reference. The following sections related to fish and wildlife resources will specifically address the feature being proposed.

#### 5.2.5.1 Alternative 1 – No Action

Without the addition of the tieback levee, the anticipated hydrologic restoration benefits as outlined in the 2004 PSRP Final PIR/EIS would not be fully realized due to the recirculation of flows through the pump station. This would mean that there would be less foraging habitat and less prime habitat for wildlife species.

#### 5.2.5.2 Alternative 2 – East-West Tieback Levee

The construction of the tieback levee will eliminate approximately 53 acres of upland habitat. The tieback levees will help facilitate flow of water south, increasing the efficiency and likelihood of hydrologic restoration; however, any freshwater flows from north of the pump stations will be cut off by the tieback levees. This could be considered an example of habitat fragmentation for some species based on scale. For example, the tieback levee could potentially be an obstacle to dispersal for amphibians, but would not impede movement of larger mammals. Any loss of habitat for fish and wildlife resources will be compensated for by the hydrologic restoration of Picayune Strand.

### 5.2.6 THREATENED AND ENDANGERED SPECIES

A discussion of threatened and endangered species within the PSRP can be found in section 9.6 of the 2004 PSRP Final PIR/EIS and is incorporated into this document by reference. Following the 2004 PSRP Final PIR/EIS, a second supplemental BA discussing design refinements in this EA for the PSRP was completed in 2008 with the USFWS BO completion in 2009. The following sections discuss the tieback levee for the Merritt, Faka Union, and Miller phases. The potential effects to threatened and endangered species as a result of the addition of the tieback levee were included in the 2008 Corps BA and the 2009 USFWS BO and are incorporated by reference in to this document. A summary of the effects determinations for the proposed action, as coordinated through the 2008 Corps BA and 2009 USFWS BO, is shown in Table 5-2 below. Detailed information on the threatened and endangered species located in the project area can be found in the PSRP 2009 USFWS BO. The Corps is in full compliance with requirements of the ESA with the addition of the tieback levee.

**Table 5-2. Federally listed threatened (T), endangered (E), or candidate (C) species that might occur within the tieback levee footprint under the purview of the USFWS.**

| Common Name | Scientific Name | Federal Status | Effect Determination |
|---|---|---|---|
| **Reptiles** | | | |
| American crocodile | *Crocodylus acutus* | E | No effect |
| Gopher tortoise | *Gopherus polyphemus* | C | No effect |
| Eastern indigo snake | *Drymarchon corais couperi* | T | May affect, not likely to adversely affect |
| **Birds** | | | |
| Everglade snail kite | *Rostrhamus sociabilis plumbeus* | E | No effect |
| Red-cockaded woodpecker | *Picoides borealis* | T | May affect, not likely to adversely affect |
| Wood stork | *Mycteria americana* | E | May affect, not likely to adversely affect |
| **Mammals** | | | |
| Florida panther | *Puma concolor coryi* | E | May affect, not likely to adversely affect |
| West Indian manatee | *Trichechus manatus* | E | No effect |
| Florida bonneted Bat | *Eumops floridanus* | E | No effect |

5.2.6.1 Everglade Snail Kite

5.2.6.1.1 Alternative 1 – No Action

As discussed in the 2004 PSRP Final PIR/EIS and 2009 USFWS BO for the PSRP, effects to the Everglade snail kite are not expected within the project area.

5.2.6.1.2 Alternative 2 – East-West Tieback Levee

As discussed in the 2004 PSRP Final PIR/EIS and 2009 USFWS BO for the PSRP, effects to the Everglade snail kite are not expected within the project area. The Corps maintains the determination of "no effect" to the Everglade snail kite.

5.2.6.2 Wood Stork

5.2.6.2.1 Alternative 1 – No Action

Effects to the wood stork would be limited to what was previously discussed in the 2004 PSRP Final PIR/EIS and the 2009 USFWS BO under the No Action Alternative.

5.2.6.2.2 Alternative 2 – East-West Tieback Levee

Effects to the wood stork would be limited to what was previously discussed in the 2004 PSRP Final PIR/EIS and the 2009 USFWS BO. The Corps determined that the addition of the tieback levee "may affect, not likely to adversely affect" the wood stork.

5.2.6.3 Florida Panther

5.2.6.3.1 Alternative 1 – No Action

Effects to the Florida panther would be limited to what was previously discussed in the 2004 PSRP Final PIR/EIS and the 2009 USFWS BO under the No Action Alternative.

5.2.6.3.2 Alternative 2 – East-West Tieback Levee

As previously discussed, the tieback levee will affect approximately 53 acres of upland habitat; however, this loss will be offset by the restoration of approximately 55,000 acres of Picayune Strand. The Corps maintains the determination of "may affect, not likely to adversely affect" the Florida panther and will adhere to the terms and conditions within the 2009 USFWS BO.

5.2.6.4 Florida Bonneted Bat

5.2.6.4.1 Alternative 1 – No Action

Effects to the Florida bonneted bat without the conversion of the individual berms to a single full width tieback levee would be very minimal. Without the full width tieback levee surface water may re-circulate to the upstream side of the pump station by flanking the berm thereby reducing the success of hydrological restoration with would provide increased suitable habitat for the bat.

5.2.6.4.2 Alternative 2 – East-West Tieback Levee

Alternative 2, the single full width tieback levee, would reduce the re-circulation of surface flows around the edges of the berms. This would increase the success of hydrological restoration and improve available suitable habitat for the Florida bonneted bat. The Corps determined that the PSRP and tieback levee have "no effect" on the Florida bonneted bat.

Evidence of direct effects to the Florida bonneted bat as a result of the implementation of the PSRP is lacking, although negative effects to the species are unlikely. The restoration of natural hydrology in Picayune Strand and the surrounding protected public lands would likely increase available nesting and foraging habitat for the Florida bonneted bat. Therefore, the overall PSRP as described in the 2004 PSRP Final PIR/EIS, including the addition of the tieback levee, would have no effect on the Florida bonneted bat.

5.2.6.5 Eastern Indigo Snake

5.2.6.5.1 Alternative 1 – No Action

Effects to Eastern indigo snakes would be limited to what was previously discussed in the 2004 PSRP Final PIR/EIS and the 2009 BO under the No Action Alternative.

5.2.6.5.2 Alternative 2 – East-West Tieback Levee

As discussed in the 2009 USFWS BO, the USFWS determined that the PSRP "may affect, is likely to adversely affect" the Eastern Indigo snake. The addition of the tieback levee will not cause a significant change to the previous analysis; therefore, the Corps determined that the tieback levee for Merritt, Faka Union, and Miller Pump Stations "may affect, not likely to adversely affect" the Eastern Indigo snake. Terms and conditions outlined in the 2009 USFWS BO will be followed with the construction of the tieback levee.

5.2.6.6 Gopher Tortoise

5.2.6.6.1 Alternative 1 – No Action

No additional effects to gopher tortoises or their habitat would occur under the No Action Alternative.

5.2.6.6.2 Alternative 2 – East-West Tieback Levee

The footprint of the tieback levee under Alternative 2 would lead to a small increase in the permanent loss of upland habitat. However, this loss will be minimal and will not cause long-term detrimental effects to the gopher tortoise. The Corps determined that Alternative 2 will have "no effect" on the gopher tortoise.

5.2.6.7 Red-cockaded Woodpecker

5.2.6.7.1 Alternative 1 – No Action

Effects to the red-cockaded woodpecker would be limited to what was previously discussed in the 2004 PSRP Final PIR/EIS and the 2009 USFWS BO under the No Action Alternative.

5.2.6.7.2 Alternative 2 – East-West Tieback Levee

The tieback levee for the Merritt and Faka Union Pump Stations and the eastern portion of Miller Pump Station tieback levee will not affect the red-cockaded woodpeckers or their habitat; however, the western Miller Pump Station section of the tieback levee is located near an active colony. This colony is located in a mesic pine flatwood, west of the PSRP.

The South Florida Multi-species Recovery Plan (1999) states "Water depths in mesic pine flatwoods vary throughout the seasonal hydrologic cycle. Extreme ranges are from just below the surface to eight feet below ground surface. Typical ranges are from six inches to one foot below ground surface at the height of the wet season to six feet below ground surface in the late dry season. For most of the year, undrained mesic pine flatwoods have water within four feet below the ground surface (Abrahamson and Hartnett 1990)."

Modeling of Alternative 3D in the 2004 PSRP Final PIR/EIS showed that areas west of Miller Canal could remain dominated by mesic pine flatwoods in some areas and be converted to hydric pine flatwoods, wet prairie, or even cypress forests in some areas. However, it is important to note that the tieback levees were not included in the original design of Alternative 3D. Recent modeling indicated that the tieback levee would not effect private lands west of the Miller Pump Station. The tieback levee will terminate approximately 6,000 feet west of the Miller Pump Station. The Corps determined that the tieback levee "may affect, not likely to adversely affect" red-cockaded woodpeckers located in the mesic pine flatwoods west of the Miller Canal.

#### 5.2.6.8 American Crocodile

#### 5.2.6.9 Alternative 1 – No Action

As discussed in the 2004 PSRP Final PIR/EIS and 2009 USFWS BO for the PSRP, effects to the American crocodile are not expected within the project area.

#### 5.2.6.10 Alternative 2 – East-West Tieback Levee

The placement of the tieback levee will not affect the American crocodile or its habitat. The Corps maintains the determination reached in the 2004 PSRP Final PIR/EIS of "no effect" for the American crocodile.

### 5.2.7 ESSENTIAL FISH HABITAT

#### 5.2.7.1 Alternative 1 – No Action

Effects to the EFH would be limited to what was previously discussed in the 2004 PSRP Final PIR/EIS and the 2009 BO under the No Action Alternative.

#### 5.2.7.2 Alternative 2 – East-West Tieback Levee

The placement of the tieback levee will not adversely affect the EFH. The tieback levee will help facilitate flows to the south through the project area and restore flows to the Ten Thousand Islands Region creating an indirect beneficial effect to the EFH. The Corps maintains that the restoration of a more natural hydrology to the estuaries will have a positive effect on the EFH in the Ten Thousand Islands Region.

### 5.2.8 SOCIO-ECONOMIC

#### 5.2.8.1 Alternative 1 – No Action

There is the potential for pumped flows to return to the upstream side of the pump station under the No Action Alternative. In the Belle Meade area, west of the Miller Pump Station, private lands could possibly be effected by these recycled flows.

#### 5.2.8.2 Alternative 2 – East-West Tieback Levee

The construction and inclusion of the tieback levee will cause no additional socioeconomic effects over those described in the 2004 PSRP Final PIR/EIS. A ring levee was included in the 2004 PSRP Final PIR/EIS design. The intent of the ring levee was flood protection for the private land northwest of the Miller Pump Station. This can be achieved by the design of the western (Miller) portion of the tieback levee; therefore the ring levee was removed from the design.

### 5.2.9 AESTHETICS

#### 5.2.9.1 Alternative 1 – No Action

Effects on aesthetics would be limited to what was previously discussed in the 2004 PSRP Final PIR/EIS under the No Action Alternative.

#### 5.2.9.2 Alternative 2 – East-West Tieback Levee

The implementation of Alternative 2 would cause no additional effects to aesthetics over what was previously discussed in the 2004 PSRP Final PIR/EIS, other than the addition of the view of the levees from the pump stations.

### 5.2.10 RECREATION

#### 5.2.10.1 Alternative 1 – No Action

Effects on recreation would be limited to what was previously discussed in the 2004 PSRP Final PIR/EIS under the No Action Alternative.

#### 5.2.10.2 Alternative 2 – East-West Tieback Levee

The implementation of Alternative 2 would have no additional effect on recreation over what was previously discussed in the 2004 PSRP Final PIR/EIS.

### 5.2.11 WATER QUALITY

#### 5.2.11.1 Alternative 1 – No Action

There would be a change or impairment to water quality as a result of a No Action Alternative.

#### 5.2.11.2 Alternative 2 – East-West Tieback Levee

The water quality within wetlands in or adjacent to the tieback levee feature would have no change or impairment as a result of the implementation of Alternative 2. Only temporary construction-related effects are anticipated such as temporary slight increases in turbidity which will be minimized through the use of best management practices during construction as well as regulatory monitoring.

### 5.2.12 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTES

#### 5.2.12.1 Alternative 1 – No Action

The No Action Alternative would not require any remediation for HTRW.

#### 5.2.12.2 Alternative 2 – East-West Tieback Levee

All remedial activity has been completed within the tieback levee footprint. Implementation of Alternative 2 would cause no additional HTRW concerns.

### 5.2.13 AIR QUALITY

#### 5.2.13.1 Alternative 1 – No Action

Implementation of the No Action alternative for the tieback levee feature would have no change or impairment to air quality.

5.2.13.2 Alternative 2 – East-West Tieback Levee

The air quality at the PSRP would have no change or impairment as a result of implementation of Alternative 2. The only anticipated effects that may be considered are short-term particulate dust emissions from land clearing and moving operations during construction; however, best management practices will be used to control such emissions.

5.2.14 NOISE

5.2.14.1 Alternative 1 – No Action

Implementation of the No Action Alternative for the tieback levee feature would have no change or impairment to noise.

5.2.14.2 Alternative 2 – East-West Tieback Levee

The noise at the PSRP would have no change or impairment as a result of implementation of Alternative 2. During construction activity, short-term noise will be generated from the operation of construction equipment. All local and state noise regulations for construction will be adhered to during the construction phase.

## 5.3 CONFLICTS AND CONTROVERSY

A detailed discussion of conflicts and controversy for the PSRP can be found in Section 10 of the 2004 PSRP Final PIR/EIS. The following sections will discuss only conflicts and controversy relevant to the specific features identified since the overall PRSP, as described in the 2004 PSRP Final PIR/EIS, was deemed consistent during the public and agency review process.

Over the life of the PSRP, numerous meetings and discussions have focused on the potential effects on the West Indian manatee through the reduction of fresh water flows to the POI Basin. Various agencies have provided information and input relevant to potential effects and mitigation for the West Indian manatee.

Initial meetings were held with residents of the POI Marina and Orchid Cove prior to the selection of Alternative 27, Option 2. Residents were very concerned that changes to the location of the Faka Union Weir Number 1 would have a negative effect on their community and property values. This concern factored into the decision to eliminate alternatives that may alter the current Faka Union Weir Number 1.

## 5.4 CLIMATE CHANGE

The features discussed in this EA, when considered separately from the overall PSRP, will be insignificantly affected by climate change. The tieback levee is located just south of Interstate 75, approximately ten miles inland. Intermediate projections of sea level rise at 100 years post project estimate sea levels will rise approximately two feet in south Florida. This would cause a loss of approximately nine percent of the southern PSRP area. The manatee mitigation feature is also unlikely to be influenced by sea level rise since the preferred alternative will establish a connection with saline groundwater; however, freshwater for manatees to drink at the Faka Union Weir number 1 may

decrease with increasing sea level rise. As weather patterns change and more extreme weather events occur (i.e. more frequent cold periods), manatees are likely to become more reliant on artificial refugium like the POI Basin.

### 5.4.1 GREEN HOUSE GAS EMISSIONS

The Council on Environmental Quality (CEQ) has provided a draft guidance memorandum dated February 18, 2010 to help explain how agencies of the Federal government should analyze the environmental effect of greenhouse gas (GHG) emissions and climate change when they describe the environmental effects of a proposed agency action in accordance with Section 102 of NEPA and CEQ Regulations for Implementing the Procedural Provisions of NEPA, 40 C.F.R. Parts 1500-1508. CEQ proposes to advise Federal agencies to consider the effects of a proposed agency action on GHG emissions and consideration of current or projected effects of climate change on proposals for agency action. The draft guidance memorandum states that if a proposed action would be reasonably anticipated to cause direct emissions of 25,000 metric tons of Carbon Dioxide ($CO_2$)-equivalent GHG emissions on an annual basis, agencies should consider this as an indicator of a minimum level of GHG emissions that may warrant a quantitative or qualitative assessment. The proposed action is not anticipated to cause direct emissions of 25,000 metric tons of $CO_2$-equivalent GHG emissions on an annual basis. GHG emissions associated with the construction of tieback levee would occur from operation of diesel powered construction equipment and will be temporary in nature.

### 5.4.2 CHANGES IN WEATHER PATTERNS

The erratic and unusual shift in normal weather patterns due to climate change could potentially effect the proposed action. Rainfall amounts, including frequency and intensity, resulting from the effects of climate change are unknown and are projected to increase or decrease up to 20 percent (SFWMD, 2009).

### 5.4.3 SEA LEVEL RISE

#### 5.4.3.1 General Effect of Sea Level Rise on PSRP

Corps planning guidance (EC 1165-2-211) calls for evaluating the effects of sea level rise (SLR) under multiple scenarios. The multiple scenarios recommended include analysis of SLR at low, intermediate and high levels at 20, 50, and 100 years following the completion of project construction. The historic SLR as measured at the National Oceanic and Atmospheric Administration (NOAA) Key West tide station is 2.24 mm/yr. SLR has been calculated by the Corps for the low, intermediate and high scenarios at five year intervals per Engineering Circular (EC) 1165-2-211 guidance (Table 5-5 and Figure 5-2).

**Table 5-3. Low, intermediate, and high projections of sea level rise over 100 year span post construction (assumes project completion by 2017)**

| Year of Analysis | Low Projection (Based on Historic Rate at Key West) | Intermediate (Based on NRC Curve I) | High (Based on NRC Curve III) | Low Projection (Based on Historic Rate) | Intermediate (Based on NRC Curve I) | High (Based on NRC Curve III) |
|---|---|---|---|---|---|---|
| | (mm) | (mm) | (mm) | (inches) | (inches) | (inches) |
| 2017 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| 2022 | 11 | 19 | 45 | 0.4 | 0.7 | 1.8 |
| 2027 | 22 | 39 | 94 | 0.9 | 1.5 | 3.7 |
| 2032 | 34 | 60 | 149 | 1.3 | 2.4 | 5.9 |
| 2037 | 45 | 83 | 209 | 1.8 | 3.3 | 8.2 |
| 2042 | 56 | 106 | 274 | 2.2 | 4.2 | 10.8 |
| 2047 | 67 | 131 | 343 | 2.6 | 5.2 | 13.5 |
| 2052 | 78 | 157 | 418 | 3.1 | 6.2 | 16.5 |
| 2057 | 90 | 184 | 498 | 3.5 | 7.3 | 19.6 |
| 2062 | 101 | 213 | 583 | 4.0 | 8.4 | 22.9 |
| 2067 | 112 | 242 | 673 | 4.4 | 9.5 | 26.5 |
| 2072 | 123 | 273 | 768 | 4.9 | 10.7 | 30.2 |
| 2077 | 134 | 305 | 868 | 5.3 | 12.0 | 34.2 |
| 2082 | 146 | 338 | 973 | 5.7 | 13.3 | 38.3 |
| 2087 | 157 | 372 | 1083 | 6.2 | 14.6 | 42.6 |
| 2092 | 168 | 407 | 1198 | 6.6 | 16.0 | 47.2 |
| 2097 | 179 | 444 | 1318 | 7.1 | 17.5 | 51.9 |
| 2102 | 190 | 482 | 1443 | 7.5 | 19.0 | 56.8 |
| 2107 | 202 | 521 | 1573 | 7.9 | 20.5 | 61.9 |
| 2112 | 213 | 561 | 1708 | 8.4 | 22.1 | 67.2 |
| 2117 | 224 | 602 | 1848 | 8.8 | 23.7 | 72.8 |

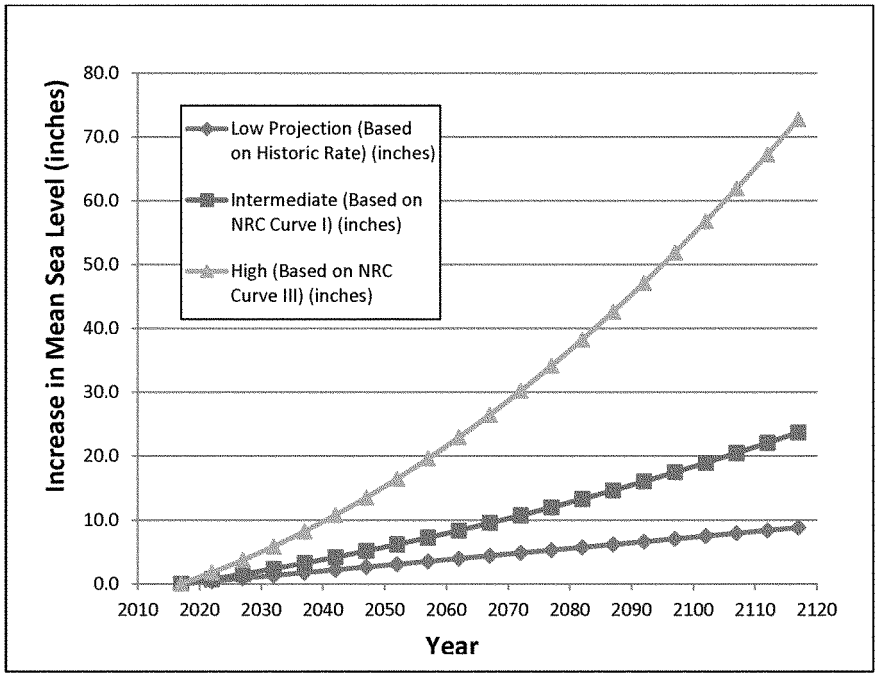



**Figure 5-2. Projected sea level rise at Picayune Strand (assumes construction completed in 2017)**

The Picayune Strand watershed is a sub-basin within the Big Cypress Basin. The highest elevation in the project area is about 10 feet North American Vertical Datum (NAVD) at Interstate 75, and the lowest elevation is about 3 feet NAVD at U.S. Highway 41. There are several sloughs that are 0.5 to 2 feet lower in elevation. Major freshwater plant communities in the project area include mesic hammock, mesic pine flatwoods, hydric hammock, hydric pine flatwoods, wet prairie, dwarf cypress forest, freshwater marsh, and mixed cypress and hardwood swamp forest. Salt marsh, mangrove forest, and estuarine habitats are found downstream of the project area in the Ten Thousand Islands National Wildlife Refuge. For long term sustainability, the major inland freshwater plant communities are dependent on an appropriate hydroperiod and depth of inundation during the growing season (Table 5-4). The numbers in the table represent long term average conditions and natural year to year variability would result in significant overlap between values for some of these communities.

**Table 5-4. PSRP Hydroperiods of Plant Communities**

| Picayune Plant Communities | Hydroperiod (months) | Water Level (in) Wet |
|---|---|---|
| Mesic Pine Flatwood, Mesic Hammock | </= 1 | </= 2 |
| Hydric Pine Flatwood, Hydric Hammock | 1-2 | 2-6 |
| Wet Prairie, Dwarf Cypress | 2-6 | 6-12 |
| Freshwater Marsh | 6-10 | 12-24 |
| Cypress Swamp Forest | 8-10 | 18-24 |
| Open Water | >10 | >/= 24 |
| Saltwater Marsh, Mangrove Forest | Tidal | Tidal |

5.4.3.2 Acres of Mean High Higher Water Mark (MHHW) Affected in Project Area

The PSRP project area covers about 55,440 acres. Table 5-5 shows the acres of mean high higher water (MHHW) within the project area, and the percentage of acreage that would potentially be affected by SLR at the corresponding levels in feet.

**Table 5-5. Acres of MHHW affected in Project Area**

| Depths | Acres of MHHW in Project boundary | Percentage affected in Project Area |
|---|---|---|
| MHHW | 673 | 1 |
| MHHW plus 1 FT | 2582 | 5 |
| MHHW plus 2 FT | 4765 | 9 |
| MHHW plus 3 FT | 8507 | 15 |
| MHHW plus 4 FT | 13840 | 25 |
| MHHW plus 5 FT | 19308 | 35 |
| MHHW plus 6 FT | 26702 | 48 |

5.4.3.3 Project Area Affected by SLR at 20 Years Post Construction

The low projection for SLR at 20 years post construction is 1.8 inches, the intermediate projection is 3.3 inches and the high projection is 8.2 inches. Due to limitations in topographic map accuracy, the low and medium projections will be rounded down and the high projection will be rounded to one foot. With the increase of one foot SLR under high projections, approximately five percent of the project area will be inundated.

5.4.3.4 Project Area Affected by SLR at 50 Years Post Construction

Note that 50-years post-construction extends beyond the authorized lifespan of the project, which ends in 2050. The low projection for SLR at 50 years post construction is 4.4 inches, the intermediate projection is 9.5 inches and the high projection is 26.5 inches. With the increase of two feet SLR under high projections, approximately nine percent of the project area will be inundated. Assuming that 50% of the anticipated project benefits will be achieved 10 years post construction and 100% achieved 20 years

post construction (Figure 5-3), the average annual loss of project benefits, as depicted on the blue line below, is approximately 5%.

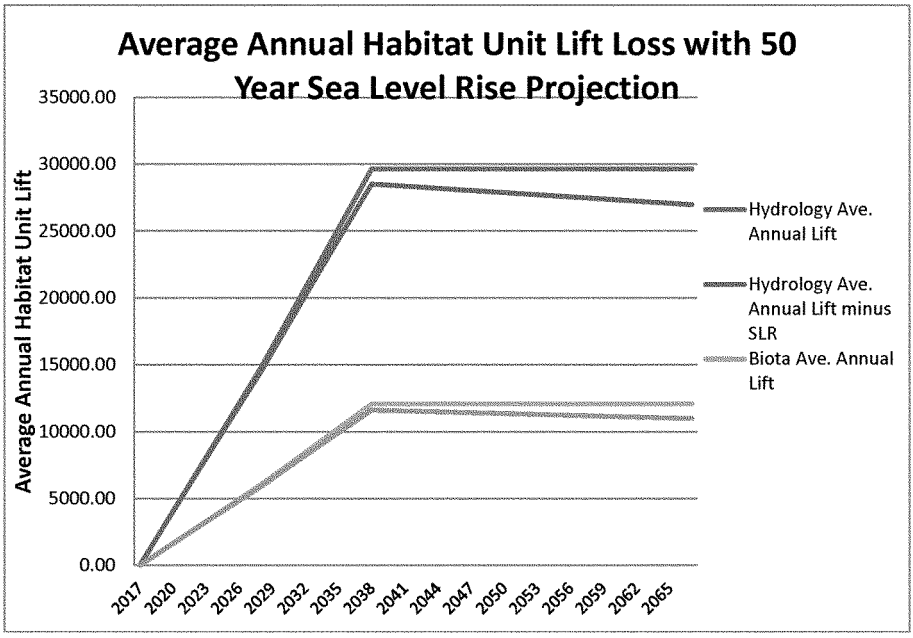



**Figure 5-3. Average Annual Benefits With and Without Sea Level Rise**

In addition to a loss of anticipated project benefits there would be a conversion of freshwater marsh to productive estuarine habitat resulting in a migration of inland habitat. A study conducted in the Ten Thousand Islands National Wildlife Refuge estimated a 35% increase in mangrove cover at the expense of marsh habitat from 1927 to 2005 (Krauss, et al., 2011). In areas where the coastline is unable to move inland, due to sea walls or other topography, a severe loss of wading bird habitat may occur (Galbraith, et al., 2002).

#### 5.4.3.5 Project Area Affected by SLR at 100 Years Post Construction

Note that 100-years post-construction extends far beyond the authorized lifespan of the project, which ends in 2050. The low projection for SLR at 100 years post construction is 8.8 inches, the intermediate projection is 23.7 inches and the high projection is 72.8 inches. With the increase of six ft SLR under high projections, approximately 48 percent of the project area will be inundated.

#### 5.4.3.6 Climate Change Conclusions

The analysis looked at the effect of SLR on the project area for the selected alternative, per the guidance provided in EC 1165-2-211. Inundation maps were generated to estimate approximately where seawater levels are projected to be in 20, 50 and 100 years after the completion of project construction. These inundation maps were then used to calculate percentages of the project area that would potentially be inundated by SLR. Note that any SLR effects happening beyond the year 2050 would occur after the authorized lifespan of the project.

The project area would likely be adversely affected by SLR if intermediate to high SLR rates were to occur for 50 years post-construction (year 2067) and beyond. Saltwater intrusion would result in a loss of freshwater plant communities; however, the acreages of affected plant communities cannot be accurately determined without more information and hydrological modeling. More information is needed to predict how SLR would affect freshwater plant communities and wildlife habitat. For a more accurate forecast of SLR effects, modeling of inundation levels and groundwater and surface water salinity levels would be required.

#### 5.4.3.7 Limitations/Recommendations on Climate Change

Without quantitative models, many types of potential hydrologic effects cannot be estimated. In some cases general hydrologic trends are known but rates and magnitude of change cannot be reliably estimated without advanced tools. Models are needed in order to ensure greater accuracy of potential effects to project benefits. Some of the hydrologic effects that cannot be reliably estimated without modeling include: changes in groundwater salinity, changes in groundwater seepage rates and directions, backwater effects in coastal canals and estuarine rivers or creeks, estuarine circulation, salinity, and tidal dynamics, flooding produced by a combination of rain and elevated groundwater tables (due to sea level rise), and storm surge affected by higher sea levels.

## 5.5 CUMULATIVE EFFECTS

Cumulative effects are defined in 40 Code of Federal Regulations (CFR) 1508.7 as those effects that result from:

> ...the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Cumulative environmental effects for the proposed project were assessed in accordance with guidance provided by the CEQ. The tieback levee and manatee mitigation feature are only two components of the PSRP. The PSRP as a whole provides hydrologic restoration for over 55,000 acres and provides additional benefits to the estuaries through the reduction of the freshwater point discharge in the Faka Union Canal as stated in the 2004 PSRP Final PIR/EIS. Several other ecosystem restoration projects that are being considered or have been completed will provide even greater benefit to the region. The

Southwest Florida Comprehensive Watershed Plan recommends the implementation of many important ecosystem restoration projects in Southwest Florida. The Tamiami Trail Critical Project involved road resurfacing and the construction of new culverts under US 41 to facilitate the more natural redirected flows through the PSRP. Although this project had overall beneficial effects, it could potentially increase overall vehicle use, which in turn, may pose long-term consequences to the Florida panther in the form of increased automobile-animal interactions.

Fish and wildlife resources, as well as threatened and endangered species, are vulnerable throughout the larger region. Urbanization, rural subdivisions, timbering, agriculture, and other land-clearing activities continue to destroy, degrade, and fragment their habitat. Lack of fire or infrequent fire that maintains habitat quality, invasion by exotic vegetation, and short-circuiting of the natural hydrology would persist as problems for all plant and animal species.

Eutrophication of water bodies and wetlands occur in southwest Florida through inappropriate disposal of domestic sewage and runoff of nutrient-laden water from urban and agricultural lands. The development of Northern Golden Gate Estates and other acreage in the region may cause long-term degradation of water quality entering the PSRP.

The hydrologic conditions most favorable to one species may not be the most favorable to another; however, all animals in this region have evolved to survive the hydrologic variability characteristic of the natural system. The reduced heterogeneity and extent of the present Picayune Strand State Forest habitat make certain species more vulnerable to natural and man-caused threats. Management actions may be required on a temporary basis to protect a particular species from a high risk of extinction, but long-term management goals should not be driven by the protection of a single species, but rather geared toward the sustainability of the entire ecosystem.

## 5.6 COMPATIBILITY WITH FEDERAL, STATE, AND LOCAL OBJECTIVES

The Corps has partnered with the SFWMD on this project. The proposed actions are consistent with the overall goals and objectives of the PSRP. It is expected that the proposed actions will be consistent with Federal, state, and local plans and objectives.

## 5.7 COMPLIANCE WITH ENVIRONMENTAL REQUIREMENTS

Coordination and evaluation of required compliance with specific Federal Acts, Executive Orders (E.O.) and other policies for the proposed actions were achieved, in part, through the coordination of this document with appropriate agencies and the public. Compliance for many of the environmental requirements was established with the 2004 PSRP Final PIR/EIS and is still applicable for this EA.

### 5.7.1 National Environmental Policy Act of 1969, As Amended

Environmental information on the proposed actions has been compiled and this EA has been prepared in compliance with the NEPA. A notice of availability of this EA will be

mailed to interested stakeholders describing the 30 day comment period. This EA will comply with all the NEPA requirements upon completion of the public review process.

### 5.7.2 Endangered Species Act of 1973, As Amended

Consultation with USFWS occurred for the Final PIR/EIS in 2004 and a finding of "no effect" was determined for the Everglade snail kite and American crocodile and a "may affect, not likely to adversely affect" for the Eastern Indigo snake and red-cockaded woodpecker. At the time of the 2004 PSRP Final PIR/EIS, there was insufficient information to make a determination on the wood stork, Florida panther, and West Indian manatee. These determinations were deferred to a later date.

In 2008 the Corps submitted a supplemental BA to USFWS with determinations for the wood stork, Florida panther, and West Indian manatee. The USFWS responded with the BO in 2009 with the determinations of "may affect, not likely to adversely affect" the wood stork and "may affect, likely to adversely affect" the Florida panther and the Eastern Indigo snake based on new information; however, more information was needed to make a determination for the West Indian manatee. A baseline study conducted from 2009 to 2011 by USGS indicated that the PSRP would have a negative effect on the thermal refugium in the POI Basin. The manatee feature proposed in this EA will be implemented to ensure the maintenance of a thermal refugium in the POI Basin. A Supplemental BA on the effects of the PSRP on the West Indian manatee and the effects of the manatee mitigation feature on other threatened and endangered species is included in Appendix E.

The placement of the tieback levee was also addressed during consultation with USFWS. The Corps maintains the determinations reached in the 2004 PSRP Final PIR/EIS and 2009 BO for this feature. USFWS provided concurrence in an email dated May 20, 2013 stating that the ESA consultation for the Merritt, Faka Union, and Miller tieback levees were completed as part of the 2009 USFWS BO. A copy of this email can be found in Appendix C (Correspondence). Any future changes to the original plan as outlined in the Final PIR/EIS and 2009 BO will undergo additional consultation under the ESA.

The ESA Consultation with the NMFS on the potential effects of the PSRP to species' under their jurisdiction occurred in October 2004. The updated PSRP will be included in a NMFS Programmatic Biological Opinion for the CERP.

### 5.7.3 Fish and Wildlife Coordination Act of 1958, As Amended

A discussion of the PSRP compliance with the Fish and Wildlife Coordination Act of 1958 can be found in Section 11.3 of the 2004 PSRP Final PIR/EIS. The USFWS Biologists have worked cooperatively with the Corps and SFWMD in the development of the proposed actions. This project is in compliance with this Act.

### 5.7.4 National Historic Preservation Act of 1966 (INTER ALIA)

The PSRP has coordinated with the SHPO and federally-recognized tribes and a determination of "no adverse effect" has been reached for all construction activity, including the tieback levee. Since the manatee mitigation feature was not included within the original project design, consultation with the SHPO will be completed prior to implementation.

### 5.7.5 Clean Water Act of 1972, As Amended

All state water quality standards will be met. A Section 404(b)(1) evaluation has been prepared and included as Appendix A. The Water Quality Certification will be met by obtaining a CERPRA permit. The project is in compliance with this Act.

### 5.7.6 Clean Air Act of 1972, As Amended

This project is in compliance with Clean Air Act General Conformity Rules. No air quality permits would be required for the features proposed within this EA.

### 5.7.7 Coastal Zone Management Act of 1972

A Federal consistency determination in accordance with 15 CFR 930 Subpart C is included in this report as Appendix B. State consistency review of the Corps determination will be performed during the public review of this EA.

### 5.7.8 Farmland Protection Policy Act of 1981

Coordination with the Natural Resource Conservation Service (NRCS) was completed for the 2004 PSRP Final PIR/EIS and for the addition of the manatee mitigation feature. This project is in compliance with this Act.

### 5.7.9 Wild and Scenic River Act of 1968, As Amended

No designated wild and scenic river reaches would be affected by project related activities. This Act is not applicable.

### 5.7.10 Marine Mammal Protection Act of 1972

Informal consultation to address the potential effects of the PSRP on the West Indian manatee was conducted in 2009 and a determination of "may affect, but not likely to adversely affect" was reached pending additional information. The PSRP is in the process of conducting consultation for the West Indian Manatee based on new information that the project may have an adverse effect on manatees at the POI Basin. The manatee mitigation feature proposed within this EA is a product of informal consultation with USFWS to ensure the continuance of a thermal refugium in the POI Basin. This project is in compliance with this Act.

5.7.11 Estuary Protection Act of 1968

In the 2004 PSRP Final PIR/EIS, the Corps considered the effects of the PSRP on the estuaries and bays of the Ten Thousand Islands Region. Most anticipated project effects are expected to be beneficial. The U.S. Environmental Protection Agency, which administers this law, has accepted the 2004 PSRP Final PIR/EIS as adequate. Please refer to Section 3.11 and 9.11 of the 2004 PSRP Final PIR/EIS for more information. This project is in compliance with this Act.

5.7.12 Federal Water Project Recreation Act of 1965, As Amended

The Florida Department of Agriculture and Consumer Services, Florida Forest Service will manage the PSRP as part of the PSSF. Outdoor recreation and fish and wildlife enhancement will be a large part of the forest management plan. This project is in compliance with this Act.

5.7.13 Submerged Lands Act of 1953

This project does not adversely affect submerged lands of the State of Florida. The project is in compliance with this Act.

5.7.14 Coastal Barrier Resources Act and Coastal Barrier Improvement Act of 1990

There are no designated coastal barrier resources within the project area. The project is in compliance with this Act.

5.7.15 Rivers and Harbors Act of 1899

The proposed actions would not obstruct navigable waters of the United States currently regulated by the Rivers and Harbors Act of 1899. Any modifications of navigable capacity caused by changes in water level in the canal system and its connections with tidal waters are authorized by the Congressional approval of the 2004 PSRP Final PIR/EIS. The project is in compliance with this Act.

5.7.16 Resource Conservation and Recovery Act (RCRA), As Amended by the Hazardous and Solid Waste Amendments (HSWA) of 1984, Comprehensive Environmental Response Compensation and Liability Act (CERCLA), Toxic Substances Control Act (TSCA) of 1976

This project is in compliance with this act. All remediation for hazardous, toxic, radioactive and waste, identified in the 2004 PSRP Final PIR/EIS, have been and will be identified and addressed by the project sponsor (land owner) prior to construction of these features.

5.7.17 Safe Drinking Water Act of 1974, As Amended

Implementation of the recommended alternatives will cause no change to the groundwater aquifer. Neither project alternative would have any effect on drinking water sources, thus, the project would remain in compliance with this Act.

### 5.7.18 Anadromous Fish Conservation Act

The PSRP would not affect anadromous fish species. The 2004 PSRP Final PIR/EIS was coordinated with the NOAA and the NMFS. The manatee mitigation feature is being coordinated with the NOAA National Marine Fisheries Service. This project is in compliance with this Act.

### 5.7.19 Migratory Bird Treaty Act and Migratory Bird Conservation Act

The PSRP, along with the proposed actions in this EA, should enhance natural habitat for migratory birds. The hydrologic restoration from the PSRP should also increase available forage species such as amphibians, fish and aquatic invertebrates for wading birds. This project is in compliance with this Act.

### 5.7.20 Marine Protection, Research and Sanctuaries Act

The PSRP does not involve any ocean dumping nor does it establish any marine sanctuaries. This project is in compliance with this Act.

### 5.7.21 Magnuson-Stevens Fishery and Conservation Management Act

This law addresses conversation of marine fish species of commercial importance, and requires consultation with the administrating agency, NMFS, on potential effects of proposed Federal projects in essential marine habitat for such species. Both the species and the habitat are defined by each Regional Fisheries Council. Information consultation with NMFS in 2004 determined that the PSRP is not likely to have a negative effect on EFH in the PSRP area. The net effect of the PSRP is expected to be beneficial through the rehydration of several estuaries to the west of the Faka Union estuary, with an improvement to the fish nursery habitats. The updated project components which include the tieback levees and manatee mitigation feature are outlined in this EA and have been coordinated with NMFS for potential impacts to recently designated critical habitat for the smalltoooth sawfish and EFH. The manatee mitigation feature is located north of designated smalltooth sawfish critical habitat above the Mean High Water Line, and inaccessible to sawfish because they are only hydrated during extreme storm events. This project is in compliance with this Act.

### 5.7.22 UNIFORM RELOCATION ASSISTANCE AND REAL PROPERTY ACQUISITION POLICIES ACT OF 1970 (PUBLIC LAW 91-646)

Acquisition of real estate is not required for the proposed actions. This project is in compliance with this Act.

### 5.7.23 E.O. 11990, Protection of Wetlands

The purpose of the PSRP is to restore wetland habitats. Wetlands assessments will be completed prior to the construction of the action. The project is in compliance with the intent of this Executive Order.

5.7.24 E.O. 11988, Flood Plain Management

The objective of the PSRP is to reestablish the natural floodplain hydrology. Flood hazards to NGGE were considered during the development of the 2004 PSRP Final PIR/EIS. Existing flood levels in NGGE and areas south of the PSRP will not be significantly or adversely affected. This project is in compliance with the intent of this Executive Order.

5.7.25 E.O. 12898, Environmental Justice

E.O. 12989 provides that each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority or low-income populations. No adverse effects to human health or the environment are anticipated as the result of the PSRP or additional features. Effects to "subsistence consumption of fish and wildlife resources" are not anticipated as a result of the proposed actions. See Section 10 of the 2004 PSRP Final PIR/EIS for more information. The project is in compliance with the intent of this Executive Order.

5.7.26 E.O. 13089, CORAL REEF PROTECTION

Those species, habitats, and other natural resources associated with coral reefs are not found in close enough proximity to the project area to be likely to derive either benefit or adverse effects from the implementation of the proposed action. This project is in compliance with the intent of this Executive Order.

5.7.27 E.O. 13112, Invasive Species

The PSRP has developed an aggressive Nuisance and Exotic Vegetation Control Plan. This plan is a part of the overall PSRP Monitoring Plan and can be found in the 2009 BO. This project is in compliance with the intent of this Executive Order.

5.7.28 E.O. 13045, Protection of Children

Executive Order 13045, requires each Federal agency to "identify and assess environmental risks and safety risks [that] may disproportionately affect children" and ensure that its "policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks." This project has no environmental health or safety risks that may disproportionately affect children. This project is in compliance with the intent of this Executive Order.

5.7.29 E.O. 13186, Migratory Birds

A monitor will be required to be on site during construction activities to provide pre-construction surveys and monitor for migratory birds. The project is in compliance with the intent of this Executive Order.

# 6.0 PUBLIC INVOLVEMENT

## 6.1 PUBLIC COORDINATION

The EA and Proposed Finding of No Significant Impact (FONSI) will be made available to the public, tribes, Federal, and state agencies by Notice of Availability. All correspondence pertaining to this EA will be included in Appendix C. Public coordination for the 2004 PSRP Final PIR/EIS is included in Section 10 of that document and is available at www.evergladesplan.org. A previous version of this EA including the tieback levee was released for public review on May 30, 2013. The May 2013 EA included an LRR to address project cost increases. This supplemental EA includes the tieback addition and addresses the addition of the manatee mitigation feature. Further, this EA incorporates comments submitted during the review of the May 2013 EA/LRR. The LRR portion of the report has been removed from this EA in an effort to allow adequate time for public review.

## 6.2 AGENCY COORDINATION

The Corps is in continuous coordination with other Federal and state resource agencies, business organizations, environmental organizations, and private citizens groups for the PSRP. The Corps will also coordinate with the federally recognized Tribal interests to ensure their participation with the design refinements discussed in this EA. This extensive coordination is a result of the magnitude of the Corps and the SFWMD efforts to implement the components of the PSRP. Previous related coordination undertaken for the PSRP is included in the 2004 PSRP Final PIR/EIS. Agency coordination letters for this EA are included in Appendix C.

## 6.3 LIST OF RECIPIENTS

The following stakeholders were provided Notice of Availability of this EA.

Native American Tribes
Miccosukee Tribe of Florida
Seminole Tribe of Florida

Federal Agencies
Bureau of Indian Affairs
Natural Resources Conservation Service
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
U.S. Department of Agriculture
U.S. Department of the Interior
U.S. Environmental Protection Agency
U.S. Department of Justice
Federal Highway Administration
U.S. Fish and Wildlife Service
Big Cypress National Preserve

State Agencies
Governor, State of Florida
Florida State Clearinghouse
Florida Department of Community Affairs
Florida Department of Environmental Protection
Florida Fish and Wildlife Conservation Commission
Florida Department of Health
Florida Department of State
Florida Department of Transportation
Florida Department of Agriculture and Consumer Services, Florida Forest Service
South Florida Water Management District

Regional Governments
South Florida Regional Planning Council

County Governments
Collier County

Municipal Governments
City of Marco Island
Mayor, Everglades City

Universities
Florida Gulf Coast University

Libraries
Collier County Public Library

Groups
Golden Gate Landowners, Inc.
Max Hasse Community Park
Port of the Islands Homeowner Association
Orchid Cove Homeowners Association

Individuals
A list of individuals who received notification of the release of the EA and Proposed FONSI is on file in the Jacksonville District, Planning Division and available upon request.

## 6.4 COMMENTS RECEIVED AND RESPONSE

A table summarizing comments received on the May 2013 LRR/EA (tieback levee) during the public review period and Corps' response is shown below in Table 6-1. The Draft LRR/EA released in May 2013 only described the addition of the tieback levee and not the manatee mitigation feature. Therefore, a supplemental EA was released in November 2014 for a second public review period to allow the public time to provide

comment on these features. Table 6-2 summarizes all comments and responses from the latter review period. Agency coordination letters for the May 2013 LRR/EA and the November 2014 EA can be found in Appendix C.

**Table 6-1: Comments Received on May 2013 Draft Limited Reevaluation Report and Environmental Assessment on Tieback Levee**

| Agency/Public | Comment | USACE Response |
|---|---|---|
| Florida Department of Agriculture and Consumer Services, Florida Forest Service – August 2, 2013 | Thank you for the opportunity to comment. We recommend all references in the document to either the "Florida Department of Forestry" or the "Florida Division of Forestry" be changed to indicate "Florida Department of Agriculture and Consumer Services, Florida Forest Service." We also suggest references to the "Fakahatchee Strand State Forest" be changed to "Fakahatchee Strand Preserve State Park." Another suggestion is that references to the "Picayune Strand State Forest" include the following "Picayune Strand State Forest (under Lease Agreement number 3927 from the Board of Trustees of the Internal Improvement Trust Fund of the State of Florida (the land owner)." Please remember management goals in the Picayune Strand State Forest are based upon Management Plans created with input from many various interested organizations as well as the public. A final comment on this draft document relates to the Red-Cockaded Woodpecker (RCW) populations that this document indicates could be impacted by the project. If this project might impact RCW populations in the Picayune Strand State Forest and the Florida Forest Service is expected to undertake the monitoring of RCW populations for impact, additional funding should be provided to help cover these costs. We look forward to working with the U.S. Army Corps of Engineers and other partners on this and other projects. Thank you! | All References to either the "Florida Department of Forestry" or the "Florida Division of Forestry" were changed to indicate "Florida Department of Agriculture and Consumer Services, Florida Forest Service" and references to the "Fakahatchee Strand State Forest" were changed to "Fakahatchee Strand Preserve State Park.<br><br>Picayune Strand State Forest (under Lease Agreement number 3927 from the Board of Trustees of the Internal Improvement Trust Fund of the State of Florida (the land owner) was added to first reference to PSSF.<br><br>No additional monitoring of RCW's has been identified within the PSRP.<br><br>Thank you for your continued support of the PSRP. |

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| Agency/Public | Comment | USACE Response |
|---|---|---|
| Florida Department of Environmental Protection – July 31, 2013 | The DEP has long supported the Picayune Strand Project. It was placed on the Conservation and Recreation Acquisition List in 1985. Unprecedented staff time and resources have been committed for the acquisition of over 55,000 acres of land over the period of a decade, and staff continues to actively participate in the project delivery team. The DEP submitted comments on the draft and final EIS demonstrating support 0f the project in 2004. In addition, the DEP formally approved what was then known as the CERP Southern Golden Gate Estates project pursuant to Section 373.026(8)(b), F.S., which directs the DEP to approve each CERP project component before it is submitted to Congress for federal authorization or receives an appropriation of state funds. The State of Florida has invested significant financial and staff resources towards this important hydrologic and ecologic restoration project and is committed to continuing restoration efforts. | Thank you for your comments and continued support of the PSRP. The FDEP is an important and valued partner on the PSRP. |

| Agency/Public | Comment | USACE Response |
|---|---|---|
| FDEP-2 | The Department recently (May 2, 2013) issued a permit modification for the final major phase of the project, construction of the Miller Canal Pump station and road removal. The draft LRR/EA states on Page 1-5, Section 1.8.1, that "To date, state water quality certification has been obtained for the tieback levees, spreader canals, canal plugs, and road removal features." Please note that while the features described in the EA are covered by the permit (which includes state water quality certification), it only includes conceptual authorization of canal plugging and demolition of weirs and bridges in the Faka Union and Miller canals. In order to plug the Faka Union and Miller Canals, the protection features (earthen levees to maintain existing levels of flood protection to adjacent private lands) must be completed, as acknowledged in the draft LRR/EA. There are additional hydrologic and hydraulic modeling efforts that are ongoing and associated with project assurances needed by the Department to issue authorization for features under state law. Consultation with the Department is required to determine whether or not a permit modification is necessary prior to the implementation of these features. Please review CERPRA Permit (File No. 0288313-008) and revise the relevant text throughout the document accordingly. | Concur. For brevity, the statement was written in general terms appropriate for an LRR to describe the overall project while not distracting from the main purpose of the document. To be strictly accurate, the permit does authorize canal plugs within the Merritt Canal as well as the "Special" plugs located at the tieback levee and spreader berm canal crossings for all three phases. While the LRR does not constitute a compliance document and the Corps acknowledges that the CERPRA permit most accurately defines the authorized features, this sentence will be revised to try and be more specific to the distinction of the canal plugging authorization. However, it is important to acknowledge that the currently permitted features do allow for the potential to realize some project benefits if not all during this phased implementation approach. Canal plugging is essential for this, as with even limited canal plugging, some benefits are expected. |

| Agency/Public | Comment | USACE Response |
|---|---|---|
| FDEP-3 | The draft LRR/EA states that remaining project components to be constructed are the protection features and the manatee mitigation feature. Please note that, in addition to the conceptual authorizations described above, these features will also require additional review and permit authorizations from the Department. The draft LRR/EA states on Page 2-7, Section 2.5.2, that "In the 2004 PSRP Final PIR/EIS cost estimate, the cost for the construction of the 6Ls Farm, Port of the Islands (POI), and protection features assumed that all earthen material would be obtained from the construction site. However, subsequent geotechnical investigations revealed that a majority of the onsite material is unsuitable for levee construction. Therefore, current LRR/EA estimates for each of the three protection features assume that the foundations for the levees will be excavated and replaced with suitable quarry material hauled in from offsite." This statement implies that a levee at 6Ls Farm, Port of the Islands and other private lands (presumably the northwest private lands) are needed. It is the Department's understanding that modeling has confirmed that there is no need for a levee at Port of the Islands nor at the northwestern privates lands (a re-location of a canal is planned to maintain levels of flood protection here). The only levee protection feature currently under design is the 6Ls protection feature. Please revise the above text to eliminate confusion on these points. As acknowledged in the draft LRR/EA, the restoration benefits will be realized when all identified roads are degraded and the Merritt, Faka Union and Miller Canal plugs can be installed. In order to plug the Faka Union and Miller Canals, the needed protection features must be completed. | Section 2, Design and Cost Changes, was included in the original LRR) and EA) but has since been removed from this EA. However, this comment will be addressed in the separate revised LRR. |

| Agency/Public | Comment | USACE Response |
|---|---|---|
| FDEP-4 | The draft LRR/EA states on Page 4-7, Section 4.12, that "Anticipated remediation actively still remains for the Belle Meade area, located within the project operational flowway, pending completion of ongoing Phase I/II Remediation Reports." The Department received a copy of the Corrective Actions Report for the Belle Meade project area based on the results of the Phase I/II Environmental Site Assessment (July 2012) on January 14, 2013. The Department's Waste Cleanup Section provided a letter on February 22, 2013, stating that the assessment is complete and no further assessment is warranted. Please coordinate with the Department's Division of Waste Management and revise your records and the text accordingly. | Concur; however, it is the Corps understanding that there are still lands located to the north of the 6Ls that will need an HTRW evaluation and/or remediation before construction can commence. Text will be updated in the LRR. |
| FDEP-5 | The draft LRR/EA states on Page 5-7, Section 5.1.5.5.1, that "Modeling is currently being conducted to confirm the need for the western portion of the Miller tieback levee to prevent impacting private lands." It is the Department's understanding that the modeling results clearly indicate that the original levee design can be shortened to approximately 6,000 feet west of the Miller Pump Station. Elimination of this unneeded portion of the tieback levee will avoid impacts to wetlands that exist beyond the 6,000 feet. The USACE determined that the tieback levee "may affect" the Red Cockaded Woodpecker located in the mesic pine flatwoods west of the Miller Canal." It is important to note that the permit authorization only includes construction of the Miller tieback levee to approximately 6,000 feet west of the pump station, based on the plans on file with the Department. Please revise the text to make these points clear. | Statement was revised to clarify that the Miller tieback levee would end approximately 6,000 feet west of the Miller Pump Station. |

| Agency/Public | Comment | USACE Response |
|---|---|---|
| FDEP-6 | The Department has several comments regarding the Coastal Zone Management Consistency in Appendix D. While the section appropriately recognizes that the Department must review the draft EA under Chapter 403, F.S., it does not appear there has been a thorough review or adequate documentation to support the conclusions made regarding other chapters of Florida Statutes that the Department is responsible for administering: | Coastal Zone Management Consistency determinations will be reviewed to ensure a thorough review has been conducted. See responses to subsequent comments. |

| Agency/Public | Comment | USACE Response |
|---|---|---|
| FDEP-7 | Chapter 253, State Lands. Please note that as staff to the Board of Trustees of the Internal Improvement Trust Fund (i.e., Governor and Cabinet), the Department is required to review activities for a determination of effects of state-owned lands. There may be activities which affect state-owned lands within the Picayune Strand State Forest subject to Board of Trustees Lease No. 3927 to the Florida Department of Agriculture and Consumer Services, Florida Forest Service. As such, additional coordination with the Florida Forest Service may be required, as noted in Specific Condition No. 34 of the CERPRA Permit (File No. 0288313-008) issued to the USACE for construction and interim operation of the project. The activities may also affect state-owned lands within Collier-Seminole State Park and, as such, additional coordination with the Department's Division of Recreation and Parks, who manages Collier-Seminole State Park, may be required. Right of Entry from the SFWMD may also be required. There is also a Cooperative Agreement between the SFWMD and Board of Trustees of the Internal Improvement Trust Fund for the CERP Central and Southern Florida, Picayune Strand Restoration Project. As such, activities outside of the scope of the Cooperative Agreement may require additional coordination and/or authorization. | The LRR phase does not signify the commencement of activity. As the comment states, Specific Condition #34 in the referenced permit requires coordination with and notification to the Florida Forest Service of the commencement of activity of all project phases. The Corps intends to continue this coordination prior to the start of construction and operations as has been done for all previous activities.<br><br>The Project Sponsor, the SFWMD, is responsible for obtaining all Real Estate Certifications and/or Rights of Entry as well as coordination with all other land owners for any other authorizations and/or cooperative agreements that may be needed. |

| Agency/Public | Comment | USACE Response |
|---|---|---|
| FDEP-8 | Chapter 258, State Parks and Aquatic Preserves. Some of the activities (i.e., 6Ls protection feature) described in the EA are adjacent to Collier-Seminole State Park, and it has been determined that other activities associated with the project may also affect state-owned lands within Collier-Seminole State Park. As such, additional coordination with the Department's Division of Recreation and Parks, who manages Collier-Seminole State Park will be required. Although modeling performed thus far may be interpreted to suggest additional conveyance under US-41 may not be needed, it is recognized by project partners that additional conveyance under US-41 may in fact be needed under US-41 in order to restore natural sheetflow and realize potential hydrologic benefits within and near Collier-Seminole State Park. The state lands within the Park are home to diverse biological communities as well as threatened and endangered species that may be affected by changes in water levels and hydroperiods. The Park also includes public facilities that may be impacted by changes in hydrologic conditions. Continued coordination with the Department's Division of Recreation and Parks is necessary to ensure that potential hydrologic benefits within the Park are realized and potential impacts to Park facilities are minimized. Right of Entry from the SFWMD may also be required. | Please reference the response to comment number FDEP-7 that addresses the Real Estate and coordination concerns.<br><br>As the comment acknowledges, at this time, modeling indicates that additional conveyance is not necessary under US-41. Additionally, any such need for conveyance would extend the project outside of the authorized boundaries and outside of the congressional authorizations. The focus of this LRR is to request additional funds for features that have already been designed and/authorized. |

| Agency/Public | Comment | USACE Response |
|---|---|---|
| FDEP-9 | Chapter 373, Water Resources. Please note that the authorities provided by this chapter are much broader than what is summarized. The Department's determination of consistency with CZMA includes a review and determination of consistency with state law, including, but not limited to, the permit authorization required by Section 373.1502, F.S., for CERP projects. | The Corps understands that this authority is broader for CERP projects; Chapter 373 will be reviewed to ensure this Chapter is summarized correctly. |
| Florida Department of State, Division of Historical Resources and State Historic Preservation Officer – July 12, 2013 | This office reviewed the referenced draft limited reevaluation report and environmental assessment to identify issues for possible concerns regarding impact to historic properties listed, or eligible for listing, in the *National Register of Historic Places*, that should be addressed in the final statement. Our review was conducted in accordance with Section 106 of the *National Historic Preservation Act of 1966* as amended, the National Environmental Policy Act (NEPA), and their implementing regulations.<br>We reviewed the information provided, and note that the U.S. Army Corps of Engineers is implementing a monitoring plan in which will be present during all construction activities to ensure that archeological sites are not affected by the Picayune Strand Project. Conditioned upon this monitoring, this agency concurs with the finding of no significant impact on historic properties. | Monitoring Plan will be implemented prior to and during all construction activities. Thank you for your continued support. |

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| Agency/Public | Comment | USACE Response |
|---|---|---|
| Southwest Florida Regional Planning Council (SWFRPC) – July 11, 2013 | The staff of the Southwest Florida Regional Planning Council reviews various proposals, Notifications of Intent, Pre-applications, permit applications, and Environmental Impact Statements for compliance with regional goals, objectives, and policies, as determined by the Strategic Regional Policy Plan. The staff reviews such items in accordance with the Florida Intergovernmental Coordination and Review Process (Chapter 291-5, F.A.C.), and adopted regional clearinghouse procedures. These designations determine Council staff procedure in regards to the reviewed project. The four designations are:<br>Less Than Regionally Significant and Consistent - No further review of the project can be expected from Council.<br>Less Than Regionally Significant and Inconsistent - Council does not find the project of regional importance, but will note certain concerns as part of its continued monitoring for cumulative impact within the noted goal area.<br>Regionally Significant and Consistent - Project is of regional importance, and appears to be consistent with Regional goals, objectives, and policies.<br>Regionally Significant and Inconsistent - Project is of regional importance and does not appear to be consistent with Regional goals, objectives, and policies. Council will oppose the project as submitted, but is willing to participate in any efforts to modify the project to mitigate the concerns.<br>The SWFRPC has determined that the Draft Limited Reevaluation Report (LRR) and Environmental Assessment (EA) and request for additional funding from Congress is **Regionally Significant and Consistent with the Southwest Florida Regional Strategic Policy Plan**. | Thank you for your continued support of the PSRP. We look forward to coordinating with the SWFRPC in the future. |

**Table 6-2: Comments Received on the November 2014 Draft Final Environmental Assessment**

| Agency/Public | Comment | USACE/SFWMD Response |
|---|---|---|
| Florida Department of Environmental Protection 01/20/15 | **Section 1.2.2 – Manatee Mitigation Feature** This section states that material will be excavated and placed on the Faka Union spoil berm both north and south of the construction feature, however the CERPRA permit application provided by SFWMD includes placing spoil only south of the feature. Please revise. | Per discussion with the SFWMD, the spoil material will be placed north and south of the feature. The SFWMD has submitted a revised permit application for both CERPRA and 404 permits. |
| FDEP-2 | **Section 1.3 – Location** In this section for location, please explain in the last paragraph that the manatee mitigation feature is located on lands managed by Rookery Bay National Estuarine Research Reserve. | Concur. The final EA will be revised to incorporate the recommended revision. |
| FDEP-4 | **Section 1.4 – Project History** On page 1-8, in the paragraph regarding the Faka Union Pump Station, it states that this construction phase includes canal plugging and is scheduled to be completed in April 2015. The paragraph below further explains that additional flood protection features and the manatee mitigation feature must be complete before the Faka Union and Miller canals can be plugged. Please revise the paragraph regarding the Faka Union Pump Station construction contract to clarify that canal plugging will not be completed in April 2015, but will be at a later date once the other necessary features are complete. | The paragraph in this section has been revised that removes canal plugging from the scheduled completion of April 2015. The canal plugging will not occur until the additional flood protection and manatee mitigation features are in place as stated in the subsequent paragraph. |
| FDEP-5 | **Section 5.1.11.2 – Water Quality** This section states that the water quality at the POI Basin would have no change or impairment as a result of the implementation of Alternative 27 Option 2 and that only temporary construction related effects are anticipated. Please include a discussion of the possibility that local, albeit temporary impacts may occur when the Feature is opened (first flush). | The Manatee Mitigation feature has been designed and will be operated to minimize a "first flush" effect. Specifically, when the feature is closed there is no anticipation that the head stage within the feature will be higher than the canal's head stage. Consequently when the feature is first opened the exchange of water |

| Agency/Public | Comment | USACE/SFWMD Response |
|---|---|---|
| | | between the feature and the canal will be tidally driven. The density difference between the tidal stream entering the feature and pool held within the feature will promote mixing and subsequently the dilution of the pooled water prior to its release into the canal; release will be two way with a rising tide moving water through the culverts and a falling tide pulling water downstream through the mouth of the southern oxbow. The SFWMD anticipates that this strategy will minimize any "first flush" impacts to the zone immediately associated with the downstream side of the culverts. |
| FDEP-6 | **Section 5.1.4.2 - Wetlands (Alt 27 Option 2)** Page 5-2 states that there will be approximately 2 acres of mangrove swamp impact. The CERPRA permit application and Uniform Mitigation Assessment Method (UMAM) Analysis identified two types of wetland habitat to be impacted: 0.43 acres of mangrove swamp and 1.79 acres of freshwater marsh. Please revise this section to be consistent with the most current UMAM analysis. | The exact acreage may change with submittal of the revised design and permit application. This section will be revised, as necessary, to reflect the actual acreage amounts in the revised permit application. |
| FDEP-7 | **Section 5.1.4.2 - Wetlands (Alt 27 Option 2)** The end of the section states that the "impacts to mangroves are expected to be mitigated by the overall improvement of mangrove conditions south of US 41 through hydrologic restoration of the PSRP area." Please update this sentence to reflect the freshwater marsh mitigation and mangrove swamp mitigation to be consistent with the Mitigation Report, Attachment 16 of the CERPRA permit application. | Concur. This section will be revised to ensure freshwater marsh mitigation and mangrove swamp mitigation is consistent with the permit application. |
| Florida Fish | The Standard Manatee Conditions for In-Water Work (2011) | Concur. Reference to the Standard Manatee |

| Agency/Public | Comment | USACE/SFWMD Response |
|---|---|---|
| and Wildlife Conservation Commission 01/20/15 | must be followed for all in-water activity. | Conditions for In-Water Work has been included in the final EA. |
| FWC-2 | No dredging in waters accessible to manatees during the winter season (November 15 through March 31). FWC recommends that all dredging or excavation of the manatee mitigation feature take place prior to connecting the Faka Union canal to the mitigation feature. If dredging or excavation takes place after the mitigation feature is connected to the Faka Union canal at least one dedicated observer that has been approved by the Florida Fish and Wildlife Conservation Commission (FWC) shall be present at any given time when dredging work is being performed and shall perform no other duties that may interfere with their ability to observe for protected marine species. FWC approval must be specifically for this project and approval must occur prior to work commencement as per FWC guidelines outlined at the following website: http://www.myfwc.com/wildlifehabitats/managed/manatee/watch-program/. Observer(s) must have prior on-the-job experience observing protected marine species (such as manatees or marine turtles) during previous dredging and in-water work where the activities were similar in nature to this project. Observer(s) shall have the authority to cease project operations: 1) upon sighting a manatee within 50 feet of any in-water construction or vessel activity; and 2) if detection of protected marine species is not possible due to weather or other conditions. A final report shall be sent to the FWC. | Concur. All excavation is planned to occur prior to connection with the Faka Union Canal. The recommended language will be inserted into the final EA; and coordinated with FWC. |
| FWC-3 | No nighttime dredging shall occur in waters accessible to manatees. | Concur. Language stating no dredging at night in waters accessible has been inserted into the final EA. |
| FWC-4 | If blasting may be required a "Blast and Manatee Watch Plan" will be required prior to construction of the manatee mitigation | Concur, a Blast and Manatee Watch Plan will be |

| Agency/Public | Comment | USACE/SFWMD Response |
|---|---|---|
| | feature. The "Blast and Manatee Watch Plan" will require the approval of the FWC and the U.S. Fish and Wildlife Service (FWS). Under the condition described above the "Blast and Manatee Watch Plan" will require aerial monitoring. To reduce construction costs due to monitoring and potential negative impacts to manatees and other fish and wildlife, FWC recommends that all blasting be conducted prior to any water connection between the Faka Union Canal and the Manatee Mitigation Feature site. | prepared and provided to Collier Co, FDEP, FWC, and USFWS for review. It is currently anticipated that all blasting will occur prior to connection with the Faka Union Canal, no blasting will occur after Nov 1, and during blasting observers will be on site during blasting. |
| FWC-5 | To avoid adverse impacts to manatees the applicant, prior to installation, shall send design plans for the boat barrier to the FWC and FWS for review and approval. The proposed boat barrier shall be designed to prevent entanglement or entrapment of the manatees. Additionally, the FWC Office of Boating and Waterways shall be contacted regarding permitting and placement of any navigational related signs or buoys at http://myfwc.com/boating/waterway/markers/. | Concur |
| FWC-6 | To reduce the risk of entrapment of manatees, manatee exclusion devices (such as grating) shall be installed and maintained over any existing or proposed pipes or culverts greater than 8 inches, but smaller than 8 feet in diameter that are submerged or partially submerged and reasonably accessible to manatees. Exclusion devices (such as horizontal or vertical bars for grates) shall allow openings with no more than 8 inch distances on center at the accessible end(s) during all phases of the construction process and as a final design element to restrict manatee access. The proposed operational plan provided in the application must be modified to make clear that the grating will remain in place during flushing activities. If grating is required to be removed, FWC and FWS shall be contacted, prior to removal of the grating, to provide guidance for monitoring the culverts to prevent manatee entrapment. | Concur, the designs and specifications specify that manatee exclusion devices that meet FWC and USFWS standards be installed on all culverts. |

| Agency/Public | Comment | USACE/SFWMD Response |
|---|---|---|
| FWC-7 | The permittee shall follow the FWC and FWS approved monitoring plan for this project. In order for the permittee or their agent to carry out the proposed manatee monitoring plan, access to the manatee mitigation feature by monitoring and research personnel will be necessary. Design and construction of structures that will be needed to support the monitoring activities can be accomplished without adversely affecting manatees by coordinating with FWC and FWS prior to implementing the monitoring plan. Structures expected to be needed to support monitoring activities include, shoreline dock or tie-off for a small vessel near the mitigation feature, upland boardwalk and multiple viewing platforms alongside the manatee mitigation pools that can be used for Manatee counts, photo identification and visual health assessments, and a small beach inside the mitigation feature where manatee capture, rescue, recovery and medical care can be provided. | Concur. SFWMD will coordinate with FWC and USFWS concerning the design of the monitoring stations within the oxbow. |
| FWC-8 | An FWC Gopher Tortoise Conservation Permit will be required for this project to allow for the relocation of gopher tortoises currently on the project site. | Concur, coordination with FWC on the removal of the gopher tortoises is on-going. |
| Florida Department of State, Division of Historical Resources 01/20/15 | **Tieback Levee**<br>Our records indicate that we previously reviewed this project area (DHR Project #2013-2749, letter date July 12, 2013). Our comments of July 2013 still stand. Therefore, based on the information provided, it is the opinion of this agency that the project will have no adverse effect on historic properties, so long as a professional archaeologist monitors during all construction activities and all recorded sites are avoided. | Concur: The Corps has coordinated monitoring requirements for the tieback levee with SHPO and will continue to work with the SFWMD to ensure monitoring during construction activities. Note that cultural resource monitoring associated with the supplemental EA is only for construction monitoring. It is not associated with operation monitoring. Cultural resource operational monitoring requirement is covered by a separate consultation. And has been included in the Operational Plan. |
| SHPO-2 | **Manatee Mitigation Feature**<br>In April 2014, Janus Research conducted a cultural resource | Concur: The Corps has been in contact with SHPO and will continue to work with the |

| Agency/Public | Comment | USACE/SFWMD Response |
|---|---|---|
| | reconnaissance survey of the proposed Manatee Mitigation area on behalf of the SFWMD (DHR project #2014-4068). Janus relocated archaeological site 8CR191 and concluded it appears to be redeposited material from the excavation of the Faka Union Canal. The site was determined ineligible for listing on the National Register. No further cultural resources from an undisturbed context was identified within the project area. However, due to the presence of archaeological material in this area, our office recommends that all ground disturbing activities be monitored by a trained cultural resources monitor. The results of which should be forwarded to this office once the project is complete. | SFWMD to ensure monitoring is conducted during ground disturbance on the manatee refugium. According to the Manatee Mitigation Area consultation with SHPO, construction monitoring was recommended by SFWMD's consultant with SHPO concurrence. Based on discussions between the District, DHR and Janus Research, the proposed ground disturbing activities are to take place away from the footprint of the 'redeposited material' and with sufficient buffer in between (approximately 800 feet). Prior to the Contractor starting any work, the SFWMD will provide training (by a professional archaeologist) on cultural resources. Additionally, an archaeological consultant will be available on an 'on-call' basis in the event that the expertise is required. |

## 7.0 LIST OF PREPARERS

The people who are responsible for contributing to this Environmental Assessment (EA) for the PSRP are listed in the table below (Table 7-1). In addition to the individuals listed below, this EA and proposed FONSI were reviewed by the supervisory chain of the Environmental Branch and Planning Division of the U.S. Army Corps of Engineers, Jacksonville District.

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Tab A

# Appendix A

# Section 404 (b) Evaluation

# APPENDIX A
# SECTION 404(b) EVALUATION

Picayune Strand Restoration Project
Tieback Levee
COLLIER COUNTY, FLORIDA

## I. Project Description

a. Location

The Picayune Strand Restoration Project (PSRP) is located in Collier County, Florida, between I-75 and US-41 (Tamiami Trail). It is east of the Belle Meade State Conservation and Recreation Lands (CARL), west of Fakahatchee Strand State Forest, southwest of the Florida Panther National Wildlife Refuge and north of the Ten Thousand Islands National Wildlife Refuge. The tieback levees will be located directly south of the pump stations in the PSRP area. The manatee mitigation feature will be located west of the Faka Union Canal in the existing spoil berm just south of the Port of the Islands marina.

b. General Description

The tieback levee is considered a refinement of the original design, but increased the footprint of the project. The component described is the substitution of a single full width tieback levee for the Merritt, Faka Union, and Miller Pump Stations in place of individual berms for each pump station. The manatee mitigation feature has been included in the project through informal ESA consultation to ensure the continuance of the POI Basin as a thermal refugium for manatees.

c. Authority and Purpose

The PSRP was authorized for construction by the Water Resources Development Act of 2007. The purposes of the tieback levees are to prevent the recycling on pumped water to the upstream side of the pump stations. The purpose of manatee mitigation feature is to ensure a thermal refugium in the POI Basin.

d. General Description of Dredged or Fill Material

(1) General Characteristics of Material

Duever et al. (1986) classified four major soil groups (rock, sand, marl, and organics) in the Big Cypress National Preserve. These major soil groups are also found in the Southern Golden Gate Estates area. Fractured limestone rock is generally found at shallow depth with outcrops occurring throughout the Project Area. Spoil materials from the original construction of the canals and roads are a combination of the above soils and limestone rock. The fill material for the tieback levee is classified per project specifications as random fill. The excavated material from the construction of the manatee mitigation feature will be disposed of onsite and will likely consist of limestone rock similar to material found within the PSRP.

(2) Quantity of Material (cubic yards)
Table 1. Fill, Excavation, and Clearing

| PSRP | Fill (cubic yards) | Excavation (cubic yards) | Clearing (acres) |
|---|---|---|---|
| Tieback levee | 386,000 | 231,000 | 1,000 |
| Manatee Mitigation Feature | 3,500 | 195,000 | 10 |

(3) Source of Material.
Fill and levee material will be recovered from road subsurfaces and road/canal spoil generated during the original construction. If additional material is required, material will be hauled in from an approved off-site source. The Miller Pump Station construction phase specifies that material be brought in from offsite since significant onsite material shortages were encountered during the construction of the tieback levee in the Faka Union and Merritt construction phases.

e. Description of the Proposed Discharge Site(s)

(1) Location.
The location of the project is shown in Figure 1-1 of the Environmental Assessment.

(2) Size.
Tieback levee footprint is approximately 62 acres. The manatee mitigation feature is approximately 10 acres.

(3) Type of Site.
The tieback levee and manatee mitigation feature are located mostly on uplands, however, isolated pockets of hydrated wetlands may be encountered. Approximately 2 acres of mangrove wetlands may be impacted with the implementation of the manatee mitigation feature.

(4) Type(s) of Habitat.
The tieback levee area is primarily disturbed woodland pine habitat. The manatee mitigation feature is located primarily on woodland pine habitat created by the placement of spoil from the creation of the Faka Union Canal. A small portion of this feature may be located on mangrove wetlands but it is likely that is footprint may be reduced.

(5) Timing and Duration of Discharge.
No effect.

f. Description of Disposal Method.
Fill material will be disposed of within the project area.

II. Factual Determinations

a. Physical Substrate Determinations.

(1) Substrate Elevation and Slope.
The project lies within Florida's coastal lowlands, in a region that is less than 13 feet above sea level. Small depressions having no surface drainage are common. The natural topography of the area is nearly flat, with the exception of unnatural features such as roadways, canals, berms, and trams.

(2) Sediment Type.
According to the National Resource Conservation Service soil survey (Luidahl et. al, 1998), this area consists of soils that are very poorly drained. The surface layer (top 5 inches) is typically black muck (organic mud). The subsurface layer (5 - 10 inches) is dark gray fine sand, and the substratum (10 - approx. 80 inches) is fine sand. Limestone outcrops were observed in the eastern portion of the project. Limestone can be encountered from the ground surface to a depth of 36 inches.

(3) Dredged/Fill Material Movement.
Once the material is in place, movement is not expected. Some minor erosion may occur in specific areas if high rain events induce flooding during or immediately after construction.

(4) Physical Effects on Benthos.
The benthos in the ponded areas adjacent to the construction areas have highly prolific organisms which are expected to quickly re-establish in the natural wetlands restored through improved hydrology.

(5) Actions Taken to Minimize Impacts.
Select fill will be used in inundated areas in order to minimize dispersal of fine materials into the substrate surrounding fill areas.

b. Water Circulation. Fluctuation and Salinity Determinations

(1) Water
(a) Salinity.
The tieback levee areas are freshwater; therefore there are no impacts to salinity. The manatee mitigation feature will establish a connection with saline groundwater in the POI Basin. There will likely be an overall increase in salinity in the POI Basin once flows are reduced through the Faka Union Canal.
(b) Water Chemistry.
No effect.
(c) Clarity.
Some decrease in clarity may occur in the immediate vicinity of construction activities. This effect will be temporary.
(d) Color.
No effect.
(e) Odor.

No effect.
(f) Taste.
No effect.
(g) Dissolved Gas Levels.
No effect.
(h) Nutrients.
No effect.
(i) Eutrophication.
No effect.

(2) Current Patterns and Circulation
(a) Current Patterns and Flow.
No effect.
(b) Velocity.
No effect.
(c) Stratification.
The temperature stratification in the POI Basin will likely change with the reduction of freshwater flows through the Faka Union Canal and the saline groundwater connection within the manatee mitigation feature.
(d) Hydrologic Regime.
No change with respect to the previously authorized project plan for the PSRP.

(3) Normal Water Level Fluctuations.
No change.

(4) Salinity Gradients.
No change.

(5) Actions That Will Be Taken to Minimize Impacts.
During construction activity, BMPs will be utilized in accordance with State regulations.

c. Suspended Particulate/Turbidity Determinations

(1) Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Disposal Site.
No significant impacts. Potential short term minor changes to turbidity and sediment transport during construction only.

(2) Effects (degree and duration) on Chemical and Physical Properties of the Water Column
(a) Light Penetration.
No effect.
(b) Dissolved Oxygen.
No effect.
(c) Toxic Metals and Organics.
None.

(d) Pathogens.
None.
(e)Aesthetics.
No effect.

(3) Effects on Biota
(a) Primary Production, Photosynthesis.
No effect
(b) Suspension/Filter Feeders.
No effect.
(c) Sight Feeders.
No effect.

d. Contaminant Determination.
Fill Material will not introduce or increase contaminants at the fill areas.

e. Aquatic Ecosystem and Organism Determinations.

(1) Effects on Plankton.
None.

(2) Effects on Benthos.
None.

(3) Effects on Nekton.
None.

(4) Effects on Aquatic Food Web.
None.

(5) Effects on Special Aquatic Sites.
(a) Sanctuaries and Refuges.
None.
(b) Wetlands.
Wetland vegetation in fill areas will be impacted. Small mangrove wetlands may also be affected near the manatee mitigation feature.
(c) Mud Flats.
None.
(d) Vegetated Shallows.
Wetland vegetation in vegetated shallows will be impacted during clearing and grubbing.
(e) Coral Reefs.
None.
(f) Riffle and Pool Complexes.
None.

(6) Threatened and Endangered Species.

There will be no significant impacts to any state or federally listed species or critical habitat. The Corps determines a "may affect, but not likely to adversely affect" the West Indian manatee.

(7) Other Wildlife.
No significant impacts to small foraging mammals, reptiles, wading birds, or wildlife in general are expected.

(8) Actions to Minimize Impacts.
Refer to Section 4.7 "Compliance with Environmental Requirements" for measures that will be implemented to protect listed species.

f. Proposed Disposal Site Determinations

(1) Mixing Zone Determination.
A 150 meter mixing zone will be requested through the CERPRA application process from the FDEP.

(2) Determination of Compliance with Applicable Water Quality Standards.
All standards will be complied with. A Comprehensive Everglades Restoration Plan Regulation Act permit will be sought from the state of Florida.

(3) Potential Effects on Human Use Characteristic
(a) Municipal and Private Water Supply.
None.
(b) Recreational and Commercial Fisheries.
No significant impacts.
(c) Water Related Recreation.
No impacts.
(d) Aesthetics.
No significant impacts. Potential for short-term negligible impact to aesthetics during construction activities.
(e) Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves.
No impacts.

g. Determination of Cumulative Effects on the Aquatic Ecosystem.
There will be no cumulative effects that result in a significant impairment of water quality as a result of the placement of fill at the project site.

h. Determination of Secondary Effects on the Aquatic Ecosystem. There will be no secondary impacts on the aquatic ecosystem as a result of the placement of fill at the project site.

III. Findings of Compliance or Non-Compliance With the Restrictions on Discharge.

a. No significant adaptations of the guidelines were made relative to this evaluation.

b. Evaluation of Availability of Practicable Alternatives to the Proposed Discharge Site Which Would Have Less Adverse Impact on the Aquatic Ecosystem. No practicable alternative exists that both meets the study objectives and does not involve discharge of fill in to waters of the United States. See Section 2.0 for an evaluation of project alternatives.

c. Compliance with Applicable State Water Quality Standards.
The discharge of fill materials will not cause or contribute to violation of any Florida water quality standards. The discharge operation will not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

d. Compliance with Endangered Species Act of 1973.
The placement of fill material would not jeopardize the continued existence of any species listed as threatened or endangered under the Endangered Species Act of 1973, as amended.

e. Evaluation of Extent of Degradation of the Waters of the United States.
The placement of fill materials will not result in significant adverse effects on human health and welfare, municipal and private water supplies, recreational and commercial fishing, plankton, fish, shellfish, wetlands and special aquatic site, or wildlife. The life stages of aquatic species and other wildlife will not be adversely affected. Significant adverse effects to aquatic ecosystem diversity, productivity and stability, and recreational, aesthetic, and economic values will not occur.

f. Appropriate steps have been taken to minimize the adverse environmental impact of the proposed actions.

Tab B

# Appendix B

# Coastal Zone Management Act Consistency

**APPENDIX B**
COASTAL ZONE MANAGEMENT ACT
AND FLORIDA COASTAL MANAGEMENT PROGRAM
FEDERAL CONSISTENCY DETERMINATION

**Enforceable Policy.** Florida State Statues considered "enforceable policy" under the Coastal Zone Management Act (www.dep.state.fl.us/cmp/federal/24_statutes.htm ).
Applicability of the Coastal Zone Management Act.
The following summarizes the process and procedures under the Coastal Zone Management Act for Federal Actions and for non-Federal Applicants*.

| Item | Non-Federal Applicant (15 CFR 930, subpart D) | Federal Action (15 CFR 930, subpart C) |
|---|---|---|
| Enforceable Policies | Reviewed and approved by NOAA (in FL www.dep.state.fl.us/cmp/federal/24_statutes.htm ) | Same |
| Effects Test | Direct, Indirect (cumulative, secondary), adverse or beneficial | Same |
| Review Time | 6 months from state receipt of Consistency Certification (30-days for completeness notice) Can be altered by written agreement between State and applicant | 60 Days, extendable (or contractible) by mutual agreement |
| Consistency | Must be Fully Consistent | To Maximum Extent Practicable** |
| Procedure Initiation | Applicant provides Consistency Certification to State | Federal Agency provides "Consistency Statement" to State |
| Appealable | Yes, applicant can appeal to Secretary (NOAA) | No (NOAA can "mediate") |
| Activities | Listed activities with their geographic location (State can request additional listing within 30 days) | Listed or Unlisted Activities in State Program |
| Activities in Another State | Must have approval for interstate reviews from NOAA | Interstate review approval NOT required |
| Activities in Federal Waters | Yes, if activity affects state waters | Same |

* There are separate requirements for activities on the Outer Continental Shelf (subpart E) and for "assistance to an applicant agency" (subpart F).
** Must be fully consistent except for items prohibited by applicable law (generally does not count lack of funding as prohibited by law, 15 CFR 930.32).

Chapter 161, Beach and Shore Preservation. The intent of the coastal construction permit program established by this chapter is to regulate construction projects located seaward of the line of mean high water and which might have an effect on natural shoreline processes.

Response: The proposed project is not located seaward of the mean high water line and would not affect shorelines or shoreline processes.

Chapters 186 and 187, State and Regional Planning. These chapters establish the State Comprehensive Plan which sets goals that articulate a strategic vision of the State's future. Its purpose is to define in a broad sense, goals and policies that provide decision-makers directions for the future and provide long-range guidance for orderly social, economic and physical growth.

Response: The project meets the primary goal of the State Comprehensive Plan through preservation and protection of the environment. The proposed work will be coordinated with the State through review of this document.

Chapter 252, Disaster Preparation, Response and Mitigation. This chapter creates a state emergency management agency, with the authority to provide for the common defense; to protect the public peace, health and safety; and to preserve the lives and property of the people of Florida.

Response: The proposed project purpose is to retain current flood protection measures and enhance the hydrologic regime in south Florida. Therefore, this work would be consistent with the efforts of Division of Emergency Management. The manatee mitigation feature will not affect public peace, health and safety, or the lives and property of the people of Florida.

Chapter 253, State Lands. This chapter governs the management of submerged state lands and resources within state lands. This includes archeological and historical resources; water resources; fish and wildlife resources; beaches and dunes; submerged grass beds and other benthic communities; swamps, marshes and other wetlands; mineral resources; unique natural features; submerged lands; spoil islands; and artificial reefs.

Response: The existing habitat within the tieback levee project area and within the manatee mitigation feature consists of uplands and some wetland areas. Impacts to wetlands will be minimized with the construction of the tieback levees and manatee mitigation feature. Any wetlands loss will be compensated by the hydrologic restoration of over 55,000 acres, as described in the 2004 Picayune Strand Restoration Project (PSRP) Final Project Implementation Report (PIR) and Environmental Impact Statement (EIS). Preconstruction surveys will be conducted to minimize any disturbance to threatened and endangered species in compliance with the U. S. Fish and Wildlife Service consultation. See the Environmental Assessment for further discussion of wetlands and cultural resources (Section 4.0, Environmental Effects).

Chapters 253, 259, 260, and 375, Land Acquisition. This chapter authorizes the state to acquire land to protect environmentally sensitive areas.

Response: The property proposed for this project is already in public ownership. The proposed project would comply with the intent of this chapter.

Chapter 258, State Parks and Aquatic Preserves. This chapter authorizes the state to manage state parks and preserves. Consistency with this statute would include consideration of projects that would directly or indirectly adversely impact park property, natural resources, park programs, management or operations.

Response: The proposed project would help improve environmental conditions at state parks or aquatic preserves in the region. The project is consistent with this chapter.

Chapter 267, Historic Preservation. This chapter establishes the procedures for implementing the Florida Historic Resources Act responsibilities.

Response: The historic properties identified in the PSRP area include features of a 1960's tram logging operation, a mid 20th century farm, and 63 prehistoric sites within or near the PSRP's area of potential effects. A determination of no adverse effect by the construction activities, including the tieback levee, has been made and coordinated with the Florida State Historic Preservation Officer and Federally Recognized Tribes. The effect of operations on the archeological sites is still being evaluated; a tentative determination of no adverse effect has been made based on the assumption that the PSRP will result in historic water levels. A monitoring plan is being developed to verify that archeological sites are not being inundated during operations. If sites are inundated by operations then the effect determination will be reevaluated. Consultation with the SHPO for the manatee mitigation feature is in progress.

Chapter 288, Economic Development and Tourism. This chapter directs the state to provide guidance and promotion of beneficial development through encouraging economic diversification and promoting tourism.

Response: Contribution of the project area to the State's tourism and economy would not be compromised but enhanced by project implementation. Therefore, the project would be consistent with the goals of this chapter.

Chapters 334 and 339, Transportation. This chapter authorizes the planning and development of a safe, balanced, and efficient transportation system.

Response: No public transportation systems would be impacted by this project.

Chapter 370, Saltwater Living Resources. This chapter directs the state to preserve, manage and protect the marine, crustacean, shell and anadromous fishery resources in state waters; to protect and enhance the marine and estuarine environment; to regulate fishermen and vessels of the state engaged in the taking of such resources within or

without state waters; to issue licenses for the taking and processing products of fisheries; to secure and maintain statistical records of the catch of each such species; and, to conduct scientific, economic, and other studies and research.

Response: This project will enhance saltwater resources by replacing man made point source discharges of freshwater to the Ten Thousand Islands Region with more natural sheet flow.

Chapter 373, Water Resources. This chapter provides the authority to regulate the withdrawal, diversion, storage, and consumption of water.

Response: The non-federal sponsor for this project is the South Florida Water Management District, which is the state agency responsible for implementing this statute. Coordinated planning has been done with this agency to ensure compatibility with established policies. The project is consistent with the goals of this chapter.

Chapter 376, Pollutant Spill Prevention and Control. This chapter regulates the transfer, storage, and transportation of pollutants and the cleanup of pollutant discharges.

Response: This work does not involve the transportation or discharging of pollutants. Conditions will be placed in all construction contracts to address any inadvertent spill of pollutants. Therefore, the project would comply with this chapter.

Chapter 377, Oil and Gas Exploration and Production. This chapter authorizes the regulation of all phases of exploration, drilling, and production of oil, gas, and other petroleum products.

Response: This work does not involve the exploration, drilling or production of gas, oil or petroleum product and therefore does not apply.

Chapter 380, Environmental Land and Water Management. This chapter establishes criteria and procedures to assure that local land development decisions consider the regional impact nature of proposed large-scale development. This chapter also deals with the Area of Critical State Concern program and the Coastal Infrastructure Policy.

Response: The work does not involve land development as described by this chapter; therefore, this chapter is not applicable.

Chapter 388 (Mosquito/Arthropod Control). Chapter 388 provides for a comprehensive approach for abatement or suppression of mosquitoes and other pest arthropods within the state.

Response: The work would not further the propagation of mosquitoes or other pest arthropods.

Chapter 403, Environmental Control. This chapter authorizes the regulation of pollution of the air and waters of the state by the Florida Department of Environmental Protection.

Response: An Environmental Assessment has been prepared and will be reviewed by the appropriate resource agencies including the Department of Environmental Protection.

Chapter 582, Soil and Water Conservation. This chapter establishes policy for the conservation of the state soil and water through the Department of Agriculture. Land use policies will be evaluated in terms of their tendency to cause or contribute to soil erosion or to conserve, develop, and utilize soil and water resources both onsite or in adjoining properties affected by the project. Particular attention will be given to projects on or near agricultural lands.

Response: Project implementation will include appropriate erosion control plans and measures to ensure compliance.

Tab C

# APPENDIX C

# PERTINENT CORRESPONDENCE

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P.O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

REPLY TO
ATTENTION OF

Planning and Policy Division
Environmental Branch

JAN 14 2014

Mr. Larry Williams
Field Supervisor, South Florida Ecological Services Office
U.S. Fish and Wildlife Service
1339 20th Street
Vero Beach, Florida 32960

Dear Mr. Williams,

This letter is in response to the U.S. Fish and Wildlife Service (USFWS) letter dated October 22, 2013 regarding the status of Endangered Species Act (Section 7) consultation for the Picayune Strand Restoration Project (PSRP). Your October 22, 2013 letter also included comments on the draft Limited Reevaluation Report (LRR) and Environmental Assessment (EA) that were released for a 30-day public and agency review on May 30, 2013. The purpose of the LRR is to address the total project cost increase over the cost authorized in the 2004 Final Project Implementation Report (PIR) and Environmental Impact Statement (EIS). The EA portion of the report was to provide compliance with the National Environmental Policy Act (NEPA) for the redesign of the spreader berms associated with each pump station. At the time of the May 30, 2013 report, the manatee mitigation feature was not fully designed and therefore, could not be fully analyzed in the LRR/EA.

Since the release of the May 30, 2013 LRR/EA, the EA portion of the document has been separated from the LRR. The revised EA will evaluate alternatives for the tieback levee and manatee mitigation feature. The LRR will be reviewed through the U.S. Army Corps of Engineers (the Corps) leadership and will not be released for subsequent public review. The revised EA will undergo an additional 30-day public and agency review period. It is anticipated that the public review will commence in February 2014 and the Corps encourages USFWS review.

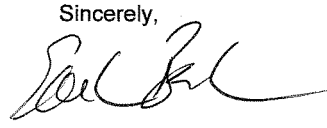
As stated in your letter, the Corps is aware of the USFWS' position regarding the need for a flood protection feature on the western side of the PSRP. At an interagency meeting, held February 28, 2013, Corps hydraulic engineers presented the final results of the detailed modeling analysis for the western protection features. This analysis found that a flood control feature would be needed to prevent water level increases in the 6L's farm area post project implementation. Following this meeting, additional model runs were completed to investigate the need for additional conveyance from U.S. 41 (Tamiami Trail) to the downstream estuaries. The results of this additional analysis were presented to the interagency team on March 8, 2013. Due to very gradual relief in this area, modeling showed that additional conveyance would not assist in moving water from U.S. 41 to the downstream estuaries.

The design of the western protection feature has not been completed and is contingent upon the authorization of additional project funds from Congress as noted in the May 30, 2013 LRR/EA. The Corps will continue to consult informally with USFWS regarding the design of the protection feature and, upon design completion, will analyze potential effects on threatened and endangered species within the project area in a Biological Assessment. Unless the final design of this feature is significantly different or larger than what was included in the 2004 Final PIR/EIS, additional NEPA is not anticipated.

The Corps is finalizing a draft BA to address potential effects of the PSRP on the West Indian manatee and potential effects associated with the proposed manatee mitigation feature on other threatened or endangered species that may occur within the action area. This draft BA will include an updated joint Corps and South Florida Water Management District manatee monitoring plan. As discussed at the November 5, 2013 PSRP manatee monitoring meeting held in Vero Beach, the Corps will provide the draft BA for USFWS' initial review and USFWS will provide manatee monitoring success criteria to incorporate into the manatee monitoring plan. The USFWS will be notified when the revised EA addressing the manatee mitigation feature and tieback levee are available for public and agency review.

Thank you for your continued coordination on the PSRP. Please contact the Project Manager, Ms. Emily Rivera at 904-232-1048 or the Project Biologist, Ms. Amy Thompson at 904-232-1545 if you have any questions.

Sincerely,



Enclosure

Eric L Bush
Chief, Planning and Policy Division

Copies Furnished (electronic):

Tom Teets, SFWMD
Janet Starnes, SFWMD
Paul Warner, SFWMD
Miles Meyer, USFWS
Kim Dryden, USFWS
Bob Pace, USFWS
Bob Progulske, USFWS
Kevin Godsea, Florida Panther National Wildlife Refuge
Ernie Marks, FDEP

# United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
1339 20th Street
Vero Beach, Florida 32960

October 31, 2014

Eric Bush
Chief, Planning Division
U.S. Army Corps of Engineers
Post Office Box 4970
Jacksonville, Florida 32232-0019

Project: Picayune Strand Restoration Project
September 2014 (Fourth) Supplemental
Biological Assessment
Dated: September11, 2014

Dear Mr. Bush:

This responds to your September 11, 2014, letter transmitting a fourth Supplemental Biological Assessment (BA) for the Picayune Strand Restoration Project (PSRP). The BA addresses the effects of construction and management of a proposed West Indian manatee (*Trichechus manatus*) mitigation feature on federally-listed species and designated West Indian manatee critical habitat consistent with the Endangered Species Act of 1973, as amended (Act) (87 Stat.884; 16 U.S.C. 1531 et seq.) and the Marine Mammal Protection Act of 1972, as amended (MMPA) (16 U.S.C. 1461 et seq.).

Critical habitat for the West Indian manatee (Code of Federal Regulations 50 Parts 1 to 199; revised on October 1, 2000) in the project area includes all United States territorial waters in southwest Florida "adjoining the coast and islands and all connected bays, estuaries, and rivers from Gordon's Pass, near Naples, Collier County, southward to and including Whitewater Bay, Monroe County." No primary constituent elements for manatee critical habitat have been designated. However, elements of the project area that are essential to the conservation of the species include access to fresh water, natural and man-made warmwater refugia, and forage; particularly submerged aquatic vegetation (U.S. Fish and Wildlife Service [Service] 2009; U.S. Army Corps of Engineers [Corps] 2014, 2008; Stith et al. 2004, 2006).

Specifically, you request concurrence with the Corps' effect determinations for the endangered West Indian manatee and West Indian manatee critical habitat, endangered American crocodile (*Crocodylus acutus*) and American crocodile critical habitat, the endangered Florida panther (*Puma concolor coryi*), endangered wood stork (*Mycteria americana*), endangered Florida bonneted bat (*Eumops floridanus*), endangered Everglade snail kite (*Rostrhamus sociabilis plumbeus*), threatened red-cockaded woodpecker (*Picoides borealis*), threatened eastern

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indigo snake (*Drymarchon corais couperi*), and gopher tortoise (*Gopherus polyphemus*), a candidate species. Consultation on other species under the authority of the National Marine Fisheries Service (NOAA Fisheries) is occurring separately, although the Service has coordinated elements of this project with NOAA Fisheries (September 10, 2013, interagency conference call).

The proposed action is the construction and management of a new manatee refugium ("manatee mitigation feature") within and adjacent to a spoil berm resulting from the 1966 construction of the Faka Union Canal, located south of the existing passive manatee refugium in the Port of the Islands (POI) marina basin in Collier County (Section 16, Township 52S Range 28E). The action also includes a proposed PSRP Manatee Monitoring Plan (September 2014) and the Corps and South Florida Water Management District (District) requested Manatee Mitigation "Success Criteria." The BA indicates that measures agreed to minimize or avoid effects to manatees as part of the project consultation on manatees and their critical habitat to date (as described in the Project Implementation Report [PIR] and Environmental Impact Statement [EIS] and the 2009 PSRP Biological Opinion, including the Final PSRP Environmental Monitoring Plan etc.) are also incorporated therein as project commitments. The PSRP action area includes estuarine areas that are designated manatee critical habitat that should benefit by changes in hydrology resulting from PSRP; including the upper estuaries and receiving estuaries from Fakahatchee Bay southeast of PSRP to Blackwater Bay to the northwest of PSRP, as well as the POI Basin and Faka Union Canal. Although, the BA delineates the upstream extent of the action area as ending at the Faka Union-1 weir, the project action area includes those canals above the weir that are accessible to manatees during high tide events.

The existing manatee refugium in POI is anticipated to fail when point-source freshwater discharges to the Faka Union Canal that act to create a thermal manatee refugium at the POI marina are modified by elimination of canals for restoration in the upstream PSRP (Slone et al. In Press; Stith et al. 2011). The existing refugium, which is maintained by thermal inversion resulting from the input of fresh water into a deep saltwater marina basin, is proposed to be replaced by an excavated basin that is fed by warm, saline groundwater. The design is intended to create a groundwater connection documented to exist by nearby wells (SGT5W2 and 3) and other regional warmwater refugia used by manatees. The feature is designed to replace, not enhance, the existing manatee refugium.

The location and design of the manatee refugium mitigation feature is Alternative 27 (Option 2) of 27 project design alternatives that were developed by a subteam of the PSRP Project Development Team in 2012 and 2013. The final design of the manatee refugium described in the September 2014 BA has been slightly modified by a 90 percent final design developed by the District as received on October 7, 2014. The design includes the excavation of a 2-acre, 20-foot deep oxbow in the Faka Union Canal spoil berm. Based on a flushing assessment that was completed by the District, operable culverts were added to the northern "ingress" (now unnavigable to manatees) so that the oxbow can be closed off during cold season to minimize flushing and opened during warm season to allow the oxbow to flush. Additionally, the southern ingress/egress was meandered to further manage flushing potential in the cold season. The footprint of the feature is approximately 10 acres; including 8 acres of upland

habitat consisting of a revegetated spoil berm, and approximately 2 acres of wetlands, including 1.07 acres of mangroves. The upland portion of the site has partially revegetated with oaks (*Quercus spp.*) and cabbage palm (*Sabal palmetto*), as well as xeric groundcover. Approximately 16 gopher tortoise burrows will be affected by the site construction, and the gopher tortoise population, originally placed on the berm as mitigation, may be relocated.

The Corps has determined that the project will have "no effect" on the Everglade snail kite, wood stork, red-cockaded woodpecker an "may affect, but is not likely to adversely affect" the Florida panther, Florida bonneted bat, American crocodile and its critical habitat, the West Indian manatee and its critical habitat, and the eastern indigo snake and gopher tortoise. In our April 23, 2014, review of a March 13, 2014, version of this BA, the Service concurred with the Corps' determination that the construction of the manatee refugium will have "no effect" on the Everglade snail kite, wood stork, and red-cockaded woodpecker. Based on subsequent modifications to the BA, which include pre-construction wildlife surveys, gopher tortoise relocation, and construction observers, the Service now concurs with the "may affect, but is not likely to adversely affect" determination of the Corps for the bonneted bat, eastern indigo snake, Florida panther, and gopher tortoise, as well as "no effect" on the American crocodile.

**West Indian Manatee**

Our assessment of effects to the West Indian manatee and its critical habitat is based on a very extended consultation which included Corps and District funded studies by the U.S. Geological Survey (USGS), a subsequent commitment to replace the existing manatee refugium, a manatee monitoring plan that amends and modifies the existing PSRP Final Environmental Monitoring Plan that is attached to the 2009 PSRP Biological Opinion, development of manatee success criteria for manatees in the project action area, consideration of ongoing State and Federal research in the action area and State and Federal monitoring for this species and its habitat. The 2009 Biological Opinion provides for the continued review of the project by a subgroup of the PSRP Monitoring and Assessment Group (MAG) comprised of species and management experts, who will monitor the project and make recommendations for project adaptive management, if necessary, to managers and stakeholders.

The enclosure is an abridged 15-year (1999 to 2014) Act and MMPA consultation history for the West Indian manatee and its critical habitat for PSRP. This extended consultation period demonstrates the scope of the potential impacts and benefits of the PSRP to the southwest Florida manatee population; the need for science-based analysis of the large but passive thermal manatee refugium on the site, the complexity of a phased 50-year restoration project on project planning and implementation for endangered species, and the projected benefits of the project on more than 20,000 acres of downstream estuaries including critical habitat of the manatee. This task was accomplished because of the dedicated efforts of biologists, hydrologists, engineers, planners, and managers of the Corps, District, Service, Florida Fish and Wildlife Conservation Commission (FWC), USGS, Florida Department of Environmental Protection (DEP) and Collier County.

*Summary of 2009 Biological Opinion for West Indian Manatee and Manatee Critical Habitat*

As summarized in the 2009 Biological Opinion, direct effects (beneficial or adverse) of PSRP on manatees may include: (1) more seagrass growth in Faka Union Bay and adjacent affected bays; (2) an increase in freshwater sources due to estuarine watershed restoration; and (3) construction impacts related to placement of barriers to upstream movement and turbidity barriers during construction in Faka Union Canal above Faka Union-1 weir.

Indirect effects (beneficial or adverse) of the project on manatees include: (1) potential failure of the thermocline/halocline that supports the warm-water refugium in the POI basin resulting in cold stress and/or mortality, and injury or mortality associated with seeking an alternate refugium; (2) a reduction in the manatee reliance on the POI basin for fresh water during the spring dry season; and (3) an increase in exposure to boat traffic associated with access to new freshwater sources and forage opportunities.

The 2009 Biological Opinion indicated that available USGS modeling in the Picayune Strand area indicated that the rerouting of water in the restoration scenario could affect the temperature and salinity of the manatee refugium at POI and posed the following questions:

1. Is the observed halocline necessary to maintain the observed thermal inversion?
2. Is the halocline primarily tidal seawater or is there a ground-water salinity source?
3. How do changes in the flow system affect the halocline and thermocline?
4. How important are freshwater inflows to maintaining the halocline in the winter months?
5. Will saline water propagate upstream of the weir at POI and reduce the available freshwater that is important to manatees?

The 2009 Biological Opinion stated that the results of the following studies and actions would be monitored by the Service:

1. Development, Testing, and Application of a Coupled Hydrodynamic Surfacewater and Ground-water Model (FTLOADDS) with Heat and Salinity Transport in the Ten Thousand Islands (TTI) and Picayune Strand Restoration Area, Florida.
2. A measurement-derived heat-budget approach for simulating coastal wetland temperature with a hydrodynamic flow model.
3. Characteristics of winter passive thermal refugia and use by manatees in southwest Florida.
4. Assessing the impact of hydrological restoration on manatees with aerial surveys and hierarchical models by Catherine Langtimm, Robert Dorazio, Brad Stith, and Terry Doyle.
5. A three-dimensional model of the hydrology of POI.
6. Mapping and characterizing seagrass beds and manatee foraging areas in the TTI by incorporating manatee Global Positioning System (GPS) tracking data and habitat information by Daniel Slone, James Reid, and W. Judson Kenworthy.
7. Past and Future Impacts of Climate Change on Coastal Habitats and Species in the Everglades — An Integrated Modeling Approach by Catherine Langtimm, Eric Swain, Don DeAngelis, Thomas Smith, Dennis Krohn, and Brad Stith.

The 2009 Biological Opinion indicated that if through research, observation, or monitoring it is discovered that manatees are being adversely affected by PSRP, reinitiation of consultation would be necessary and the following potential measures may need to be taken to alleviate stress on manatees: (1) construction of a pipe to supply fresh water over the Faka Union -1 weir if the freshwater source fails as a result of the project; (2) maintenance of the Faka Union-1 weir in its existing condition; (3) installation of a precautionary groundwater well to substitute for the warmwater refugium represented by the thermocline/halocline in the POI basin; (4) monitoring of the location and type of manatee-related watercraft injury and mortality in the project action area; and (5) monitoring of the cold-stress/cold-related mortality in the POI marina basin or adjacent areas.

*Reinitiation of Consultation on the West Indian Manatee and Manatee Critical Habitat*

As a result of uncertainties posed by the available scientific information, subsequent to the 2009 Biological Opinion, a number of the referenced studies were conducted that resulted in additional analysis of the viability of the manatee thermal refugium on the site, as well other elements of the area affected by the project. Slone et al. (In Press), Stith et al. 2011, and Swain et al. 2009 documented that the primary attraction of the passive thermal refugia (PTR) at PSRP was the warm-water temperatures maintained in the bottom layers of the marina during the coldest periods. Bottom temperatures at nearby inland bays, nearshore Gulf, and surface layers at the PTRs regularly fell below temperatures suitable for manatees. These temperature patterns account for aerial survey results of manatee presence in southwest Florida which showed a majority of the individuals counted were aggregated at POI, while the next three largest aggregations occurred at similar inland sites, all artificial canals or basins. The telemetry data showed that manatees preferentially moved into these PTRs as the water temperatures fell below 20°C on their primary foraging areas in the shallow Gulf (Stith et al. 2011).

Stith et al. (2011) demonstrated that salinity stratification played an unexpectedly important role at the PTRs, explaining how warmer water persisted in the bottom layer, even when the surface water became much colder and turnover of the system might be expected. Thorough turnover and mixing did occur at POI, but only when salinity stratification was absent. The relationship between temperature inversion and salinity stratification was readily identified in comparisons of the densities of the surface and bottom under different conditions. During cold periods at POI, the warmer bottom layer was considerably denser than the cooler surface water, but only when there was a significant salinity gradient. Haloclines maintained a stable density gradient despite the temperature inversion, thus preventing vertical mixing. This finding was supported by the POI three-dimensional model (Swain et al. 2009), which showed that convective turnover rapidly cooled the bottom in the absence of salinity stratification. Within the typical range of salinity and temperature gradients observed at POI, salinity had a much greater impact on density than temperature, enabling haloclines to offset the potentially unstable density differences caused by temperature inversions.

The formation and maintenance of salinity stratification at POI during winter was strongly correlated with the amount of upstream freshwater discharged over the southern Faka Union weir. Under low or no-flow conditions, the stratification decreased fairly rapidly over time as

the surface salinity approached the higher values of the bottom layer. In such systems, an "estuarine circulation" pattern is established where the lighter freshwater layer flows seaward above a saltwater layer which is propagated upstream by tidal forcing (Kurup et al. 1998). Under such conditions, salinity stratification typically increases as freshwater discharge increases (Xu et al. 2008). At high levels of freshwater discharge tidal salinities can be eliminated (Hamilton et al. 2001). During the wet season, the entire Faka Union canal system has been observed to be oligohaline (Surge and Lohmann 2002). At POI, the strong correlation between winter discharge and salinity stratification indicates that haloclines break down without adequate levels of freshwater discharge.

Additional analysis by Slone et al. (In Press) documented that groundwater isotopes were not present in the POI marina basin, supporting a conclusion that for the POI marina, the thermal refugium was not correlated with groundwater input.

In June of 2011, the Manatee Mitigation Team (MMT) and project managers decided that a manatee refugium mitigation option would be the best solution for protection of the southwest Florida manatee population, to accommodate various project constraints and benefits, and avoid project delays that would benefit the ecosystem, including manatee critical habitat. From 2011 to 2013, the MMT developed some 27 alternatives to address manatee refugium issues and function within cost constraints.

*Manatee Monitoring Plan*

A Manatee Monitoring Plan (Corps 2014) was developed from 2013 to 2014 after the design of the new manatee refugium was finalized. The plan includes measures that are phased to accommodate the current construction plan for the PSRP. At present, this plan includes measures to first fill Merritt Canal, and although these effects will be monitored, no significant impacts to the thermal refugia are predicted because the east-west T canal will remain open, as will the freshwater input from Faka Union and Miller Canals. After a new thermal refugium is constructed, as indicated above, monitoring of the refugia (2 old and new) will occur to determine if initial success criteria have been met. If the new refugium is determined to have met the initial physical success criteria, the remainder of the project canals will be backfilled. Monitoring will continue until at least one moderate and two severe cold events have demonstrated that the replacement of the refugium is successful. The determination of success will made by project managers after the monitoring information is received and assessed by an expert subgroup of the PSRP MAG.

In addition to the Manatee Monitoring Plan included in the September 2014 BA, the 2009 PSRP Biological Opinion contains measures related to project description, project operations, and project construction that are included in the Biological Opinion or the Final Environmental Monitoring Plan which is a Term and Condition of the Biological Opinion. These include such measures as the Standard Manatee Construction Conditions, Comprehensive Everglades Restoration Plan (CERP) Manatee Guidelines, seagrass monitoring and some estuarine hydrological monitoring stations.

*Manatee Mitigation Success Criteria*

The Manatee Monitoring Plan includes "success criteria" negotiated by the project M and project managers. These success criteria include both physical and observational measures that demonstrate that the new refugium is functioning correctly to replace the features of the existing refugium. These criteria include project sponsor commitments for isotope and water temperature, observation of manatees in the new and old refugia, and agency commitments for manatee health assessments, boat traffic analysis, mortality/morbidity data and assessment of population demographics. The success criteria also identify and note the importance of specific hydrologic monitoring stations. As stated above, the determination of mitigation success will made by project managers after the monitoring information is received and assessed by a manatee expert subgroup of the PSRP MAG which includes the Service, FWC, and USGS.

*Long-term management and maintenance*

The new manatee refugium will be maintained by the District. As part of a long-term agreement between the District and Rookery Bay National Estuarine Reserve which manages the property for the State of Florida, access to the refugium will be restricted by water and by land except for research or recovery purposes.

*Conservation Recommendations*

The Service believes that a number of additional monitoring programs and research studies that were performed as part of the baseline information for this project, but are now unfunded or tied to other project success critera would benefit the post-project analysis of the manatees affected by this project. These include:

Langtimm, C.A. Doyle, T.J. Stith, B.M. and Kochman, H.I. 2009. A New Aerial Survey Method to Monitor the Response of Manatees to Restoration of the Florida Everglades. First National Conference on Ecosystem Restoration (NCER), Orlando, Florida. U.S. Geological Survey, Gainesville, Florida and U.S. Fish and Wildlife Service; Naples, Florida.

Locker, S.D. and A.K. Wright. 2003 Benthic Habitat Mapping for Habitat Suitability Modeling in Rookery Bay National Estuarine Research Reserve. College of Marine Science, University of South Florida, St. Petersburg, Florida 33701.

Patino, E. and L. Soderqvist. 2010. Western Tamiami Trail Flows-Baseline Information and Response to CERP. U.S. Geological Survey, Fort Myers, Florida.

Patino, E. and L. Soderqvist. 2010. Hydrodynamic and Salinity Characteristics of Rivers and Estuaries of the Ten Thousand Islands. U.S. Geological Survey, Fort Myers, Florida.

Slone, D.H., J.P. Reid, and W.J. Kenworthy. 2013. Mapping spatial resources with GPS animal telemetry: Foraging manatees locate seagrass beds in the Ten Thousand Islands, Florida. Marine Ecology Progress Series, Vol. 476:285-299, 2013. U.S. Geological Survey; Gainesville; Florida.

*Summary*

The proposed new manatee refugium is expected to functionally replace the potentially adverse effect of a failed thermocline/halocline within the project basin. No additional exposure to mortality associated with boat traffic will occur as a result of the new refugium because the location of the new refugium is within Faka Union canal which is posted "Idle Speed Only" downstream of the existing refugium. Isolation of the refugium from the boat access that occurs in the existing refugium may reduce human-caused stress to manatees that are seeking refuge from the cold.

Based on the September 14, 2014, BA, including the Manatee Monitoring Plan and manatee success criteria; the project site plan dated August 27, 2014; a commitment for long-term site management and maintenance by Rookery Bay National Estuarine Research Reserve and the District; the manatee protection measures as included in PSRP Final Environmental Monitoring Plan including estuarine condition monitoring and the ongoing monitoring of the manatee and its critical habitat in the project action area by state and federal governments, and implementation of the Adaptive Assessment and Management Plan strategy consistent with the PSRP Environmental Monitoring Plan (Corps 2008), the Service concurs with the Corps' determination that the project "may affect, but is not likely to adversely affect" the West Indian manatee and its critical habitat.

We sincerely appreciate the efforts that the Corps and District have employed to address protection of the endangered West Indian manatee as part of this restoration project completion. Thank you for your continued coordination on the PSRP effects on listed species, particularly the West Indian manatee. If you have any questions, please contact Bob Progulske, Everglades Program Supervisor at 772-469-4299.

Sincerely,

Donald (Bob) Progulske
Everglades Program Supervisor
South Florida Ecological Service Office

cc: electronic copy only w/enclosure
District, West Palm Beach, Florida (Thomas Teets)
District, Naples, Florida (Janet Starnes)
Corps, Jacksonville, Florida (Brad Tarr, Gina Ralph, Eric Summa, Eric Bush)
Service, Jacksonville, Florida (Jim Valade)
Florida Panther NWR, Naples, Florida, (Kevin Godsea)
FWC, Tallahassee, Florida (Carol Knox, Ron Mezich)
USGS, Gainesville, Florida (Dan Slone)
DEP, Fort Myers, Florida (Jordan Pugh)
Rookery Bay National Estuarine Research Reserve, Naples, Florida (Gary Lytton, Jeff Carter)

**Literature Cited**

Hamilton, D.P., T. Chan, M.S. Robb, C.B. Pattiaratchi, and M. Herzfeld. 2001. The hydrology of the upper Swan River estuary with focus on an artificial destratification trial. *Hydrological Processes* 15: 2465–2480.

Kurup, R.G., D.P. Hamilton, and J.C. Patterson. 1998. Modelling the effect of seasonal flow variations on the position of salt wedge in a microtidal estuary. *Estuarine, Coastal and Shelf Science* 47: 191–208.

Slone, D.H., J.P. Reid, B.M. Stith, C.A. Langtimm,, S.M. Butler, E.D. Swain, W.M. Wolfert, R.A. Renken, J.D. Decker, E. Pantino. 2008. Assessing PSRP effects on the Florida manatee, Scope of work, 23 pages (unpublished).

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Swain, E. and J. Decker. 2009. "Development, Testing, and Application of a Coupled Hydrodynamic Surface-Water/Groundwater Model (FTLOADDS) with Heat and Salinity Transport in the Supplemental Biological Assessment Picayune Strand Restoration Project, Ten Thousand Islands/Picayune Strand Restoration Project Area, Florida." U.S. Geological Survey Scientific Investigations Report No. 2009-5146 (2009): 42.

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## Enclosure

### Consultation History (Abridged) for the West Indian Manatee and its Critical Habitat on the Picayune Strand Restoration Project

Since 1999, the U.S. Fish and Wildlife Service (Service) has initiated and participated in numerous meetings with the Corps, District, U.S. Geological Survey (USGS), Florida Fish and Wildlife Conservation Commission (FWC) manatee experts, and others, to identify expected effects on manatees from completion of the Picayune Strand Restoration Project (PSRP). The following is an abridged list of only what the Service considers to be major events in the Endangered Species Act section 7 consultation and other environmental restoration issues for the PSRP. These parties are described as the manatee mitigation team (MMT) during the development of the manatee refugium mitigation feature.

The Corps provided an initial Biological Assessment (BA), dated October 17, 2001, that included a determination of "may affect, but would not be likely to adversely affect" the West Indian manatee (*Trichechus manatus*). This preliminary BA was found to lack sufficient detail in project design, was subject to several changes in hydrologic modeling, and needed additional and updated information on manatee and other listed species issues.

The Service's July 8, 2004, Planning Aid Letter in response to the Draft Project Implementation Report/Environmental Impact Statement (PIR/EIS) led to an August 5, 2004, meeting with the U.S. Army Corps of Engineers (Corps), Corps, U.S. Geological Survey (USGS), and South Florida Water Management District (District) in Vero Beach, Florida to address comments on manatees and other listed species. The Service requested additional information on the manatee including project effects on its warmwater refugium and critical habitat. The Service and USGS also provided the Corps with updated information on the status of the southwest Florida regional population of the manatee and USGS manatee studies conducted near the PSRP.

On October 20, 2004, the Corps provided a second and more extensive BA.

On October 24, 2004, the Service concurred with the Corps' determinations that, based on project commitments and conservation measures described in their October 20, 2004, BA, the PSRP would have "no effect" on Everglade snail kite (*Rostrhamus sociabilis*) critical habitat and American crocodile (*Crocodylus acutus*) critical habitat, and "may affect, but is not likely to adversely affect" the Everglade snail kite, American crocodile, red-cockaded woodpecker (*Picoides borealis*), bald eagle (*Haliaeetus leucocephalus*), eastern indigo snake (*Drymarchon corais*), and manatee critical habitat. The Corps concluded that it did not have sufficient information to reach an effect determination for the wood stork (*Mycteria americana*), Florida panther (*Puma concolor coryi*), and West Indian manatee. Those latter determinations were made in part because of the lack of detailed design or assessment for some features, particularly flood control features (red-cockaded woodpecker, wood stork, and Florida panther), impending studies on the panther and manatee, contaminant issues, concerns of adjacent public land managers (particularly estuarine interests), the lack of a draft project operating manual, and the lack of a monitoring and adaptive assessment plan.

In March 2007, the USGS submitted a Scope of Work (SOW) entitled "Monitoring and Assessing Effects of the PSRP Restoration Project on the Manatee." This SOW was negotiated by the Service, Corps, and District to address a number of uncertainties, including the effect of the PSRP on the existing thermal refugium, the potential for the PSRP to impact the volume and timing of freshwater inflow to the Faka Union canal, the effects of the redistribution of fresh water on receiving estuaries, and the potential effects of this redistribution on the regional distribution/behavior of manatees, including exposure to additional boat traffic leading to injury/mortality, and the effects of the redistribution of freshwater on manatee critical habitat.

On September 6, 2007, the Service, Corps, and District attended an interagency conference in Gainesville, Florida to discuss with State and Federal manatee experts the project's likely effects on southwest Florida manatees.

On March 20, 2008, the Service met with the Corps, District, and USGS to discuss the project SOW for manatees, USGS manatee modeling, and proposed changes in aerial survey techniques for manatees.

On April 18, 2008, the Service participated in a teleconference with USGS and Ten Thousand Islands (TTI) National Wildlife Refuge biologists regarding potential changes in the aerial survey methodology that might affect baseline information on manatees for the project. Hydrologic models for the TTI Islands estuary, post-construction monitoring for the manatee, and contingency plans for decline of the manatee warm water refugium at Port of the Islands (POI) were also discussed.

On May 20, 2008, the USGS provided an update on the status and expected due date for delivery of their Coupled Hydrodynamic Surface-water/Groundwater Model that included analysis of the warm water refugium and adjacent estuaries.

Between May and July of 2008, the Service met with the District and Corps nine times to discuss various elements of a Draft PSRP Environmental Monitoring Plan and pending BA.

On August 1, 2008, the Service attended an interagency meeting on manatees at the TTI National Wildlife Refuge. This meeting updated agency stakeholders; including the FWC, Rookery Bay National Estuarine Research Reserve (RBNERR), Florida Department of Environmental Protection (DEP), and Collier County, on the project status and manatee issues.

On August 6, 2008, the Service received a memo from USGS outlining their recommendation for improving the manatee aerial survey methodology with the new methodology to maintain a consistent baseline for the PSRP and TTI National Wildlife Refuge.

On August 7, 2008, the Service attended an interagency meeting (Corps, District, USGS) in Vero Beach, Florida to discuss the monitoring plan and listed species, with particular emphasis on manatees.

The Corps provided a third (supplemental) BA on November 6, 2008. The BA specifically described effects related to the elements of the authorized construction project only, and did not include any other features west of the 55,000-acre area that was described as the Federal project boundary. There was no description of effects related to the flood control features, particularly the 6Ls feature, or red-cockaded woodpecker, panther, or wood stork in the Belle Meade area to be affected by the project. Effects to estuaries or manatees west of Blackwater Bay, and features to mitigate and monitor for manatee effects within the thermal refugium or in the defined manatee action area (Fakahatchee to Blackwater Bay) were not included in the BA.

On November 25, 2008, the USGS sent the Service a memorandum commenting on the Corps' BA and disagreeing with the Corps' conclusion that freshwater flow from Faka Union canal was not a factor in sustaining the temperature and salinity characteristics at POI that created the manatee refugium.

On March 11, 2009, the Corps provided the Service with the PSRP Monitoring Plan and the Final Nuisance and Exotic Vegetation Control Plan.

The Service issued a Biological Opinion on March 12, 2009, that included a summary of the status of consultation on the manatee at that time. The Biological Opinion noted that data analysis and modeling completed to date was insufficient to address project uncertainties. Specifically, the Biological Opinion stated that results of the study entitled "Monitoring and Assessing Effects of the Picayune Strand Restoration Project on the Florida Manatee: Hydrological Monitoring and Analysis", as included in the PSRP Environmental Monitoring Plan, and other studies would be necessary to evaluate project level impacts on the manatee. The Biological Opinion further stated that estuarine conditions will be monitored throughout the life of the project using the hydrologic monitoring stations for the PSRP, including stations in the upper, middle, and lower estuaries (Final PSRP Environmental Monitoring Plan). Information on estuarine components, such as submerged aquatic vegetation, would also be monitored. In addition, the USGS would complete and continue studies on the dynamics of the manatee warm water refugium in the P01 marina basin (Corps 2008 BA; Final PSRP Environmental Monitoring Plan), manatee behavior in the project action area and southwest Florida, water quality, and the characteristics of the restored volume and quantity of water delivered to the estuaries. The Biological Opinion stated that baseline studies on manatees would be complete prior to the construction of project components that alter flows to the estuaries. The Biological Opinion concluded that if research, observation or monitoring indicated that manatees were being adversely affected by the PSRP, reinitiation of consultation would be necessary.

In February 2009, the USGS published a fact sheet entitled "Integrated Science: Florida Manatees and Everglades Hydrology (Langtimm et al. 2009).

On July 7, 2009, a juvenile manatee calf was photographed on the south side of a weir at Stewart Boulevard in the upper PSRP area, confirming that manatees could access the project area above the Faka Union-1 weir, near U.S. Highway 41 (Tamiami Trail).

On September 15, 2009, USGS hosted a workshop via web meeting to update the MMT on Hydrological Monitoring of Modeling of POI and Use by Manatees.

On November 17, 2009, the MMT met to review the USGS' progress on baseline studies; preliminary data from an isotope analysis suggested that the warm water refugium was not a result of groundwater in the POI basin. The importance of specific hydrologic monitoring sites in the affected estuaries was described as necessary to assess effects to critical habitat and changes in manatee behavior (movements related to boat traffic and access to fresh water).

On April 21, 2010, the USGS published information documenting the POI passive manatee refugium (Temperature Inverted Haloclines Provide Winter Warm- Water Refugia for Manatees in Southwest Florida; Stith et al. 2010). The study found that the refugium was maintained by upstream freshwater inflow creating salinity stratification over a tidal wedge in the POI marina. In response to Service comments on the Draft Project Operating Manual for the Merritt Pump Station, the Corps stated on June 2, 2010, that pump operations for manatee management were not feasible or necessary, based on their opinion that there was no conclusive effect of the project on manatees.

On February 1, 2011, the Service convened an interagency meeting to discuss manatee issues, including the project schedule, USGS updates on manatee baseline studies, and the construction monitoring plan for the project. The Service submitted a draft Monitoring and Assessment Plan for review.

On May 24, 2011, the Service, FWC, USGS, Corps, and District met at the USGS office in Gainesville, Florida to discuss PSRP manatee effects and project mitigation alternatives. The FWC, Service, and Corps also convened a separate meeting on the same day to discuss the feasibility of alternatives, including potentially authorization of take under the Marine Mammal Protection Act of 1972, as amended (MMPA) (16 U.S.C. 1461 et seq.).

In June 2011, after discussions with the North Florida Ecological Services Office (the lead office for manatee policies in Florida), the Service's South Florida Ecological Services Office concluded that writing a rule for take under the MMPA was not supportable from biological, legal, or time feasibility standpoints. This took into consideration a 2005 lawsuit on manatees, the status of the southwest Florida manatee population, and status of recovery and de-listing efforts.

On June 29, 2011, the Service, Corps, and District met at RBNERR to screen and preliminarily rank 19 manatee mitigation measures for cost, manatee effects, and overall restoration project benefits.

On September 16, 2011, the MMT met in Gainesville, Florida to discuss six proposed manatee mitigation alternatives (3, 9, 10, 17, 18, and 19), triggers for hydrologic effects on manatees at the POI refugium, USGS modeling, and the history of manatee mortality at POI.

On September 19, 2011, the Corps provided a Draft Manatee Monitoring Plan to the Service and District.

On September 27, 2011, the Service received recommendations from the USGS on manatee monitoring, including requirements during construction and crucial hydrologic indicators of adverse effects to manatees at the thermal refugium.
On September 29, 2011, the Service, in coordination with USGS, sent an email to the Corps in response to the September 19, 2011, Corps' draft manatee monitoring conditions, including post-construction aerial surveys and hydrologic monitoring in the upper estuarine bays and rivers.

On October 26, 2011, the MMT met at the USGS office in Gainesville, Florida to discuss seven proposed manatee mitigation alternatives (3, 9, 10, 10a, 10b, 7, and 20).

On August 12, 18, and 30 and November 8 and 22, 2011; the MMT held bi-weekly meetings and teleconferences to discuss project schedule and several manatee mitigation alternatives, and baseline study updates.

On September 30, 2011, the Corps made a determination that the dewatering plans for the Faka Union pump site would not have any effect on the manatee. From May 2011 to January 2012, in coordination with USGS, the Service reviewed proposed dewatering plans for the Faka Union pump station for effects to manatees and recommended monitoring of canal flow and temperature during dewatering events.

The Corps prepared a Memorandum for the Record (MRR) dated March 21, 2012, discussing various manatee mitigation alternatives and recommending Alternative 20 (a manatee refugium to be constructed north of the Faka Union-1 weir).

On April 5, 2012, the MMT met in Vero Beach, Florida and received management approval for the team's recommended manatee mitigation, Alternative 20.

On May 8, 2012, the Service received a second Draft Manatee Monitoring Plan from the Corps. From May through July 2012, the Service coordinated with the DEP and Corps on several weeks of geotechnical surveys associated with manatee mitigation Alternative 20. The Service observed an adult manatee and calf passing north over the Faka Union-1 weir during high water tropical storm conditions on June 26, 2012. After observing attempts by these manatees to cross back downstream over the weir during the next week, the Service contacted the FWC about a possible rescue, but the manatees were not observed again.

On October 26, 2012, the District accepted the offer from the Corps to take the lead in design and construction of the manatee mitigation feature.

On January 11, 2013, the MMT met at the USGS office in Gainesville, reviewed previously developed alternatives from the June 2011 meeting, and discussed problems with the preferred Alternative 20 (dredging of Faka Union canal above the Faka Union-1 weir). The Corps' modeling results did not support likely success of this feature, and difficulties in dealing with concerns of the adjacent Orchid Cove homeowners were considered to be insurmountable. New information from USGS indicated that an artificial (canal basin) manatee thermal refugium at Big Cypress National Park was supported by groundwater-fed warm saline water. Based on this

information and groundwater well information from PSRP upper estuaries, the MMT decided to move away from the concept of a thermocline to sustain the refugium, especially given that the Corps' hydrologic modeling suggested the inability to provide sufficient freshwater volumes to sustain the thermocline. The MMT recommended moving forward on Alternatives 22 and 23A, and possibly a phased approach to look at combinations of several alternatives. On January 30, 2013, managers of the MMT were briefed, and they supported the MMT's recommendations to move forward with either Alternative 22 or 23A.

Off-site manatee mitigation features were discussed in early 2013, including areas within Big Cypress National Preserve, temporary refugium in the TTI National Wildlife Refuge and Everglades National Park, Warm Mineral Springs in Sarasota County, and Henderson Creek near RBNERR. On January 28, 2013, the FWC and the Service inspected the location of a small manatee refugium at Henderson Creek in Collier County and discussed manatee mitigation alternatives. Off-site mitigation options were determined to be inappropriate due to their location outside the action area of the consultation, their inadequate size, and anticipated additional direct and indirect effects to manatees in the POI basin and in other locations.

The agencies held an on-site inspection of PSRP that included senior management from the Corps, District, and Service on February 21 and 22, 2013. This visit included inspection of the existing manatee refugium at the Faka Union-1 weir and the leading two candidate areas for compensation, Alternative 22 and Alternative 23A. The field trip also included a site inspection and discussion of red-cockaded woodpecker, Florida panther, and estuarine habitat areas to be affected by a 6Ls levee feature. These areas are located in the State's portion of the Picayune Strand State Forest and Collier-Seminole State Park (CSSP). We also discussed effects on downstream estuaries in TTI National Wildlife Refuge, RBNERR, and CSSP.

On May 7, 2013, the MMT met and discussed the benefits and costs of potential mitigation features (Alternatives 22, 23A and a new Alternative 27). The District proposed Alternative 27, which would entail excavating a portion of the Faka Union Canal berm below the POI marina, creating an "oxbow" basin as the replacement manatee refugium. The berm in this location is owned by the state of Florida and managed by RBNERR. Monitoring during the testing of the Merritt Pump Station in July and August 2013 was also discussed. Previous discussions between the Service and FWC regarding the size of the mitigation basin, prohibition of boat traffic and other disturbances, and site management and enforcement were shared with the MMT. On July 10, 2013, the Corps transmitted a proposed manatee monitoring plan.

On June 27, 2013, the Service sent a letter to the Corps commenting on the modified Draft Project Operating Manual for PSRP, including provisions to avoid take of the manatee from pump discharges or operations.

On July 15, 2013, the MMT received the draft USGS publication entitled "Hydrological Monitoring and Analysis to Assess Effects of the Picayune Strand Restoration Project on the Florida Manatee" (Slone et al. in publication) which completed baseline studies funded by the Corps and District in 2008 on project effects on the manatee. These effects and contingencies had been outlined in the 2009 Biological Opinion.

On July 17, 2013, the MMT met to discuss the decision by the Corps' Real Estate Division that acquiring property or an easement in the POT marina basin (Alternative 23A) was not authorized by the PIR/EIS. The MMT decided to move forward with Alternative 27 (oxbow south of the POI marina). The monitoring plan was discussed and a decision was made to resolve remaining issues at the management level. Long-term population monitoring, the extent and length of monitoring at the mitigation feature, and water quality monitoring in the POT basin and in adjacent estuaries were among the unresolved issues remaining that needed to be considered at levels above the MMT.

On July 25, 2013, the District, Service, DEP, RBNERR, and TTI National Wildlife Refuge staff site inspected the Alternative 27 site to determine the feasibility of various design locations. The site inspection was followed by an interagency meeting to discuss the site design at RBNERR.

On July 26, 2013, the PSRP Monitoring and Assessment Group met at the District to discuss site construction status and monitoring with an interagency group.

On August 9, 2013, the Service and FWC had a teleconference to discuss manatee mitigation monitoring.

On August 14, 2013, the Service received the published USGS paper on the "modified aerial transect" manatee survey technique which was the baseline aerial survey methodology for manatees in the project action area (Langtimm et al. 2009).

On August 27, 2013, the Service received a preliminary manatee mitigation design from the District.

On September 10, 2013, the Service, Corps, and District had a teleconference with the National Marine Fisheries Service to discuss potential effects of the project on the endangered smalltooth sawfish (*Pristis pectinata*) and goliath grouper (*Epinephelus itajara*) as well as Essential Fish Habitat.

On November 5, 2013, the Service, Corps, USGS, and District met with managers to discuss the Manatee Mitigation Monitoring Plan.

On December 4, 2013, the Corps responded to the June 27, 2013, letter from the Service commenting on the Draft Project Operating Manual.

On December 5, 2013, the Service, FWC, and USGS met to discuss the Draft Manatee Monitoring Plan and Mitigation Feature Design as well as to develop Draft "Success Criteria" for the Manatee Mitigation Feature.

On January 9, 2014, the Corps transmitted a Draft Biological Assessment for the Manatee Mitigation to the Service for internal review.

On January 15, 2014, URS Corporation sent a proposal for geotechnical exploration on the POI Berm to the District.

On February 20, 2014, the Service sent the "Manatee Mitigation Success Criteria" drafted by the Service, FWC, and USGS to the Corps and District.

On February 28, 2014, the District sent a notice to the Service and Corps that the geotechnical exploration on the POI Berm was complete.

On March 13, 2014, the Corps sent a Final Draft of the Manatee Mitigation BA to the Service requesting written comments.

On April 23, 2014, the Service responded to the March 13, 2014, Manatee Mitigation BA citing the need for additional information and clarification.

On May 13, 2014, the District conducted a Manatee Mitigation Feature Design meeting to solicit comments on the design.

On May 22, 2014, the District and the Corps provided comments on the Draft Manatee Monitoring Plan and Success Criteria modified by the Service, FWC, and USGS.

On July 10, 2014, the Service and the District met with DEP at RBNERR to discuss the proposed state management and recreation of the Manatee Mitigation Feature at POI.

On July 27, 2014, the Service received a modified Manatee Mitigation Feature Design and comments on hydrological modeling of the design from the District.

On August 19, 2014, the Service and USGS exchanged updated information on water quality and hydrological monitoring stations that were located in the project action area estuaries.

On August 20, 2014, the Service, Corps, District, and DEP (Tallahassee real estate and CERPRA permitting sections) met with managers to finalize the Manatee Mitigation Feature Design, Manatee Monitoring Plan, and Manatee Success Criteria. Proposed design changes which included a meandered southern ingress/egress and culverting of the northern "ingress" were approved. Permitting deadlines, the Environmental Assessment, and compliance with Endangered Species Act of 1973, as amended (87 Stat.884; 16 U.S.C. 1531 et seq.) and MMPA were also discussed.

On September 8, 2014, the Corps transmitted a Final Draft BA to the Service for the Manatee Mitigation Feature, Monitoring Plan, and Success Criteria. On September 8, 2014, the Service transmitted the Final Draft BA to USGS and FWC for comment. On September 8, the Service transmitted recommended BA modifications to the Corps on other federally-listed species.

On September 11, 2014, the Corps transmitted the Final BA to the Service.

On September 30, the District, Corps, Service, and DEP participated in a pre-application conference for the Corps of Engineers 404 permit application for the project by the District.

On October 7, 2014, the District transmitted draft 90 percent plan details of the manatee mitigation feature to an interagency group for review.

On October 17, 2014, the Service sent recommendations to the Corps and District regarding the definition of moderate and severe cold events based on input from the Service, FWC, and USGS, to the Corps and District.

On October 31, 2014, the Service sent a letter to the Corps concurring on the effects of the project as described in the fourth BA.

## Thompson, Amy D SAJ

**From:** Kim_Dryden@fws.gov
**Sent:** Tuesday, April 24, 2012 1:34 PM
**To:** Thompson, Amy D SAJ
**Cc:** Ralph, Gina P SAJ
**Subject:** Re: Listed Species for PSRP (UNCLASSIFIED)

**Follow Up Flag:** Follow up
**Flag Status:** Completed

**Categories:** Red Category

For this particular project, you can delete the red-cockaded woodpecker as I do not believe any habitat exists in that particular area. The bald eagle is no longer listed although it is covered under BGEPA and MBTA. There is a nest near POI, we need to check the distance. Add the hawksbill sea turtle. There are no nesting sea turtles in the immediate project area (there are downstream), however effects will depend on how equipment accesses or launches to the site.

Please copy me with your consultation with NMFS on listed species and Essential Fish Habitat.

Kim Dryden
Fish and Wildlife Biologist
U.S. Fish and Wildlife Service
South Florida Ecological Services Office
3860 Tollgate Blvd., Suite 300
Naples, FL 34114
Phone: (239) 353-2873
Fax: (239) 353-8640

"Thompson, Amy D SAJ" <Amy.D.Thompson@usace.army.mil>

04/10/2012 11:03 AM To
'Kim Dryden' <Kim_Dryden@fws.gov>
cc
"Ralph, Gina P SAJ" <Gina.P.Ralph@usace.army.mil>
Subject
Listed Species for PSRP (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Kim,

I am in the process of preparing a BA for the PSRP Manatee Mitigation Project and want to make sure the listed species table is up to date. I pulled the table below from a previous BA. Could you please look over and update if needed?

Federally listed threatened (T), endangered (E), or candidate (C) species that might occur within the PSRP area.

REPTILES
American crocodile Crocodylus acutus E
Eastern indigo snake Drymarchon corais couperi T
Loggerhead sea turtle Caretta caretta T
Kemp's ridley sea turtle Lepidochelys kempi E
Atlantic green sea turtle Chelonia mydas mydas E

BIRDS
Red-cockaded woodpecker Picoides borealis E
Wood stork Mycteria americana E
Everglade snail kite Rostrhamus sociabilis plumbeus E
Bald eagle Haliaeetus leucocephalus T

MAMMALS
Florida panther Puma concolor coryi E
West Indian manatee Trichechus manatus E

FISH
Consultation on listed fish will be coordinated with the National Oceanic and Atmospheric Administration Fisheries (NOAA Fisheries).
Smalltooth sawfish Pristis pectinata E
Goliath grouper Epinephelus itajara C
Mangrove rivulus Rivulus marmoratus C
Sand tiger shark Odontaspis taurus C

Thanks!

Amy

Amy Thompson
Biologist
US Army Corps of Engineers
Office: 904-232-1545
Cell: 904-607-7793
Fax: 904-232-3442

Classification: UNCLASSIFIED
Caveats: NONE

## Thompson, Amy D SAJ

**From:** Dryden, Kim [kim_dryden@fws.gov]
**Sent:** Monday, May 20, 2013 11:49 AM
**To:** Thompson, Amy D SAJ
**Cc:** Pace, Robert FWS@SAD
**Subject:** Service Concurrence on Merritt, Faka Union and Miller phases

**Follow Up Flag:** Follow up
**Flag Status:** Completed

**Categories:** Red Category

The Service concurs with the Corps statement that listed species issues under the ESA were covered for the Merritt, Faka Union, and Miller tie-back levees under the 2009 Biological Opinion per the work (project description) specifically described in that opinion. Minor extensions of the Merritt and Faka Union levees which are beyond the descriptions in the BO are being compiled for concurrence under a minor Biological Opinion modification and are considered to be covered per agreements reached on those separate project descriptions.

Amy - we still have no phone Service here at my office if you need to reach me.

**FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION**
MARJORY STONEMAN DOUGLAS BUILDING
3900 COMMONWEALTH BOULEVARD
TALLAHASSEE, FLORIDA 32399-3000

RICK SCOTT
GOVERNOR
HERSCHEL T. VINYARD JR.
SECRETARY

July 31, 2013

Ms. Amy D. Thompson, Biologist
Jacksonville District, Planning & Policy Division
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232-0019

RE: Department of the Army, Jacksonville District Corps of Engineers
Draft Limited Reevaluation Report and Environmental Assessment (LRR/EA),
Picayune Strand Restoration Project – Collier County, Florida.
SAI # FL201306036606C

Dear Ms. Thompson:

The Florida State Clearinghouse has coordinated a review of the U.S. Army Corps of Engineers' (USACE) Draft LRR/EA for the Picayune Strand Restoration Project under the following authorities: Presidential Executive Order 12372; § 403.061(42), *Florida Statutes*; the Coastal Zone Management Act, 16 U.S.C. §§ 1451-1464, as amended; and the National Environmental Policy Act, 42 U.S.C. §§ 4321-4347, as amended.

The following agencies submitted comments, concerns and recommendations regarding the Draft LRR/EA, all of which (memorandum, letters or Clearinghouse database entries) are attached hereto, incorporated herein by this reference, and made an integral part of this letter:

- Florida Department of Environmental Protection
- Florida Department of Agriculture and Consumer Services, Florida Forest Service
- Florida Department of State, Division of Historical Resources
- Southwest Florida Regional Planning Council

Based on the information contained in the submittal and enclosed agency comments, the state has determined that the USACE's Draft LRR/EA for the Picayune Strand Restoration Project is consistent with the Florida Coastal Management Program (FCMP). To ensure the project's continued consistency with the FCMP, the concerns identified by our reviewing agencies must be addressed prior to project implementation. The state's continued concurrence will be based on the activities' compliance with FCMP authorities, including federal and state monitoring of the activities to ensure their continued conformance, and the adequate resolution of issues identified during this and any subsequent reviews. If further regulatory review is required, the state's final concurrence of the project's consistency with the FCMP will be determined upon

completion of the state's environmental permitting process, in accordance with Section 373.428, *Florida Statutes*.

Please refer to the attached memorandum, letters and Clearinghouse database entries for all agency comments, concerns and recommendations regarding the above-captioned project. Should you have any questions or require additional information, please contact Ms. Lauren Milligan, Clearinghouse Coordinator, at (850) 245-2170 or Lauren.Milligan@dep.state.fl.us.

Yours sincerely,

Sally B. Mann, Director
Office of Intergovernmental Programs

SBM/lm
Enclosures

cc: Ernie Marks, DEP, OEP
Chad Kennedy, DEP, OEP WPB
Jennifer Nelson, DEP, South District
Tom Butler, DEP, DSL OES
Gregg Walker, DEP, DRP BNCR
Forrest Watson, FDACS, FFS
Timothy Parsons, DOS, DHR
Nichole Gwinnett, SWFRPC

Florida State Clearinghouse



# Florida
## Department of Environmental Protection
*"More Protection, Less Process"*



Categories



| Project Information | |
|---|---|
| Project: | FL201306036606C |
| Comments Due: | 07/12/2013 |
| Letter Due: | 08/02/2013 |
| Description: | DEPARTMENT OF THE ARMY, JACKSONVILLE DISTRICT CORPS OF ENGINEERS - DRAFT LIMITED REEVALUATION REPORT AND ENVIRONMENTAL ASSESSMENT, PICAYUNE STRAND RESTORATION PROJECT - COLLIER COUNTY, FLORIDA. |
| Keywords: | ACOE - DRAFT LLR/EA, PICAYUNE STRAND RESTORATION PROJECT - COLLIER CO. |
| CFDA #: | 99.997 |

**Agency Comments:**

**AGRICULTURE - FLORIDA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES**

Thank you for the opportunity to comment. We recommend all references in the document to either the "Florida Department of Forestry" or the "Florida Division of Forestry" be changed to indicate "Florida Department of Agriculture and Consumer Services, Florida Forest Service." We also suggest references to the "Fakahatchee Strand State Forest" be changed to "Fakahatchee Strand Preserve State Park." Another suggestion is that references to the "Picayune Strand State Forest" include the following "Picayune Strand State Forest (under Lease Agreement number 3927 from the Board of Trustees of the Internal Improvement Trust Fund of the State of Florida (the land owner)." Please remember management goals in the Picayune Strand State Forest are based upon Management Plans created with input from many various interested organizations as well as the public. A final comment on this draft document relates to the Red-Cockaded Woodpecker (RCW) populations that this document indicates could be impacted by the project. If this project might impact RCW populations in the Picayune Strand State Forest and the Florida Forest Service is expected to undertake the monitoring of RCW populations for impact, additional funding should be provided to help cover these costs. We look forward to working with the U.S. Army Corps of Engineers and other partners on this and other projects. Thank you!

**ENVIRONMENTAL PROTECTION - FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION**

The DEP has long supported the Picayune Strand Project. It was placed on the Conservation and Recreation Acquisition List in 1985. Unprecedented staff time and resources have been committed for the acquisition of over 55,000 acres of land over the period of a decade, and staff continues to actively participate on the project delivery team. The DEP submitted comments on the draft and final EIS demonstrating support of the project in 2004. In addition, the DEP formally approved what was then known as the CERP Southern Golden Gate Estates project pursuant to Section 373.026(8)(b), F.S., which directs the DEP to approve each CERP project component before it is submitted to Congress for federal authorization or receives an appropriation of state funds. The State of Florida has invested significant financial and staff resources towards this important hydrologic and ecologic restoration project and is committed to continuing restoration efforts. For further detailed comments, please refer to the enclosed DEP memorandum.

**STATE - FLORIDA DEPARTMENT OF STATE**

The DOS notes that the USACE is implementing a monitoring plan in which monitors will be present during all construction activities to ensure that archaeological sites are not affected by the project. Conditioned upon this monitoring, the DOS concurs with the finding of no significant impact on histoic properties.

**SOUTH FLORIDA WMD - SOUTH FLORIDA WATER MANAGEMENT DISTRICT**

| |
|---|
| **COLLIER - COLLIER COUNTY** |
| |
| **COMMUNITY PLANNING - FLORIDA DEPARTMENT OF ECONOMIC OPPORTUNITY** |
| |
| **FISH and WILDLIFE COMMISSION - FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION** |
| No Comment by Ron Mezich on 6/5/13. Waiting on further information for NEPA review. |
| **TRANSPORTATION - FLORIDA DEPARTMENT OF TRANSPORTATION** |
| The proposed project has been reviewed by Florida Department of Transportation, District One staff and no significant impact is anticipated on the state road system. FDOT District One offers no comments at this time. |
| **SW FLORIDA RPC - SOUTHWEST FLORIDA REGIONAL PLANNING COUNCIL** |
| The SWFRPC has determined that the Draft LRR/EA is Regionally Significant and Consistent with the Southwest Florida Regional Strategic Policy Plan. Please refer to the enclosed letter for further information. |

For more information or to submit comments, please contact the Clearinghouse Office at:

3900 COMMONWEALTH BOULEVARD, M.S. 47
TALLAHASSEE, FLORIDA 32399-3000
TELEPHONE: (850) 245-2161
FAX: (850) 245-2190

Visit the Clearinghouse Home Page to query other projects.

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**Memorandum**

TO: Lauren Milligan, Florida State Clearinghouse

THROUGH: Ernie Marks, Director
Office of Ecosystem Projects

FROM: Jordan Pugh and Stacey Feken
Office of Ecosystem Projects

Jennifer Nelson
South District Office

Chris Becker and Maulik Patel
Division of Recreation and Parks, Bureau of Parks District 4

DATE: July 31, 2013

SAI #: FL13-6606C

SUBJECT: Department of the Army, Jacksonville District Corps of Engineers – Draft Limited Reevaluation Report and Environmental Assessment, Picayune Strand Restoration Project – Collier County, Florida.

**Summary:**
The United States Army Corps of Engineers (USACE) prepared a Draft Limited Reevaluation Report and Environmental Assessment (LRR/EA) for the Comprehensive Everglades Restoration Plan (CERP) Picayune Strand Restoration Project in southwestern Collier County, Florida. Covering an area of 55,247 acres, the objective of the project is to restore natural water flow across 85 square miles of Collier County lands that were drained for the former Southern Golden Gate Estates extensive residential development. The South Florida Water Management District (SFWMD) is the non-Federal local sponsor.

The purpose of the LRR is to request a post authorization change for the project to increase the authorized project cost. The Picayune Strand Restoration Project was authorized in the Water Resources Development Act (WRDA) of 2007, with a total cost of $375.33 million. The current Section 902 limit in FY 2013 price levels is $505.5 million. The 2013 certified project current cost estimate is $601 million, requiring authorization of additional project funding of $96 million above the 2007 Section 902 limit authorization level.

The 2004 Final Project Implementation Report and Environmental Impact Statement (PIR/EIS) authorized the features of the Picayune Strand Restoration Project as Alternative 3D. However, since the original authorization there have been numerous design refinements which have resulted in this additional funding request. The EA included within the document evaluates one design refinement which led to an increase in the construction footprint of the Picayune Strand

Restoration Project and therefore must be analyzed under the National Environmental Policy Act. All other features discussed within the LRR were included in the 2004 Final PIR/EIS.

**Background:**
The State of Florida expedited efforts on the Picayune Strand project and the SFWMD completed initial construction efforts in the eastern portion of Picayune Strand under the Florida Department of Environmental Protection's (Department) Comprehensive Everglades Restoration Plan Regulation Act Permit (CERPRA) and associated modifications (File No. 0221670). This included installation of earthen plugs within the Prairie Canal, removal of roads east of the Merritt Canal (Prairie Canal Backfill and Road Removal Project). Additionally, work was completed on the Tamiami Trail Culverts West project, including the construction of culverts under Stewart Boulevard and Jane's Scenic Highway.

The WRDA of 2007 provided authorization for federal participation in the Picayune Strand Restoration Project, including construction of three pump stations, tie-back levees, and spreader systems in addition to the continuation of road removal and canal plugging activities. In 2008, the SFWMD transferred responsibility to complete construction of the project to the USACE. Significant revisions to the project design and construction planning were made to ensure conformity with the budget process and Federal Acquisition Regulations.

In 2009, the Department issued a permit and associated modification (Files Nos. 0288313-001-GL and 0288313-002-EM) to the USACE for construction and interim operation of the Merritt Canal Pump Station and associated components, removal of roads west of the Merritt Canal and east of the Faka Union Canal, and installation of earthen plugs within the Merritt Canal. Construction of the pump station and associated components for the Merritt Canal phase began in January 2010 and is scheduled for completion in 2013. In 2010, the Department issued a major modification (File No. 0288313-003) to the USACE for construction of the Faka Union Canal Pump Station, associated components, and removal of the roads between Faka Union and Miller Canals. Construction of the pump station and associated components for the Faka Union Canal phase began in May 2011, which is scheduled for completion in 2014. The Department recently (May 2, 2013) issued a permit modification for the final major phase of the project. Construction of the Miller Canal Pump station and road removal is scheduled for award in 2013/2014 with a final project completion target of 2017.

**Comments:**
The Department has long supported the Picayune Strand Project. It was placed on the Conservation and Recreation Acquisition List in 1985. Unprecedented staff time and resources have been committed for the acquisition of over 55,000 acres of land over the period of a decade, and staff continues to actively participate on the project delivery team.

The Department submitted comments on the draft and final EIS demonstrating support of the project in 2004. In addition, the Department formally approved what was then known as the CERP Southern Golden Gate Estates project pursuant to Section 373.026(8)(b), Florida Statutes (F.S.), which directs the Department to approve each CERP project component before it is

submitted to Congress for federal authorization or receives an appropriation of state funds. The Department also participated in the review of the water reservation for the project, which was adopted into rule by the SFWMD governing board in 2009.

The State of Florida has invested significant financial and staff resources towards this important hydrologic and ecologic restoration project and is committed to continuing restoration efforts. As stated in the draft LRR/EA, the Picayune Strand Restoration Project is an important component of CERP, essential for the recovery of the South Florida ecosystem. The project area is in the center of a block of surrounding state and Federal nature preserves and wildlife areas. The completed project will result in a much larger contiguous natural area, providing valuable wildlife habitat that was previously lost due to development. Since authorization, a substantial investment has been made constructing the sequential project components required to ultimately restore the project area to pre-drainage conditions. The additional funding requested is necessary to complete the project and realize the ecological benefits envisioned in the 2004 Final PIR/EIS, as well as connect the surrounding Federal and state parks, preserves, and refuges. When completed, the project will provide approximately 343,440 habitat units of hydrologic, biological, and estuarine restoration. The draft EA states that if the additional funding is not authorized, the protection features will not be constructed and full restoration will not be achieved resulting in the loss of approximately 70 percent of the hydrologic benefits, 62 percent of the biological benefits, and 100 percent of the estuarine benefits. The Department supports seeking additional federal funding to complete this critical project and ensure continued progress on ecosystem restoration in the area.

The Department recently (May 2, 2013) issued a permit modification for the final major phase of the project, construction of the Miller Canal Pump station and road removal. The draft LRR/EA states on Page 1-5, Section 1.8.1, that "To date, state water quality certification has been obtained for the tieback levees, spreader canals, canal plugs, and road removal features." Please note that while the features described in the EA are covered by the permit (which includes state water quality certification), it only includes ***conceptual*** authorization of canal plugging and demolition of weirs and bridges in the Faka Union and Miller canals. In order to plug the Faka Union and Miller Canals, the protection features (earthen levees to maintain existing levels of flood protection to adjacent private lands) must be completed, as acknowledged in the draft LRR/EA. There are additional hydrologic and hydraulic modeling efforts that are ongoing and associated with project assurances needed by the Department to issue authorization for features under state law. Consultation with the Department is required to determine whether or not a permit modification is necessary prior to implementation of these features. Please review CERPRA Permit (File No. 0288313-008) and revise the relevant text throughout the document accordingly.

The draft LRR/EA states that remaining project components to be constructed are the protection features and the manatee mitigation feature. Please note that, in addition to the conceptual authorizations described above, these features will also require additional review and permit authorizations from the Department. The draft LRR/EA states on Page 2-7, Section 2.5.2, that "In the 2004 Final PIR/EIS cost estimate, the cost for the construction of the 6Ls Farm, Port of

the Islands (POI), and protection features assumed that all earthen material would be obtained from the construction site. However, subsequent geotechnical investigations revealed that a majority of the onsite material is unsuitable for levee construction. Therefore, current LRR/EA estimates for each of the three protection features assume that the foundations for the levees will be excavated and replaced with suitable quarry material hauled in from offsite." This statement implies that a levee at 6Ls Farm, Port of the Islands and other private lands (presumably the northwest private lands) are needed. It is the Department's understanding that modeling has confirmed that there is no need for a levee at Port of the Islands nor at the northwestern private lands (a re-location of a canal is planned to maintain levels of flood protection here). The only levee protection feature currently under design is the 6Ls protection feature. Please revise the above text to eliminate confusion on these points. As acknowledged in the draft LRR/EA, the restoration benefits will be realized when all identified roads are degraded and the Merritt, Faka Union and Miller Canal plugs can be installed. In order to plug the Faka Union and Miller Canals, the needed protection features must be completed.

The draft LRR/EA states on Page 4-7, Section 4.11, that "Changes to the FDEP classification system have been made since the time the 2004 Final PIR/EIS was published. The new classification lists the PSRP project under the Faka Union Canal South Water Body Identification Number (WBID) which is listed as impaired for dissolved oxygen (DO)." The FDEP *classification* of these waterbodies has not changed, however the *assessment status* has changed. Please revise the text to make this distinction. Also, the Faka Union Canal South WBID number is 3278I (this was not identified in the text).

The draft LRR/EA states on Page 4-7, Section 4.12, that "Anticipated remediation activity still remains for the Belle Meade area, located within the project operational flowway, pending completion of ongoing Phase I/II Remediation Reports." The Department received a copy of the Corrective Actions Report for the Belle Meade project area based on the results of the Phase I/II Environmental Site Assessment (July 2012) on January 14, 2013. The Department's Waste Cleanup Section provided a letter on February 22, 2013, stating that the assessment is complete and no further assessment is warranted. Please coordinate with the Department's Division of Waste Management and revise your records and the text accordingly.

The draft LRR/EA states on Page 5-7, Section 5.1.5.5.1, that "Modeling is currently being conducted to confirm the need for the western portion of the Miller tieback levee to prevent impacting private lands." It is the Department's understanding that the modeling results clearly indicate that the original levee design can be shortened to approximately 6,000 feet west of the Miller Pump Station. Elimination of this unneeded portion of the tie-back levee will avoid impacts to wetlands that exist beyond the 6,000 feet. The USACE determined that the tieback levee "may affect" the Red Cockaded Woodpecker located in the mesic pine flatwoods west of the Miller Canal." It is important to note that the permit authorization only includes construction of the Miller tieback levee to approximately 6,000 feet west of the pump station, based on the plans on file with the Department. Please revise the text to make these points clear.

The Department has several comments regarding the Coastal Zone Management Consistency in Appendix D. While the section appropriately recognizes that the Department must review the draft EA under Chapter 403, F.S., it does not appear there has been a thorough review or adequate documentation to support the conclusions made regarding other chapters of Florida Statutes that the Department is responsible for administering:

- Chapter 253, State Lands. Please note that as staff to the Board of Trustees of the Internal Improvement Trust Fund (i.e., Governor and Cabinet), the Department is required to review activities for a determination of effects on state-owned lands. There may be activities which affect state-owned lands within the Picayune Strand State Forest subject to Board of Trustees Lease No. 3927 to the Florida Department of Agriculture and Consumer Services, Florida Forest Service. As such, additional coordination with the Florida Forest Service may be required, as noted in Specific Condition No. 34 of the CERPRA Permit (File No. 0288313-008) issued to the USACE for construction and interim operation of the project. The activities may also affect state-owned lands within Collier-Seminole State Park and, as such, additional coordination with the Department's Division of Recreation and Parks, who manages Collier-Seminole State Park, may be required. Right of Entry from the SFWMD may also be required. There is also a Cooperative Agreement between the SFWMD and Board of Trustees of the Internal Improvement Trust Fund for the CERP Central and Southern Florida, Picayune Strand Restoration Project. As such, activities outside of the scope of the Cooperative Agreement may require additional coordination and/or authorization.

- Chapter 258, State Parks and Aquatic Preserves. Some of the activities (i.e., 6Ls protection feature) described in the EA are adjacent to Collier-Seminole State Park, and it has been determined that other activities associated with the project may also affect state-owned lands within Collier-Seminole State Park. As such, additional coordination with the Department's Division of Recreation and Parks, who manages Collier-Seminole State Park, will be required. Although modeling performed thus far may be interpreted to suggest additional conveyance under US 41 may not be needed, it is recognized by project partners that additional conveyance may in fact be needed under US 41 in order to restore natural sheetflow and realize potential hydrologic benefits within and near Collier-Seminole State Park. The state lands within the Park are home to diverse biological communities as well as threatened and endangered species that may be affected by changes in water levels and hydroperiods. The Park also includes public facilities that may be impacted by changes in hydrologic conditions. Continued coordination with the Department's Division of Recreation and Parks is necessary to ensure that potential hydrologic benefits within the Park are realized and potential impacts to Park facilities are minimized. Right of Entry from the SFWMD may also be required.

- Chapter 373, Water Resources. Please note that the authorities provided by this chapter are much broader than what is summarized. The Department's determination of consistency with CZMA includes a review and determination of consistency with state law, including,

but not limited to, the permit authorization required by Section 373.1502, F.S., for CERP projects.

The Department has been closely monitoring the progress of this project since the SFWMD expedited efforts on the Prairie Canal phase of the project approximately ten years ago. We are pleased that restoration benefits are already being observed through the reemergence of foraging wading birds and native flora and fauna that have been absent from the area for decades.

The Department sincerely appreciates the opportunity to comment and looks forward to continuing the partnership with the SFWMD, the USACE and other state and federal agencies, such as the U.S. Fish and Wildlife Service and Florida Forest Service in completing this important restoration project. Should you have any questions regarding our comments, please contact Stacey Feken at 850-245-3176.

**ec:** Ernie Marks, Frank Powell, Jennifer Nelson, Stacey Feken, Kelli Edson, Deinna Nicholson, Chad Kennedy, Jordan Pugh, Renee Rau, Sheryl Boutin, Marianne Gengenbach, Paula Allen, Tom Butler, Judy Warrick, Chris Becker, Kirby Wilson, Valinda Subic, Gregory Walker

FLORIDA DEPARTMENT of STATE

**RICK SCOTT**
Governor

**KEN DETZNER**
Secretary of State

Re: SHPO/DHR Project File No.: 2013-2749 July 12, 2013
Agency: Florida State Clearinghouse
Agency Project Number: SAI#: FL201306036606C
Project Name: Draft Limited Reevaluation Report and Environmental Assessment, Picayune Strand Restoration Project

To Whom It May Concern:

This office reviewed the referenced draft limited reevaluation report and environmental assessment to identify issues for possible concerns regarding impact to historic properties listed, or eligible for listing, in the *National Register of Historic Places*, that should be addressed in the final statement. Our review was conducted in accordance with Section 106 of the *National Historic Preservation Act of 1966* as amended, the National Environmental Policy Act (NEPA), and their implementing regulations.

We reviewed the information provided, and note that the U.S. Army Corps of Engineers is implementing a monitoring plan in which monitors will be present during all construction activities to ensure that archaeological sites are not affected by the Picayune Strand Restoration Project. Conditioned upon this monitoring, this agency concurs with the finding of no significant impact on historic properties.

If you have any questions concerning our comments, please contact Deena Woodward at Deena.Woodward@dos.myflorida.com, or at 850-245-6333. Thank you for your interest in protecting Florida's archaeological and historical resources.

Sincerely,

Robert F. Bendus, Director
Division of Historical Resources
and State Historic Preservation Officer

Southwest Florida Regional Planning Council
1926 Victoria Avenue, Fort Myers, Florida 33901-3414
(239)338-2550 FAX (239)338-2560 SUNCOM (239)748-2550

July 11, 2013

Ms. Lauren P. Milligan
Department of Environmental Protection Florida State Clearinghouse
3900 Commonwealth Boulevard, M.S .47
Tallahassee, Florida 32399-3000

RE: IC&R 2013-27/SAI # 201306036606C, Department of the Army, Jacksonville District Corps of Engineers – Draft Limited Reevaluation Report (LRR) and Environmental Assessment (EA) and request for additional funding from Congress, Collier County, Florida.

Dear Ms. Milligan:

The staff of the Southwest Florida Regional Planning Council reviews various proposals, Notifications of Intent, Pre-applications, permit applications, and Environmental Impact Statements for compliance with regional goals, objectives, and policies, as determined by the Strategic Regional Policy Plan. The staff reviews such items in accordance with the Florida Intergovernmental Coordination and Review Process (Chapter 291-5, F.A.C.), and adopted regional clearinghouse procedures.

These designations determine Council staff procedure in regards to the reviewed project. The four designations are:

Less Than Regionally Significant and Consistent- No further review of the project can be expected from Council.

Less Than Regionally Significant and Inconsistent- Council does not find the project of regional importance, but will note certain concerns as part of its continued monitoring for cumulative impact within the noted goal area.

Regionally Significant and Consistent- Project is of regional importance, and appears to be consistent with Regional goals, objectives, and policies.

TO: Ms. Lauren P. Milligan
DATE: July 11, 2013
PAGE: 2
RE: IC&R # 2013-27/SAI # 201306036606C

Regionally Significant and Inconsistent- Project is of regional importance and does not appear to be consistent with Regional goals, objectives, and policies. Council will oppose the project as submitted, but is willing to participate in any efforts to modify the project to mitigate the concerns.

**The SWFRPC has determined that the Draft Limited Reevaluation Report (LRR) and Environmental Assessment (EA) and request for additional funding from Congress is Regionally Significant and Consistent with the Southwest Florida Regional Strategic Policy Plan.**

The purpose of the EA portion of the report is to evaluate and compare alternatives for tieback levee features under NEP A. This evaluation was necessitated due to the larger feature footprint than indicated in the 2004 PIRJEIS.

The purpose of this LRR is to request a post authorization change for the project to increase the authorized project cost. The Picayune Strand Restoration Project (PSRP) was authorized in the Water Resources Development Act of 2007 and contained a total cost of $375.33 million. The current Section 902 limit in FY 2013 price levels is $505.5 million. The 2013 certified project current cost estimate is $601 million, requiring authorization of additional project funding of $96 million above the 2007 Section 902 limit authorization level. The 2004 Final Project Implementation Report and Environmental Impact Statement authorized the features of the Picayune Strand Restoration Project as Alternative 3D. However, since the original authorization there have been numerous design refinements which have resulted in this additional funding request. The Environmental Assessment included within this document, will evaluate one design refinement which led to an increase in the construction footprint of the Picayune Strand Restoration Project and therefore must be analyzed under the National Environmental Policy Act. All other features discussed within this Limited Reevaluation Report were included in the 2004 Final Project Implementation Report/Environmental Impact Statement.

The overarching objective of the authorized plan is the hydrologic restoration, preservation, and protection of the Southwest Florida ecosystem while providing flood protection to the adjacent lands. The project area is in the center of a landscape of surrounding state and Federal nature preserves and wildlife areas. The completed project will result in a much larger contiguous natural area, providing valuable wildlife habitat that was previously lost due to development. The plan consists of constructing three pump stations, spreader canals and levees, filling and plugging existing canals, and removing existing roadways to restore natural sheetflow to rehydrate the wetlands within Picayune Strand and reduce point source freshwater discharge to the estuary. When completed, it is expected that the project will successfully achieve all of the planning objectives authorized in the 2004 Final PSR Implementation Report and Environmental Impact Statement:

TO: Ms. Lauren P. Milligan
DATE: July 11, 2013
PAGE: 3
RE: IC&R # 2013-27/SAI # 201306036606C

- Reestablish natural freshwater flows to estuary
- Restore historic hydropatterns, sheetflow and flowways
- Reestablish natural plant distribution and composition
- Increase surface aquifer recharge
- Restore habitat for listed species
- Increase fish and wildlife resources
- Restore ecological connectivity and provide contiguous habitat
- Provide resource based recreational opportunities
- Restore natural fire regime

The PSRP Implementation Report and Environmental Impact Statement was completed in 2004. Prior to the authorization in 2007, the Non-Federal sponsor initiated preconstruction, engineering and design efforts and started construction activity under the State of Florida's Acceler8 initiative. Roadway removal and the seven mile long Prairie Canal backfilling effort were completed in 2007. In 2008 the non-Federal sponsor transferred responsibility to complete the project to the U.S. Army Corps of Engineers. Significant revisions to the project design and construction planning were required to ensure conformity with the budget process and Federal Acquisition Regulations.

The Corps of Engineers awarded a contract for the construction of the first (Merritt) pump station and associated tieback levee, spreader canal, road removal and canal plugging activities in 2009. The Merritt project is scheduled for completion in 2013. The second pump station (Faka Union) and associated tie back levee, spreader canal, road removal and canal plugging construction contract was awarded in 2010 and is scheduled for completion in 2014. The final pump station (Miller) and related work is scheduled for award in 2013 with a final project completion target of 2017.

The remaining project components to be constructed are the protection features and the manatee mitigation feature. The restoration benefits will be realized when all identified roads are degraded and the Merritt, Faka Union and Miller Canal plugs can be installed. In order to plug the Faka Union and Miller Canals, the protection features (earthen levees to maintain existing levels of flood protection to adjacent private lands) must be completed. If the additional funding is not authorized, the protection features will not be constructed and full restoration will not be achieved resulting in the loss of approximately 70 percent of the hydrologic benefits, 62 percent of the biological benefits, and 100 percent of the estuarine benefits.

TO: Ms. Lauren P. Milligan
DATE: July 11, 2013
PAGE: 4
RE: IC&R # 2013-27/SAI # 201306036606C

The 2004 Project Implementation Report and Environmental Impact Statement were prepared based on a limited engineering study and analysis, resulting in a project plan and cost estimate that were conceptual in nature and subject to refinement during preconstruction, engineering and design. Design refinements to the three pump stations and associated earthwork, detailed surveys of the project area revealing previously unknown topographic features and additional tram roads requiring removal as well as requiring a revised, full project width tieback levee to preclude recirculation of water from the pump stations, along with the increase in preconstruction, engineering and design and construction management costs have resulted in increasing the project's total cost above the authorized level.

The PSRP is an important component in the Comprehensive Everglades Restoration Plan and essential for the recovery of the South Florida ecosystem. Since authorization, a substantial investment has been made constructing the sequential project components required to ultimately restore the project area to pre-drainage conditions. The additional funding requested is necessary to complete the project and realize the ecological benefits envisioned in the 2004 Final Project Implementation Report and Environmental Impact Statement, as well as connect the surrounding Federal and state parks, preserves, and refuges. When completed in full, the project will provide approximately 343,440 habitat units of hydrologic, biological, and estuarine restoration.

Based on the information analyzed and presented in the EA, dated May 2013, reflecting pertinent information obtained from agencies having jurisdiction by law and/or special expertise, the USACOE has concluded that the proposed action will not significantly impact the quality of the human environment and does not require an Environmental Impact Statement (EIS). The USACOE states the proposed action is a minor activity that is not similar to any action normally requiring an EIS. There are no significant affects anticipated as a result of this design refinement to the PSRP as described in the 2004 Final Project Implementation Report (PIR) and EIS. Reasons for this conclusion are, in summary:

a. The primary purpose of the PSRP is to restore and enhance wetland habitat over approximately 55,000 acres in Southwest Florida. The PSRP is expected to provide the required flood protection for Northern Golden Gate Estates (NGGE),private lands, the 6L's agricultural area, and Port of the Islands community located near the PSRP area (33 C.F.R. § 385.37 Flood Protection).
b. The proposed action would facilitate movement of freshwater sheetflow to the estuaries thereby improving the water quality as it passes through the restored system. The PSRP would be in compliance with the conditions of a State Water Quality Certification.

TO: Ms. Lauren P. Milligan
DATE: July 11, 2013
PAGE: 5
RE: IC&R # 2013-27/SAI # 201306036606C

c. The U.S. Army Corps of Engineers (Corps) is coordinating a consistency determination with the Florida Department of Environmental Protection (FDEP) under the guidelines of the Coastal Zone Management Act (CZMA) through the circulation of this EA. The Corps has determined that the proposed action is consistent with the State of Florida's CZMA program through compliance with all applicable chapters of the Coastal Zone Management Act (Appendix D).
d. Endangered Species Act (ESA) consultation has been completed for the proposed action and is described in the 2009 Biological Opinion (BO) for the PSRP. ESA and Marine Mammal Protection Act (MMPA) consultation for the West Indian Manatee are currently being revisited based on new scientific information and will be addressed in a future Biological Assessment and National Environmental Policy Act (NEPA) evaluation.
e. The proposed action would have no effect on any resources of cultural or historical significance. Monitors will be present during construction activities tonsure archeological sites are not affected by the PSRP. This project is incompliance with the National Historic Preservation Act.
f. Implementation of the proposed action will follow the guidelines outlined in the PSRP Nuisance and Exotic Vegetation Management Plan.
g. The proposed action would not substantially alter any other environmental or social impacts from those previously described in the 2004 Final PIR/EIS for the PSRP and in any other NEPA compliance documents related to the PSRP.
h. The proposed action is consistent with the authorized purpose of the PSRP and will not adversely affect anticipated restoration benefits.

Thank you for the opportunity to participate in the development and review of the LRR and EA. If you have specific questions about the content of this letter, please contact Mr. Jim Beever directly at (239) 338-2550 ext. 224, e-mail jbeever@swfrpc.org.

Sincerely,

Southwest Florida Regional Planning Council
Margaret Wuerstle
Margaret Wuerstle, AICP
Executive Director

CC: Ms. Amy Thompson, Environmental Lead
U.S. Army Corps of Engineers

2014-4068
SFWMD

August 2, 2014

RECEIVED
BUREAU OF
HISTORIC PRESERVATION
2014 SEP -4 A 10:41

Mr. Robert F. Bendus
Director, and State Historic Preservation Officer
Florida Division of Historical Resources
R.A. Gray Building
500 South Bronough Street
Tallahassee, Florida 32399

Attn: Timothy Parsons, Ph.D.

Re: Cultural Resource Reconnaissance Survey
Manatee Mitigation Picayune Strand Restoration Project
Collier County

Dear Mr. Bendus:

Please find enclosed the Cultural Resource Reconnaissance Survey (CRRS) memo report conducted by Janus Research for the Manatee Mitigation Picayune Strand Restoration Project (the Project). Enclosed you will find the following documents:

- One unbound copy of the CRRS memo report
- One CD containing a PDF of the CRRS memo report, an electronic version of the FMSF form for site 8CR191 and survey log sheet;
- One unbound FMSF forms for site 8CR191; and
- One unbound survey log sheet.

The purpose of this study was to attempt to relocate a previously recorded archaeological site (8CR191) within the project area, evaluate the project area for the potential for any new prehistoric or historic resources, and establish the research and field methods for the identification of cultural resources within the project area that may be eligible for listing in the *National Register of Historic Places* (National Register). Principal Investigators meet the *Secretary of the Interior's Professional Qualification Standards* (48 FR 44716) for archaeology. The archaeological reconnaissance survey was conducted under the direction of James Pepe, M.A., RPA.

The CRRS of the Manatee Mitigation Picayune Strand Restoration Project resulted in the relocation of 8CR191 and the confirmation of the low archaeological site potential for the remainder of the project area. No historic resources were identified within the project area.

Site 8CR191 appears to be cultural material redeposited from the excavation of the Faka Union Canal. No cultural material from an undisturbed context was found. Based on the results of the survey, no additional research is recommended. However, due to the presence of archaeological material in this area, archaeological monitoring is recommended for any future ground disturbing activities planned for the project in the vicinity of the site.

If you have questions regarding the Project or if I may be of assistance, please contact me at 813-636-8200 or jim_pepe@janus-research.com, or Armando Ramirez (SFWMD) at 561-682-6684 or aramire@sfwmd.gov.

Sincerely,

Jim Pepe, M.A., R.P.A.
Archaeologist
Janus Research

Enclosure

cc: Armando Ramirez, SFWMD

**The Director of the Florida Division of Historical Resources, State Historic Preservation Officer finds the attached Cultural Resource Assessment Surveys complete and sufficient and concurs with the recommendations and findings provided in this cover letter for SHPO/DHR Project File Number** 2014-4068.

**Robert F. Bendus**
**Director, and State Historic Preservation Officer**
**Florida Division of Historical Resources**

10/3/14
**Date**

**FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION**
MARJORY STONEMAN DOUGLAS BUILDING
3900 COMMONWEALTH BOULEVARD
TALLAHASSEE, FLORIDA 32399-3000

RICK SCOTT
GOVERNOR

CARLOS LOPEZ-CANTERA
LT. GOVERNOR

JONATHAN P. STEVERSON
SECRETARY

January 20, 2015

Mr. Brad A. Tarr, Biologist
Jacksonville District, Planning & Policy Division
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232-0019

RE: Department of the Army, Jacksonville District Corps of Engineers
Draft Environmental Assessment (EA), Design Refinements for the
Picayune Strand Restoration Project – Collier County, Florida.
SAI # FL201411247115C (Reference Prior SAI # FL201306036606C)

Dear Mr. Tarr:

The Florida State Clearinghouse has coordinated a review of the U.S. Army Corps of Engineers' (USACE) Draft EA for the Picayune Strand Restoration Project Design Refinements under the following authorities: Presidential Executive Order 12372; § 403.061(42), *Florida Statutes*; the Coastal Zone Management Act, 16 U.S.C. §§ 1451-1464, as amended; and the National Environmental Policy Act, 42 U.S.C. §§ 4321-4347, as amended.

The following agencies submitted comments, concerns and recommendations regarding the Draft EA, all of which (memorandum and letters) are attached hereto, incorporated herein by this reference, and made an integral part of this letter:

- Florida Department of Environmental Protection
- Florida Fish and Wildlife Conservation Commission
- Florida Department of State, Division of Historical Resources

Based on the information contained in the submittal and enclosed agency comments, the state has determined that the USACE's Draft EA for the Picayune Strand Restoration Project Design Refinements is consistent with the Florida Coastal Management Program (FCMP). To ensure the project's continued consistency with the FCMP, the concerns identified by our reviewing agencies must be addressed prior to project implementation. The state's continued concurrence will be based on the activities' compliance with FCMP authorities, including federal and state monitoring of the activities to ensure their continued conformance, and the adequate resolution of issues identified during this and any subsequent reviews. If further regulatory review is required, the state's final concurrence of the project's consistency with the FCMP will be

determined upon completion of the state's environmental permitting process, in accordance with Section 373.428, *Florida Statutes*.

Thank you for the opportunity to review the draft document. Should you have any questions regarding this letter, please don't hesitate to contact me at Lauren.Milligan@dep.state.fl.us or (850) 245-2170.

Yours sincerely,

Lauren P. Milligan

Lauren P. Milligan, Coordinator
Florida State Clearinghouse
Office of Intergovernmental Programs

Enclosures

cc: Ed Smith, DEP, OEP
Chad Kennedy, DEP, OEP WPB
Julie Neurohr, DEP, South District
Scott Sanders, FWC
Timothy Parsons, DOS-DHR

# Memorandum

TO: Florida State Clearinghouse

THROUGH: Edward C. Smith, Director
Office of Ecosystem Projects

FROM: Jerilyn Ashworth, Paul Julian, Julie Neurohr, and Jordan Pugh
Office of Ecosystem Projects

DATE: January 12, 2015

SUBJECT: Department of the Army, Jacksonville District Corps of Engineers – Draft Environmental Assessment, Design Refinements for the Picayune Strand Restoration Project – Collier County, Florida

SAI #: FL201411247115C

**Summary:**

The United States Army Corps of Engineers (USACE) prepared a Draft Limited Reevaluation Report and Environmental Assessment (LRR/EA) for the Comprehensive Everglades Restoration Plan (CERP) Picayune Strand Restoration Project in southwestern Collier County, Florida. Covering an area of 55,247 acres, the objective of the project is to restore natural water flow across 85 square miles of Collier County that were drained for the former Southern Golden Gate Estates development.

The Draft Environmental Assessment illustrates design refinements that have been made to the original plan in order to maximize the project's full restoration benefits. These design refinements will increase the project footprint, so an Environmental Assessment (EA) was prepared to ensure that the refinements would have no adverse impacts to the environment. The EA determined that no significant impacts will be anticipated as a result of the refinements. The design refinements include:

- The replacement of berms for the Merritt, Faka Union, and Miller Pump Stations with a single full width tieback levee for each pump station. This project component was authorized as part of the project and is needed to achieve full restoration benefits.
- A manatee mitigation feature located south of the project near the Port of the Islands Basin on land managed by Rookery Bay National Estuarine Research Reserve. This feature has been negotiated through informal Endangered Species Act consultation with the U.S. Fish and Wildlife Service to mitigate for potential adverse effects due to project implementation on the existing thermal refugium in the Port of the Islands Basin.

**Background:**

USACE is the federal sponsor and South Florida Water Management District (SFWMD) is the non-Federal local sponsor. The State of Florida expedited efforts on the Picayune Strand project and the SFWMD completed initial construction efforts in the eastern portion of Picayune Strand under the Florida Department of Environmental Protection's (Department) Comprehensive Everglades Restoration Plan Regulation Act Permit (CERPRA) and associated modifications (File No. 0221670). This included installation of earthen plugs within the Prairie Canal, removal of roads east of the Merritt Canal (Prairie Canal Backfill and Road Removal Project).

The Water Resources Development Act of 2007 provided authorization for federal participation in the Picayune Strand Restoration Project, including construction of three pump stations, tie-back levees, and spreader systems in addition to the continuation of road removal and canal plugging activities. In 2008, the SFWMD transferred responsibility to complete construction of the project to the USACE. Significant revisions to the project design and construction planning were made to ensure conformity with the budget process and Federal Acquisition Regulations.

In 2009, the Department issued a permit and associated modification (Files Nos. 0288313-001-GL and 0288313-002-EM) to the USACE for construction and interim operation of the Merritt Canal Pump Station and associated components, removal of roads west of the Merritt Canal and east of the Faka Union Canal, and installation of earthen plugs within the Merritt Canal. Construction of the pump station and associated components for the Merritt Canal phase began in January 2010 and was completed in 2014. In 2010, the Department issued a major modification (File No. 0288313-003) to the USACE for construction of the Faka Union Canal Pump Station, associated components, and removal of the roads between Faka Union and Miller Canals. Construction of the pump station and associated components for the Faka Union Canal phase began in May 2011, which is scheduled for completion in 2015. The Department issued a permit modification for the final major phase of the project in May of 2013. Construction of the Miller Canal Pump station and road removal has a final project completion target of 2017.

The Department submitted comments on the draft and final EIS demonstrating support of the project in 2004. In addition, the Department formally approved what was then known as the CERP Southern Golden Gate Estates project pursuant to Section 373.026(8)(b), Florida Statutes, which directs the Department to approve each CERP project component before it is submitted to Congress for federal authorization or receives an appropriation of state funds. In 2009, the Department participated in the review of the water reservation for the project, which was adopted into rule by the SFWMD governing board. The Department also provided comments on the Draft LRR/EA in July of 2013.

**Comments:**

**Section 1.2.2 – Manatee Mitigation Feature**

- This section states that material will be excavated and placed on the Faka Union spoil berm both north and south of the construction feature, however the CERPRA permit application provided by SFWMD includes placing spoil only south of the feature. Please revise.

**Section 1.3 – Location**

- In this section for location, please explain in the last paragraph that the manatee mitigation feature is located on lands managed by Rookery Bay National Estuarine Research Reserve.

**Section 4.10 – Water Quality**

- The downstream WBID 3259M is impaired for dissolved oxygen with no causative pollutant identified and is also impaired for fecal coliform (SEAS Classification). This is important due to the number of manatees that will potentially be occupying the refugium and the initial flush when the feature is opened. Additionally, this document lists Faka Union Canal South as impaired; please clarify that it is listed as "impaired due to natural conditions."

**Section 1.4 – Project History**

- On page 1-8, in the paragraph regarding the Faka Union Pump Station, it states that this construction phase includes canal plugging and is scheduled to be completed in April 2015. The paragraph below further explains that additional flood protection features and the manatee mitigation feature must be complete before the Faka Union and Miller canals can be plugged. Please revise the paragraph regarding the Faka Union Pump Station construction contract to clarify that canal plugging will not be completed in April 2015, but will be at a later date once the other necessary features are complete.

**Section 5.1.11.2 – Water Quality**

- This section states that the water quality at the POI Basin would have no change or impairment as a result of the implementation of Alternative 27 Option 2 and that only temporary construction related effects are anticipated. Please include a discussion of the possibility that local, albeit temporary impacts may occur when the Feature is opened (first flush).

**Section 5.1.4.2 - Wetlands (Alternative 27 Option 2)**

- Page 5-2 states that there will be approximately 2 acres of mangrove swamp impact. The CERPRA permit application and Uniform Mitigation Assessment Method (UMAM) Analysis identified two types of wetland habitat to be impacted: 0.43

acres of mangrove swamp and 1.79 acres of freshwater marsh. Please revise this section to be consistent with the most current UMAM analysis.

**Section 5.1.4.2 - Wetlands (Alternative 27 Option 2)**

- The end of the section states that the "impacts to mangroves are expected to be mitigated by the overall improvement of mangrove conditions south of US 41 through hydrologic restoration of the PSRP area." Please update this sentence to reflect the freshwater marsh mitigation and mangrove swamp mitigation to be consistent with the Mitigation Report, Attachment 16 of the CERPRA permit application.

The Department has long supported the Picayune Strand Restoration Project and has been closely monitoring the progress of this project since the SFWMD expedited efforts on the Prairie Canal phase of the project approximately ten years ago. Unprecedented staff time and resources have been committed for the acquisition of over 55,000 acres of land over the period of a decade, and staff continues to actively participate on the project delivery team.

The Department sincerely appreciates the opportunity to comment and looks forward to continuing the partnership with the SFWMD, the USACE and other state and federal agencies, such as the U.S. Fish and Wildlife Service and Florida Forest Service, in completing this important restoration project. Should you have any questions regarding our comments, please contact Natalie Barfield at 850-245-3197.

**Electronic copies to:**
Ed Smith
Frank Powell
Kelli Edson
Chad Kennedy
Jerilyn Ashworth
Rodolfo Pacheco
Deinna Nicholson
Jordan Pugh
Julie Neurohr
Jennifer Carpenter

Florida Fish and Wildlife Conservation Commission

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**Charles W. Roberts III**
*Tallahassee*

Executive Staff
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**Jennifer Fitzwater**
Chief of Staff

Division of Habitat and Species Conservation
Thomas Eason, Ph.D.
Director

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(800) 955-8771 (T)
(800) 955-8770 (V)

MyFWC.com

December 31, 2014

Ms. Lauren Milligan, Coordinator
Florida State Clearinghouse
Florida Department of Environmental Protection
3900 Commonwealth Blvd., M.S. 47
Tallahassee, Florida 23299-1600

Dear Ms Milligan:

The Florida Fish and Wildlife Conservation Commission (FWC) staff has reviewed the U.S. Army Corps of Engineers (USACE) Draft Environmental Assessment, Design Refinements for the Picayune Strand Restoration Project located in Collier County. We provide the following comments for your consideration in accordance with our authorities under the Coastal Zone Management Act/Florida's Coastal Zone Program.

**Project Description and History**

FWC has coordinated with the South Florida Water Management District (SFWMD), USACE and the U.S. Fish and Wildlife Service (USFWS) and provided technical assistance and permit comments and recommendations on the proposed manatee mitigation feature. The proposed Comprehensive Everglades Restoration Plan project located north of the existing manatee warm-water site at Port of the Islands will reestablish freshwater flows from the current canal system restoring natural flow patterns and enhancing surrounding wetlands. The freshwater flows that currently enter into the Port of the Islands basin are an integral part of the physical characteristics that create warm-water habitat in the basin that is used by up to 300 manatees in the winter. Due to the changes in the freshwater flow, it has been determined that the thermal properties of this warm-water site will be less dependable and under some circumstances lost during the winter months resulting in the potential for increased cold stress related manatee deaths. As mitigation for these changes, construction of a new manatee warm-water refuge has been proposed that will use warm saline ground water to maintain manatees through the winter months.

To create this manatee mitigation feature an area approximately 1700 feet long will be excavated from the spoil berm located along the western shoreline of the Faka Union canal 800 feet south of the southwestern-most basin at Port of the Isles. The manatee mitigation feature will range from 44 feet to 86 feet wide in the channel and 184 feet wide in the pool areas. The pool area depths will be 20 feet to allow for intrusion of ground water that will be approximately 24° C creating a suitable manatee warm-water refuge. The channel leading from the Faka Union canal will be narrower than the pools but will range from 6 to 11 feet in depth. The channel will be open on the southern end to allow for manatee access. A boat barrier is planned to keep vessels out to avoid disturbance within the refuge. The northern end the refuge will be connected to the Faka Union canal by two culverts that will allow for water exchange within the refuge.

Our Agency provided comments to the Department of Environmental Protection on this project most recently in December 2014 (Attached).

**Potentially Affected Resources and Recommendations**

The Florida manatee may be negatively affected by the alteration of freshwater flows from the current canals that empty into the Port of the Isles basin. The freshwater flows at this location were part of the process that created a passive thermal basin at this location that has long been used by manatees as a warm-water refuge. With the reduction of these flows it is likely that this passive thermal basin will be less reliable and possibly disappear resulting in a loss of warm-water habitat. As many as 300 manatees have used this site and its loss could result in an increase in cold stress related deaths in this region. The construction of the manatee mitigation feature is designed to replace the existing warm-water refuge.

Gopher tortoises inhabit the spoil berm located on the west side of the Faka Union canal. Due to the construction of the manatee mitigation feature approximately 15 gopher tortoise burrows will be affected. Relocation of the affected tortoises is being arranged with FWC staff.

No other wildlife or plant species have been identified as being significantly affected by the proposed construction of the manatee mitigation feature.

**Comments and Recommendations**

The following comments have been provided to FDEP for this project (CERPRA permit # 0221670-008EM) to avoid, minimize and mitigate fish and wildlife impacts as a result of this project:

1. The Standard Manatee Conditions for In-Water Work (2011) must be followed for all in-water activity.

2. No dredging in waters accessible to manatees during the winter season (November 15 through March 31). FWC recommends that all dredging or excavation of the manatee mitigation feature take place prior to connecting the Faka Union canal to the mitigation feature. If dredging or excavation takes place after the mitigation feature is connected to the Faka Union canal at least one dedicated observer that has been approved by the Florida Fish and Wildlife Conservation Commission (FWC) shall be present at any given time when dredging work is being performed and shall perform no other duties that may interfere with their ability to observe for protected marine species. FWC approval must be specifically for this project and approval must occur prior to work commencement as per FWC guidelines outlined at the following website: http://www.myfwc.com/wildlifehabitats/managed/manatee/watch-program/. Observer(s) must have prior on-the-job experience observing protected marine species (such as manatees or marine turtles) during previous dredging and in-water work where the activities were similar in nature to this project. Observer(s) shall have the authority to cease project operations: 1) upon sighting a manatee within 50 feet of any in-water construction or vessel activity; and 2) if detection of protected marine species is not possible due to weather or other conditions. A final report shall be sent to the Florida Fish and Wildlife

Conservation Commission at ImperiledSpecies@myfwc.com, no later than 30 days after each event and/or final project completion. The report shall outline project name and permit number, names of observers and contact information, and summaries of protected marine species sightings and actions taken.

3. No nighttime dredging shall occur in waters accessible to manatees.

4. If blasting may be required a "Blast and Manatee Watch Plan" will be required prior to construction of the manatee mitigation feature. The "Blast and Manatee Watch Plan" will require the approval of the FWC and the U.S. Fish and Wildlife Service (FWS). Under the condition described above the "Blast and Manatee Watch Plan" will require aerial monitoring. To reduce construction costs due to monitoring and potential negative impacts to manatees and other fish and wildlife, FWC recommends that all blasting be conducted prior to any water connection between the Faka Union Canal and the Manatee Mitigation Feature site.

5. To avoid adverse impacts to manatees the applicant, prior to installation, shall send design plans for the boat barrier to the FWC and FWS for review and approval. The proposed boat barrier shall be designed to prevent entanglement or entrapment of the manatees. Additionally, the FWC Office of Boating and Waterways shall be contacted regarding permitting and placement of any navigational related signs or buoys at http://myfwc.com/boating/waterway/markers/.

6. To reduce the risk of entrapment of manatees, manatee exclusion devices (such as grating) shall be installed and maintained over any existing or proposed pipes or culverts greater than 8 inches, but smaller than 8 feet in diameter that are submerged or partially submerged and reasonably accessible to manatees. Exclusion devices (such as horizontal or vertical bars for grates) shall allow openings with no more than 8 inch distances on center at the accessible end(s) during all phases of the construction process and as a final design element to restrict manatee access. The proposed operational plan provided in the application must be modified to make clear that the grating will remain in place during flushing activities. If grating is required to be removed, FWC and FWS shall be contacted, prior to removal of the grating, to provide guidance for monitoring the culverts to prevent manatee entrapment.

7. The permittee shall follow the FWC and FWS approved monitoring plan for this project. In order for the permittee or their agent to carry out the proposed manatee monitoring plan, access to the manatee mitigation feature by monitoring and research personnel will be necessary. Design and construction of structures that will be needed to support the monitoring activities can be accomplished without adversely affecting manatees by coordinating with FWC and FWS prior to implementing the monitoring plan. Structures expected to be needed to support monitoring activities include, shoreline dock or tie-off for a small vessel near the mitigation feature, upland boardwalk and multiple viewing platforms alongside the manatee mitigation pools that can be used for Manatee counts, photo identification and visual health assessments, and a small beach inside the

mitigation feature where manatee capture, rescue, recovery and medical care can be provided.

8. An FWC Gopher Tortoise Conservation Permit will be required for this project to allow for the relocation of gopher tortoises currently on the project site.

In summary, we appreciate the efforts and coordination of the SFWMD, USACOE and the USFWS to avoid, minimize and mitigate the potential impacts of the proposed Picayune Strand projects. We expect that the permit conditions and monitoring plans associated with this project will adequately address the anticipated impacts to state fish and wildlife resources.

If you need further assistance, please do not hesitate to contact Jane Chabre either by phone at (850) 410-5367 or at FWCConservationPlanningServices@MyFWC.com. If you have specific technical questions regarding the content of this letter, please contact Ron Mezich at (850) 922-4330 or by email at ron.mezich@myfwc.com.

Sincerely,

Carol A. Knox
Section Leader
Imperiled Species Management
Division of Habitat and Species Conservation

Picayune Strand Restoration Project_20269_123114

cc: Jim Valade, Jim_Valade@fws.gov
Kim Dryden, kim_dryden@fws.gov
Heather Rigney, heather.rigney@MyFWC.com
Mary Duncan, mary.duncan@MyFWC.com

RECEIVED
DEC 16 2014
DEP Office of
Intergovt'l Programs

FLORIDA DEPARTMENT *of* STATE

**RICK SCOTT**
Governor

**KEN DETZNER**
Secretary of State

Florida State Clearinghouse
Agency Contact and Coordinator (SCH)
Attn: Lauren Milligan
3900 Commonwealth Blvd. MS-47
Tallahassee, Florida 32399-3000

December 9, 2014

RE: DHR Project File No.: 2014-5529/ Received by DHR: December 01, 2014
Application No.: SAI FL201411247115C
Project: *Draft EA, Design Refinements for the Picayune Strand Restoration Project*
County: Collier

Dear Ms. Milligan,

Our office received and reviewed the project in accordance with Section 106 of the *National Historic Preservation Act of 1966*, as amended and the *National Environmental Policy Act of 1969*. The State Historic Preservation Officer is to advise and assist federal agencies when identifying historic properties (archaeological, architectural, and historical resources) listed, or eligible for listing, in the National Register of Historic Places, assessing the project's effects, and considering alternatives to avoid or minimize adverse effects.

**Tieback Levee**
Our records indicate that we previously reviewed this project area (DHR Project # 2013-2749, letter date July 12, 2013, copy enclosed). Our comments of July 2013 still stand. Therefore, based on the information provided, it is the opinion of this agency that the project will have no adverse effect on historic properties, so long as a professional archaeologist monitors during all construction activities and all recorded sites are avoided.

**Manatee Mitigation Feature**
In April 2014, Janus Research conducted a cultural resource reconnaissance survey of the proposed Manatee Mitigation area on behalf of the South Florida Water Management District (DHR project #2014-4068). Janus relocated archaeological site 8CR191 and concluded it appears to be redeposited material from the excavation of the Faka Union Canal. The site was determined ineligible for listing on the National Register. No further cultural resources from an undisturbed context was identified within the project area. However, due to the presence of archaeological material in this area, our office recommends that all ground disturbing activities be monitored by a trained cultural resources monitor. The results of which should be forwarded to this office once the project is complete.

Thus, conditioned upon the above referenced monitoring request, it is the opinion of this office that the proposed project will have no adverse effect on historic properties listed, or eligible for listing in the National Register of Historic Places, or otherwise of historical or archaeological value.

We look forward to consulting on the 6L's protection levee in the future.

For any questions concerning our comments, please contact Mary Berman, Historic Sites Specialist, by phone at 850.245.6333 or by electronic mail at Mary.Berman@dos.myflorida.com.

Sincerely,

Robert F. Bendus, Director
Division of Historical Resources
and State Historic Preservation Officer

*Attachment: DHR Project Letter # 2013-2749*

FLORIDA DEPARTMENT of STATE

RICK SCOTT
Governor

KEN DETZNER
Secretary of State

Re: SHPO/DHR Project File No.: 2013-2749 July 12, 2013
Agency: Florida State Clearinghouse
Agency Project Number: SAI#: FL201306036606C
Project Name: Draft Limited Reevaluation Report and Environmental Assessment, Picayune Strand Restoration Project

To Whom It May Concern:

This office reviewed the referenced draft limited reevaluation report and environmental assessment to identify issues for possible concerns regarding impact to historic properties listed, or eligible for listing, in the *National Register of Historic Places*, that should be addressed in the final statement. Our review was conducted in accordance with Section 106 of the *National Historic Preservation Act of 1966* as amended, the National Environmental Policy Act (NEPA), and their implementing regulations.

We reviewed the information provided, and note that the U.S. Army Corps of Engineers is implementing a monitoring plan in which monitors will be present during all construction activities to ensure that archaeological sites are not affected by the Picayune Strand Restoration Project. Conditioned upon this monitoring, this agency concurs with the finding of no significant impact on historic properties.

If you have any questions concerning our comments, please contact Deena Woodward at Deena.Woodward@dos.myflorida.com, or at 850-245-6333. Thank you for your interest in protecting Florida's archaeological and historical resources.

Sincerely

Robert F. Bendus, Director
Division of Historical Resources
and State Historic Preservation Officer

## Thompson, Amy D SAJ

**From:** Robbins, Rick - NRCS, Gainesville, FL [rick.a.robbins@fl.usda.gov]
**Sent:** Friday, November 09, 2012 7:15 AM
**To:** Thompson, Amy D SAJ
**Subject:** RE: Picayune Strand Restoration Project Environmental Assessment
**Attachments:** Collier_Imp_Farmlands.pdf

**Follow Up Flag:** Follow up
**Flag Status:** Completed

**Categories:** Red Category

Hello Amy,

Attached is a list of Locally and Unique Farmland soils for Collier County. None of the soils on the Web Soil Survey document you provided are listed as Local or Unique Farmland soils. Therefore, no Farmland impact.

Regards,

Rick

Rick Robbins
USDA-NRCS
Soil Scientist
2614 NW 43rd Street,
Gainesville, FL 32606
Phone: 352.338.9536
Email: rick.a.robbins@fl.usda.gov

"Helping people help the land"

Myakka Series: State Soil of Florida

-----Original Message-----
From: Thompson, Amy D SAJ [mailto:Amy.D.Thompson@usace.army.mil]
Sent: Thursday, November 08, 2012 11:13 AM
To: Robbins, Rick - NRCS, Gainesville, FL
Subject: Picayune Strand Restoration Project Environmental Assessment

Good Morning Rick,

I am a biologist with the Corps of Engineers and am preparing a Environmental Assessment for the Picayune Strand Restoration Project (PSRP) located in Collier County, Florida. An Environmental Impact Statement for the project was completed in 2004 but since then an additional feature has been added that has an additional project footprint. The feature is a weir located in the Faka Union Canal just north of US-41. In order to construct and maintain the weir, an access road must be constructed next to the canal. The impact area will be approximately 3 acres. I have attached a .kmz file of the project footprint as well are a map from the NRCS soil survey site. Please let me know if you need any additional information in order to reach a determination regarding the impact to farmlands.

Thanks,

Amy

Amy Thompson
Biologist
US Army Corps of Engineers
904-232-1545
Fax: 904-232-3442

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# Prime and other Important Farmlands

Collier County Area, Florida

| Map symbol | Map unit name | Farmland classification |
|---|---|---|
| 14 | Pineda fine sand, limestone substratum | Farmland of local importance |
| 18 | Riviera fine sand, limestone substratum | Farmland of local importance |
| 21 | Boca fine sand | Farmland of local importance |
| 2 | Holopaw fine sand, limestone substratum | Farmland of unique importance |
| 3 | Malabar fine sand | Farmland of unique importance |
| 7 | Immokalee fine sand | Farmland of unique importance |
| 8 | Myakka fine sand | Farmland of unique importance |
| 10 | Oldsmar fine sand, limestone substratum | Farmland of unique importance |
| 15 | Pomello fine sand | Farmland of unique importance |
| 16 | Oldsmar fine sand | Farmland of unique importance |
| 17 | Basinger fine sand | Farmland of unique importance |
| 20 | Ft. Drum and Malabar, high, fine sands | Farmland of unique importance |
| 22 | Chobee, Winder, and Gator soils, depressional | Farmland of unique importance |
| 27 | Holopaw fine sand | Farmland of unique importance |
| 28 | Pineda and Riviera fine sands | Farmland of unique importance |
| 29 | Wabasso fine sand | Farmland of unique importance |
| 37 | Tuscawilla fine sand | Farmland of unique importance |

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701-5505
http://sero.nmfs.noaa.gov

F/SER31: SJA/KD

Mr. Eric Summa
Chief, Environmental Branch
Jacksonville District Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

DEC 17 2013

Re: Comprehensive Everglades Restoration Plan Programmatic Consultation

Dear Mr. Summa:

This responds to your July 2, 2013, Biological Assessment (BA) for the Comprehensive Everglades Restoration Plan (CERP) program received from the U.S. Army Corps of Engineers (USACE) requesting National Marine Fisheries Service (NMFS) concurrence with program and project-effect determinations submitted pursuant to Section 7 of the Endangered Species Act (ESA). You have determined that of the projects reasonably expected to be implemented as part of the CERP, only the following projects may directly affect, but are not likely to adversely affect through construction impacts, listed species and their critical habitats under NMFS's purview: Biscayne Bay Coastal Wetlands (BBCW); Indian River Lagoon South (IRL-S); Caloosahatchee River (C-43) West Basin Storage Reservoir; Picayune Strand Restoration Project; and the Central Everglades Planning Project (CEPP). Further, you determined that all the CERP program components that will change freshwater flow and storage across south Florida and thus affect salinity and aquatic resources in several coastal estuaries and bays inhabited by NMFS's listed species, may affect, but are not likely to adversely affect green, hawksbill, Kemp's ridley, leatherback, or loggerhead sea turtles and their respective critical habitat, smalltooth sawfish and its critical habitat, or Johnson's seagrass and its critical habitat. In addition, you determined that the proposed action would not affect Gulf sturgeon, elkhorn or staghorn corals and their critical habitat, or blue, finback, humpback, sei, or sperm whales. We have also determined that the proposed action may affect, but is not likely to adversely affect seven coral species, and would have no effect on the loggerhead critical habitat currently proposed to be listed as threatened or endangered in the action area of the program. Our findings on the program and each of the project's potential effects are based on the project descriptions in this response. Changes to the proposed actions for any of these projects may negate our findings and may require reinitiating consultation. An acronyms and abbreviation list is provided at the end of this document.

## 1.0 Consultation History

Between 2002 and 2011, NMFS and USACE consulted informally on several individual project components of the CERP program. In its November 3, 2011, letter concurring with USACE that the BBCW project is not likely to adversely affect any listed species, NMFS recommended that consultation should be conducted on the combined effects of the CERP program (SER-2010-2615). In the BBCW informal concurrence letter, NMFS indicated that 13 CERP projects were

in various stages of construction or planning. Of those 13 projects, seven were determined to potentially affect species and/or critical habitat under NMFS's purview through construction impacts, due to their presence in the action areas of the projects or due to change in water flows. These 13 projects were the BBCW, C-111 Spreader Canal, Site 1 Impoundment, IRL-S, C-43 West Basin Storage Reservoir, Picayune Strand Restoration Project, and Everglades National Park (ENP) Seepage Management. The other six projects have either been constructed or would have no construction effects on listed species or designated critical habitat including the L-31N Seepage Management Pilot Project, C-111 South Dade, Water Conservation Area 3A, Decompartmentalization (Decomp) and Sheet Flow Enhancement, Broward County Water Preserve Area, Lake Okeechobee Watershed, and Everglades Agricultural Area (EAA) Storage Restoration, though all these projects contribute to the overarching restoration objectives of the CERP program and these program-level effects are evaluated in this consultation.

USACE submitted a Programmatic BA on July 2, 2013, which included the seven projects as well as a more recently developed CERP project that may affect listed species and critical habitat, the CEPP, and provided specific evaluations of potential effects to threatened and endangered species and critical habitats within the purview of NMFS. This consultation on the CERP program evaluates the effects of all individual projects reasonably expected to be implemented over the course of the program, including the additive effects of the project components on Florida habitats and resources, and whether listed species or critical habitats under NMFS's purview may be adversely affected.

Because the program components and individual projects included in CERP that may affect NMFS's resources are sufficiently identified and described, including their likely locations, to determine and evaluate potential routes of effects, we are not recommending second tier consultation procedures in the future to validate effects predictions for these projects. Rather, any changes to individual projects covered by this consultation, or additional projects added to CERP, will be evaluated for potential needs to reinitiate consultation.

## 2.0 Interrelated or Interdependent Activities

As defined in ESA implementing regulations, effects of agency actions, including programs, include the effects of all activities that are either interrelated or interdependent with the action undergoing consultation (i.e. CERP). An interrelated activity is an activity that is part of the proposed action and depends on the proposed action for its justification. An interdependent activity is an activity that has no independent utility apart from the action under consultation. NMFS recognizes that there are numerous activities being implemented across south Florida by state, local, and conservation entities that share similar goals with CERP, and may augment the benefits of Everglades restoration. Some non-CERP projects were assumed to be completed in the CEPP (system-wide) modeling, acknowledging that full restoration benefits of CEPP would not be achieved without the completion and operation of these projects [C-111 South Dade, Central and South Florida (C&SF) C-51, Kissimmee River Restoration, South Florida Water Management District Restoration Strategies]. These projects are all located inland and would not have direct construction impacts on NMFS species (project locations can be found http://www.evergladesplan.org/pm/projects/landing_projects.aspx). The goals of the non-CERP projects mentioned here have the same restoration goals as CERP, to improve the quality, quantity, timing, and distribution of freshwater flows to the estuaries and south Florida

ecosystem. These projects are not interrelated or interdependent since they each provide restoration benefits on their own.

The most closely associated project we evaluated is the Lake Okeechobee Regulation Schedule (LORS 2008), which regulates the freshwater flows that are released from Lake Okeechobee to the St. Lucie and Caloosahatchee estuaries. This is a legally separate project from CERP, with different National Environmental Policy Act (NEPA) documentation and consultation with NMFS and other agencies (SER-1999-1473; SER-1999-1111; SER-2005-4702; SER-2006-4089; SER-2012-2653; SER-2007-4580). NMFS received a supplemental BA from the USACE in January 2013, due to the need for consultation on sawfish critical habitat and Johnson's seagrass critical habitat (SER-2013-10229). LORS only restricts the water flows that would come from Lake Okeechobee if the water level is too low in the lake (ecological and public water supply purposes) or too high in the lake (flood control purposes). CERP would operate within the operational restrictions of LORS 2008, and if LORS changes there would be a new Environmental Impact Statement (EIS) and thus, new consultation. Therefore, LORS is not interrelated or interdependent since it operates separately from CERP and CERP is designed to add to the benefits of LORS by further improving releases of freshwater flows from Lake Okeechobee.

**3.0 Description of CERP (Proposed Action and Action Area)**

The purpose of CERP (originally called the Restudy) was to evaluate and determine the feasibility of modifying the C&SF project to provide ecosystem restoration and to provide for other water related needs of the region, such as agriculture. The C&SF project was authorized in 1948 and is a multi-purpose project that provides flood control; water supply for municipal, industrial, and agricultural uses; prevention of saltwater intrusion; water supply for Everglades National Park; and protection of fish and wildlife resources through an extensive system of canals, levees, pumps, and other structures. However, the C&SF project also had significant unintended adverse impacts on environments of south Florida, notably the Everglades. The Restudy investigated structural and operational changes to the C&SF project with the goal of improving the quality of the environment; improving protection of the aquifer; improving the integrity, capability, and conservation of urban and agricultural water supplies; and improving other water-related purposes.

A reconnaissance report for the Restudy was completed in 1994, with the feasibility study beginning in 1995. The Water Resources Development Act (WRDA) 1996 provided specific congressional direction stating that the feasibility report and programmatic EIS would need to be complete by 1999. CERP was authorized under WRDA in 2000. It is a joint South Florida Water Management District and USACE project with the goal of restoring the quality, quantity, timing, and distribution of water throughout the south Florida ecosystem. The CERP program's goal is to help restore the historic freshwater flows as shown in Figure 1.

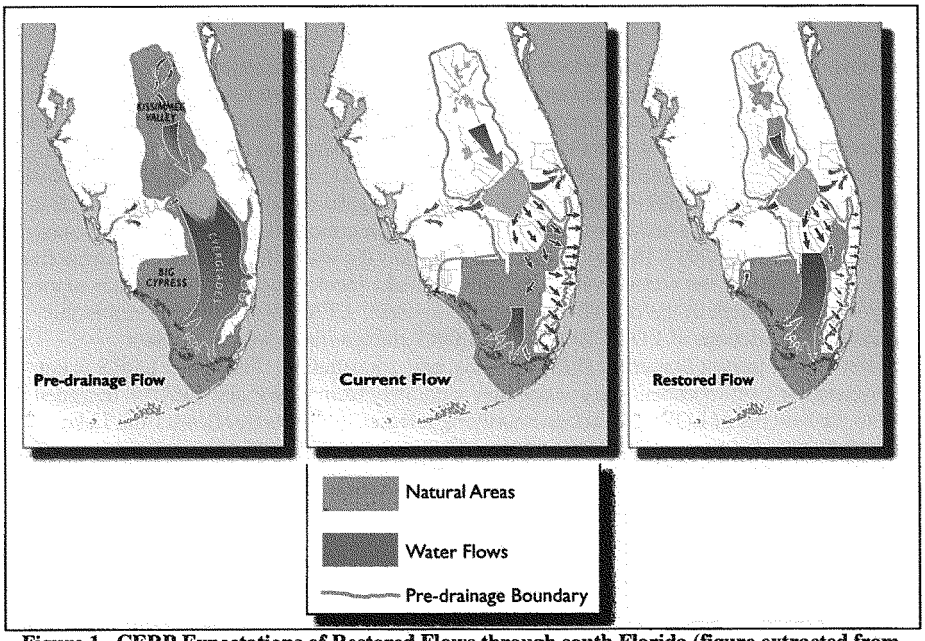



**Figure 1. CERP Expectations of Restored Flows through south Florida (figure extracted from CEPP powerpoint presentations)**

The CERP study area and thus the action area for this consultation encompasses approximately 18,000 square miles from Orlando to the Florida Reef Tract, within multiple counties including: Monroe, Miami-Dade, Broward, Collier, Palm Beach, Hendry, Martin, St. Lucie, Glades, Lee, Charlotte, Highlands, Okeechobee, Osceola, Orange, and Polk, depicted in Figure 2. The study regions of CERP are described in Table 1 and include Lake Okeechobee, EAA, the Water Conservation Areas (WCA), the majority of ENP, Florida Bay, the majority of Big Cypress National Preserve, coastal estuaries, and urban and agricultural areas along Florida's east coast, south of St. Lucie Canal. Descriptions of the action area and further descriptions in the rest of this section are taken from the CERP Programmatic BA.

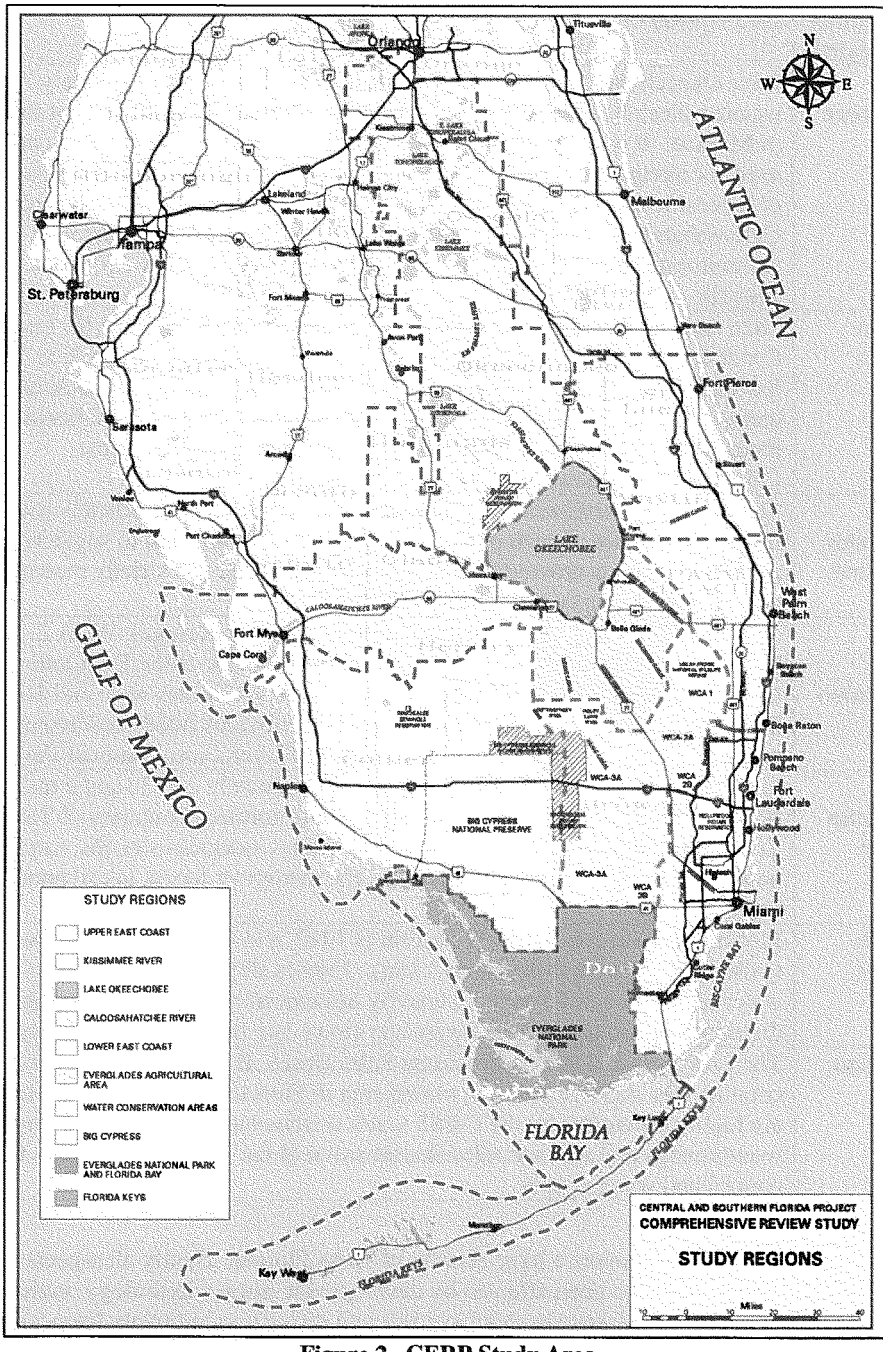



**Figure 2. CERP Study Area**

**Table 1. Description of CERP Study Regions**

| CERP Study Area Region | Description of the Study Area Region |
|---|---|
| Lake Okeechobee | Lake Okeechobee is a large, shallow lake (surface area approximately 73 square miles) 30 miles west of the Atlantic coast and 60 miles east of the Gulf of Mexico. It is the principal water supply reservoir for south Florida and is used for navigation, flood control, and recreation. It is impounded by a system of levees, with 6 outlets: St. Lucie Canal eastward to the Atlantic Ocean, Caloosahatchee Canal/River westward to the Gulf of Mexico, and four agricultural canals (West Palm Beach, Hillsboro, North New River and Miami). |
| Northern Estuaries | Lake Okeechobee discharges into the 2 Northern Estuaries. The St. Lucie Canal feeds into the St. Lucie Estuary, which is part of a larger system, the Indian River Lagoon (designated an Estuary of National Significance and is part of the U.S. Environmental Protection Agency - sponsored National Estuary program). The Caloosahatchee Canal/River feeds into the Caloosahatchee Estuary to the west. |
| EAA (Everglades agricultural area) | The EAA is approximately 700,000 acres in size and is immediately south of Lake Okeechobee. Much of this rich, fertile land is devoted to sugarcane production, and is crossed by a network of canals that are strictly maintained to manage water supply and flood protection. |
| WCAs (Water conservation areas) | The WCAs, WCA 1 (Loxahatchee National Wildlife Refuge), WCA 2, and, WCA 3 (the largest of the three) are situated southeast of the EAA and are approximately 1,350 square miles (approximately 40 miles wide and 100 miles long) from Lake Okeechobee to Florida Bay. Provides floodwater retention, public water supply, and are the headwaters of Everglades National Park. |
| ENP (Everglades National Park) | ENP was established in 1947, covering approximately 2,353 square miles (total elevation changes of only 6 feet from its northern boundary of Tamiami Trail south to Florida Bay). Landscape includes sawgrass sloughs, tropical hardwood hammocks, offshore coral reefs, mangrove forest, lakes, ponds, and bays. |
| Southern Estuaries | Florida Bay comprises a large portion of ENP, and is a shallow estuarine system (average depth less than 3 feet). Florida Bay is the main receiving water of the greater Everglades heavily influenced by changes in timing, distribution, and quantity of freshwater flows into the southern estuaries. |
| Lower East Coast | The Lower East Coast encompasses Palm Beach, Broward, and Miami-Dade counties, the most densely populated area in Florida. Water levels in this area are highly controlled by the C&SF water management system to prevent overdrainage and manage saltwater intrusion at the shoreline, provides flood control and water supply. |

As discussed, the action area covers a large portion of south Florida. Nearly all aspects of south Florida's native vegetation have been affected by development, altered hydrology, nutrient inputs, and spread of non-native species that have resulted directly or indirectly from a century of water management. Habitat types that dominate the southern coastal regions within the project area include submerged aquatic vegetation (SAV) (primarily seagrasses and algae), mangrove

forests, saline emergent wetlands, freshwater wetlands, and non-native dominated wetlands (primarily wetlands dominated by Australian pine, (*Casuarina equisetifolia*), or Brazilian pepper, (*Schinus terebinthifolius*)).

The estuarine communities of south Florida have been affected by upstream changes in freshwater flows through the Everglades as a result of the C&SF project. A reduction in freshwater inflows into Florida Bay and alterations of the normal salinity balance have affected mangrove community composition and may have contributed to a large-scale die-off of seagrass beds (FWS 1999[1]).

Mangrove communities occur within a range of salinities from 0 to 40 practical salinity units (psu). Florida Bay experiences salinities in excess of 40 psu on a seasonal basis. Implementing CEPP will provide increased freshwater flows to Florida Bay and the southwest coast, thereby contributing to lower salinity levels within these areas to better encompass the mangrove salinity tolerance range. In addition, past changes in freshwater flow (from historic conditions) can lead to an invasion by exotic species such as Australian pine and Brazilian pepper.

All CERP projects are expected to improve freshwater flows throughout the south Florida ecosystem. Section 2 (Existing and Future Conditions) in the CEPP Project Implementation Report (PIR)/EIS explains in detail the current conditions of the south Florida ecosystem, including the vegetation, invasive species, threatened and endangered species, etc. Structural features currently in south Florida are depicted in Figure 3.

[1] U.S. Fish and Wildlife Service. 1999. South Florida Multi-Species Recovery Plan. Southeast Region, Atlanta, Georgia, USA.

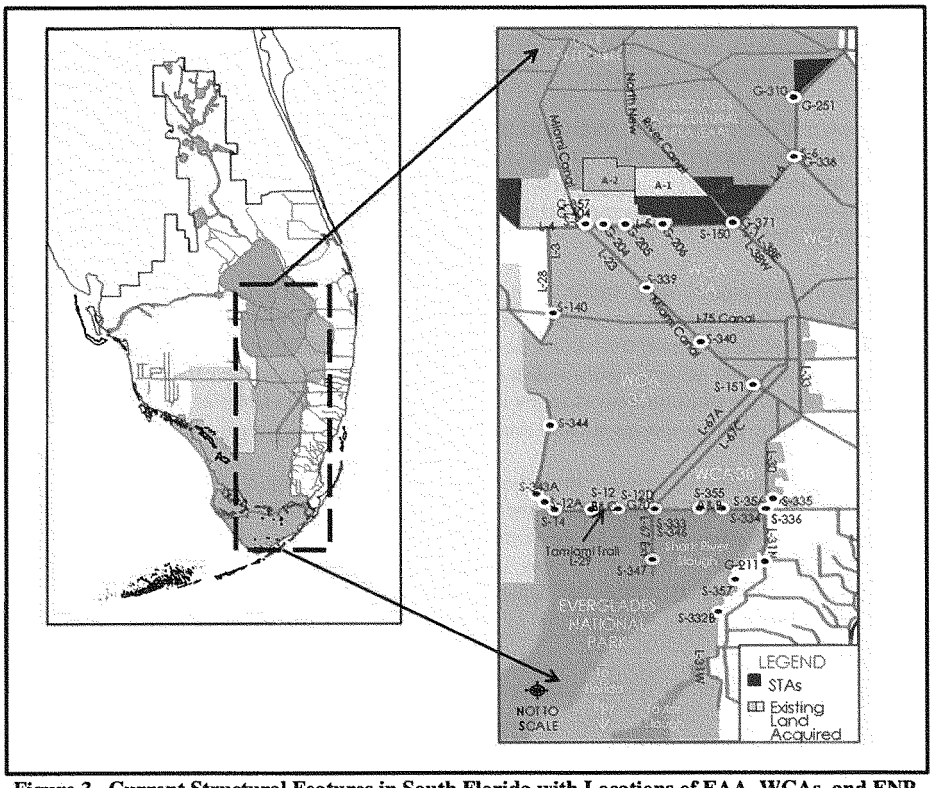



**Figure 3. Current Structural Features in South Florida with Locations of EAA, WCAs, and ENP**

Overall, freshwater flow improvements from the existing conditions is needed due to current freshwater flow conditions where approximately 1.7 billion gallons of water goes straight to tide through the extensive system of built canals and levees, rather than allowing sheetflow throughout the central part of the state (Figure 3 and Figure 4). More freshwater throughout south Florida will allow for rehydration of wetlands, marl prairies, and ultimately help regulate the salinity regimes in the estuaries by reducing the amount of harmful freshwater pulse releases from Lake Okeechobee and salt water intrusion. These freshwater improvements will then allow for more wading birds, fish, and many other species to thrive throughout south Florida.

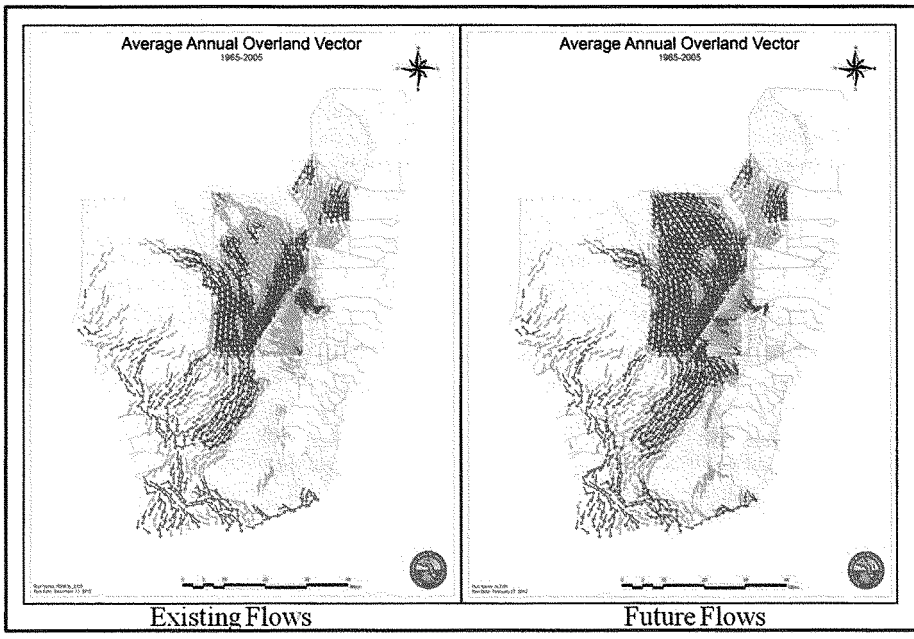



**Figure 4. Existing and Future with Project Flows. Blue arrows indicate more water flowing throughout the areas. The box in Figure 2 depicts the same region shown in this figure. (Figure extracted from CEPP PIR/EIS Appendix G – Benefits Analysis)**

Below is a detailed decription of all of the proposed actions covered under CERP, an explanation of the major components of CERP, and and an evaluation of the effects anticipated from the completion of CERP.

### 3.1 Major Components of CERP

CERP consists of structural and operational changes to the C&SF Project and defines components as conceptual project features (or options) intended to achieve a particular planning objective or set of planning objectives. They include both structural measures, such as reservoirs, pump stations, and canals, and nonstructural measures, such as reservoir operating schedules. One or more components are combined as features of specific projects to be implemented.

Components were developed by sub-regions and were optimized at the sub-regional level and then grouped with other components to form alternative Comprehensive Plans. The Restudy Team formulated and evaluated 10 alternative comprehensive plans. Alternative D-13R was selected as the Initial Draft Plan. Alternative D-13R, which is comprised of forty-nine operational and structural features or components, along with the series of Other Project Elements, Critical Projects, water quality treatment facilities, and other modifications that further improve performance of the plan, comprise the recommended Comprehensive Everglades

Restoration Plan. The following subsections (3.1.1 through 3.1.14) describe the structural and operational changes to the existing C&SF Project as part of the CERP.

### 3.1.1 Surface Water Storage Reservoirs

A number of water storage facilities are planned north of Lake Okeechobee, in the Caloosahatchee and St. Lucie basins, in the EAA, and in the Water Preserve Areas of Palm Beach, Broward, and Miami-Dade counties. These areas will encompass approximately 181,300 acres and will have the capacity to store 1.5 million acre-feet of water.

### 3.1.2 Water Preserve Areas

Multipurpose water management areas are planned in Palm Beach, Broward, and Miami-Dade counties between the urban areas and the eastern Everglades. The WCAs will have the ability to treat urban runoff, store water, reduce seepage, and improve existing wetland areas.

### 3.1.3 Manage Lake Okeechobee as an Ecological Resource

Lake Okeechobee is currently managed for many, often conflicting uses. The lake's regulation schedule will be modified and plan features constructed to reduce the extreme high and low levels that damage the lake and its shoreline. Management of intermediate water levels will be improved, while allowing the lake to continue to serve as an important source for water supply. Several plan components and Other Project Elements are included to improve water quality conditions in the lake. A study is recommended to evaluate in detail the dredging of nutrient-enriched lake sediments to help achieve water quality restoration targets, important not only for the lake, but also for downstream receiving bodies.

### 3.1.4 Improve Water Deliveries to Estuaries

Excess stormwater that is discharged to the ocean and the gulf through the Caloosahatchee and St. Lucie Rivers is very damaging to their respective estuaries. The CERP will greatly reduce these discharges by storing excess runoff in surface and underground water storage areas. During times of low rainfall, the stored water can be used to augment flow to the estuaries. Damaging high flows will also be reduced to the Lake Worth Lagoon.

### 3.1.5 Underground Water Storage

Wells and associated infrastructure will be built to store water in the upper Floridian aquifer. As much as 1.6 billion gallons a day may be pumped down the wells into underground storage zones. The injected fresh water, which does not mix with the saline aquifer water, is stored in a "bubble" and can be pumped out during dry periods. This approach, known as aquifer storage and recovery, has been used for years on a smaller scale to augment municipal water supplies. Since water does not evaporate when stored underground and less land is required for storage, aquifer storage and recovery has some advantages over surface storage. CERP includes aquifer storage and recovery wells around Lake Okeechobee, in the WCAs, and the Caloosahatchee Basin.

### 3.1.6 Treatment Wetlands

Approximately 35,600 acres of man-made wetlands, known as stormwater treatment areas, will be built to treat urban and agricultural runoff water before it is discharged to the natural areas throughout the system. Stormwater treatment areas are included in CERP for basins draining to Lake Okeechobee, the Caloosahatchee River Basin, the St. Lucie Estuary Basin, the Everglades, and the Lower East Coast. These are in addition to the over 44,000 acres of stormwater treatment areas already being constructed pursuant to the Everglades Forever Act to treat water discharged from the EAA.

### 3.1.7 Improve Water Deliveries to the Everglades

The volume, timing, and quality of water delivered to the south Florida ecosystem will be greatly improved. CERP will deliver an average of 26 percent more water into Northeast Shark River Slough over current conditions. This translates into nearly a half million acre-feet of additional water reaching the slough, and is especially critical in the dry season. More natural refinements will be made to the rainfall-driven operational plan to enhance the timing of water sent to the WCAs, ENP, Holey Land, and Rotenberger Wildlife Management Areas.

### 3.1.8 Remove Barriers to Sheetflow

More than 240 miles of project canals and internal levees within the Everglades will be removed to reestablish the natural sheetflow of water through the Everglades. Most of the Miami Canal in WCA 3 will be removed and 20 miles of the Tamiami Trail (U.S. Route 41) will be rebuilt with bridges and culverts, allowing water to flow more naturally into ENP, as it once did. In the Big Cypress National Preserve, a north-south levee will be removed to restore more natural overland water flow.

### 3.1.9 Store Water in Existing Quarries

Two limestone quarries in northern Miami-Dade county will be converted to water storage reservoirs to supply Florida Bay, the Everglades, Biscayne Bay, and Miami-Dade county residents with water. The 11,000-acre area will be ringed with seepage barriers to ensure that stored water does not leak or adjacent groundwater does not seep into the area. A similar facility will be constructed in northern Palm Beach county.

### 3.1.10 Reuse Wastewater

CERP includes two advanced wastewater treatment plants in Miami-Dade county capable of making more than 220 million gallons a day of the county's treated wastewater clean enough to discharge into wetlands along Biscayne Bay and for recharging the Biscayne Aquifer. This reuse of water will improve water supplies to south Miami-Dade county as well as reducing seepage from the Northeast Shark River Slough area of the Everglades. Given the high cost associated with using reuse to meet the ecological goals and objectives for Biscayne Bay, other potential sources of water to provide freshwater flows to the central and southern bay will be investigated before pursuing reuse.

### 3.1.11 Pilot Projects

A number of technologies proposed in CERP have uncertainties associated with them - either in the technology itself, its application, or in the scale of implementation. While none of the proposed technologies are untested, what is not known is whether actual performance will measure up to that anticipated in CERP. The pilot projects, which include wastewater reuse, seepage management, Lake Belt technology, and three aquifer storage and recovery projects are recommended to address uncertainties prior to full implementation of these components.

### 3.1.12 Improve Fresh Water Flows to Florida Bay

Improved water deliveries to Shark River Slough, Taylor Slough, and wetlands to the east of ENP will in turn provide improved deliveries of fresh water flows to Florida Bay. A feasibility study is also recommended to evaluate additional environmental restoration needs in Florida Bay and the Florida Keys.

### 3.1.13 Southwest Florida

There are additional water resource problems and opportunities in southwest Florida requiring studies beyond the scope of the CERP. In this regard, a feasibility study for Southwest Florida is being recommended to investigate the region's hydrologic and ecological restoration needs.

### 3.1.14 Comprehensive Integrated Water Quality Plan

The CERP includes a follow-on feasibility study to develop a comprehensive water quality plan to ensure that CERP leads to ecosystem restoration throughout south Florida. The water quality feasibility study would include evaluating water quality standards and criteria from an ecosystem restoration perspective and recommendations for integrating existing and future water quality restoration targets for south Florida water bodies into future planning, design, and construction activities to facilitate implementation of CERP. Further, water quality in the Keys is critical to ecosystem restoration. The Florida Keys Water Quality Protection Plan includes measures for improving wastewater and stormwater treatment within the Keys. Implementation of the Keys Water Quality Protection Plan is critical for restoration of the south Florida ecosystem.

The CERP program's projects will remove over 240 miles of internal levees in the Everglades to help the recovery of natural volumes of water to rehydrate preexisting wetlands. Water storage and water quality treatment are part of the overall project design to improve ecosystem and urban water supply needs within south Florida. Providing adequate flows throughout the system will help recharge the surficial aquifer, protecting it from saltwater intrusion and also providing for public water supply and other users in the lower east coast. All CERP projects have the same goal of improving the quality, quantity, timing, and distribution of freshwater flows throughout south Florida for the purpose of restoring the Everglades ecosystem. It will take more than 30 years to construct all of the elements and projects of CERP.

CERP plans to provide benefits to the estuaries by reducing harmful freshwater releases from Lake Okeechobee into the Caloosahatchee and St. Lucie River estuaries. The benefits would include improved seagrass beds as well as other SAV, thereby also improving species conditions that depend upon those resources (i.e. manatee, oysters, etc.). Increased freshwater flowing into the southern coastal systems (i.e. Florida and Biscayne Bays) would also improve habitat for listed species in the area.

## 4.0 CERP Evaluation and Reporting

Throughout the project implementation process, system-wide analyses will continue. A feedback loop will be established so that each PIR is evaluated for its contribution to the overall system and that the Comprehensive Plan is revised as necessary to reflect new information developed during the project development process. As part of this effort, the REstoration COordination VERification (RECOVER) team is responsible for linking science and the tools of science to a set of system-wide planning, evaluation, and assessment tasks. Their objectives are to evaluate and assess CERP's performance periodically, refine, and improve the plan during implementation, and ensure that a system-wide perspective is maintained throughout the restoration program.

The CERP program includes an adaptive management plan as well as an extensive monitoring and assessment plan (MAP). Monitoring results are reported to the RECOVER team of scientists who put together a system status report every four to five years. The MAP program provides documentation of the status and trends of the key indicator species of the south Florida

ecosystem, as well as addresses the key questions and uncertainties about achieving ecosystem restoration goals. A comprehensive understanding of the system enables the successful use of adaptive management principles to track and guide restoration activities to ultimately achieve restoration success (CERP reports are available on www.evergladesplan.org). These reports are distributed to all agencies and provide indicators such as salinity changes and changes in SAV as results that can be extrapolated to determine whether conditions for NMFS species have improved.

Performance measures were used in the CEPP modeling which includes other CERP projects within its modeling assumptions. These performance measures are described in detail in the CEPP PIR/EIS Appendix G – Benefits Model. The performance measures were split up by Northern Estuaries, Greater Everglades, and the Southern Coastal Systems. The RECOVER system-wide evaluation (CEPP PIR/EIS Annex E) analyzes the modeling results from CEPP in the same format, allowing for an evaluation of the estuaries, central Florida, and the southern estuaries. These effects are described in the Section 6.0 (Program Effects to Species) of this consultation.

**5.0 CERP Projects Included in this Consultation**

The projects included in the final recommended CERP are described in detail at http://evergladesplan.org/pm/projects/project_list.aspx. WRDA 2000 approved CERP as a framework for modifications to the C&SF project needed to restore the south Florida ecosystem and to provide for the other water-related needs of the region. WRDA 2000 also authorized construction of four pilot projects from CERP and implementation of ten initial projects needed to provide, in the short term, system-wide water quality and flow distribution benefits as well as an adaptive assessment and monitoring program subject to conditions. Authorization for the remaining components of the CERP occurs through subsequent WRDA legislation, after completion of PIRs.

In addition, Acceler8, a major initiative for Everglades restoration, was launched in 2005 to accelerate the pace of funding, design, and construction for eight environmental restoration projects. Seven of the ten congressionally authorized CERP projects are included in this initiative. These projects were recommended to Congress for initial authorization because the scientists and engineers engaged in the C&SF Restudy considered that they would provide immediate and significant restoration benefits.

The following CERP projects are either authorized by Congress and/or will be constructed entirely or in part by Acceler8 are the:

- C-44 Basin Storage Reservoir
- EAA Storage Reservoir – Phase 1
- Site 1 Impoundment (to be dedicated as the Fran Reich Preserve)
- WCA-3A/3B Levee Seepage Management
- C-9 Impoundment and Stormwater Treamtment Area (STA) – recently added to the Long-Term Plan
- C-11 Impoundment and STA – recently added to the Long-Term Plan
- C-111 N Spreader Canal
- Taylor Creek/Nubbin Slough STAs Project

- Raise and Bridge East Portion of Tamiami Trail and Fill Miami Canal
- North New River Improvement

In addition, the Acceler8 initiative will advance restoration benefits by constructing the following projects:

- Acme Basin B Discharge Project – programmatic authorization in WRDA 2000 and recently added to the Long-Term Plan
- Biscayne Bay Coastal Wetlands Project - Phase I
- Picayune Strand Restoration Project (formerly Southern Golden Gate Estates)
- C-43 West Reservoir Project
- Three STA expansions in the EAA as part of the Long-Term Plan

The CEPP project is a new project (2013) and is awaiting Congressional approval to begin detailed planning, construction, and implementation. Completed consultation is needed for CEPP approval, and this project is described in detail below. Because this project is more recent, modeling results encompass other CERP projects, presenting a programmatic view of CERP plus CEPP project effects.

### 5.1 Consultation Overview

Table 2 lists proposed and listed threatened (T) and endangered (E) species, along with designated or proposed critical habitat under the jurisdiction of NMFS that we believe may occur in or near the action area and may be affected by the project.

**Table 2. Status of Species and Their Critical Habitat (CH) in the Project and Action Area**

| Species Name | Scientific Name | Status |
|---|---|---|
| **Turtles** | | |
| Green sea turtle | *Chelonia mydas*[2] | T |
| Hawksbill sea turtle | *Eretmochelys imbricata* | E |
| Kemp's ridley sea turtle | *Lepidochelys kempii* | E |
| Leatherback sea turtle | *Dermochelys coriacea* | E |
| Loggerhead sea turtle | *Caretta caretta*[3] | T |
| **Fish** | | |
| Smalltooth sawfish | *Pristis pectinata*[4] | E, CH |
| Gulf Sturgeon | *Acipenser oxyrinchus desotoi* | E, CH |
| **Seagrass** | | |
| Johnson's seagrass | *Halophila johnsonii* | T, CH |
| **Invertebrates** | | |
| Elkhorn coral | *Acropora palmata*[5] | T, CH |
| Staghorn coral | *Acropora cervicornis*[6] | T, CH |
| Elliptical star coral | *Dichocoenia stokesii* | Proposed T[7] |

[2] Green turtles are listed as threatened except for the Florida and Pacific coast of Mexico breeding populations, which are listed as endangered

[3] Northwest Atlantic Ocean distinct population segment (DPS).

[4] U.S. DPS

[5] Proposed listing change from threatened to endangered on December 7, 2012

[6] Proposed listing change from threatened to endangered on December 7, 2012

[7] Corals proposed to be listed as threatened on December 7, 2012 (77 Fed. Reg. 73220)

| Species Name | Scientific Name | Status |
|---|---|---|
| Lamarck's sheet coral | *Agaricia lamarcki* | Proposed T |
| Star coral | *Montastraea franksi* | Proposed E[8] |
| Mountainous star coral | *Montastraea faveolata* | Proposed E |
| Pillar coral | *Dendrogyra cylindrus* | Proposed E |
| Rough cactus coral | *Mycetophyllia ferox* | Proposed E |
| Boulder star coral | *Montastraea annularis* | Proposed E |

Proposed critical habitat for the loggerhead sea turtle is within the action area, however, there are no routes of adverse effects to this habitat. No projects will be constructed in these habitats. The proposed units closest to the action area of the project are units 21-29, consisting of nearshore reproductive critical habitat defined as nearshore waters adjacent to nesting beaches that are used by hatchlings to egress to the open- water environment as well as by nesting females to transit between beach and open water during the nesting season (see http://www.nmfs.noaa.gov/pr/species/criticalhabitat_loggerhead.htm). The increased freshwater flows would likely not extend out into the ocean to effect this habitat, and even if it did, it would have no effect on the essential features of these units, which consist of lack of structures or conditions that would inhibit use of the habitat and ingress and egress to and from the beaches. Thus, loggerhead critical habitat will not be considered further in this consultation.

We reviewed all the projects included in the recommended CERP and authorized as a restoration framework by Congress in WRDA 2000 (Table 3). The level of specificity of project description, location, and objectives allowed us to make ESA effects determinations for all projects, including those not yet authorized. In many cases, we were able to conclude that projects would not have any direct effects on listed species or critical habitats, for example through construction interactions or noise, because the projects will be built outside of the ranges of NMFS's listed species and critical habitats. Those projects and reasoning are discussed below. We also evaluated the projects' potential effects individually and additively (programmatically) on habitats and aquatic resources used by NMFS species, primarily through the alteration of freshwater flow regimes across south Florida and into coastal habitats, which is one of the main goals of the CERP program.

CERP projects that may overlap with species or critical habitats under NMFS purview, and may affect these resources through construction activity include: IRL-S, Picayune Strand Restoration Project, BBCW Project, C-43 West Basin Storage Reservoir, C-111 Spreader Canal Western Project, and CEPP (the ENP Seepage Management Project has been incorporated into CEPP). The Florida Keys Tidal Restoration project is a project that may affect NMFS's listed species and would need separate NMFS consultation because no known plans exist for the project at this time or are expected in the foreseeable future.

Table 3 summarizes CERP projects in terms of their capacity to have potential direct effects through construction activities on NMFS species or critical habitats. Some projects were consulted on individually in the past and for most, construction is already complete. Potential impacts to sawfish critical habitat, which was designated after the project was already built or

[8] Corals proposed to be listed as endangered on December 7, 2012 (77 Fed. Reg. 73220)

consulted on, are evaluated here. Similarly, whether any of the past projects consulted on and/or completed may affect the seven species of corals proposed to be listed, was also evaluated. Below we describe the previous consultations, including any new information about the projects and anticipated effects. Program effects to species are evaluated in Section 6.0 (Program Effects to Species) and the project effects are equal to or less than determinations made on the program (meaning that each project has a may affect, not likely to adversely affect determination or less).

**Table 3. CERP projects from Evergladesplan.org and determination of capacity for direct (construction) effects on NMFS species or their Critical Habitat (CH) http://evergladesplan.org/pm/projects/project_list.aspx**

| Project Name and PCTS # if Applicable | Potential to Affect NMFS species or CH |
|---|---|
| Acme Basin B Discharge | No Effect |
| Aquifer Storage and Recovery Regional Study | No Effect |
| Big Cypress – L-28 Interceptor Modifications | No Effect |
| Biscayne Bay Coastal Wetlands (SER-2010-2615) | Johnson's seagrass, elkhorn & staghorn coral, sea turtles, smalltooth sawfish |
| Broward Co. Secondary Canal System | No Effect |
| Broward County Water Preserve Areas | No Effect |
| C-111 Spreader Canal (SER-2009-3680) | No Effect |
| C-4 Control Structures | No Effect |
| C-43 Aquifer Storage and Recovery Pilot (SER-2004-1548) | No Effect |
| C-43 West Basin Storage Reservoir Project (SER-2007-2630) | Gulf sturgeon, sea turtles, smalltooth sawfish & CH |
| Caloosahatchee Back Pumping with Stormwater Treatment | No Effect |
| Caloosahatchee River West Basin Storage Reservoir Project | No Effect |
| Central Everglades Planning Project | Smalltooth sawfish & CH, sea turtles & CH, elkhorn & staghorn coral CH, Johnson's seagrass & CH, marine mammals |
| Central Lake Belt Storage Area | No Effect |
| Everglades Agricultural Area Storage Reservoirs | No Effect |
| Everglades National Park Seepage Management (now part of CEPP) | No Effect |
| Florida Keys Tidal Restoration | Smalltooth sawfish & CH, sea turtles & CH, elkhorn & staghorn coral CH, Johnson's seagrass & CH |
| Flows to Northwest and Central Water Conservation Area 3A | No Effect |
| Henderson Creek – Belle Meade Restoration | No Effect |
| Hillsboro Aquifer Storage and Recovery and Pilot | No Effect |
| Indian River Lagoon South | Sea turtles, Johnson's seagrass & CH |
| L-31N (L-30) Seepage Management Pilot | No Effect |
| Lake Belt In ground Reservoir Technology Pilot | No Effect |
| Lake Okeechobee Aquifer Storage and Recovery and Pilot | No Effect |
| Lake Okeechobee Watershed | No Effect |
| Lakes Park Restoration | No Effect |
| Loxahatchee National Wildlife Refuge Internal Canal Structures | No Effect |

| Project Name and PCTS # if Applicable | Potential to Affect NMFS species or CH |
|---|---|
| Loxahatchee River Watershed Restoration Project | No Effect |
| Loxahatchee River Watershed Restoration Aquifer Storage and Recovery | No Effect |
| Melaleuca Eradication and Other Exotic Plants | No Effect |
| Miccosukee Tribe Water Management Plan | No Effect |
| Modify Holey Land Wildlife Management Area Operation Plan | No Effect |
| Modify Rotenberger Wildlife Management Area Operation Plan | No Effect |
| North Lake Belt Storage Area | No Effect |
| Palm Beach County Agriculture Reserve Reservoir | No Effect |
| Picayune Strand Restoration Project | Smalltooth sawfish & CH, sea turtles |
| Restoration of Pineland and Hardwood Hammocks in C-111 Basin | No Effect |
| Site 1 Impoundment (SER-2005-7112) | No Effect |
| South Miami-Dade Reuse | No Effect |
| Strazzulla Wetlands | No Effect |
| Wastewater Reuse Technology Pilot | No Effect |
| Water Conservation Area 3 Decompartmentalization & Sheetflow Enhancement – Part 1 (Decomp) | No Effect |
| Water Conservation Area 2B Flows to ENP | No Effect |
| West Miami-Dade Reuse | No Effect |
| Winsberg Farm Wetlands Restoration | No Effect |
| Water Ppreserve Area Conveyance | No Effect |

### 5.2 CERP Projects with No Potential to Directly Affect Listed Species or Critical Habitats

Projects listed as No Effect in Table 3 are not expected to have any effects on NMFS species due to construction activities. A review of the documentation for these projects on evergladesplan.org reveals that they are inland projects that do not consist of any construction or dredging in or near the estuaries or the coastline of Florida (all construction will be on or from the uplands), or in any designated critical habitat, and therefore would not directly impact NMFS species or their critical habitat. However, they all have and contribute additively to the overarching program objectives of CERP, to improve the quality, quantity, timing, and distribution of water flows throughout the south Florida ecosystem for restoration purposes.

### 5.3 CERP Projects that Have Prior Individual Consultations: Project Descriptions, Summary of Prior Consultation Conclusions, and Evaluation of New Information

As discussed above, between 2002 and 2011, NMFS and USACE consulted informally on several individual projects of the CERP program. In a November 3, 2011, letter of concurrence, NMFS summarized that at time 13 CERP projects were in various stages of construction or planning. Of those 13 projects, seven were determined to potentially affect species and/or critical habitat under NFMS's purview through construction impacts, due to their presence in the action areas of the projects. None of the projects were found likely to have adverse effects on NMFS listed species or critical habitats. These previous individual consultations and their effects conclusions are summarized below. Any new information or new species and critical habitat evaluations relevant to construction impacts of these projects is discussed below. Direct

construction would not take place in coral reef or hard bottom communities, thus elkhorn and staghorn corals, and the seven coral species proposed to be listed, will not be affected by construction activities. The program-level impacts of all CERP projects from changes in freshwater flow and hydrology, including the projects in this section that have had previous section 7 consultations, are evaluated in section 6.0. The previous section 7 concurrence letters for these projects are included as attachments to this programmatic consultation.

### 5.3.1 C-111 Spreader Canal

The C-111 Spreader Canal Western Project is an enhancement to the 1994 C-111 General Reevaluation Report. Its goal is to improve ENP conditions by establishing more natural water flows in Taylor Slough. This, in turn, will improve the timing, distribution, and quantity of water in Florida Bay. The western project also has features that will jumpstart environmental restoration in the Southern Glades and Model Lands. These areas form a contiguous habitat corridor with ENP, Biscayne National Park, Crocodile Lakes National Wildlife Refuge, the north Key Largo Conservation and Recreational Lands purchases, John Pennekamp State Park, and the National Marine Sanctuary. It is estimated that about 252,000 acres of wetlands and coastal habitat may be affected by the proposed project (Figure 5).

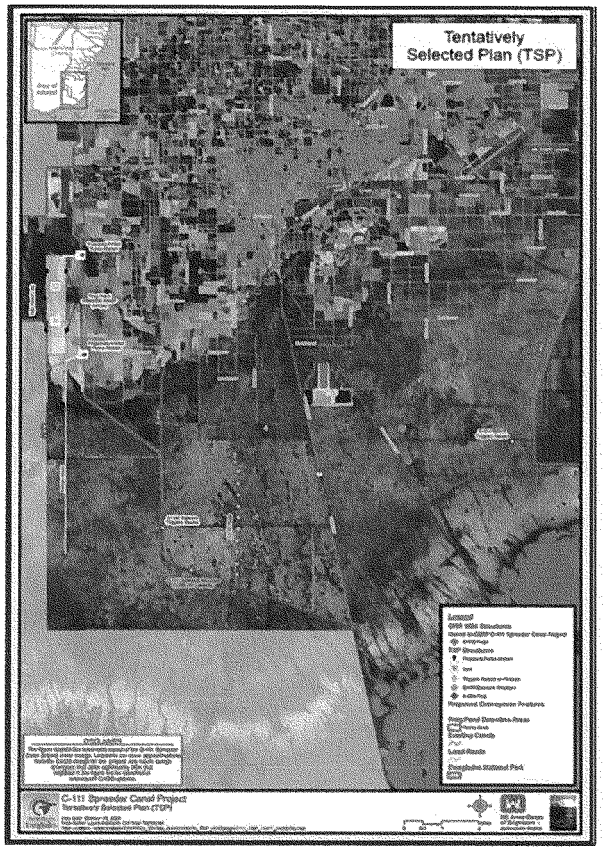



**Figure 5. C-111 Spreader Canal Project Area**

The C-111 Spreader Canal Western Project will create a nine-mile hydraulic ridge adjacent to ENP that will keep more of the natural rainfall and water flows within Taylor Slough. The hydraulic ridge will be created by constructing a 590-acre above-ground detention area in the Frog Pond area by installing two 225 cubic feet per second pump stations, and integrating other project features. The project will also begin restoration of the Southern Glades and Model Lands with an operable structure in the lower C-111 canal, incremental operational changes at the S-18C structure, a plug at S-20A, operational changes at the S-20 structure, and construction of earthen plugs at the C-110 canal (http://www.evergladesplan.org/docs/fs_c111_july_2013_508.pdf).

On May 7, 2009, the USACE requested concurrence with NMFS on its determination of may affect, but is not likely to adversely affect smalltooth sawfish and sea turtles. In addition, the USACE determined that the project would not modify critical habitat for elkhorn or staghorn

coral. Critical habitat for the smalltooth sawfish had not been designated until after publication of the final PIR/EIS. After further discussion with NMFS, and as described in their BA, the USACE changed their determinations to no effect for all species currently listed, including elkhorn and staghorn corals, and their designated critical habitat. Consultation on this individual project was concluded in 2009 with a no effect determination on all listed species under NMFS purview. Construction on this project is complete. We have no new information that requires revisiting the previous consultation conclusions.

### 5.3.2 Site 1 Impoundment

The Site 1 Impoundment (Figure 6) is designed to capture and store local runoff during wet periods and then use the water to supplement water deliveries to the Hillsborough Canal during dry periods, thus reducing demands for releases from Lake Okeechobee and the Arthur R. Marshall Loxahatchee National Wildlife Refuge (LNWR). Constructing and operating the impoundment will reduce the need for releases from LNWR during the dry season to meet local water demands and will facilitate the maintenance of more natural, desirable, and consistent water levels within the LNWR. The impoundment will also reduce groundwater seepage from LNWR. The ability to achieve and maintain more natural hydroperiods and hydropatterns within LNWR by retaining more rainfall and inflows from upstream will enhance habitat function and quality, also improving native plant and animal species abundance and diversity. In addition, there will be benefits to the downstream estuaries as a result of reducing peak freshwater flows from local stormwater runoff and large pulse releases from Lake Okeechobee.

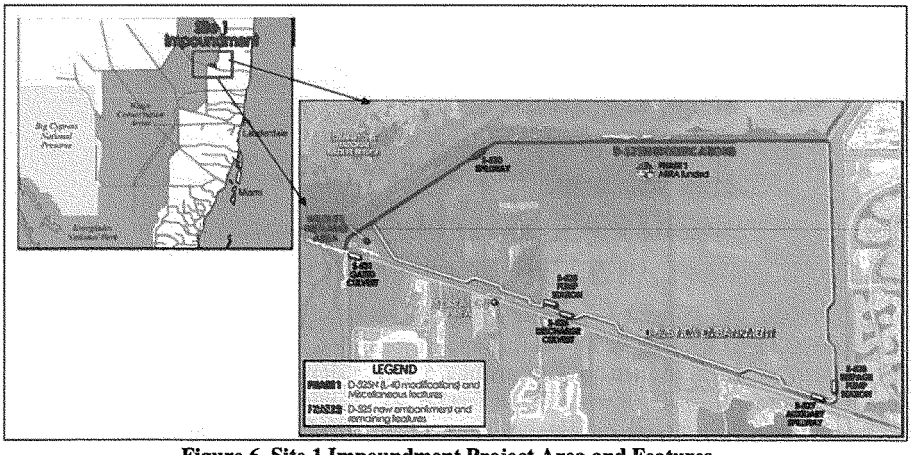



**Figure 6. Site 1 Impoundment Project Area and Features**

Consultation on this individual project was completed in 2005 with a no effect determination on smalltooth sawfish. Construction is currently ongoing for this project. This project is not located within smalltooth sawfish critical habitat and will not have any effect on other listed species or critical habitats, given its location, other than its contribution to the program effects on freshwater flows and hydrology, discussed in Section 6.0 below.

### 5.3.3 Caloosahatchee River (C-43) West Basin Storage Reservoir

The C-43 project purpose is to improve the timing, quantity, and quality of freshwater flows to the Caloosahatchee River estuary. The project provides approximately 170,000 acre-feet of above-ground storage volume in a two-cell reservoir. Major features of the project include external and internal embankments, and environmentally responsible design features to provide fish and wildlife habitat such as littoral areas in the perimeter canal and deep water refugia within the reservoir. The project contributes toward the restoration of ecosystem function in the Caloosahatchee estuary by reducing the number and severity of events where harmful amounts of freshwater from basin runoff and Lake Okeechobee releases are discharged into the estuary system. The project also helps to maintain a desirable minimum flow of freshwater to the estuary during dry periods. These two primary functions help to moderate unnatural changes in salinity that are detrimental to estuarine communities (Figure 7).

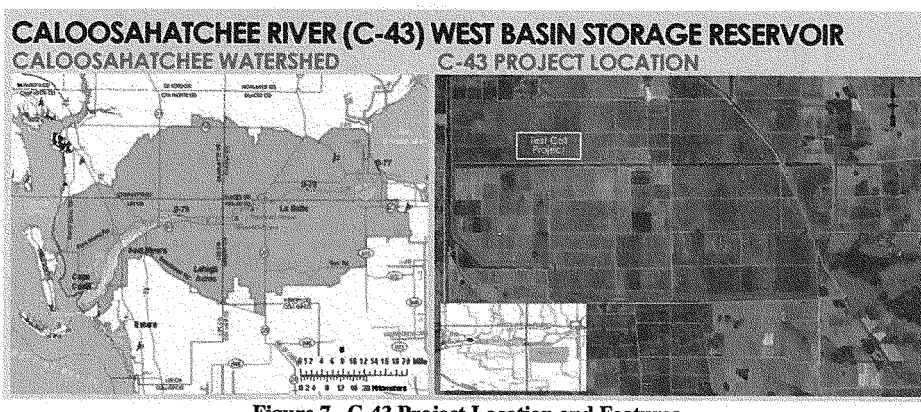



**Figure 7. C-43 Project Location and Features**

Consultation on this project was completed in 2007 with the conclusion of may affect, not likely to adversely affect sea turtles and smalltooth sawfish. We have no new information requiring that the previous consultation conclusions be revisited. However, critical habitat for the smalltooth sawfish was designated in 2009. This project is located upstream from critical habitat and therefore needs to be considered in the evaluation of program level effects below.

### 5.3.4 Biscayne Bay Coastal Wetlands

The BBCW project is located in coastal wetlands adjacent to Biscayne Bay in Miami-Dade county (Figure 8).

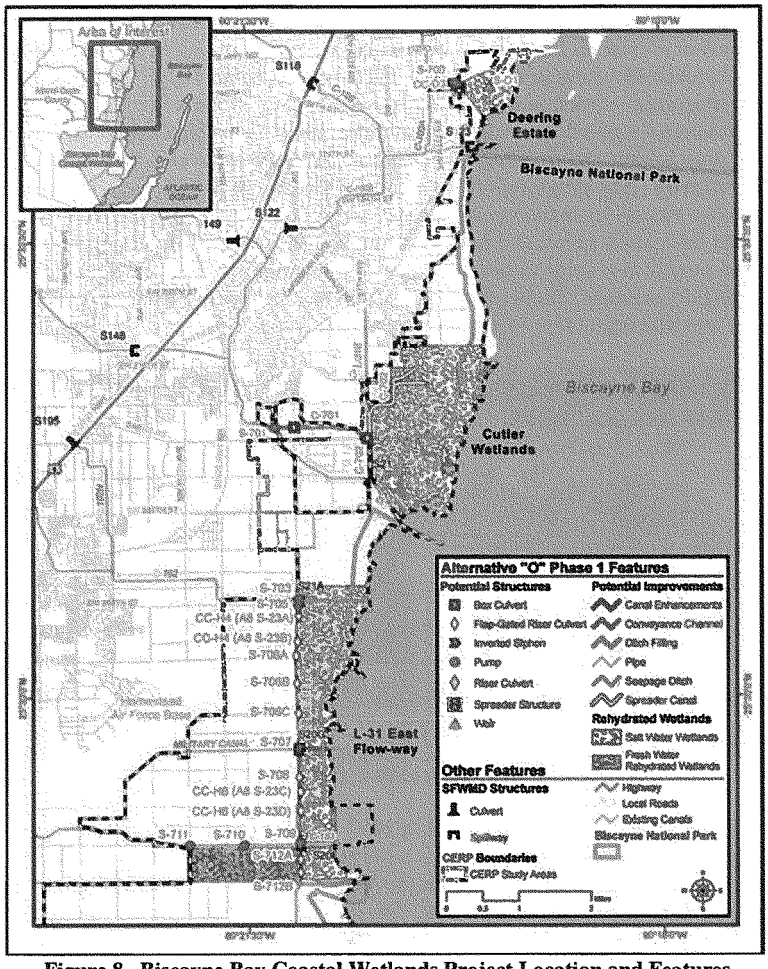



**Figure 8. Biscayne Bay Coastal Wetlands Project Location and Features**

The primary project purpose is to redistribute freshwater runoff from the watershed adjoining Biscayne Bay to provide a more natural and historic overland flow through existing coastal wetlands. CERP identified a need to replace lost overland flow, rehydrate coastal wetlands, and reduce point source freshwater discharges to Biscayne Bay using a system of pumps and interconnections between coastal canals and operational changes to coastal structures.

Consultation on this specific project was completed November 3, 2011, with a may affect, not likely to adversely affect determination for smalltooth sawfish and other listed species under NMFS purview. NMFS concurred with the USACE's determination that the BBCW project is not likely to adversely affect any listed species pending completion of a recommended

programmatic consultation for any remaining individual CERP projects. We have no new information that requires revisiting the prior effects determinations on listed species from construction activities.

### 5.3.5 Indian River Lagoon South

The IRL-S project is located in Martin and St. Lucie counties. The purpose is to improve surface-water management in the C-23/C-24, C-25, and C-44 basins for habitat improvement in the St. Lucie River Estuary and southern portions of the Indian River Lagoon. Project features include (1) the construction and operation of four above-ground reservoirs to capture water from the C-44, C-23, and C-25 canals for increased storage (130,000 acre-feet), (2) the construction and operation of four stormwater treatment areas to reduce the introduction of sediment, phosphorus, and nitrogen into the estuary and lagoon, (3) the restoration of upland and wetland habitat, (4) the redirection of water from the C-23/24 basin to the north fork of the St. Lucie River to attenuate freshwater flows to the estuary,(5) muck removal from the north and south forks of the St. Lucie River and middle estuary, and (6) the creation of oyster shell, reef balls, and artificial submerged habitat near muck removal sites for added habitat improvement. The project is expected to provide significant water quality improvement benefits to both the St. Lucie River and estuary and Indian River Lagoon by reducing the load of nutrients, pesticides, and suspended materials from basin runoff (Figure 9).

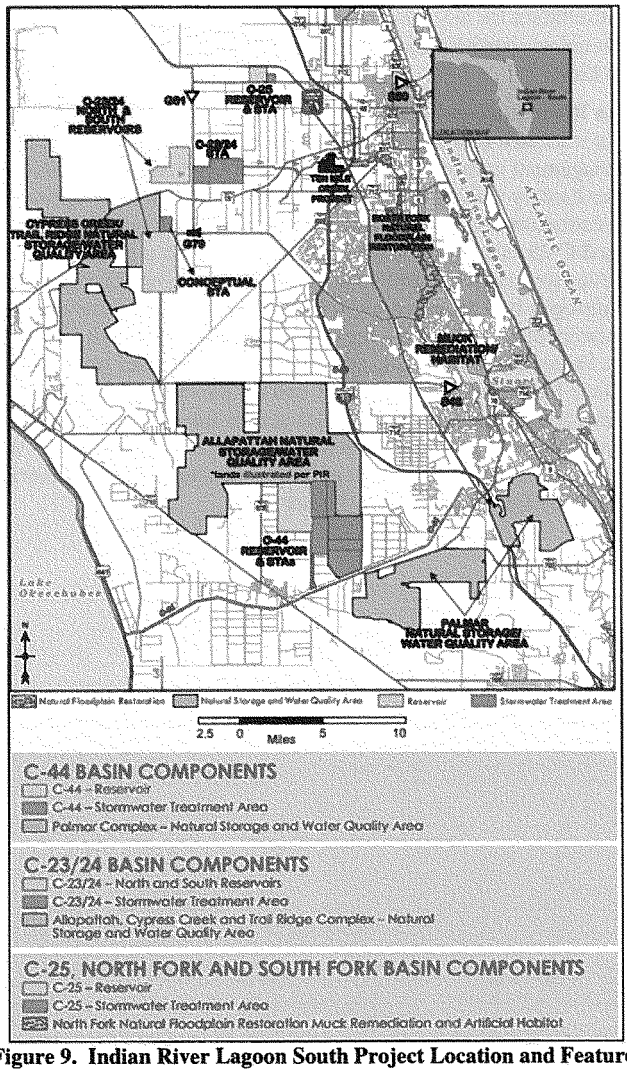



**Figure 9. Indian River Lagoon South Project Location and Features**

Consultation was complete in 2002, determining that the project may affect, but is not likely to adversely affect sea turtles, Johnson's seagrass, and Johnson's seagrass critical habitat. The smalltooth sawfish was listed after this project's consultation and needs to be considered in this consultation. The project is not located in sawfish critical habitat. Project features include building pumps, levees, canals, and other structures. These features are required in order to operate and interconnect project features, provide a mechanism for re-directing freshwater

discharges to the north fork of the St. Lucie River, and facilitate muck removal and habitat restoration actions inside the estuaries.

Smalltooth sawfish may be adversely affected by being temporarily unable to use the site for foraging and shelter due to avoidance of construction activities, related noise, and physical exclusion from areas blocked by turbidity curtains. Muck removal has not yet been completely designed for this project, therefore we are including measures to reduce any risk to NMFS's species. Construction will include minor dredging of muck by a mechanical dredge along with upland construction projects. All construction will be limited to daylight hours only to help construction workers spot sea turtles near the project areas and avoid interactions with these species. These effects will be insignificant, given the small area anticipated to be dredged and the short, daylight-only construction time limited likely needed to complete the task. The USACE will be required to follow NMFS's *Sea Turtle and Smalltooth Sawfish Construction Conditions*, which require work to stop if a protected species is seen within 50 feet of operating construction equipment. Additionally, turbidity controls will enclose the project site and be removed after construction which will not appreciably block use of the area by ESA-listed species, but will help prevent these species from getting close to the active construction site. The construction activies have not changed from previous consultation conclusions and will not impact foraging or refuge habitat for smalltooth sawfish. Thus we believe that effects to this species from construction activity are discountable. Once a muck removal plan is developed, USACE will provide this to NMFS in order to assure that the above measures are followed.

### 5.3.6 Picayune Strand Restoration

The Picayune Strand project involves restoration of natural water flow across 85 square miles in western Collier county that were drained in the early 1960s in anticipation of extensive residential development. The subsequent development dramatically altered the natural landscape, changing a healthy wetland ecosystem into a distressed environment. The goal is to restore wetlands in Picayune Strand and in adjacent public lands by reducing over-drainage while restoring a natural and beneficial sheetflow of water to the Ten Thousand Islands National Wildlife Refuge. Project features include 83 miles of canal plugs, 227 miles of road removal, and the addition of pump stations and spreader swales to aid in rehydration of the wetlands. Restoration benefits include wetland restoration and subsequent reemergence of foraging wading birds and native flora. In addition to restoring freshwater wetlands, the project will improve estuarine water quality by increasing groundwater recharge and reducing large and unnatural freshwater inflows.

On October 20, 2004, the USACE requested concurrence from NMFS on its no effect determination on smalltooth sawfish, green sea turtle, Kemp's ridley sea turtle, and loggerhead sea turtle. Re-initiation of consultation is needed since smalltooth sawfish critical habitat was designated after the original consultation was completed.

A recent potential project feature would remove up to two acres of mangrove habitat approximately one-half mile north of the smalltooth sawfish critical habitat along the Faka Union Canal (Figure 10). These effects will be discountable because the mangroves are likely located above the Mean High Water Line and inaccessible to sawfish because they are only hydrated during extreme storm events.

The mangroves are located west of the Faka Union Canal and all construction would take place from upland areas.

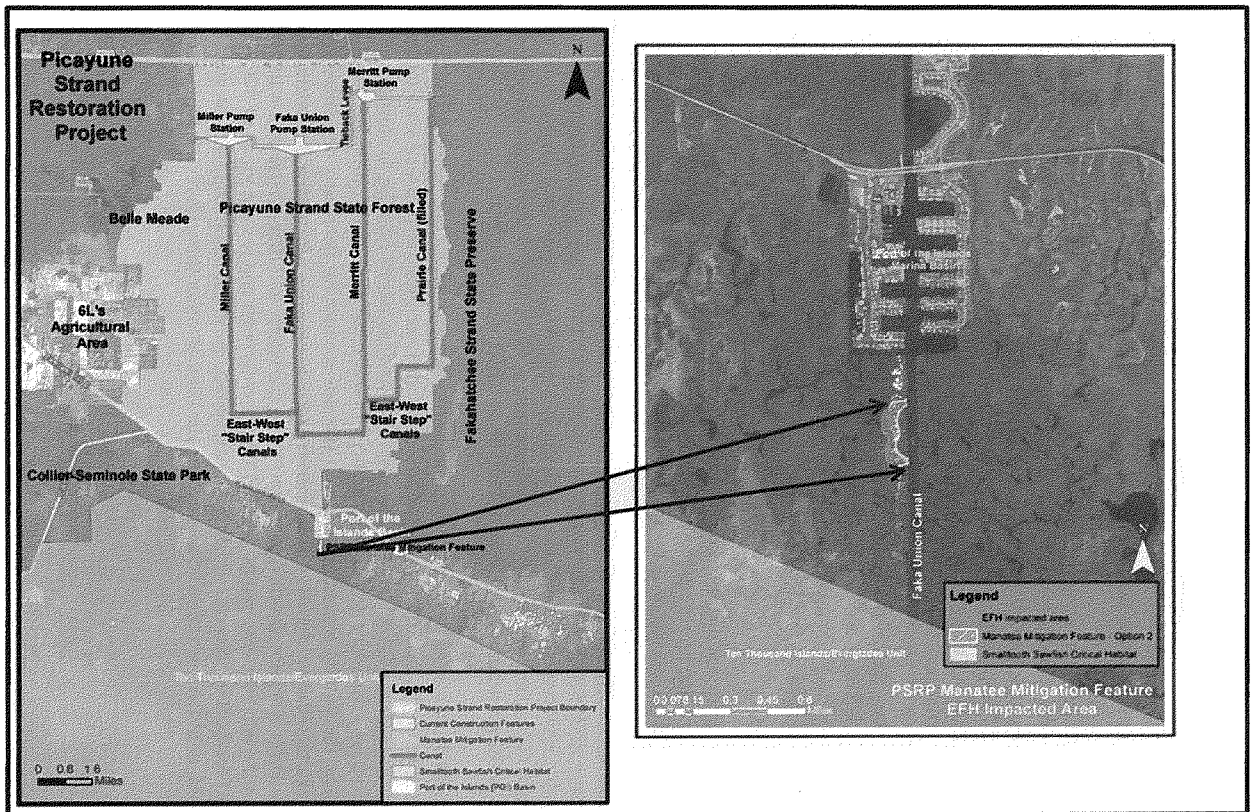



**Figure 10. Picayune Strand Project Area and Potential Manatee Mitigation Feature with Smalltooth Sawfish Critical Habitat**

### 5.4 Central Everglades Planning Project (CEPP)

CEPP is being described in detail in this document because the USACE is currently seeking authorization to construct new projects to achieve CEPP's goals, and authorization is contingent upon completion of consultation. As discussed below, CEPP assumes that some CERP projects are already completed, including some that have previous consultation histories, and some projects to be constructed in the future.

The purpose of CEPP is to propose implementation of a new set of components of CERP. Since the CERP framework and initial projects were approved through WRDA 2000, three projects were authorized in the 2007 WRDA and proceeded into construction (IRL-South, Picayune Strand, and Site 1 Impoundment) and a fourth project, Melaleuca and Other Exotic Plants Biological Controls, was implemented under the programmatic authority in WRDA 2000. Despite this progress, ecological conditions and functions within the central portion of the Everglades ridge and slough community continue to decline due to lack of sufficient quantities of freshwater flow into the central Everglades and timing and distribution problems. To respond to this concern, the USACE and the South Florida Water Management District initiated CEPP in November of 2011 to evaluate alternatives for restoring ecosystem conditions in the central portion of the Everglades and opportunities for providing for other water-related needs in the region.

This project incorporates restoration components primarily intended to benefit freshwater wetlands and estuarine resources by distributing freshwater flows through WCA 3A, 3B, and ENP. The CEPP project assumes that the following CERP projects are complete: (1) IRL-S, (2) Picayune Strand Restoration Project, (3) Site 1 Impoundment Project, (4) BBCW Project, (5) C-43 West Basin Storage Reservoir, and (6) C-111 Spreader Canal Western Project. CEPP encompasses ENP Seepage Management within its project, therefore combining the two. Because all CERP projects expected to potentially affect NMFS species or their critical habitat are assumed to be complete prior to implementation of CEPP, the modeling analysis for CEPP is inclusive of the programmatic effects of individual CERP projects effects.

CEPP would decrease the large freshwater pulse releases from Lake Okeechobee that currently are sent east to the St. Lucie and west to the Caloosahatchee estuaries, instead sending the water southward through the EAA canals to flowage equalization basins (similar to stormwater treatment areas). The reduction of existing high flows to the estuaries would help restore them by regulating the salinity regimes in a more favorable manner for listed and non-listed species. The flowage equalization basins would deliver water to existing stormwater treatment areas, which would reduce phosphorus concentrations in the water, and then the treated water would be released at the northwestern end of WCA 3A to flow through and restore much of WCA 3A, 3B, ENP, and Florida Bay. Several existing levees, canals, culverts, and pump stations would be constructed, modified, or removed to improve the flow of water through the system (Figure 11).

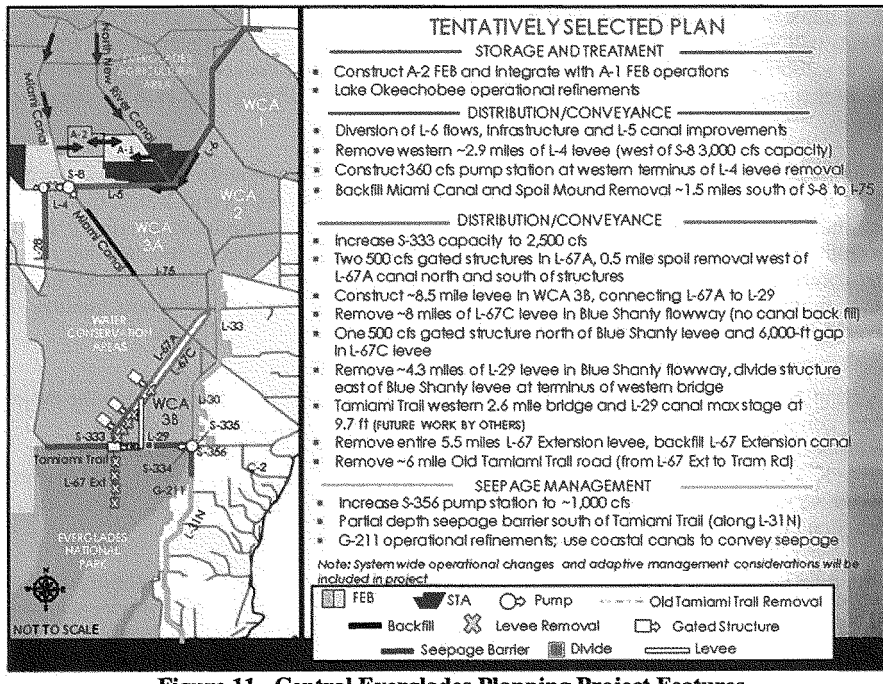



**Figure 11. Central Everglades Planning Project Features**

Consultation for six of these CERP projects were previously conducted. In its BA, the USACE determined CEPP would have no effect on corals or listed whales, due to these species' habitats outside of the expected extent of impacts of this project. The USACE determined, and NMFS concurs, that CEPP's construction activities may affect, but are not likely to adversely affect, green, hawksbill, leatherback, Kemp's ridley, and loggerhead sea turtles, and smalltooth sawfish. If they would be in the inland action areas of these projects, which is unlikely, these species would be expected to be foraging or migrating through project construction areas, but their mobility, and implementation of NMFS' sea turtle and sawfish construction conditions, will allow them to avoid any adverse effects from construction.

The program-level effects of CEPP through changes in freshwater flow and hydrology are discussed in Section 6.0.

## 6.0 CERP Program Effects on Listed Species or their Critical Habitat

NMFS has considered all routes of effects that CERP could have on listed species and critical habitat and determined that species and critical habitats may be affected through either impacts of construction activities or through changes to freshwater hydrologic flows. As described above, NMFS has previously consulted on all potential projects that may have construction impacts, with the exception of the Florida Keys Tidal Restoration Project which is not covered by this consultation and some components of CEPP, which are evaluated above. NMFS has determined that effects from construction, both individually and additively, would be

discountable or insignificant. All construction projects in the ranges of listed species or critical habitats will use floating turbidity curtains around all in-water construction areas and will follow NMFS's 2006 *Sea Turtle and Smalltooth Sawfish Construction Conditions*. The mobility of species that may be in the action area of construction activities allows them to avoid construction impacts.

As discussed below, CERP's program effects to freshwater hydrologic flows, individually and additively, would have solely beneficial effects to NMFS listed species and critical habitats. Potential effects would result from change in freshwater flows and alteration of salinity through the south Florida ecosystem. The Recovery Plans for some NMFS species indicate that restoring more natural freshwater flows would be a conservation measure for the species. CERP program effects are meant to be beneficial in nature to help restore the historic/more natural quality, quantity, timing, and distribution of freshwater flows throughout south Florida.

## 6.1 CEPP Modeling Evaluations and Key Findings

Modeling that was completed for CEPP includes the existing (current in 2010 when the project began) conditions, the Future Without Project (FWO), and CEPP. The FWO project assumptions contains all CERP projects listed in this consultation with the exception of the Florida Keys Tidal Restoration Project. CERP projects are also included in the CEPP Preferred Alternative modeling which provides an additive evaluation of program effects. Therefore, all discussion of CEPP modeling is an evaluation of the CERP program.

Evaluations of CEPP were performed using performance measures, independent analysis of the RECOVER system-wide evaluation (CEPP PIR/EIS Annex E), and a benefits model analysis (CEPP PIR/EIS Appendix G), as well as best professional judgment. This consultation is reiterating the key findings, however, a more detailed analysis of CEPP performance measures and modeling can be found in the CERP Programmatic BA or is located in the CEPP PIR/EIS located on www.evergladesplan.org. Modeling assumptions are explained in more detail in Section 2, Table 2-2 in the CEPP PIR/EIS.

The RECOVER system-wide evaluation was completed on Alternatives 1-4 of CEPP and not on the preferred Alternative (Alt 4R2). RECOVER recommendations were incorporated into Alternative 4R to improve performance in the St. Lucie Estuary, Water Conservation Area 2, and Biscayne Bay. Because most of the changes to CEPP Alternative 4R2 (preferred alternative) were limited to the southern end of the system, RECOVER scientist models were only rerun to determine Florida Bay benefits and to understand potential effects on Biscayne Bay. RECOVER scientists agree that Alternative 4R2 results to Biscayne Bay improved over Alternatives 1-4 for increased freshwater flows.

### 6.1.1 Northern Estuary Modeling

The northern estuary restoration goals include re-establishment of a salinity range favorable to juvenile marine fish, shellfish, oysters, and SAV, re-establishment of seasonally appropriate freshwater flows of favorable quality that maintain low salinities in the upper estuary and re-establishment of more stable salinities and ranges in the lower estuary.

In the Caloosahatchee, targets were based on freshwater discharges from C-43 canal at the S-79 structure where the mean monthly inflow should be maintained between 450 and 2,800 cubic feet per second (cfs). Targets were developed to reduce minimum discharge and mediate high flow events to the estuary to improve estuarine water quality and protect and enhance estuarine

habitat and biota. Ultimately, the low flow target is no months during October to July when the mean monthly inflow from the Caloosahatchee watershed, as measured at S-79, falls below a low-flow limit of 450 cfs (C-43 basin runoff and Lake Okeechobee regulatory releases). Ultimately, the high flow target is no months with mean monthly flows greater than 2,800 cfs, as measured at the S-79, from Lake Okeechobee regulatory releases in combination with flows from the Caloosahatchee River (C-43) basin.

The St. Lucie Estuary restoration requires addressing high volume, long duration discharge events from Lake Okeechobee, the C-44, C-23, and C-24 watersheds. The flow targets are designed to result in a favorable salinity envelop in the mid estuary of 8 to 25 psu salinity. Only discharges from Lake Okeechobee were included in the St. Lucie Estuary flow targets. This is due to the fact that the watershed flow targets are being addressed in the IRL-S Project which is included in the 2050 base conditions. Full restoration targets are estimated to be 31 months where mean flow is less than 350 cfs and 0 Lake Okeechobee regulatory discharge events (14 day moving averages > 2000 cfs).

Performance measures within the northern estuaries were used to measure the suitability for oyster and SAV habitat based on target flows from structures S-79 and S-80. CEPP will improve conditions for estuarine and marine resources throughout the northern estuaries by restoring more natural timing, volume, and duration of freshwater flows to the Caloosahatchee and St. Lucie estuaries with the potential to provide a more appropriate range of salinity conditions by reducing extreme salinity fluctuations. Performance measure scores within the northern estuaries were generated from the model at S-79 and S-80. Calculation of habitat benefits achieved by each of the project alternatives is restricted to portions of the estuary where changes in salinity in relation to freshwater flows at S-79 and S-80 can be reasonably predicted.

Modeling results indicate that CEPP would reduce the number of high flow events in both estuaries, thereby improving habitat for oyster and SAV. The low flow reductions were minimal, however, the RECOVER scientists state that the results provide indication that CEPP is moving restoration in the right direction.

### 6.1.2 Southern Coastal Systems Modeling

A desired result of restored hydroperiods through CEPP is to increase densities of small fishes and macroinvertebrates throughout the Everglades, especially in the southern Everglades. Because small fishes are the most abundant vertebrates in the Everglades and are consumed by large predators, the Trophic Hypothesis predicts that an increase in density of small fish will benefit higher trophic-level predators such as wading birds, reptiles, and larger fish that depend on them as a food source. This CEPP model (Cantano and Trexler, 2013[9]) compares freshwater fish densities in the WCA 3A and 3B, Shark River Slough, and Taylor Slough of existing conditions against FWO and CEPP.

Results of these model comparisons agree that abundance of both small fishes and largemouth bass would increase under the CEPP hydrologic model scenarios compared to the Existing

[9] Catano, C. and J. Trexler. 2013. CEPP Model Comparison of Predicted Freshwater Fish Densities, Draft 3.0. Comprehensive Everglades Restoration Plan, Restoration Coordination and Verification (RECOVER). U.S. Army Corps of Engineers, Jacksonville District, Jacksonville, Florida, USA and South Florida Water Management District, West Palm Beach, Florida, USA.

Conditions hydrology or the FWO. The increased fish productivity under CEPP is linked to longer hydroperiods and reduced severity of drying events in regions south of the L-5 canal (WCA 3A, WCA 3B, Shark River Slough, Southern Marl Prairies, Taylor Slough). CEPP Alternative 4 yielded the greatest benefits for fish production. There were relatively small differences between these two scenarios in the predicted benefits on small fish density and largemouth bass.

RECOVER evaluations determined that the model-predicted salinity improvements in Florida and Biscayne Bays translated to a noticeable increase in abundance of juvenile spotted trout, pink shrimp, juvenile crocodiles, and SAV. Salinity improvements from CEPP over the existing conditions and FWO include a more stable salinity regime for marine species in the estuaries due to a reduction in large freshwater pulse releases from Lake Okeechobee with CERP features such as more water storage, decreased acreage of levees acting as barriers to sheetflow, and increased overland freshwater flows throughout south Florida (CEPP PIR/EIS Annex E – RECOVER System-wide Evaluation).

### 6.2 Sea Turtles

There are five species of sea turtles (green, hawksbill, Kemp's ridley, leatherback, and loggerhead) that may be affected within the action area due to habitat alteration. Although these species may be present in the action area, adverse effects would not be expected to occur to them or their habitat due to the alteration of freshwater flows. On the contrary, increased freshwater flows to the estuaries would potentially benefit the species by better regulating the frequency of high volume freshwater discharges as well as regulating low flow events from Lake Okeechobee to the Caloosahatchee and St. Lucie River estuaries. Increased freshwater flows to the estuaries due to CERP are expected to regulate the salinity regime within the estuaries, thereby beneficially affecting seagrass foraging habitat. This beneficial regulation of salinity regimes is documented in the RECOVER system-wide evaluation, as well as the Habitat Modeling for CEPP (CEPP PIR/EIS Annex E and G). CERP expects to increase freshwater flows to Florida Bay; however, this would not alter the foraging base for the leatherback and is therefore unlikely to be impacted by activities in the proposed action. Based on the above discussion, we consider the potential for impacts to sea turtles to be discountable and they are not likely to be adversely affected by the program.

### 6.3 Smalltooth Sawfish and its Critical Habitat

Smalltooth sawfish and its critical habitat are within the action area that may be affected by the programmatic effects of CERP on freshwater flow and hydrology. The critical habitat consists of two units: the Charlotte Harbor Estuary Unit (CHEU) located in Charlotte and Lee Counties, which comprises approximately 221,459 acres (346 $mi^2$) of coastal habitat; and the Ten Thousand Islands/Everglades Unit, located in Collier, Monroe, and Miami-Dade Counties, which comprises approximately 619,013 acres (967 $mi^2$) of coastal habitat. The essential features of critical habitat are red mangroves and shallow, euryhaline waters less than 3 feet mean lower low water (MLLW). The only essential feature of critical habitat that would be affected by the proposed action is mangroves. NMFS has identified the following potential effects to smalltooth sawfish and its critical habitat, and concluded they will not likely be adversely affected by the program.

The goal and expectation of CERP is to decrease large freshwater pulse releases from Lake Okeechobee to the estuaries, and specific to the sawfish, the Caloosahatchee estuary which

contains critical habitat. The change in freshwater flows throughout central and south Florida would benefit the sawfish with more stable salinity regimes in the estuaries as well as providing more historic overland flows to Ten Thousand Islands and Florida Bay, thereby improving mangrove wetland habitat[10].

The ideal salinity range for sawfish is 18- 30 parts per thousand (ppt) (Poulakis et al 2011[11]). CEPP used salinity envelopes in their model by range of tolerability for tape grass (*Vallisneria Americana*) and oysters, which have a similar range to sawfish at 16-28 psu, with this range considered beneficial and less harmful to estuarine flora and fauna (USACE 2013 Appendix E[12]).

CEPP modeling results indicate that at Shell Point (Figure 12), which is within sawfish critical habitat, salinity is increased within the ideal range for oysters (16-28) from existing conditions at 8,569 psu to 9,870 psu with CEPP due to the reduction of freshwater pulse releases from Lake Okeechobee. Since the sawfish range is similar to the oyster, this increase in salinity at Shell Point (lower estuary) would benefit the smalltooth sawfish and its critical habitat as the salinity is better than current conditions.

The salinity regimes also improved at Cape Coral (middle estuary) from existing conditions to the FWO, and then improved more with CEPP (Table 4).

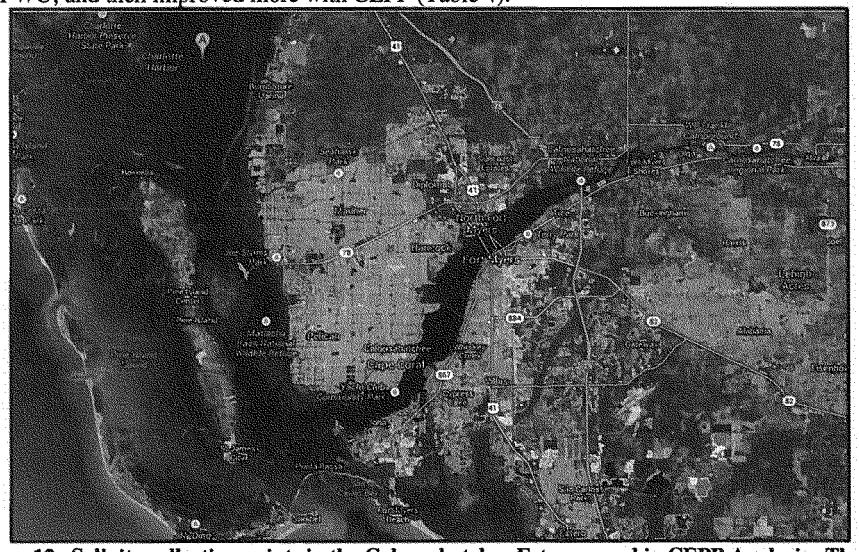


**Figure 12. Salinity collection points in the Caloosahatchee Estuary used in CEPP Analysis. The red dots indicate where information was collected.**

[10] http://www.evergladesplan.org/pm/recover/recover_docs/et/ne_pm_salinityenvelopes.pdf pg 9

[11] Poulakis, G.R., Stevens, P.W., Timmers, A.A., Wiley, T.R., and Simpfendorfer, C.A. (2011). Abiotic affinities and spatiotemporal distribution of the endangered smalltooth sawfish, *Pristis pectinata*, in a south-western Florida nursery. Marine and Freshwater Research. Available online (www.publish.csiro.au/journal/mfr)

[12] USACE 2013. Draft Project Implementation Report and Environmental Impact Statement for the Central Everglades Planning Project. Appendix E – RECOVER System-wide Evaluation. Jacksonville, FL.

**Table 4. Distribution of daily average salinity modeled at Cape Coral Bridge. Table extracted from Annex E, RECOVER system-wide evaluation of CEPP.**

| Salinity ranges | Existing Conditions | FWO | CEPP |
|---|---|---|---|
| <16 psu | 8596 | 8461 | 8025 |
| 16-28 psu | 5640 | 6404 | 6772 |
| >28 | 733 | 110 | 178 |

Implementation of CERP could benefit the smalltooth sawfish and its critical habitat with more stable salinity regimes in the estuaries as described above, and is consistent with the objectives of the Sawfish Recovery Plan[13], which states that one of the causes of sawfish decline was the diversion of freshwater runoff to the coast and throughout Ten Thousand Islands. CERP goals are in line with conservation aspects in the recovery plan to minimize or eliminate the disruption of natural and historic freshwater flow regimes (including timing, distribution, quality, and quantity) and maintain or restore water quality to ensure long term viability of sawfish. The potential restored hydrology provided by CERP would increase the periodic inundation of the downstream mangrove wetlands, which depend on this periodic inundation; the lack of freshwater from upstream sources contributes to their degradation. Based on the above discussion, we consider the potential programmatic effects to smalltooth sawfish and its critical habitat from freshwater flow to be beneficial and are therefore not likely to be adversely affected.

### 6.4 Johnson's Seagrass

Johnson's seagrass and its critical habitat have the potential to be affected within the action area in the St. Lucie estuary as well as the southern estuaries. The essential features of Johnson's seagrass critical habitat are: (1) adequate water quality; (2) adequate salinity levels; (3) adequate water transparency; and (4) stable, unconsolidated sediments that are free from physical disturbance. All four essential features must be present in an area for it to function as critical habitat for Johnson's seagrass.

Based on a study by Virnstein (1997[14]) in the Indian River Lagoon area (CERP project), the reduced high volume discharge to the northern estuaries due to implementation of CERP would benefit seagrass due to decreased siltation, increased water clarity, and more stable salinity envelopes, thus also beneficially affecting the features of Johnson's critical habitat. In the RECOVER annual report (2009[15]), the Interim Goals on Seagrass section suggest that Johnson's seagrass is expected to expand with improved salinity conditions. Analysis performed by the RECOVER team in 2013 for CEPP revealed that salinity envelopes for seagrasses improved with CEPP in the northern estuaries, Florida Bay, and Biscayne Bay. Based on the above discussion, we consider the potential for impacts to Johnson's seagrass and its critical habitat to be beneficial and this species is not likely to be adversely affected.

### 6.5 Corals

Elkhorn and staghorn coral and their critical habitat occur on the Atlantic side of Florida and have the potential to be affected by CERP. For elkhorn and staghorn coral, the physical feature

[13] NMFS. 2009. Recovery Plan for Smalltooth Sawfish (*Pristis pectinata*).
[14] Virnstein, R.W., L.J. Morris, J.D. Miller, and R. Miller-Myers. 1997. Distribution and abundance of Halophila johnsonii in the Indian River Lagoon. St. Johns River Water Management District Technical Memorandum #24. November 1997. 14 pp.
[15] USACE, 2009. RECOVER: 2009 System Status Report. http://www.evergladesplan.org/pm/ssr_2009/ssr_main.aspx

of critical habitat essential to the conservation of the species is substrate of suitable quality and availability, in water depths from the mean high water line to 30 meters, to support successful larval settlement, recruitment, and reattachment of fragments. Substrate of suitable quality and availability means consolidated hardbottom or dead coral skeletons free from fleshy macroalgae and sediment cover.

Proposed listed species of corals include the elliptical star coral, Lamarck's sheet coral, star coral, mountainous star coral, pillar coral, rough cactus coral, and boulder star coral that are located on the Atlantic and Caribbean side of Florida could also have the potential to be affected by CERP. Program effects include alteration of habitat due to changes in freshwater distribution throughout south Florida. Habitat suitability and quality are factors impacting recovery of the two listed species (http://sero.nmfs.noaa.gov/pr/esa/acropora.htm). Although the action area of CERP encompasses the shoreline, effects from freshwater flow alterations are not expected to reach the proximity of corals and their critical habitat. However, the southern estuaries are expected to receive more overland freshwater flows, thereby providing more stable salinity regimes within the southern coastal systems (see Section 6.1.2, Annex E of the CEPP PIR/EIS or Appendix G – Benefits Model of the CEPP PIR/EIS). Based on the above discussions, we consider the potential for impacts to corals and their critical habitat to be beneficial and are not likely to be adversely affected.

**7.0 Conclusion and Next Steps**

Based on our analysis, we concur with the USACE's determination that CERP is not likely to adversely affect any listed species or their designated critical habitat under our purview. CERP system-wide evaluation reports are provided to all agencies every four to five years and will be reviewed by NMFS. All reports are posted to the web: http://www.evergladesplan.org/pm/recover/assess_team.aspx. Because this is an ongoing action and involves assumptions about future individual projects, USACE has a continuing duty to ensure the program and its effects are not modified in a way that requires reinitiation of consultation, or that reinitiation is required due to new species listings or critical habitat designations in the future. As part of this responsibility, USACE will review all projects covered by this consultation as authorization to construct them is sought, to ensure that their locations and construction activities are not different than as evaluated in this consultation to the extent it requires additional consultation with NMFS.

This concludes the USACE's consultation responsibilities under the ESA for species under NMFS's purview. Consultation must be reinitiated if a take occurs or new information reveals effects of the action not previously considered, or the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat in a manner or to an extent not previously considered, or if a new species is listed or critical habitat designated that may be affected by the identified action.

Additional relevant information is enclosed for your review. We look forward to further cooperation with you on other projects to ensure the conservation of our threatened and endangered marine species and designated critical habitat.

If you have any questions on this consultation, please contact Kay Davy, consultation biologist, at (727) 415-9271, or by e-mail at kay.davy@noaa.gov.

Sincerely,

Miles M. Croom

for Roy E. Crabtree, Ph.D.
Regional Administrator

Enc.: 1. *Sea Turtle and Smalltooth Sawfish Construction Conditions* (Revised March 23, 2006)
2. *PCTS Access and Additional Considerations for ESA Section 7 Consultations* (Revised June 11, 2013)
3. Prior NMFS Concurrence Documentation for CERP Projects

cc: F/SER4 – Kay Davy

File: 1514-22.F.4

## ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| BA | Biological Assessment |
| C-43 | Caloosahatchee River Project(C-43) |
| C&SF | Central and South Florida |
| CEPP | Central Everglades Planning Project |
| CERP | Comprehensive Everglades Restoration Plan |
| CH | Critical Habitat |
| cfs | Cubic Feet per Second |
| EAA | Everglades Agricultural Area |
| EIS | Environmental Impact Statement |
| ENP | Everglades National Park |
| ESA | Endangered Species Act |
| FWO | Future Without Project |
| IRL-S | Indian River Lagoon South Feasibility Study |
| LNWR | Loxahatchee National Wildlife Refuge |
| LORS | Lake Okeechobee Regulation Schedule |
| MAP | Monitoring and Assessment Plan |
| NEPA | National Environmental Policy Act |
| NMFS | National Marine Fisheries Service |
| PIR | Project Implementation Reports |
| Psu | Pratical Salinity Units |
| RECOVER | REstoration COordination VErification |
| SAV | Submerged Aquatic Vegetation |
| STA | Stormwater Treatment Area |
| USACE | U.S. Army Corps of Engineers |
| WCA | Water Conservation Areas |
| WRDA | Water Resources Development Act |

# SEA TURTLE AND SMALLTOOTH SAWFISH CONSTRUCTION CONDITIONS (REVISED MARCH 23, 2006)

**UNITED STATES DEPARTMENT OF COMMERCE**
**National Oceanic and Atmospheric Administration**
**NATIONAL MARINE FISHERIES SERVICE**
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701

## SEA TURTLE AND SMALLTOOTH SAWFISH CONSTRUCTION CONDITIONS

The permittee shall comply with the following protected species construction conditions:

a. The permittee shall instruct all personnel associated with the project of the potential presence of these species and the need to avoid collisions with sea turtles and smalltooth sawfish. All construction personnel are responsible for observing water-related activities for the presence of these species.

b. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing sea turtles or smalltooth sawfish, which are protected under the Endangered Species Act of 1973.

c. Siltation barriers shall be made of material in which a sea turtle or smalltooth sawfish cannot become entangled, be properly secured, and be regularly monitored to avoid protected species entrapment. Barriers may not block sea turtle or smalltooth sawfish entry to or exit from designated critical habitat without prior agreement from the National Marine Fisheries Service's Protected Resources Division, St. Petersburg, Florida.

d. All vessels associated with the construction project shall operate at "no wake/idle" speeds at all times while in the construction area and while in water depths where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will preferentially follow deep-water routes (e.g., marked channels) whenever possible.

e. If a sea turtle or smalltooth sawfish is seen within 100 yards of the active daily construction/dredging operation or vessel movement, all appropriate precautions shall be implemented to ensure its protection. These precautions shall include cessation of operation of any moving equipment closer than 50 feet of a sea turtle or smalltooth sawfish. Operation of any mechanical construction equipment shall cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-ft radius of the equipment. Activities may not resume until the protected species has departed the project area of its own volition.

f. Any collision with and/or injury to a sea turtle or smalltooth sawfish shall be reported immediately to the National Marine Fisheries Service's Protected Resources Division (727-824-5312) and the local authorized sea turtle stranding/rescue organization.

g. Any special construction conditions, required of your specific project, outside these general conditions, if applicable, will be addressed in the primary consultation.

Revised: March 23, 2006

**PCTS ACCESS AND ADDITIONAL CONSIDERATIONS FOR ESA SECTION 7 CONSULTATIONS (REVISED JUNE 11, 2013)**

**PCTS Access and Additional Considerations for ESA Section 7 Consultations (Revised 7-15-2009)**

Public Consultation Tracking System (PCTS) Guidance: PCTS is an online query system at **https://pcts.nmfs.noaa.gov/** that allows federal agencies and U.S. Army Corps of Engineers' (COE) permit applicants and their consultants to ascertain the status of NMFS' Endangered Species Act (ESA) and Essential Fish Habitat (EFH) consultations, conducted pursuant to ESA section 7, and Magnuson-Stevens Fishery Conservation and Management Act's (MSA) sections 305(b)2 and 305(b)(4), respectively. Federal agencies are required to enter an agency-specific username and password to query the Federal Agency Site. The COE "Permit Site" (no password needed) allows COE permit applicants and consultants to check on the current status of Clean Water Act section 404 permit actions for which NMFS has conducted, or is in the process of conducting, an ESA or EFH consultation with the COE.

For COE-permitted projects, click on "Enter Corps Permit Site." From the "Choose Agency Subdivision (Required)" list, pick the appropriate COE district. At "Enter Agency Permit Number" type in the COE district identifier, hyphen, year, hyphen, number. The COE is in the processing of converting its permit application database to PCTS-compatible "ORM." An example permit number is: SAJ-2005-000001234-IPS-1. For the Jacksonville District, which has already converted to ORM, permit application numbers should be entered as SAJ (hyphen), followed by 4-digit year (hyphen), followed by permit application numeric identifier with no preceding zeros. For example: SAJ-2005-123; SAJ-2005-1234; SAJ-2005-12345.

For inquiries regarding applications processed by COE districts that have not yet made the conversion to ORM (e.g., Mobile District), enter the 9-digit numeric identifier, or convert the existing COE-assigned application number to 9 numeric digits by deleting all letters, hyphens, and commas; converting the year to 4-digit format (e.g., -04 to 2004); and adding additional zeros in front of the numeric identifier to make a total of 9 numeric digits. For example: AL05-982-F converts to 200500982; MS05-04401-A converts to 200504401. PCTS questions should be directed to Eric Hawk at Eric.Hawk@noaa.gov. Requests for username and password should be directed to PCTS.Usersupport@noaa.gov.

EFH Recommendations: In addition to its protected species/critical habitat consultation requirements with NMFS' Protected Resources Division pursuant to section 7 of the ESA, prior to proceeding with the proposed action the action agency must also consult with NMFS' Habitat Conservation Division (HCD) pursuant to the MSA requirements for EFH consultation (16 U.S.C. 1855 (b)(2) and 50 CFR 600.905-.930, subpart K). The action agency should also ensure that the applicant understands the ESA and EFH processes; that ESA and EFH consultations are separate, distinct, and guided by different statutes, goals, and time lines for responding to the action agency; and that the action agency will (and the applicant may) receive separate consultation correspondence on NMFS letterhead from HCD regarding their concerns and/or finalizing EFH consultation.

Marine Mammal Protection Act (MMPA) Recommendations: The ESA section 7 process does not authorize incidental takes of listed or non-listed marine mammals. If such takes may occur an incidental take authorization under MMPA section 101 (a)(5) is necessary. Please contact NMFS' Permits, Conservation, and Education Division at (301) 713-2322 for more information regarding MMPA permitting procedures.

**NMFS's PRIOR CONCURRENCE**

**Biscayne Bay Coastal Wetlands**

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701-5505
(727) 824-5312, FAX (727) 824-5309
http://sero.nmfs.noaa.gov

F/SER31:AL

NOV 0 8 2011

Ms. Rebecca S. Griffith
Environmental Branch
Planning Division
Jacksonville District Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232-0019

Re: Biscayne Bay Coastal Wetlands (BBCW) Project and Recommendation for Programmatic Consultation on the Comprehensive Everglades Restoration Plan and Implementation

Dear Ms. Griffith:

This responds to your June 16, 2010, letter and October 2008 biological assessment (BA) regarding the subject Corps of Engineers' (COE) project located in coastal wetlands adjacent to Biscayne Bay in Miami-Dade County, Florida. The BBCW project is a component of the larger Comprehensive Everglades Restoration Plan (CERP). The primary purpose of the BBCW project is to redistribute freshwater runoff from the watershed away from the existing canal discharges and into the coastal wetlands adjoining Biscayne Bay to provide a more natural and historic overland flow of freshwater through existing coastal wetlands (BA, page A4-5). The proposed BBCW project will include pumps, a spreader canal, canal staging, and several culvert structures to manage freshwater flows for optimal restoration opportunities to adjacent freshwater and saltwater wetlands. You determined that the proposed activity may affect, but is not likely to adversely affect smalltooth sawfish and five species of sea turtles (loggerhead, leatherback, green, hawksbill, and Kemp's ridley), and requested the National Marine Fisheries Service's (NMFS) concurrence, pursuant to Section 7 of the Endangered Species Act (ESA). In addition, you determined that the proposed activity would not affect Johnson's seagrass, elkhorn coral, or staghorn coral.

**Consultation History**

By letter dated June 18, 2007, the COE submitted a BA and request for ESA Section 7 consultation with NMFS on the BBCW Acceler8 project. By letter dated August 30, 2007, NMFS concurred with the COE's determination that implementation of the BBCW Acceler8 project may affect, but is not likely to adversely affect, smalltooth sawfish. The Project Implementation Report (PIR), Environmental Impact Statement (EIS), and BA are written for this project only. However, the BBCW is part of the larger CERP program evaluated in a programmatic EIS, and as such, NMFS requested additional information from the COE (via phone and e-mail on 10/3/11, 10/17/11, and 10/20/11) which was received via e-mail on

10/17/11, 10/19/11, 10/20/11, and 10/26/11. The purpose of our request was to assess the need for a programmatic ESA Section 7 consultation that would evaluate the potential effects of the CERP program on listed species and designated critical habitat under NMFS' purview. A summary of the CERP projects is provided below under Conclusion and Next Steps. The Project Description and the Effects Analysis below pertain only to the BBCW project.

To evaluate potential effects of the CERP program on listed species and critical habitat under our purview, NMFS sought additional information on the CERP program and individual projects on the CERP website (http://www.evergladesplan.org/pm/projects/landing_projects.aspx). Based on our review, there are 13 CERP projects in various stages of planning and/or construction. Of these, NMFS determined that seven of the projects may affect listed species and/or designated critical habitat under our purview; one of those projects is the subject of this consultation. The other six projects have either been constructed or would have no effect on listed species or designated critical habitat under our purview. The status of these projects is summarized below:

- C-111 Spreader Canal: On 7 May 2009, the COE requested concurrence with NMFS on its determination of may affect, but is not likely to adversely affect smalltooth sawfish and sea turtles. In addition, the COE determined that the project would not modify critical habitat for elkhorn or staghorn coral. Critical habitat for the smalltooth sawfish had not been designated until after publication of the final PIR/EIS. After further discussion with NMFS, the COE changed their determinations to no effect for each species and their designated critical habitat, and NMFS concurred by email on 6 August 2009. Per COE, construction is complete for this project; therefore, reinitiation is not required.

- Site 1 Impoundment: On 16 February 2005, the COE requested concurrence with NMFS on its determination of no effect on the smalltooth sawfish and opossum pipefish downstream of the project area. By letter dated 18 February 2005, NMFS concurred with the COE's no effect determination. Per COE, construction is complete for this project.

- Indian River Lagoon South Feasibility Study: On 18 March 2002, NMFS concurred with the COE's determination of may affect, but is not likely to adversely affect sea turtles, Johnson's seagrass, and Johnson's seagrass designated critical habitat. The COE stated that construction is not complete and reinitiation of ESA Section 7 consultation with NMFS is needed to evaluate potential effects on smalltooth sawfish (e-mail from Bradley Tarr, COE, 10-20-11). The project is not located in designated critical habitat for smalltooth sawfish.

- Caloosahatchee River (C-43) West Basin Storage Reservoir: By letter dated 18 March 2002, NMFS stated that only the Gulf sturgeon could potentially be affected by the proposed action, but concluded that the project would not adversely affect the species. On 10 January 2007, the COE submitted a revised BA to the FWS and NMFS. NMFS concurred with the COE's determination of "may affect, but is not likely to adversely affect" sea turtles and smalltooth sawfish by letter dated 20 July 2007. NMFS designated critical habitat for smalltooth sawfish on September 2, 2009. Although the project site is not located within critical habitat, it is located upstream from smalltooth sawfish critical

habitat. If construction has not been completed for this project, NMFS recommends that the COE reinitiate Section 7 consultation and address its effects in a programmatic consultation as we believe the project may affect downstream designated critical habitat for smalltooth sawfish.

- Picayune Strand Restoration Project: On 20 October 2004, the COE requested concurrence with NMFS on its determination of may affect, but is not likely to adversely affect the smalltooth sawfish, the green sea turtle, Kemp's ridley sea turtle and the loggerhead sea turtle. As stated in the Biological Assessment published in the final PIR/EIS, NMFS concurred with the COE's effect determination for those species. This project intends to re-establish sheetflow to the Ten Thousand Islands, which has been designated as critical habitat for the smalltooth sawfish; therefore, re-initiation of consultation with NMFS is required and effects should be evaluated programmatically along with the other projects that have the potential to affect critical habitat.

- Everglades National Park (ENP) Seepage Management Project: As envisioned, this project is comprised of three components: L-31N Improvements for Seepage Management, S-356 Structures, and Bird Drive Recharge Area. These three components would work to improve freshwater deliveries to Northeast Shark River Slough and restore wetland hydroperiods and hydropatterns in ENP via seepage management. Planning efforts proceeded up to the formulation of an initial array of alternatives; however, the project is on hold until related projects can develop the best possible solutions for seepage management out of ENP. Therefore, ESA consultation on this project should be included in the proposed programmatic consultation no later than when the project planning resumes.

Based on the preceding, it is evident that some of the projects listed above (e.g., Indian River Lagoon South, C-43, Picayune Strand, and ENP) may affect one or more listed species or critical habitats under NMFS jurisdiction, and may have additive effects. Therefore, we recommend that the COE request a programmatic consultation with NMFS in order to assess potential effects of the CERP program on listed species and designated critical habitat under our purview. In the interim, we concur with the COE's determination that implementation of the BBCW project may affect, but is not likely to adversely affect smalltooth sawfish and sea turtles and that proceeding with this project pending completion of the programmatic consultation will not violate ESA sections 7(a)(2) or 7(d). Our project specific effects analysis on the BBCW project in support of that conclusion is included below.

**BBCW Project Description and Effects Analysis**

Based on discussions with the SFWMD, we understand that the Deering Estate and Cutler Flow Way components of the BBCW Acceler8 project are near completion (John Shaffer, SFWMD Project Manager, pers. comm. by telephone to Audra Livergood, NMFS, August 5, 2010). In addition, four culverts have been installed within the L-31E component of the Acceler8 project. No mangrove impacts are proposed for the Deering Estate component of Acceler8 or BBCW Phase 1. However, filling of mosquito ditches in the Cutler Flow Way will entail several acres of mangrove impacts. Mangrove impacts are also proposed under the L-31E component of the

BBCW Phase 1 project. Both of these components (including mangrove impacts) are discussed in greater detail below.

As described in the BA, the BBCW project objectives are to:

- Re-establish productive nursery habitat along the shoreline;
- Redistribute freshwater flow to minimize point source discharges to improve freshwater and estuarine habitat;
- Enhance and improve quantity, quality, timing, and distribution of freshwater to Biscayne Bay, including Biscayne National Park;
- Preserve and restore spatial extent of natural coastal glades habitat;
- Re-establish connectivity between the BBCW, C-111 Basin, Model Lands, and adjacent basins; and
- Restore nearshore and tidal wetland salinity regimes.

The goal of the project is to rehydrate coastal wetlands and reduce 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. The proposed redistribution of freshwater across a broad front is expected to restore or enhance tidal wetlands and nearshore bay habitat. Diversion of canal discharges into coastal wetlands, as opposed to their direct discharge into Biscayne Bay, is expected to re-establish productive nursery habitat along the shoreline and reduce abrupt freshwater discharges that are physiologically stressful to fish and benthic invertebrates in Biscayne Bay near the canal discharge points (BA, page A4-8).

The project area is approximately 11,000 acres and is located in southeast Miami-Dade County, Florida (figures attached). It is comprised of three components: (1) the Deering Estate, (2) the Cutler Wetlands C-1 Flow Way, and (3) the L-31E Culverts. The Deering Estate includes the Power's Addition Parcel, also known as the Cutler Glade Rehydration Area. Features of this component include an extension of the C-100A Spur Canal, construction of a freshwater wetland on the Power's Addition Parcel, and delivery of freshwater under Old Cutler Road to the Cutler Drain and to the coastal wetlands along Biscayne Bay. The Spur Canal extension and freshwater wetland would run approximately 500 feet through the Power's Addition Parcel. The pump station required to move the water is located on the Power's Addition Parcel and has 100 cubic feet per second total capacity. The pump would discharge to a surcharge chamber and then to a 60-inch-diameter discharge pipe running under Old Cutler Road and to the outlet structure on the east side of Old Cutler Road. No other structures are proposed downstream of the outlet structure as the Cutler Drain is found immediately east of the roadway. Based on Table A4-2 in the BA, no mangrove impacts are anticipated from this component of the project.

The second component of the project is the Cutler Wetlands C-1 Flow Way. Features of this component include a pump station, a conveyance canal, culverts for roadway and canal crossings, and a spreader canal. This component also includes plugging and filling of mosquito ditches found in the saltwater wetlands east of the L-31E Levee and Canal. According to the BA, the intent is to discourage the channelization of freshwater delivered to the area by the spreader canals. Currently, the mangrove wetlands that have been impacted by mosquito ditches

are not receiving adequate amounts of freshwater, especially during times of drought. The plugging and filling of the ditches should help alleviate the channelization of freshwater and should restore a more natural flow of freshwater to rehydrate these wetlands. Based on Table A4-2 in the BA, the COE estimates 2.1 acres of mangroves would be impacted by filling/plugging approximately 2,500 linear feet of mosquito ditches. In addition to filling/plugging of mosquito ditches and rehydrating the wetlands, this component also includes removal of exotic vegetation.

The third component of the project is the L-31E Culverts. This component is divided into the L-31 North area (described in the BA as the portion of the project between the C-1 Canal to the north and the Military Canal to the south) and the L-31 South area (described in the BA as the portion of the project between the Military Canal to the north and the North Canal to the south). Features of this component include installing structures that would isolate the L-31E Canal from the major discharge canals (C-102 Canal and the Military Canal) as well as gated riser culverts (L-31E Culverts) that would deliver water from the L-31E Canal, through the L-31E Levee, and discharge freshwater into the saltwater wetlands to the east. In addition, a pump station would be constructed to mimic the intent of the L-31E Culverts by pumping water over the L-31E Levee and delivering it to the saltwater wetlands. The L-31E component involves the installation of ten culverts (five in the L-31 North area and five in the L-31 South area). The culverts would gravity discharge to the east at the edge of the wetlands. Flap gates would be installed on the culverts to prevent saltwater intrusion during periods of high tide when the tailwater elevation could exceed the headwater elevation. The purpose of the culverts is to rehydrate the adjacent saltwater wetlands and restore a more natural flow of freshwater into Biscayne Bay. Based on Table A4-2 in the BA, the COE proposes approximately 3 acres of mangrove impacts from the L-31E component (via installation of pumps, culverts, and the spreader canal). In addition to installing culverts to benefit saltwater wetlands (i.e., mangrove-dominated wetlands), L-31E includes a freshwater wetland component. The freshwater wetland component includes two pump stations, a spreader canal, a small berm, and a seepage collector ditch. Once filled, the spreader canal would deliver overland freshwater flows to the freshwater wetland. To help alleviate flooding concerns to the west of the spreader canal, a small berm and seepage collector ditch would be constructed immediately to the west of the spreader canal.

In summary, the proposed action may involve construction impacts to approximately 5.1 acres of mangrove habitat (2.1 acres in the Cutler C-1 Flow Way and 3 acres in the L-31E component). The BA states the project will adhere to the NMFS' March 23, 2006, Sea Turtle and Smalltooth Sawfish Construction Conditions (enclosed).

The project is located south of the known range of Johnson's seagrass; therefore, NMFS believes the project would have no effect on Johnson's seagrass. Two listed species of coral, elkhorn coral (*Acropora palmata)* and staghorn coral (*Acropora cervicornis),* are known to occur within the waters of Biscayne Bay and Biscayne National Park. However, NMFS believes there would be no effect on these species because they are not found within or near the project area. There is no designated critical habitat under NMFS' purview within the project area.

Five species of sea turtles (loggerhead, green, Kemp's ridley, hawksbill, and leatherback) and smalltooth sawfish, protected by the ESA and under NMFS' purview, are known to occur within

or near the project area (in Biscayne Bay). NMFS believes smalltooth sawfish and sea turtles may be affected by the proposed work. Potential direct effects from the proposed action include adverse effects resulting from construction activities in red mangroves and nearshore waters. Potential indirect effects include habitat loss and/or alteration.

NMFS believes that direct effects from the proposed action are extremely unlikely to occur and therefore discountable. Smalltooth sawfish and sea turtles are highly mobile and likely to move away from the work area during construction. In addition, the applicant has agreed to follow the enclosed construction conditions.

NMFS believes smalltooth sawfish may be indirectly affected by habitat loss and/or alteration. The Cutler Flow Way segment of the project proposes approximately 2.1 acres of mangrove impacts via backfilling and plugging of mosquito ditches. In addition, the L-31E component of the project proposes approximately 3 acres of construction-related mangrove impacts associated with the installation of pumps, culverts, and the spreader canal. Combined, these two components propose approximately 5.1 acres of construction-related mangrove impacts. NMFS believes the 2.1 acres of mangroves within the Cutler Flow Way segment are inaccessible to sawfish because these mangroves are impounded (i.e., they are not tidally connected to Biscayne Bay). Therefore, we believe the proposed action would only affect 3 acres of red mangrove habitat that is potentially utilized by sawfish. While NMFS acknowledges that approximately 3 acres of red mangroves may be adversely affected during construction, we believe that the overall project purpose (i.e., rehydrating coastal wetlands and restoring a more natural flow of freshwater into Biscayne Bay) may benefit smalltooth sawfish. The mangroves in this area exist within a hypersaline regime. Most juvenile smalltooth sawfish have an affinity for salinity between 18 and 30 psu.[1] The proposed action would not permanently alter the salinity regime such that it would fall outside of this range; however, during extremely wet periods, salinity in the nearshore environment may fall below 18 psu for a short duration until the freshwater from land mixes with the nearshore waters of the bay (personal communication, Bradley Tarr, COE, October 28, 2011). NMFS believes juvenile smalltooth sawfish that potentially utilize red mangroves in the project area would be able to physiologically tolerate salinities below 18 psu for a short duration. In a recent study, juvenile smalltooth sawfish were captured at the mouth of the Caloosahatchee River during a period of low salinity (between 3.1-9.0 psu) caused by increased freshwater flow. These individuals remained in the study area for as long as 473 days.[2] Based on these findings, Poulakis *et al.* 2011 conclude "the water conditions observed during the capture of these sawfish probably does not reflect an affinity for low salinity, but rather a tolerance, because they remained in the river rather than egressing to the open bay to find higher salinities." Based on the preceding, NMFS believes juvenile sawfish that may be found in the project area are likely to tolerate a temporary reduction in salinity (below 18 psu) for a short duration and are not likely to be adversely affected.

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[1] Poulakis, G.R., Stevens, P.W., Timmers, A.A., Wiley, T.R., and Simpendorfer, C.A. (2011). Abiotic affinities and spatiotemporal distribution of the endangered smalltooth sawfish, *Pristis pectinata*, in a south-western Florida nursery. Marine and Freshwater Research. Available online (www.publish.csiro.au/journal/mfr) [published online 12 August 2011].

[2] Simpendorfer, C.A., Yeiser, B.G., Wiley, T.R., Poulakis, G.R., Stevens, P.W., and Heupel, M.R. (2011). Environmental influences on the spatial ecology of juvenile smalltooth sawfish (*Pristis pectinata*): results from acoustic monitoring. *PLoS ONE* 6, e16918. Doi:10.1371/JOURNAL.PONE.0016918.

The proposed installation of culverts would rehydrate mangrove wetlands by restoring a more natural flow of freshwater to these wetlands and Biscayne Bay. NMFS believes the restoration of more natural freshwater flows to the mangroves and the bay may provide an ecological benefit to Biscayne Bay and smalltooth sawfish that potentially utilize red mangrove habitat in this area. In addition, the Cutler Flow Way component also proposes the removal of exotic vegetation, which may indirectly benefit coastal wetlands. NMFS believes the project may have a net benefit on smalltooth sawfish by rehydrating mangrove wetlands, enhancing coastal wetland function, and reducing harmful point source discharges from the major conveyance canals. We believe indirect effects due to habitat loss/alteration from the project are insignificant.

In addition to smalltooth sawfish, NMFS believes the project may affect sea turtles by habitat alteration. Foraging habitat for several sea turtle species (e.g., loggerhead, green, and Kemp's ridley) is present in the project area. NMFS believes there is the potential for changes in the species composition of seagrasses in the project area due to an increase in the amount of freshwater delivery to the coastal wetlands and nearshore waters of the project area. However, we concur with the FWS (November 18, 2009, concurrence letter from FWS to the COE for the BBCW project) that lowering salinities in the nearshore waters of the project area is not anticipated to reduce seagrass abundance in the project area; therefore, we believe the project is not likely to adversely affect sea turtles due to potential changes in their foraging habitat. Moreover, the proposed action may indirectly benefit sea turtles by minimizing harmful freshwater pulse releases and point-source discharges from the major conveyance canals, which may improve nearshore water quality and nearshore foraging habitat.

**Conclusion and Next Steps**

Based on our analysis, we concur with the COE's determination that the BBCW project is not likely to adversely affect any listed species under our purview and we concur with COE's determination that proceeding with the project will not violate sections 7(a)(2) and 7(d) pending completion of the recommended programmatic consultation. Be advised that the consultation on this particular project must be reinitiated if a take occurs or new information reveals effects of the action not previously considered, or the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat in a manner or to an extent not previously considered, or if a new species is listed or critical habitat designated that may be affected by the identified action.

We have enclosed additional information on other statutory requirements that may apply to this action, as well as information on NMFS' Public Consultation Tracking System (PCTS) that allows you to track the status of ESA consultations. We look forward to further cooperation with you on other projects to ensure the conservation of our threatened and endangered marine species and designated critical habitat. If you have any questions on this consultation or PCTS, please contact Audra Livergood at (954) 356-7100, or by e-mail at Audra.Livergood@noaa.gov.

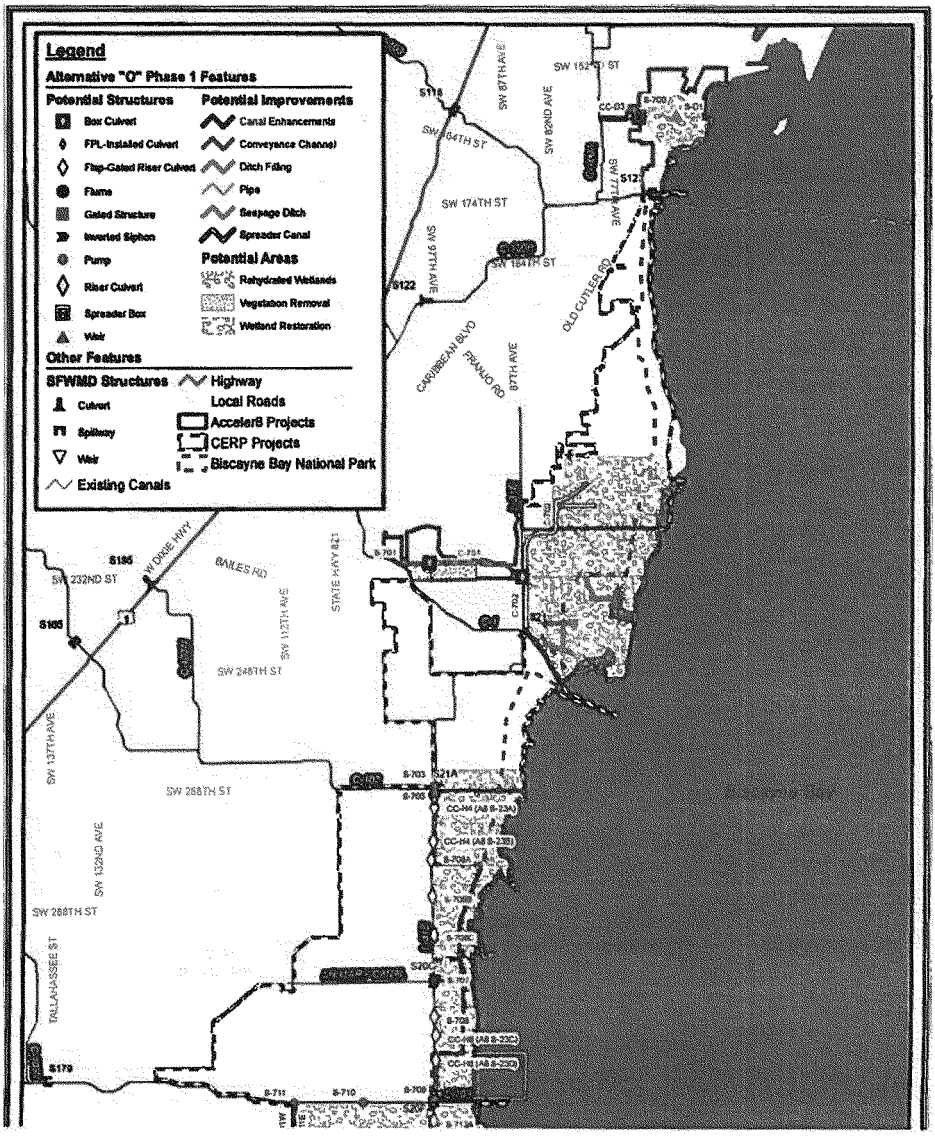
Sincerely,

Miles M. Croom

for Roy E. Crabtree, Ph.D.
Regional Administrator

Enclosures (2)

File: 1514-22.F.4
Ref: I/SER/2010/02615


Legend
Alternative "O" Phase 1 Features
Potential Structures
Box Culvert
FPL-Installed Culvert
Flap-Gated Riser Culvert
Flume
Gated Structure
Inverted Siphon
Pump
Riser Culvert
Spreader Box
Weir
Potential Improvements
Canal Enhancements
Conveyance Channel
Ditch Filling
Pipe
Seepage Ditch
Spreader Canal
Potential Areas
Rehydrated Wetlands
Vegetation Removal
Wetland Restoration
Other Features
SFWMD Structures
Culvert
Spillway
Weir
Existing Canals
Highway
Local Roads
Accelerated Projects
CERP Projects
Biscayne Bay National Park
S118
SW 184TH ST
SW 87TH AVE
SW 152ND ST
SW 82ND AVE
CC-03
S-700A
S-01
S123
SW 174TH ST
SW 94TH AVE
SW 177TH AVE
S122
CARIBBEAN BLVD
FRANJO RD
87TH AVE
OLD CUTLER RD
S-701
C-701
C-702
S195
W DIXIE HWY
SW 232ND ST
BAILES RD
STATE HWY 821
SW 112TH AVE
S185
SW 248TH ST
SW 137TH AVE
SW 268TH ST
SW 132ND AVE
S-703
S21A
CC-I-I4 (AB S-23A)
CC-I-I4 (AB S-23B)
S-708A
S-708B
S-708C
S20C
S-707
S-708
CC-I-I6 (AB S-23C)
CC-I-I6 (AB S-23D)
TALLAHASSEE ST
S179
S-711
S-710
S-709
S20F
S-713A

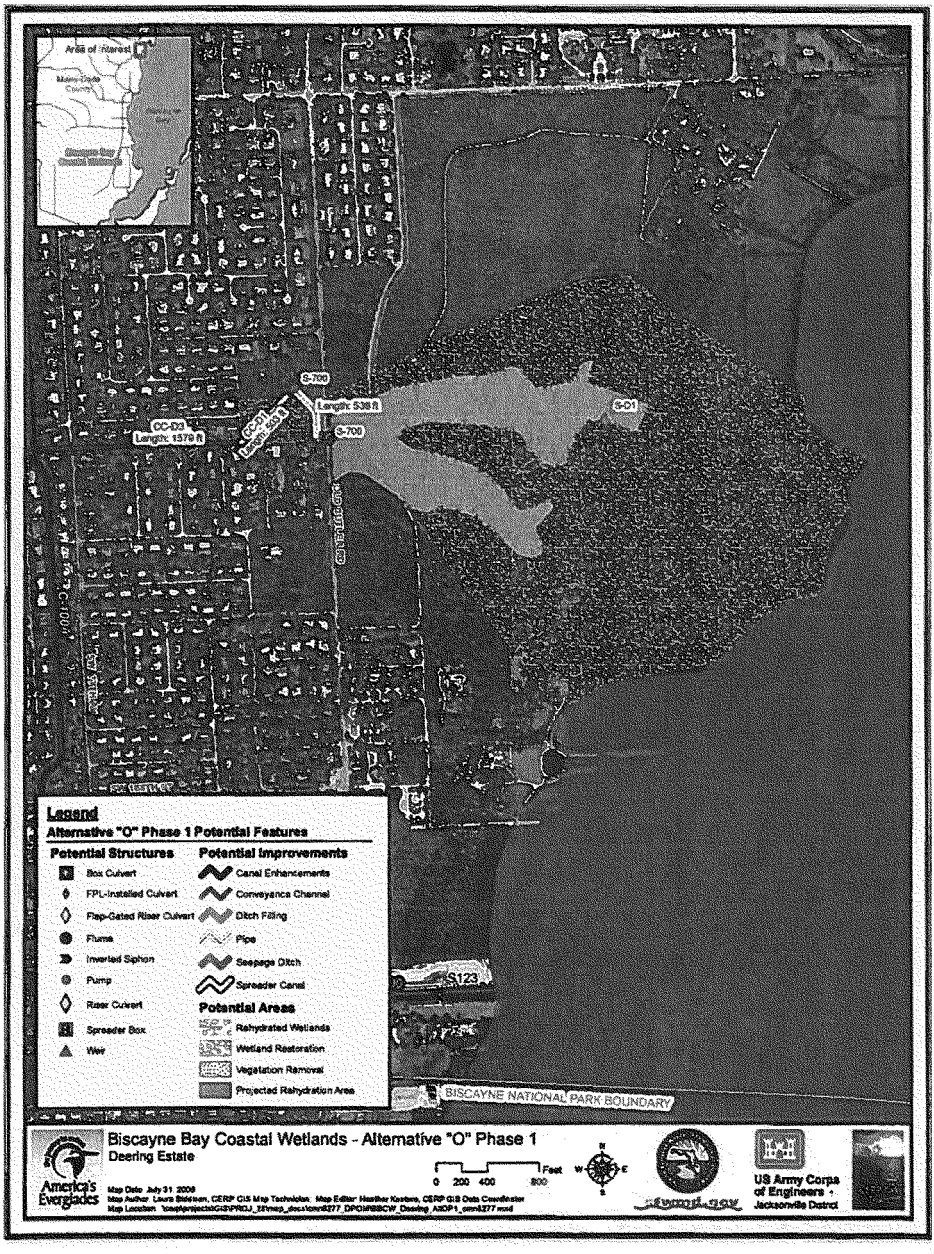



**FIGURE A4-2: BISCAYNE BAY COASTAL WETLANDS DEERING ESTATE**

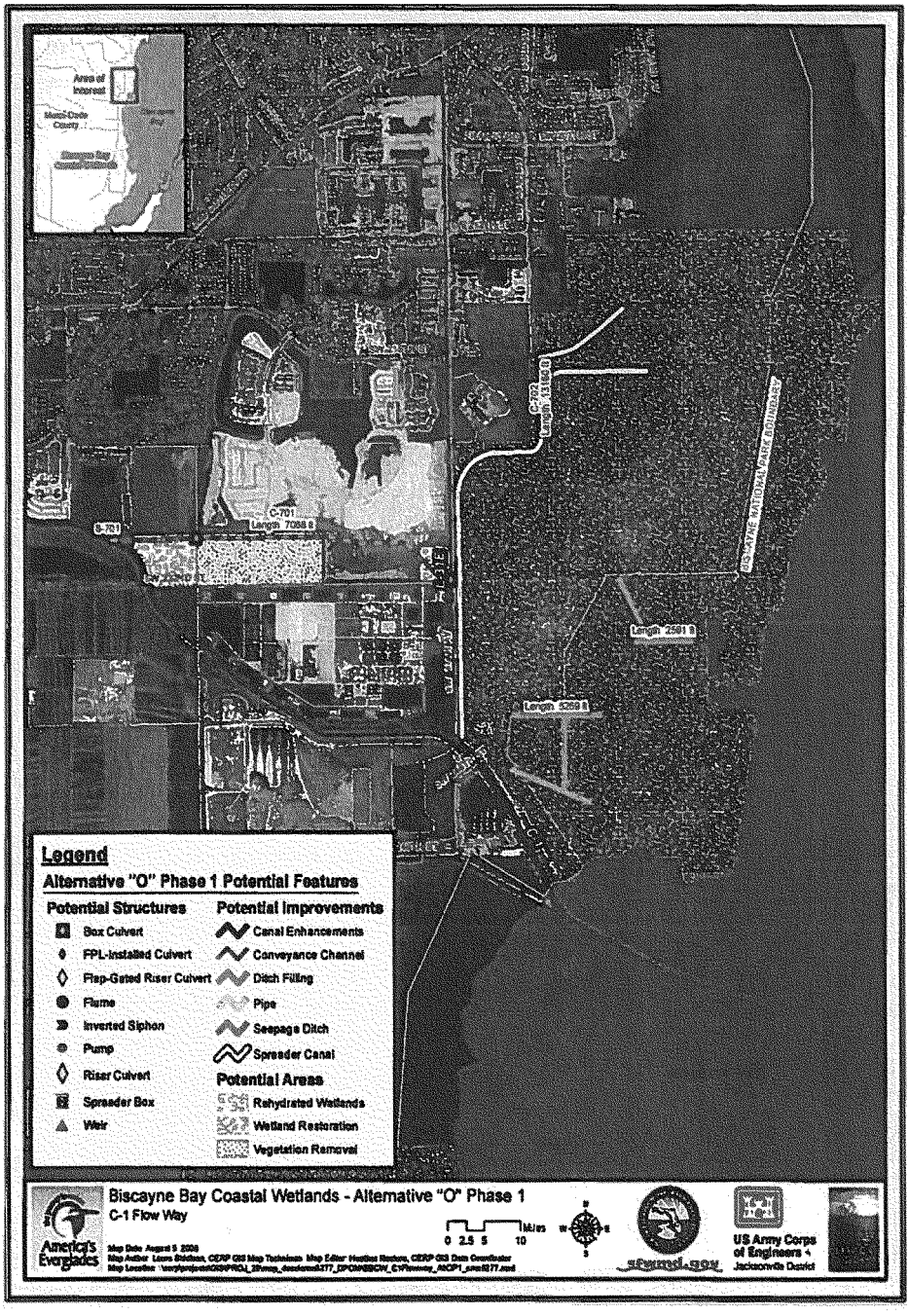



**FIGURE A4-3: BISCAYNE BAY COASTAL WETLANDS C-1 FLOW WAY**

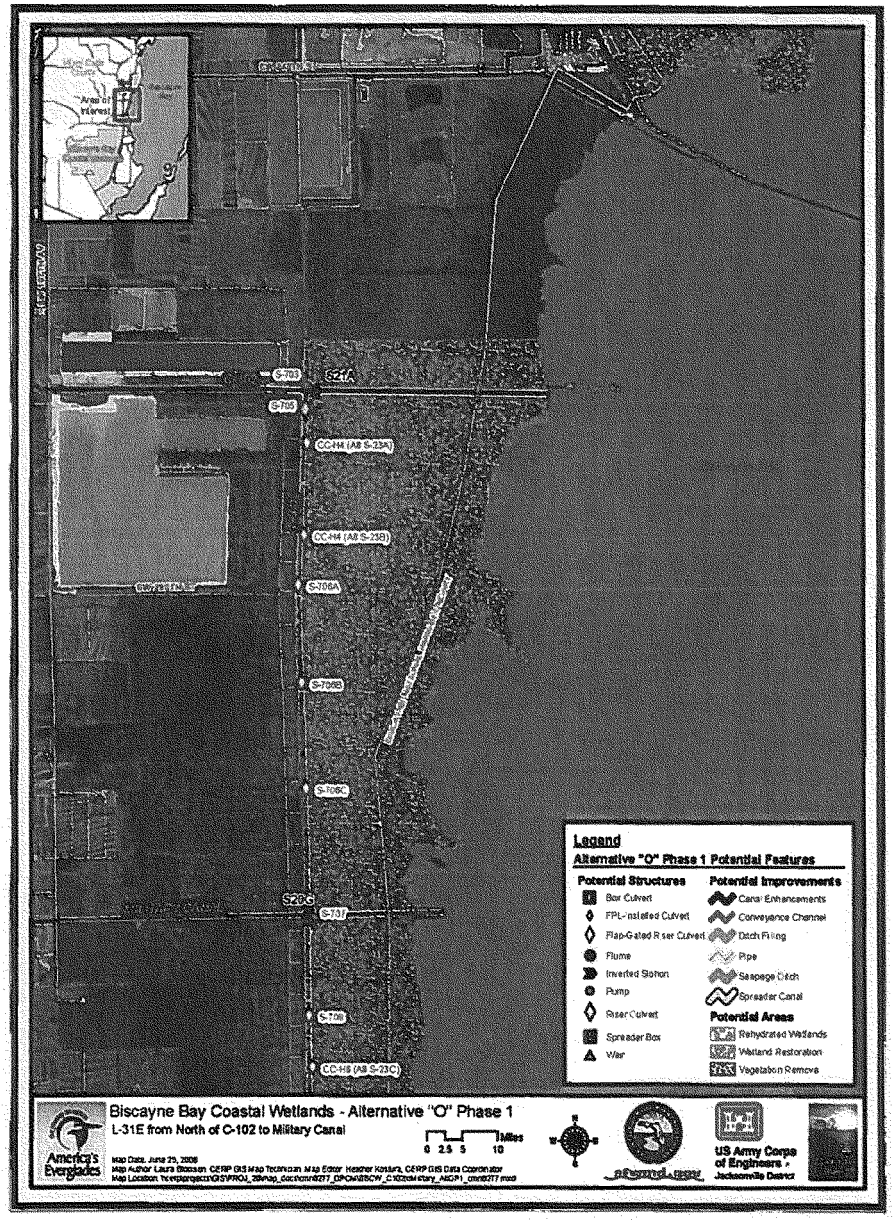



**FIGURE A4-4: BISCAYNE BAY COASTAL WETLANDS L-31 FROM NORTH OF C-102 TO MILITARY CANAL**

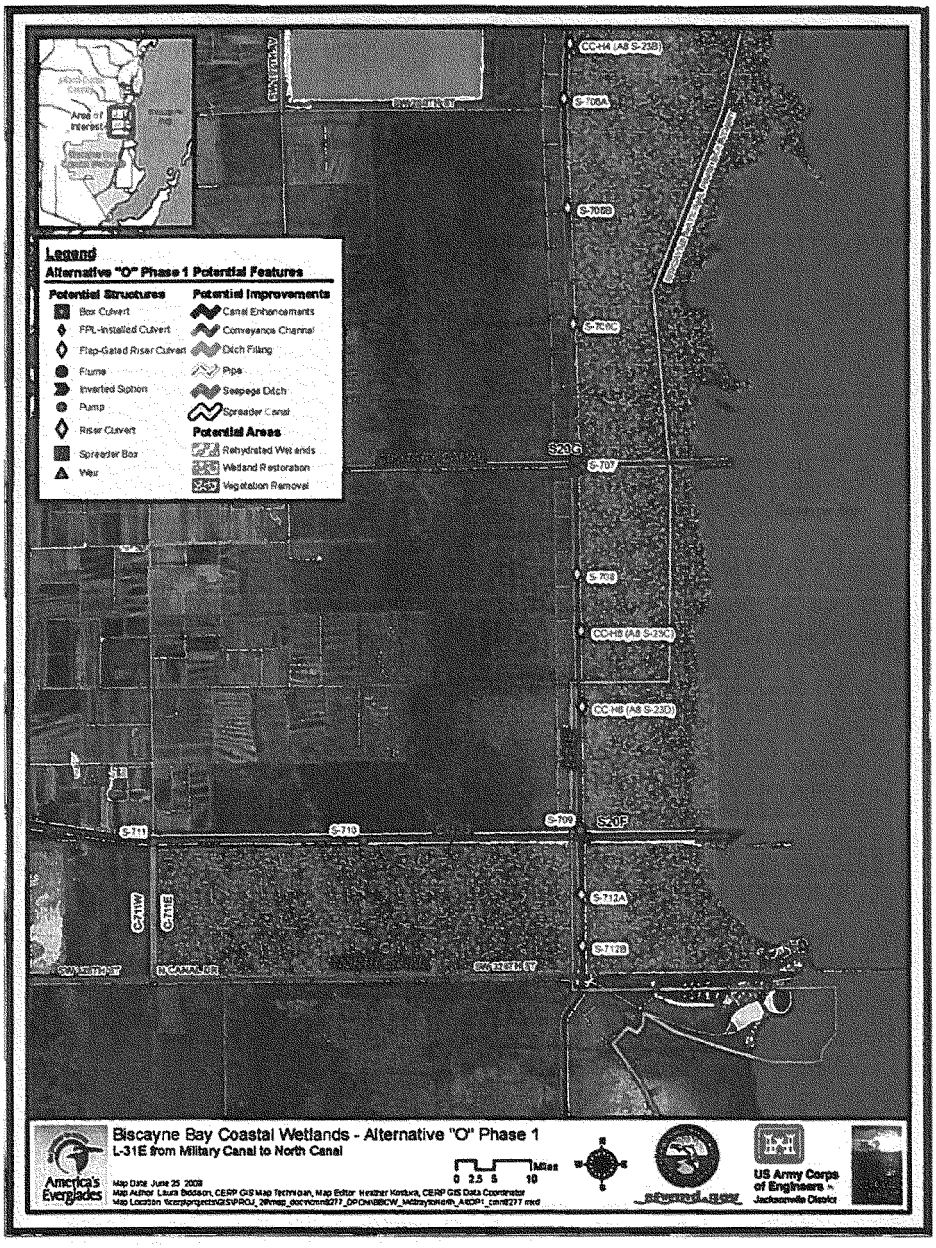



**FIGURE A4-5: BISCAYNE BAY COASTAL WETLANDS L-31E FROM MILITARY CANAL TO NORTH CANAL**

**UNITED STATES DEPARTMENT OF COMMERCE**
**National Oceanic and Atmospheric Administration**
**NATIONAL MARINE FISHERIES SERVICE**
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701

## SEA TURTLE AND SMALLTOOTH SAWFISH CONSTRUCTION CONDITIONS

The permittee shall comply with the following protected species construction conditions:

a. The permittee shall instruct all personnel associated with the project of the potential presence of these species and the need to avoid collisions with sea turtles and smalltooth sawfish. All construction personnel are responsible for observing water-related activities for the presence of these species.

b. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing sea turtles or smalltooth sawfish, which are protected under the Endangered Species Act of 1973.

c. Siltation barriers shall be made of material in which a sea turtle or smalltooth sawfish cannot become entangled, be properly secured, and be regularly monitored to avoid protected species entrapment. Barriers may not block sea turtle or smalltooth sawfish entry to or exit from designated critical habitat without prior agreement from the National Marine Fisheries Service's Protected Resources Division, St. Petersburg, Florida.

d. All vessels associated with the construction project shall operate at "no wake/idle" speeds at all times while in the construction area and while in water depths where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will preferentially follow deep-water routes (e.g., marked channels) whenever possible.

e. If a sea turtle or smalltooth sawfish is seen within 100 yards of the active daily construction/dredging operation or vessel movement, all appropriate precautions shall be implemented to ensure its protection. These precautions shall include cessation of operation of any moving equipment closer than 50 feet of a sea turtle or smalltooth sawfish. Operation of any mechanical construction equipment shall cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-ft radius of the equipment. Activities may not resume until the protected species has departed the project area of its own volition.

f. Any collision with and/or injury to a sea turtle or smalltooth sawfish shall be reported immediately to the National Marine Fisheries Service's Protected Resources Division (727-824-5312) and the local authorized sea turtle stranding/rescue organization.

g. Any special construction conditions, required of your specific project, outside these general conditions, if applicable, will be addressed in the primary consultation.

Revised: March 23, 2006

**PCTS Access and Additional Considerations for ESA Section 7 Consultations (Revised 7-15-2009)**

Public Consultation Tracking System (PCTS) Guidance: PCTS is an online query system at **https://pcts.nmfs.noaa.gov/** that allows federal agencies and U.S. Army Corps of Engineers' (COE) permit applicants and their consultants to ascertain the status of NMFS' Endangered Species Act (ESA) and Essential Fish Habitat (EFH) consultations, conducted pursuant to ESA section 7, and Magnuson-Stevens Fishery Conservation and Management Act's (MSA) sections 305(b)2 and 305(b)(4), respectively. Federal agencies are required to enter an agency-specific username and password to query the Federal Agency Site. The COE "Permit Site" (no password needed) allows COE permit applicants and consultants to check on the current status of Clean Water Act section 404 permit actions for which NMFS has conducted, or is in the process of conducting, an ESA or EFH consultation with the COE.

For COE-permitted projects, click on "Enter Corps Permit Site." From the "Choose Agency Subdivision (Required)" list, pick the appropriate COE district. At "Enter Agency Permit Number" type in the COE district identifier, hyphen, year, hyphen, number. The COE is in the processing of converting its permit application database to PCTS-compatible "ORM." An example permit number is: SAJ-2005-000001234-IPS-1. For the Jacksonville District, which has already converted to ORM, permit application numbers should be entered as SAJ (hyphen), followed by 4-digit year (hyphen), followed by permit application numeric identifier with no preceding zeros. For example: SAJ-2005-123; SAJ-2005-1234; SAJ-2005-12345.

For inquiries regarding applications processed by COE districts that have not yet made the conversion to ORM (e.g., Mobile District), enter the 9-digit numeric identifier, or convert the existing COE-assigned application number to 9 numeric digits by deleting all letters, hyphens, and commas; converting the year to 4-digit format (e.g., -04 to 2004); and adding additional zeros in front of the numeric identifier to make a total of 9 numeric digits. For example: AL05-982-F converts to 200500982; MS05-04401-A converts to 200504401. PCTS questions should be directed to Eric Hawk at Eric.Hawk@noaa.gov. Requests for username and password should be directed to PCTS.Usersupport@noaa.gov.

EFH Recommendations: In addition to its protected species/critical habitat consultation requirements with NMFS' Protected Resources Division pursuant to section 7 of the ESA, prior to proceeding with the proposed action the action agency must also consult with NMFS' Habitat Conservation Division (HCD) pursuant to the MSA requirements for EFH consultation (16 U.S.C. 1855 (b)(2) and 50 CFR 600.905-.930, subpart K). The action agency should also ensure that the applicant understands the ESA and EFH processes; that ESA and EFH consultations are separate, distinct, and guided by different statutes, goals, and time lines for responding to the action agency; and that the action agency will (and the applicant may) receive separate consultation correspondence on NMFS letterhead from HCD regarding their concerns and/or finalizing EFH consultation.

Marine Mammal Protection Act (MMPA) Recommendations: The ESA section 7 process does not authorize incidental takes of listed or non-listed marine mammals. If such takes may occur an incidental take authorization under MMPA section 101 (a)(5) is necessary. Please contact NMFS' Permits, Conservation, and Education Division at (301) 713-2322 for more information regarding MMPA permitting procedures.

**Picayune Strand Restoration Project**

Everglade snail kite, eastern indigo snake, American crocodile and West Indian manatee critical habitat. The proposed project would have "no effect" on everglade snail kite critical habitat and American crocodile critical habitat. Corps and Service biologists have agreed that there is insufficient information at this project phase to make a determination regarding effects on wood stork, West Indian manatee and Florida Panther. By letter dated October 20, 2004, the Service concurred with these determinations. A copy of the Biological Assessment for listed species found on proposed project lands is included in Appendix D. Coordination has concluded for the planning (feasibility-stage) of the project in 2004, but will continue, if the project is approved and funds are provided to continue through detailed design and construction, throughout the project life. No construction will begin until determinations of effects are coordinated with the Service for the three species of ongoing concern and concurrence is reached. It is the expectation of Corps and Service biologists that with detailed analysis, availability of pre-construction surveys, and final coordination of listed species conservation measures, concurrence may be reached early in the detailed design phase.

Initial informal consultation on marine species with the National Marine Fisheries Service (NMFS) began on May 25, 2001. Informal consultation was updated in an email exchange and a February 10, 2004 phone conversation. NOAA fisheries indicated its concurrence with a Corps information determination of no effect on listed marine species.

Section 9.6 of this report has additional information on both marine and upland listed species. With receipt of Service concurrence with current effect determinations, the Project is in compliance with the ESA for feasibility phase activities. Full compliance will be achieved when determinations on the manatee, Florida panther and wood stork are re-coordinated with the Service in a new BA, and Service concurrence is received.

## 11.3 FISH AND WILDLIFE COORDINATION ACT OF 1958, AS AMENDED

Consultation was initiated with FWS on February 26, 1999 in a Scope of Work (SOW) requesting a Planning Aid Letter (PAL) for the SGGE project. Several planning aid letters (PALs) have been received by the Corps (ref. Appendix D) Further coordination with the U.S. Fish and Wildlife Service resulted in the submission to the Corps of a draft Coordination Act Report (dCAR) dated February 2, 2004 and a Final report (FCAR) on September 22, 2004. The FCAR included 16 recommendations to assure that the objectives of the project would be achieved. The FWS stated that the proposed project, as described, should provide significant hydrologic improvements and enhancement of wetland

**Kremer, John G SAJ**

**From:** David Bernhart [David.Bernhart@noaa.gov]
**Sent:** Friday, August 10, 2001 9:04 AM
**To:** David Dale
**Cc:** Kremer John G SAJ; Eric Hawk; Jennifer Lee
**Subject:** Re: Southern Golden Gate Estates (SGGE) project

08-10-01 ESA phone consultation with David Bernhart of NMFS:
At approximately 1015 hrs on the above date I talked to David to explain the SGGE project. David stated that he was not aware of any listed marine species able to move up the Fahka Union Canal over the existing weir to the SGGE construction sites. Also since the project intent is to eliminate fresh water point source surges and restore the pre-alteraton overland flows which will emulate a natural hydrology he could see no negative indirect effects to listed species. He agreed that a no effects call in the EA would be justfied.

Good morning, John,

David's points on EFH consultation are directly applicable to ESA consultation as well. The adverse effect vs. net benefit is especially important. If there will be any adverse effect to a listed species, you need to consult, even if the outcome of that consultation is that the action will produce a net benefit. If the project will only produce beneficial results for ESA-listed species, then no consultation is required, but you should note in your NEPA documents that you've made these determinations.

I can send you a species list if you like. It sounds like there are none of our listed species present near the construction site. The 10,000 Islands (is this the affected downstream area?) are a very important habitat for endangered Kemp's ridley sea turtles, the proposed to be listed as endangered smalltooth sawfish, and several candidate species of fish. Please consider possible direct and indirect effects to these critters. If you need additional assistance, please call at 727-570-5312.

-DB

David Dale wrote:

> John, a couple points you may want to consider for this project and others in the future:
>
> 1. Even if an EFH or ESA Consultation is not required, you may want to note that finding in the NEPA document.
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> 2. NMFS has a division of labor regarding habitat issues and T&E issues. EFH Consultations and NEPA or FWCA coordination's are handled by the Habitat Conservation Division (which I am in). ESA Consultations are handled by the Protected Resources Division. I'm copying David Bernhart of that Division with this response, you will want to get a response from them regarding your need to Consult.
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> 3. Regarding EFH: Even projects that have a net positive effect on EFH still require EFH Consultation if they may adversely impact designated

EFH to implement them. For example, filling mud bottoms to an elevation to create saltmarsh results in a negative effect on mud bottoms but a positive effect on emergent wetlands and would generally be considered a net positive effect.

In this case I think all the implementing features of the project are well upstream of any designated EFH (depending where the canal is plugged) thus all the effects on EFH would be positive and consultation would not be required.

4. We've been asked to prepare EFH Assessments for FWCA Reports but it is our policy that we will not prepare EFH Assessments on behalf of another agency because it is our responsibility to review the Assessment and provide Conservation Recommendations. In essence, it would create a case where we are reviewing our own work and would create a conflict of interest. Also, EFH Assessments include the views of the Federal action agency which would not be appropriate for NMFS to provide. Bottom line is that the Magnuson-Stevens Act clearly puts that responsibility on the Federal action agency.

If this did nothing but confuse you give me a call!

David
727.570.5311

"Kremer, John G SAJ" wrote:

>
>
> David,
> Kim Dryden gave me your name as the NOAA biologist to contact about
> Essential Fish Habitat and any potential listed species for the SGGE
> project. Essentially what this project will do is reduce the Fahka
> Union Canal fresh water flows and storm surges to almost nothing.
> Instead broad slow moving sheetflow will be reestablished to the SGGE
> landscape. These waters will flow through culverts under US 41 and
> reach tide along a broad front which mimics the natural system that
> existed prior to this 1960 's real estate development debacle.
>
> At this time I have come across no information indicating that
> returning the SGGE landscape to a more natural system would have
> adverse effects on any EFH or listed aquatic species. If you have any
> information to the contrary please let me know.
>
> This project is on a very tight schedule to make the WRDA 2002
> congressional funding cycle. There is a lot of federal, state, and
> local political pressure to meet this deadline. I will be attending a
> meeting of the Interagency Team on 15 Aug 01 at the SFWMD Naples
> office. You are welcome to attend and present any information you
> have. If you are unable to attend please send your comments to me
> before 14 Aug 01 and I will present them.

> Should I not hear from you in the next week I will assume you have no
> input and the Corps will proceed with a "no effects" determination
> for this project.
>
> Thanks,
> John Kremer
> (904)232-3551
>
>

8/10/01

08-10-01 ESA phone consultation with David Bernhart of NMFS:
At approximately 1015 hrs on the above date I talked to David to explain the SGGE project. David stated that he was not aware of any listed marine species able to move up the Fahka Union Canal over the existing weir to the SGGE construction sites. Also since the project intent is to eliminate fresh water point source surges and restore the pre-alteraton overland flows which will emulate a natural hydrology he could see no negative indirect effects to listed species. He agreed that a no effects call in the EA would be justfied.

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> for this project.

>
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> John Kremer
> (904)232-3551

# Estuary selections by estuary:

| Estuary | State | Common | Species | Lifestage | PDF |
|---|---|---|---|---|---|
| Ten Thousand Islands | Florida | Brown shrimp | Penaeus aztecus | Adult | Florida\TenThous\TenKbsa.PDF |
| Ten Thousand Islands | Florida | Brown shrimp | Penaeus aztecus | Juvenile | Florida\TenThous\TenKbsj.PDF |
| Ten Thousand Islands | Florida | Gray snapper | Lutjanus griseus | Adult | Florida\TenThous\TenKgsa.PDF |
| Ten Thousand Islands | Florida | Gray snapper | Lutjanus griseus | Juvenile | Florida\TenThous\TenKgsj.PDF |
| Ten Thousand Islands | Florida | Gulf stone crab | Menippe adina | Adult | Florida\TenThous\TenKgsca.PDF |
| Ten Thousand Islands | Florida | Gulf stone crab | Menippe adina | Juvenile | Florida\TenThous\TenKgscj.PDF |
| Ten Thousand Islands | Florida | Pink shrimp | Penaeus duorarum | Adult | Florida\TenThous\TenKpsa.PDF |
| Ten Thousand Islands | Florida | Pink shrimp | Penaeus duorarum | Juvenile | Florida\TenThous\TenKpsj.PDF |
| Ten Thousand Islands | Florida | Red drum | Sciaenops ocellatus | Adult | Florida\TenThous\TenKrda.PDF |
| Ten Thousand Islands | Florida | Red drum | Sciaenops ocellatus | Juvenile | Florida\TenThous\TenKrdj.PDF |
| Ten Thousand Islands | Florida | Spanish mackerel | Scomberomorus maculatus | Adult | Florida\TenThous\TenKsma.PDF |
| Ten Thousand Islands | Florida | Spanish mackerel | Scomberomorus maculatus | Juvenile | Florida\TenThous\TenKsmj.PDF |
| Ten Thousand Islands | Florida | Spiny lobster | Panulirus argus | Adult | Florida\TenThous\TenKsla.PDF |
| Ten Thousand Islands | Florida | Spiny lobster | Panulirus argus | Juvenile | Florida\TenThous\TenKslj.PDF |
| Ten Thousand Islands | Florida | Stone crab | Menippe mercenaria | Adult | Florida\TenThous\TenKsca.PDF |
| Ten Thousand Islands | Florida | Stone crab | Menippe mercenaria | Juvenile | Florida\TenThous\TenKscj.PDF |
| Ten Thousand Islands | Florida | White shrimp | Penaeus setiferus | Adult | Florida\TenThous\TenKwsa.PDF |
| Ten Thousand Islands | Florida | White shrimp | Penaeus setiferus | Juvenile | Florida\TenThous\TenKwsj.PDF |

**United States Department of Commerce**
**National Oceanic and Atmospheric Administration**
**National Marine Fisheries Service**
**Southeast Fisheries Science Center**
**Galveston Laboratory**
**4700 Avenue U**
**Galveston, TX 77551-5997**
**(409) 766-3500**

1 = SUBMIT

**Indian River Lagoon South**

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
9721 Executive Center Drive North
St. Petersburg, FL 33702
(727) 570-5312; FAX 570-5517
http://caldera.sero.nmfs.gov

FILE #

JAN 3 2002 F/SER3:BH:mdh

Mr. John R. Hall
Stuart Regulatory Office
Jacksonville District Corps of Engineers
218 Atlanta Ave.
Stuart, Florida 34994

Dear Mr. Hall:

This is in reference to the Army Corps of Engineers' (COE) permit application number 200101177 (IP-TA). The proposed project consists of the restoration of aquatic habitat at Spoil Island, SL-15, in the Indian River Lagoon, St. Lucie County, Florida. This project includes the construction of a temporary work platform, the dredging of 0.61 acres of mangroves to create flushing channels, the removal of exotic vegetation, and the regrading of the island to create approximately 3.28 acres of submerged aquatic vegetation and 4.74 acres of mangroves. The National Marine Fisheries Service (NMFS) consultation number for this project is I/SER/2001/01161; please refer to this number in future correspondence on this project.

Five species of sea turtles (loggerhead, green, Kemp's ridley, hawksbill, and leatherback), Johnson's seagrass, and designated Johnson's seagrass critical habitat protected by the Endangered Species Act (ESA) can be found in or near the action area. Construction methods used for docks (*e.g.*, pile driving or jetting-in and construction barge anchoring) and small scale dredging have not been shown to adversely affect sea turtles, which are highly mobile and may be frightened away from the project area by construction activity and noise; therefore, the chances of the proposed action affecting sea turtles is discountable.

Seagrass surveys of the area indicate that Johnson's seagrass can be found in the action area. NMFS believes that the only parts of this project likely to affect Johnson's seagrass are the construction of the temporary work platform and the construction of the flushing channels. However, the applicant has stated that they will site the platform and flushing channels in areas devoid of Johnson's seagrass. Therefore, NMFS believes that any effects that the proposed action will have on Johnson's seagrass will be insignificant. In conclusion, NMFS believes that the proposed action is not likely to adversely affect species protected by the ESA under its purview.

This concludes the COE's consultation responsibilities under section 7 of the ESA for the proposed project. Be advised that 50 CFR 402.16 requires that consultation be

reinitiated if a take occurs or new information reveals effects of the action not previously considered, or the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat in a manner or to an extent not previously considered, or if a new species is listed or critical habitat designated that may be affected by the identified action.

We are copying our Habitat Conservation Division (HCD) with this letter, in case HCD has any habitat concerns pursuant to the section 305 essential fish habitat consultation requirements of the Magnuson-Stevens Fishery Conservation and Management Act (50 CFR 600.905-600.930, subpart k). HCD may be reached at (904) 232-2580, extension 121.

If you have any questions, please contact Mr. Robert Hoffman, fishery biologist, at the number listed above.

Sincerely yours,

for, Joseph E. Powers, Ph.D.
Acting Regional Administrator

cc: F/PR3
F/SER45 - George Getsinger

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1514.22f.1

FILE #

**UNITED STATES DEPARTMENT OF COMMERCE**
**National Oceanic and Atmospheric Administration**
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
9721 Executive Center Drive North
St. Petersburg, FL 33702
(727) 570-5312; FAX (727) 570-5517
http://caldera.sero.nmfs.gov

MAR 18 2002 F/SER3:EGH

Mr. James C. Duck
Chief, Planning Division
Army Corps of Engineers, Jacksonville District
P.O. Box 4970
Jacksonville, FL 32232-0019

Dear Mr. Duck:

This responds to Mr. Stephen Traxler's February 12, 2002, telephone request to Mr. Eric Hawk of my staff for a written response from the National Marine Fisheries Service (NMFS) to your May 25, 2001, letter requesting informal consultation, pursuant to section 7 of the Endangered Species Act (ESA), on the potential effects of the Indian River Lagoon Restoration Integrated Feasibility Study. On June 12, 2001, Mr. Hawk advised Mr. Traxler of NMFS' concurrence with the Corps' determination that the study would not likely adversely affect listed species under NMFS' purview. We assigned consultation number I/SER/2001/00697 to this action. Additional details on the project were submitted by Mr. Traxler on February 17, 2002, and are incorporated herein by reference (Draft IRL-South Feasibility Report and Supplemental EIS, October 2001: Recommended Plan [Section 8: Construction Features]).

NMFS Protected Resources Division (PRD) has reviewed the proposed action, a restoration project whose primary goal is reestablishing a stable salinity regime in the St. Lucie Estuary. The recommended plan is a combination of components and operational rules that will help lead to a healthy, sustainable estuarine and watershed ecosystem. The components in the preferred plan include construction of reservoirs and stormwater treatment areas, and rehydration of impacted agricultural lands. These components will attenuate and treat the high freshwater flows to the St. Lucie Estuary. In addition, the preferred plan has proposed muck management, artificial habitats, and floodplain restoration in the north fork of the St. Lucie Estuary.

PRD has reviewed the construction features of the various components of the preferred plan, including: C-44 West Reservoir and Stormwater Treatment Areas, C-44 East Stormwater Treatment Area, Palmar Complex - Natural Storage and Treatment Area, C-23 North Reservoir, C-23 South Reservoir, C-23/C-24 Stormwater Treatment Area, Allapattah Complex - Natural Storage and Treatment Area, Cypress Creek Complex - Natural Storage and Treatment Area, C-23/C-44 Stormwater Treatment Area and Diversion Canal, C-25 Reservoir and Stormwater Treatment Area, Muck Remediation and Artificial Habitat (Creation), and North Fork Floodplain Restoration. The planned removal of approximately 5.5 million cubic yards of fine-grained

material ("muck") from the bottom of the St. Lucie River will create an additional 2,650 acres of substrate suitable for colonization by benthic organisms. In addition, six sites in the middle estuary, each approximately 15 acres in area, have been identified for creation of oyster habitat. Oysters are a desirable species because they are excellent at filtering fine sediments and nutrients in the water column. A total of 90 acres of artificial habitat will be created: 60 acres of oyster shell hash, 24 acres of prefabricated reef balls, and 6 acres of artificial submerged aquatic vegetation.

Sea turtles and Johnson's seagrass may occur within the Indian River Lagoon system. PRD concurs with the Corps' determination that implementation of the preferred plan will not adversely affect listed species nor designated critical habitat under NMFS' purview. PRD believes that implementation of the plan will lead to improvement of foraging and developmental habitat for federally listed species and candidate species under NMFS' purview by reducing the loads of nutrients, pesticides, phosphorous levels, and other pollutants entering the Indian River Lagoon system. Improved water quality will benefit existing submerged aquatic vegetation within the Indian River Lagoon system, including Johnson's seagrass. PRD believes that neither of the methods being considered for remediating or removing the muck - capping or dredging - will adversely impact listed species under NMFS' purview, since dredge equipment will necessarily be limited (because of the shallowness of the site) to a non-hopper type dredge. Reservoirs are located in inland areas where no endangered species under NMFS' purview are present.

This concludes consultation responsibilities under section 7 of the ESA. Consultation should be reinitiated if there is a take, new information reveals impacts of the identified activity that may affect listed species or their critical habitat, a new species is listed, the identified activity is subsequently modified or critical habitat designated that may be affected by the identified activity.

Pursuant to the essential fish habitat consultation requirements of the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1855(b)(2) and 50 CFR 600.905-.930, Subpart K), the NMFS Habitat Conservation Division (HCD) is being copied with this letter. The HCD biologist for this region is Mike Johnson. If you have any questions about consultation regarding essential fish habitat for this project, please contact Mr. Johnson at (305)595-8352.

Please contact Mr. Eric Hawk at 727/570-5312 if you have any questions or if we may be of assistance.

Sincerely,

for, Joseph E. Powers, Ph.D.
Acting Regional Administrator

cc: F/SER43 - Mike Johnson

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File: 1514-22 f.1. FL
Ref: I/SER/2001/00697

# C-111 Spreader Canal

Stacie Auvenshine - NOAA Federal <stacie.auvenshine@noaa.gov>

# FW: C-111 Spreader Canal Western Project (UNCLASSIFIED)

1 message

**Tarr, Bradley A SAJ** <Bradley.A.Tarr@usace.army.mil> Mon, Dec 16, 2013 at 4:21 PM
To: Stacie Auvenshine - NOAA Federal <stacie.auvenshine@noaa.gov>
Cc: "Ralph, Gina P SAJ" <Gina.P.Ralph@usace.army.mil>

Classification: UNCLASSIFIED
Caveats: NONE

Stacie,

As stated in Section 7.2.2.4 of the CERP Programmatic BA, I originally (7 May 2009) stated that the C-111 SC project would have a may affect, not likely to adversely affect the smalltooth sawfish and the five sea turtles. My rationale was that we anticipated some potential benefits with improved estuarine conditions for the sawfish, and improved salinities in the nearshore that would benefit seagrasses, thus benefitting sea turtles. NMFS didn't feel that there would be any impact, therefore, suggesting a "no effect" determination which essentially, closed consultation. Below is the excerpt from the CERP BA; and below that is related correspondence with NMFS. Call me if you need more info.

Brad

"On 7 May 2009, the Corps requested concurrence with NMFS on its determination of may affect, but is not likely to adversely affect smalltooth sawfish and sea turtles. In addition, the Corps determined that the project would not modify critical habitat for elkhorn or staghorn coral. Critical habitat for the smalltooth sawfish had not been designated until after publication of the final PIR/EIS. After further discussion with NMFS, the Corps changed their determinations to no effect for each species and their designated critical habitat, and NMFS concurred by email on 6 August 2009.
Construction is complete for this project; therefore, re-initiation is not required."

----Original Message----
From: Shelley Norton [mailto:Shelley.Norton@noaa.gov]
Sent: Thursday, August 06, 2009 9:06 AM
To: Eric G. Hawk
Cc: Tarr, Bradley A SAJ
Subject: Re: C-111 Spreader Canal Western Project

Hi Bradley, I spoke with Alisa today. We discussed the potential routes of effects to our listed species and critical habitat. Alisa could not determine any and neither can I. Alisa changed the determinations to no effect. Let me know if you have any questions.

Shelley

Eric G. Hawk wrote:
> Hi Bradley,
> Shelley Norton was working with Alisa Zarbo on this, and sent out a
> technical assistance/request for additional information letter on it
> on August 4.

> Eric
>
> Tarr, Bradley A SAJ wrote:
>> Hello all,
>>
>> Can you guide me to the NMFS POC for the reference project? The Corps is
>> seeking a concurrence letter regarding the threatened and endangered
>> species
>> determinations outlined in the Biological Assessment which is
>> contained in
>> Annex A of the final EIS.
>>
>> Thank you very much,
>>
>> Brad Tarr
>> US Army Corps of Engineers
>> Environmental Branch, Planning Division
>> 701 San Marco Blvd.
>> Jacksonville, Florida 32232-0019
>> 904-232-3582
>>
>>

Classification: UNCLASSIFIED
Caveats: NONE

**Shelley_Norton.vcf**
1K

**Caloosahatchee – 43 West Basin Storage Reservoir**

**UNITED STATES DEPARTMENT OF COMMERCE**
**National Oceanic and Atmospheric Administration**
NATIONAL MARINE FISHERIES SERVICE

Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701
(727) 824-5317, FAX 824-5309
http://sero.nmfs.noaa.gov

MAR 28 2007

F/SER31:WW

Mr. David S. Hobbie
Jacksonville District Corps of Engineers
South Florida Restoration Program Office
1400 Centrepark, Suite 750
West Palm Beach, FL 33401

Re: SAJ-2005-5958 (IP-TKW)

Dear Mr. Hobbie:

This responds to your letter dated January 10, 2007, requesting section 7 consultation pursuant to the Endangered Species Act (ESA) for the subject Army Corps of Engineers (COE), permit application for the C-43 Basin Storage Reservoir Project (C-43 Project). You submitted a biological assessment and other supporting information prepared by Scheda Ecological Associates on behalf of the applicant, the South Florida Water Management District, along with your determinations that the project may affect but is not likely to adversely affect smalltooth sawfish and sea turtles, and requested our concurrence.

The C-43 Project is part of the Comprehensive Everglades Restoration Plan authorized by the Water Resources Development Act of 2000. The project is located in Hendry County, Florida, encompassing approximately 10,000 acres of low-lying uplands adjacent to the Caloosahatchee River. The purpose of the project is to capture excess storm water runoff and releases from Lake Okeechobee for later release into the Caloosahatchee River during times of need, preventing saltwater intrusion and providing water supplies during times of drought. The project would entail an above ground reservoir(s) with a total storage capacity of approximately 170,000 acre-feet within the Caloosahatchee Basin. Anticipated benefits of the C-43 Project include the attenuation of flood flows; improvement of water quality and timing of releases to the Caloosahatchee River and Estuary; protection of the Caloosahatchee Estuary from excessive fresh water deliveries; and improvement of water supply benefits for environmental, urban and agricultural users.

Five species of sea turtles (loggerhead, green, Kemp's ridley, hawksbill, and leatherback) and smalltooth sawfish, protected by the ESA under National Marine Fisheries Service (NMFS) purview can be found in or near the Caloosahatchee River and Estuary, may be affected by the project, and are included in this consultation.

Because of the project's inland location, NMFS believes there will be no direct effects to listed species. NMFS believes potential indirect effects of the action to sea turtles and sawfish are limited to saltwater regime changes that may alter the potential foraging and nursery habitat of smalltooth sawfish and foraging habitat for green sea turtles. Saltwater regime changes could alter survival and recruitment of seagrass beds and mangrove habitat. However, the project is intended to mediate current unnatural flows of freshwater and instead to replicate natural conditions in the Caloosahatchee Estuary resulting in preservation of aquatic flora and fawna in

its naturally occurring range. NMFS believes there will be no loss of habitat for these listed-species and the effects of the project will be beneficial to habitat utilized by protected species in the Caloosahatchee Estuary. Based on the above, NMFS concludes that the C-43 project may affect but is not likely to adversely affect sea turtles or smalltooth sawfish.

Changes to freshwater flows throughout the historic range of smalltooth sawfish, and in peninsular Florida in particular, may have affected how juvenile sawfish use nursery habitats. Little scientific research is available on the salinity preferences and tolerances of this species. This information needs to be collected and used to set appropriate freshwater flow regimes. NMFS is currently in the process of developing a Recovery Plan for smalltooth sawfish. Part of this plan will focus on the need to further research the role of salinity regimes in the lifecycle of smalltooth sawfish. While the C-43 Reservoir Project should be beneficial to smalltooth sawfish by simulating natural freshwater flows to the estuary, NMFS recommends the project should also allow for increased cooperation between the SFWMD, NMFS and smalltooth sawfish-associated research institutions in further defining the salinity requirements required by this species and allow the project, once implemented, to be operated in a manner consistent with its needs.

This concludes your consultation responsibilities under the ESA for species under NMFS' purview. Consultation must be reinitiated if a take occurs or new information reveals effects of the action not previously considered, or the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat in a manner or to an extent not previously considered, or if a new species is listed or critical habitat designated that may be affected by the identified action. We have enclosed additional information on other statutory requirements that may apply to this action, as well as NMFS' Public Consultation Tracking System to allow you to track the status of ESA consultations. The COE's user identification name and password for querying PCTS are: pctscoe and pcts22nmfs, respectively.

If you have any questions, please contact Walt Wilson at (727) 824-5312 or by e-mail at walt.wilson@noaa.gov.

Sincerely,

Roy E. Crabtree, Ph.D.
Regional Administrator

Enclosure

File: 1514-22.f.1.FL
Ref: I/SER/2007/00096

**Additional Considerations for ESA Section 7 Consultations (Revised 12-6-2005)**

Marine Mammal Protection Act (MMPA) Recommendations: The Endangered Species Act (ESA) section 7 process does not authorize incidental takes of listed or non-listed marine mammals. If such takes may occur an incidental take authorization under MMPA section 101 (a)(5) is necessary. Contact Ken Hollingshead of our NMFS Headquarters' Protected Resources staff at (301) 713-2323 for more information on MMPA permitting procedures.

Essential Fish Habitat (EFH) Recommendations: In addition to its protected species/critical habitat consultation requirements with NMFS' Protected Resources Division (PRD) pursuant to section 7 of the ESA, prior to proceeding with the proposed action the action agency must also consult with NMFS' Habitat Conservation Division (HCD) pursuant to the Magnuson-Stevens Fishery Conservation and Management Act's (MSA) requirements for essential fish habitat (EFH) consultation (16 U.S.C. 1855 (b)(2) and 50 CFR 600.905-.930, subpart K). The action agency should also ensure that the applicant understands the ESA and EFH processes; that ESA and EFH consultations are separate, distinct, and guided by different statutes, goals, and time lines for responding to the action agency; and that the action agency will (and the applicant may) receive separate consultation correspondence on NMFS letterhead from HCD regarding their concerns and/or finalizing EFH consultation.

Public Consultation Tracking System (PCTS) Guidance: PCTS is an online query system allowing federal agencies and U.S. Army Corps of Engineers' (COE) permit applicants to track the status of NMFS consultations under ESA section 7 and under MSA sections 305(b)2 and 305(b)(4): Essential Fish Habitat. Access PCTS via: www.nmfs.noaa.gov/pcts. Federal agencies are required to enter an agency-specific username and password to query the Federal Agency Site. The Corps Permit Site allows COE permit applicants the ability to check on the current status of Clean Water Act section 404 permit actions for which NMFS has conducted an ESA section 7 consultation with the COE since the beginning of the 2001 fiscal year (no password needed).

For COE-permitted projects, click on "Enter Corps Permit Site." From the "Choose Agency Subdivision (Required)" list, pick the appropriate COE district. At "Enter Agency Permit Number" type in the COE district identifier, hyphen, year, hyphen, number. The COE is in the processing of converting its permit application database to PCTS-compatible "ORM." An example permit number is: SAJ-2005-000001234-IPS-1. For the Jacksonville District, which has already converted to ORM, permit application numbers should be entered as SAJ (hyphen), followed by 4-digit year (hyphen), followed by permit application numeric identifier with no preceding zeros. E.g., SAJ-2005-123, SAJ-2005-1234, SAJ-2005-12345.

For inquiries regarding applications processed by Corps districts that have not yet made the conversion to ORM (e.g., Mobile District), enter the 9-digit numeric identifier, or convert the existing COE-assigned application number to 9 numeric digits by deleting all letters, hyphens, and commas; converting the year to 4-digit format (e.g., -04 to 2004); and adding additional zeros in front of the numeric identifier to make a total of 9 numeric digits. E.g., AL05-982-F converts to 200500982; MS05-04401-A converts to 200504401. PCTS questions should be directed to Eric Hawk at Eric.Hawk@noaa.gov. Requests for username and password should be directed to April Wolstencroft (PCTSUsersupport@noaa.gov).

## Thompson, Amy D SAJ

**From:** Mark Sramek - NOAA Federal [mark.sramek@noaa.gov]
**Sent:** Thursday, September 26, 2013 10:26 AM
**To:** Thompson, Amy D SAJ
**Cc:** David Dale - NOAA Federal; Shelley Norton - NOAA Federal; Auvenshine, Stacie SAJ
**Subject:** Re: [EXTERNAL] Re: FW: Picayune Strand Restoration Project Manatee Mitigation Feature Location
**Attachments:** Manatee_Option_2.jpg

**Follow Up Flag:** Follow up
**Flag Status:** Flagged

**Categories:** Red Category

Hi Amy,

Thank you for your email and the attached map you created overlaying the Picayune Strand Restoration Project (a component of the the Comprehensive Everglades Restoration Project) Manatee Mitigation Feature (MMF) onto the available online EFH mapper. Portions of the proposed project would be constructed in mangrove wetlands, identified by the Gulf of Mexico Fishery Management Council as essential fish habitat (EFH) for postlarval, juvenile and subadult shrimp; postlarval, juvenile and adult red drum; postlarval, juvenile and adult gray snapper; juvenile red and gag groupers; and juvenile and adult yellowtail and lane snappers. The area has also been designated as EFH by NMFS for highly migratory species including bull, lemon, and bonnethead sharks.

I agree the graphic designation using the EFH Mapper Tool seems inconsistent with the existing landscape adjacent to the Faka Union Canal as shown on the map provided. That said, in reviewing the project area on Google Earth, it appears a majority of the Feature's western limit would occur in mangrove wetlands; so, your estimate of one acre of EFH impacts may be inaccurate, depending on current onsite conditions.

Has a site meeting been conducted (or planned) for this restoration project, or a field assessment report available describing the wetland types and conditions of the site?

Thanks for your efforts, and please keep me apprised of project activities.
Mark S.
727-824-5311

---------- Forwarded message ----------
From: Thompson, Amy D SAJ <Amy.D.Thompson@usace.army.mil>
Date: Tue, Sep 17, 2013 at 3:07 PM
Subject: RE: [EXTERNAL] Re: FW: Picayune Strand Restoration Project Manatee Mitigation Feature Location
To: Mark Sramek - NOAA Federal <mark.sramek@noaa.gov>

Hi Mark,

I have put together a map with the proposed footprint of the manatee feature and the areas of EFH that would be affected. The entire footprint is 10 acres, and the EFH area impacted shown on this map is 1 acre. I was surprised to see that EFH extended through the Faka Union Spoil berm and to the Northeast. I did not count the berm in my calculation of EFH impacts. Let me know you thoughts on the assessment attached.

Thanks,

Amy

-----Original Message-----
From: Mark Sramek - NOAA Federal [mailto:mark.sramek@noaa.gov]
Sent: Monday, September 16, 2013 3:04 PM
To: Thompson, Amy D SAJ
Subject: Re: [EXTERNAL] Re: FW: Picayune Strand Restoration Project Manatee Mitigation Feature Location

Hi Amy,

Thanks for the update; please see:
http://www.habitat.noaa.gov/protection/efh/efhmapper/

Please feel free to contact me if you have any questions with regard to use of the mapper or categories at the project site. Feel free to contact me at the number below if you'd prefer to call.

I look forward to working with you on this project.

Mark
727-824-5311

On Mon, Sep 16, 2013 at 9:47 AM, Thompson, Amy D SAJ <Amy.D.Thompson@usace.army.mil> wrote:
> Hi Mark,
>
> The discussion went well. We will have a follow meeting when the design footprint is more refined. Do you have a shapefile that shows EFH in the southwest Florida? I looked on the NMFS website but didn't have any luck locating.
>
> Thanks,
>
> Amy
>
> -----Original Message-----
> From: Mark Sramek - NOAA Federal [mailto:mark.sramek@noaa.gov]
> Sent: Tuesday, September 10, 2013 4:42 PM
> To: Thompson, Amy D SAJ
> Cc: Kay Davy - NOAA Federal; Shelley Norton - NOAA Federal; Tarr, Bradley A SAJ
> Subject: Re: [EXTERNAL] Re: FW: Picayune Strand Restoration Project Manatee Mitigation Feature Location
>
> Hi Amy,
>
> I apologize for missing the call as I was in a meeting with USACE
> Tampa Section and Hillsborough County staffs which ran late; I then

> met with Tampa Section staff regarding a local project.
>
> If there are any notes, action items, or a timeline as the result of
> today's call, please let me know and I will continue to be engaged in
> this activity.
>
> Thank you for your efforts,
> Mark S.
> 727-824-5311
>
> On Tue, Sep 10, 2013 at 1:15 PM, Thompson, Amy D SAJ
> <Amy.D.Thompson@usace.army.mil> wrote:
>> Are you all planning to call in the meeting today at 1:15?
>>
>> -----Original Message-----
>> From: Kay Davy - NOAA Federal [mailto:kay.davy@noaa.gov]
>> Sent: Thursday, September 05, 2013 4:09 PM
>> To: Livergood, Audra
>> Cc: Thompson, Amy D SAJ; Shelley Norton - NOAA Federal; Tarr, Bradley A SAJ; Mark Sramek -
NOAA Federal
>> Subject: Re: [EXTERNAL] Re: FW: Picayune Strand Restoration Project Manatee Mitigation
Feature Location
>>
>> yes...she will have email access tomorrow and I will provide her address then
>>
>> Kay
>>
>>
>> On Thu, Sep 5, 2013 at 4:03 PM, Audra Livergood - NOAA Federal <audra.livergood@noaa.gov>
wrote:
>>
>>
>>         Hi Amy et al.,
>>
>>
>>         Until recently, Kay Davy was the NMFS Protected Resources Division point of
contact for CERP.  However, our office recently hired a contractor, and Kay is in the process
of transferring all of the CERP files to the contractor.
>>
>>
>>         Since we have a designated person to work on CERP, I do not plan to participate.
>>
>>
>>         Kay, when you have a chance, can you please provide Stacy's contact info to Amy
Thompson?
>>
>>         Thank you,
>>         Audra
>>
>>
>>
>>         On Thu, Sep 5, 2013 at 8:34 AM, Thompson, Amy D SAJ
<Amy.D.Thompson@usace.army.mil> wrote:
>>
>>
>>                 Hi Shelley,
>>

>> The shapefiles are attached. Let me know if these work. Are you available to discuss early next week?
>>
>>
>> Thanks,
>>
>> Amy
>>
>> -----Original Message-----
>> From: Shelley Norton - NOAA Federal [mailto:shelley.norton@noaa.gov]
>>
>> Sent: Tuesday, September 03, 2013 4:00 PM
>> To: Thompson, Amy D SAJ
>>
>> Cc: Tarr, Bradley A SAJ; Livergood, Audra; Mark Sramek - NOAA Federal
>> Subject: Re: [EXTERNAL] Re: FW: Picayune Strand Restoration Project Manatee Mitigation Feature Location
>>
>> Hi Amy, do you have a shapefile of the project area? Since the project is located in smalltooth sawfish critical habitat we need to look at the effects of the project to the features (euryhaline waters less than 3 ft a MLLW and red mangroves). We also need to see if the project area is located near one of the nursery hotspots. You cannot mitigate for losses to critical habitat under the ESA. Mark Sramek is our Habitat Division contract for this area so I will include him on this email so he can address EFH issues. We can set up a conference call to discuss this further if that works for you.
>>
>> Thanks,
>> Shelley
>>
>>
>> On Tue, Sep 3, 2013 at 3:01 PM, Thompson, Amy D SAJ <Amy.D.Thompson@usace.army.mil> wrote:
>>
>>
>> Shelley,
>>
>> It is not included in the review submitted by Brad since it is a new feature that was not designed yet when Brad submitted the BA; however, this feature is part of CERP and would have been included if design was complete. We are looking for NMFS thoughts on whether the placement of the feature in the mangroves would be permitted and if so what conditions/mitigation would be needed so we can select the most efficient design.
>>
>> Thanks,
>>
>> Amy
>>
>> -----Original Message-----
>> From: Shelley Norton - NOAA Federal [mailto:shelley.norton@noaa.gov]
>> Sent: Tuesday, September 03, 2013 2:57 PM
>> To: Thompson, Amy D SAJ; Tarr, Bradley A SAJ; Livergood, Audra
>> Subject: [EXTERNAL] Re: FW: Picayune Strand Restoration Project Manatee Mitigation Feature Location
>>
>> Hi Amy, I know that Audra Livergood Davy is working with Brad Tarr on a comprehensive consultation on Everglades Restoration Projects. Do you know if this project is included in the review or not? I will include Brad on this email too.

>>
>> Thanks,
>> Shelley
>>
>>
>> On Tue, Sep 3, 2013 at 2:41 PM, Thompson, Amy D SAJ
<Amy.D.Thompson@usace.army.mil> wrote:
>>
>>
>> Good Afternoon,
>>
>> The Picayune Strand Restoration Project, part of the Comprehensive Everglades Restoration Project, is investigating locations for implementation of a manatee mitigation feature at Port of the Islands along US-41 south of Picayune Strand in Collier County, Florida. The feature would consist of a deep oxbow connected to the Faka Union Canal. We previously contacted you with regard to the possibility of placing this feature in mangroves adjacent to the Faka Union Canal spoil berm. The current draft options are attached. We would like to discuss this feature and potential effects to T&E species and EFH before we determine the final footprint for the feature. We are available to discuss at your convenience.
>>
>> Thanks,
>>
>> Amy Thompson
>>
>> -----Original Message-----
>> From: Audra Livergood - NOAA Federal
[mailto:audra.livergood@noaa.gov]
>> Sent: Tuesday, July 30, 2013 4:08 PM
>> To: Thompson, Amy D SAJ
>> Cc: Kim Dryden
>> Subject: Re: Picayune Strand Restoration Project Manatee
Mitigation Feature Location
>>
>> Good afternoon Amy and Kim,
>>
>> I will forward your request to Cathy Tortorici (my supervisor) and Shelley Norton (our Smalltooth Sawfish Coordinator) who are both based in St. Pete. Perhaps they can provide technical assistance.
>>
>> Thank you,
>> Audra
>>
>>
>> On Fri, Jul 26, 2013 at 9:39 AM, Thompson, Amy D SAJ
<Amy.D.Thompson@usace.army.mil> wrote:
>>
>>
>> Good Morning Audra,
>>
>> The Picayune Strand Restoration Project is exploring options and locations to implement a manatee mitigation feature at the Port of the Islands, near Naples, Florida. The team is exploring the option of creating a deep water oxbow partially in mangrove habitat which is considered EFH and Smalltooth sawfish Critical Habitat. This mangrove is in an area that was historically freshwater/brackish marsh. Before we move forward with design and surveys we would like to meet with NMFS to discuss the

proposed footprint and your thoughts on the impacts/feasibility. This feature is not included in the original NMFS consultation or in the recent CERP programmatic BA.
>>
>> I am tentatively proposing to meet the week of August 5. Let me know your thoughts and if you may be available. I would like to do this in person if possible.
>>
>> Thank you,
>>
>> Amy Thompson
>> Biologist
>> US Army Corps of Engineers
>> 904-232-1545
>> Fax: 904-232-3442
>>
>>
>>
>>
>>
>>
>> --
>> Audra Livergood
>> Marine Resource Manager
>> NOAA National Marine Fisheries Service
>> SERO Protected Resources Division
>> Fort Lauderdale Field Office
>>
>>
>> For if one link in nature's chain might be lost, another might be lost, until the whole of things will vanish by piecemeal. Thomas Jefferson
>>
>>
>>
>>
>>
>>
>> --
>>
>>
>> Shelley Norton
>> Sawfish and Johnson's Seagrass Coordinator
>> National Marine Fisheries Service
>> NOAA Southeast Regional Office
>> Protected Resources Division
>> 263 13th Avenue South
>> St. Petersburg, Florida 33701
>>
>> PH: (727) 551-5781 <tel:%28727%29%20551-5781>
<tel:%28727%29%20551-5781>
>> FX: (727) 824-5309 <tel:%28727%29%20824-5309>
<tel:%28727%29%20824-5309>
>>
>> Email: shelley.norton@noaa.gov
<mailto:%20shelley.norton@noaa.gov>
>> Web: http://sero.nmfs.noaa.gov/pr/pr.htm
<http://sero.nmfs.noaa.gov/pr/pr.htm%20>
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>>
>>  Shelley Norton
>>  Sawfish and Johnson's Seagrass Coordinator
>>  National Marine Fisheries Service
>>  NOAA Southeast Regional Office
>>  Protected Resources Division
>>  263 13th Avenue South
>>  St. Petersburg, Florida 33701
>>  PH:  (727) 551-5781 <tel:%28727%29%20551-5781>
>>  FX:   (727) 824-5309 <tel:%28727%29%20824-5309>
>>  Email:  shelley.norton@noaa.gov <mailto:%20shelley.norton@noaa.gov>
>>  Web:   http://sero.nmfs.noaa.gov/pr/pr.htm
<http://sero.nmfs.noaa.gov/pr/pr.htm%20>
>>
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>>  --
>>
>>  Audra Livergood
>>  Marine Resource Manager
>>  NOAA National Marine Fisheries Service
>>  SERO Protected Resources Division
>>  Fort Lauderdale Field Office
>>
>>
>>  With people it is impossible, but not with God; for all things are possible with
God.
>>
>>  Jesus Christ
>>
>>
>>
>>
>>
>> --
>>
>> Kay Davy
>> Protected Resources Division
>> National Marine Fisheries Service
>> National Oceanic and Atmospheric Administration (NOAA)
>> Office: 727-415-9271

Tab D

# APPENDIX D

# MANATEE MONITORING PLAN

Appendix D
Picayune Strand Restoration Project
Draft Manatee Monitoring Plan

Evaluation of Effects of Backfilling Merritt Canal on Flows to Port Of the Islands BASIN

When the north-south portion of Merritt Canal is plugged, the east-west portion of the canal at the southern end of the Picayune Strand Restoration Project (PSRP) will remain open and continue to capture flows moving to the south. Thus, the current level of flow into the Port of the Islands (POI) Basin should remain essentially the same after the north-south section of Merritt Canal down to 126th Avenue is plugged. However, monitoring will be conducted to ensure that plugging the Merritt Canal does not cause significant changes to the conditions in the POI Basin.

The South Florida Water Management District (SFWMD) currently monitors flows over Faka Union Weir #1 and three rainfall stations; SGGEWX (NW), Collier Seminole State Park (SW) and Dan House Prairie (SE), within or near the PSRP. The data are stored within SFWMD's DBHydro database. An equation developed by the United States Geological Survey (USGS) uses these four datasets to correlate canal flows from the lower Faka Union Canal into POI Basin with rainfall within the upstream watershed.

The USGS equation described above will be used to assess whether the monthly flow-rainfall relationship has been significantly altered by filling the north-south portion of Merritt Canal. This relationship will be evaluated for one winter season (December 1 to April 1) following the start of Merritt Canal plugging. If canal plugging begins between December 1 and April 1, monitoring will occur through April 1 of that dry season and be repeated the next winter season from December 1 through April 1. If canal plugging begins between April 1 and November 30, monitoring will occur during the next winter season from December 1 through April 1. The actual plugging of the canals will take approximately three to four months. If no significant changes to flows are observed, the evaluations will be discontinued after one full winter season (December 1 to April 1); however, if a significant change is observed using the equation developed by USGS, as a function of plugging Merritt Canal, the U.S. Army Corps of Engineers (Corps) and SFWMD will consult with U.S. Fish and Wildlife Service (USFWS) and Florida Fish and Wildlife Conservation Commission (FWC) to determine if any additional action(s) are needed or required. Information will be analyzed and reported on a monthly basis.

Additionally, the "Guidelines for Manatee Conservation During Comprehensive Everglades Restoration Plan Implementation" (CERP Interagency Manatee Task Force 2006) and the Standard Manatee Construction Guidelines will be implemented for all construction phases while working in canals accessible to manatees.

Post-construction Manatee Monitoring

Post-construction manatee monitoring for the PSRP will begin with the plugging of all canals within the project. The Faka Union Canal conveys the largest amount of water to POI Basin; therefore, plugging the Faka Union Canal will likely alter freshwater flows into POI Basin more

significantly than plugging of the Merritt or Miller canals. Therefore, if the Faka Union Canal is plugged prior to the Miller Canal, post-construction monitoring will begin following the construction of the first Faka Union Canal plug. As freshwater flows into POI Basin are reduced, the manatee refugium at POI Basin will likely be altered.

The Faka Union and Miller Canals will not be plugged until the Endangered Species Act (ESA) consultation on the West Indian Manatee is complete and a manatee mitigation feature has been implemented in the POI Basin to compensate for the reduction in freshwater flows into POI Basin. The project is phased so that each pump station will begin operations when complete, with the Miller pump station completed last. When all pump stations are completed, the manatee mitigation feature and western protection features are functional, and all canals are plugged, the project can begin to achieve estuarine benefits. One goal of PSRP was to redistribute freshwater flows to the estuaries and reduce the point discharge from the Faka Union Canal. It is this point source discharge from the Faka Union Canal that is responsible for the current manatee refugium within the POI Basin. As a result of restoration, this artificial refugium will be altered, thus the need for the manatee mitigation feature. As natural freshwater flows are reestablished in the estuaries south of Picayune Strand, it is anticipated that manatees will begin to utilize these natural areas once again. The PSRP acknowledges that manatees have become reliant upon the POI Basin refugium; therefore monitoring will be conducted in the POI Basin beginning the first winter season from December 1 through April 1 as identified in Table D-1. Manatee observations as described in Table D-1 will be conducted by a qualified marine species observer as outlined within the 2006 Guidelines for Manatee Conservation during Comprehensive Everglades Restoration Plan Implementation (CERP Interagency Task Force 2006). Post-construction seagrass surveys are included in the overall PSRP Monitoring Plan and will be included in results of manatee monitoring.

Table D-1: Proposed Picayune Strand Restoration Project Manatee Monitoring Plan

| FEATURE | OBJECTIVE | TASK | DURATION | TARGET |
|---|---|---|---|---|
| Merritt Canal (begin monitoring with construction of first plug) | | | | |
| Begin evaluating flows at Faka Union-1 (FU-1) and rainfall after the start of Merritt canal plugging. | Determine if significant changes occur to flows at FU-1 at times when rainfall would historically maintain the manatee refugium at POI. | Evaluate stage and rainfall at FU-1 using DBHydro and rainfall (SGGEWX [NW]; Collier Seminole State Park [SW] and Dan House Prairie [SE]) monthly using equation developed by USGS (Sloan et al., 2013) to determine if significant changes occur.<br><br>Assumption: Headwater stages above 2.34 feet NAVD88 at FU-1 would result in halocline formation and resultant thermal refuge. | If the canal plugging begins between December 1 and April 1, monitoring will occur through April 1 of that winter season and be repeated the next winter season from December 1 through April 1.<br><br>OR<br><br>If canal plugging begins between April 1 and November 30, monitoring will be conducted for one full winter season from December 1 through April 1. | Maintain stage/rainfall correlation within 95% confidence limits of prediction based on 7 years of winter rainfall data for first full winter season following canal plugging. If stage/rainfall correlations met after one year (December 1-April 1 time period), determine no effect.<br><br>If stage/rainfall correlations not met after one year, identify if rainfall patterns were outside of original model period of record (2003-2004 to 2009-2010). If yes, repeat analysis for one more year. If no, initiate consultation with FWS/FWC on manatee effects due to Merritt and potential additional effects from Miller and Faka Union canal plugging. |
| Post-Construction Monitoring (all canals plugged – Prairie, Merritt, Miller, Faka Union) | | | | |

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| FEATURE | OBJECTIVE | TASK | DURATION | TARGET |
|---|---|---|---|---|
| If construction of the manatee mitigation feature is completed between April 1 through November 30 monitoring will start the following December 1.<br><br>OR<br><br>If construction of the manatee mitigation feature is completed from December 1 through April 1 monitoring will start immediately through April 1 and restart the next winter season (December 1 to April 1). | Determine success of the manatee mitigation feature following the completion of the PSRP at times when rainfall would historically maintain the manatee refugium at POI. | 1. Monitoring of vertical temperature strata using data loggers. Vertical temperature strata to include bottom, middle, and upper depths. These depths will be determined during mitigation feature design. At least one temperature logger would be telemetry-based for real time transmission of data to determine cold events.<br><br>2. Isotope analysis – collect water isotopes to determine 18O/16O and 2H/1H ratios. Monthly (December 1 to April 1) The bottom depth would be determined during mitigation feature design. | 1. Collect and evaluate temperature data monthly during winter season (15 to 30 minute intervals with data loggers) collected and evaluated monthly from December 1 to April 1. Monitor for 3 years then re-evaluate in consultation with USFWS and FWC using decision matrix with options to continue or discontinue monitoring. Isotope data would be collected monthly (December 1 to April 1) and during moderate to severe cold weather events.<br><br>2. First test performed immediately following completion of construction of the manatee mitigation feature (construction | 1. Maintain vertical temperature strata with bottom layer at least 20°C during moderate to severe cold weather events at times when rainfall would historically maintain the manatee refugium at POI.<br><br>2. Confirm presence of groundwater isotopes and trend in bottom layer.<br><br>Moderate to severe weather events occurred:<br>a) If groundwater isotopes are confirmed within mitigation refugium area and bottom temperatures remain at or above 20 degrees Celsius during moderate to severe cold weather events for 3 full winter seasons - monitoring will be discontinued.<br>b) If isotopes are confirmed but temperature threshold is exceeded, monitor for additional 3 years and reevaluate.<br>c) If isotopes are not confirmed, evaluate rainfall/stage equation to determine if halocline |



510

| FEATURE | OBJECTIVE | TASK | DURATION | TARGET |
|---|---|---|---|---|
| | | | contract). Duration: Monthly (December 1 to April 1) for 3 years at the beginning of winter season. Re-evaluate after 3 years in consultation with USFWS and FWC. | formation would have likely formed. If no, continue monitoring for additional 3 years. If yes, initiate consultation with USFWS and FWC on potential manatee effects.<br>d) If no moderate to severe whether events occur, continue monitoring for 3 more years. |
| Manatee Observations | Determine if manatees are using the manatee mitigation feature. | Manatee use*:<br>1. Manatee mitigation feature and;<br><br>2. POI Basin<br><br>* Manatee Observation protocol will be developed in conjunction with USFWS and FWC. | Winter season for up to 10 years following completion of the manatee mitigation feature within:<br><br>1. Manatee mitigation feature area beginning the next day following a cold event (water temperature below 20°C) for 2 days. Based upon information provided from data loggers described in post-construction monitoring. | Determine presence and number of manatees within:<br><br>1. Manatee mitigation feature<br>Confirm presence of manatees within the feature for 3 cold weather events (2 moderate and 1 severe during the period between December 1 to April 1).<br><br>2. POI Basin<br>Confirm presence of manatees within the POI Basin for 3 cold weather events (2 moderate and 1 severe) during the period between December 1 to April 1.<br>Discontinue task if target (letter a below) reached. |



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| FEATURE | OBJECTIVE | TASK | DURATION | TARGET |
|---|---|---|---|---|
| | | | 2. POI Basin area for 2 days beginning the next day following a cold event (water temperature below 20°C) **and** when FU-1 stage is below 2.34 feet NAVD88.<br><br>The PSRP Monitoring and Assessment Group (MAG) will meet annually to assess monitoring data. After three cold events (two moderate and one severe), the PSRP MAG will reassess need for further manatee observation monitoring requirements. | a. If manatees are present in manatee mitigation feature during 3 cold events (1 moderate and 2 severe) and the feature is working (hydrology/temperature criteria), then reevaluate monitoring. *<br>b. If moderate to severe cold events occur and manatee mitigation feature is not working (hydrology/temperature criteria) and halocline would not have formed based on USGS equation analysis of rainfall and stage, then continue monitoring for additional 3 years.<br>c. If manatees are not present in manatee mitigation feature during cold events and mitigation feature is working (hydrology/temperature criteria), then coordinate with FWC/USFWS to evaluate potential manatee effects.<br>d. If manatees are not present in manatee mitigation feature during cold events and mitigation feature is not working (hydrology |

| FEATURE | OBJECTIVE | TASK | DURATION | TARGET |
|---|---|---|---|---|
| | | | | and temperature criteria), and halocline would have formed based on USGS equation analysis of rainfall and stage; then coordinate with FWC/USFWS. |

*A moderate cold event is described as ambient water temperatures fall below 20°C for a period of 14 days. A severe cold event is defined as ambient water temperatures (as indicated by monitoring well located at mouth of Faka Union Canal) fall below 20°C for 25 days or fall below 15°C for a period of 14 days.

The determination of whether an event is considered to be moderate or severe should be part of the annual assessment of a subgroup of the PSRP Monitoring and Assessment Group which consists of manatee experts, including biologists with the Service, FWC, and USGS. All determinations of defined events and management recommendations that result will be subsequently coordinated with the Service, FWC, Corps, and SFWMD.

Additional Monitoring:

The following monitoring data is included in this monitoring plan solely per request of FWC and USFWS. All data are collected and funded by FWC/USFWS and will be considered in determining manatee use in area. Any data that are available and determined to be of use by FWC/USFWS will be coordinated with the Corps/SFWMD.

1. Boat Strike Data: FWC and USFWS boat strike data may be used to assess post-construction manatee distribution changes in POI Basin area. Data will be provided to Corps and SFWMD for review, if available and produced by FWC/FWS. Data will be assessed until manatee mitigation feature success criteria are met.
2. Mortality/Morbidity Data: FWC/FWS data regarding manatee mortality and morbidity related to regional cold stress data may be used to assess post-construction cold stress effects on manatees in the POI Basin area. Data will be provided to Corps and SFWMD for review, if available and produced by FWC/FWS. Data will be assessed until manatee mitigation feature success criteria are met.

In addition to the monitoring listed above, the following list of estuarine water quality and hydrological monitoring stations as well as the project-specific hydrological monitoring stations located in the upper estuary are considered important to evaluating project effects on manatees and their critical habitat. Funding sources for these stations have varied and have included RECOVER, USGS, PES, and the SFWMD. If funding of these stations is proposed to be discontinued, the MAG will be notified and the effect that the loss of the stations would have on manatees and their critical habitat will be evaluated.

1. **POI Boat Basin** – floating salinity/temperature sensor, near bottom salinity/temperature sensor, and 8 sensor thermistor string – monitoring salinity stratification and temperature inversions (re-starting in November 2013; only winter months) – **Funded by PES**
2. **East River** – salinity, temperature, water level – **funded by RECOVER**; discharge (*re-starting in November 2014*) – **funded by PES**
3. **Faka Union Canal near the mouth** – salinity, temperature, water level, and discharge – **funded by RECOVER**
4. **Pumpkin River** – salinity, temperature, water level, and discharge – **funded by RECOVER**
5. **Blackwater River** – salinity, temperature, water level, and discharge – **funded by RECOVER**
6. **Palm River** – salinity, temperature, and water level – **funded by RECOVER**

Vertical Temperature Strata

Three vertical temperature strata will be continuously monitored, as defined in Table D-1, during the winter season from December 1 through April 1 for three full winter seasons following the beginning of plugging the Faka Union and Miller Canals to determine the temperature in the water column within the manatee mitigation feature. Vertical temperature strata will include bottom, middle, and upper depths. These depths will be determined during mitigation feature design. Prolonged water temperatures below 20 degrees Celsius can lead to cold stress syndrome in manatees (Bossart et al. 2003). The current refugium in the POI Basin functions as a temperature inverted thermocline/halocline; it is expected that the manatee mitigation feature will serve as a manatee refugium by establishing a connection with warmer saline groundwater. It is important to monitor the vertical temperature strata to determine whether the manatee mitigation feature serves as a refugium in light of the post-construction reduction in point source discharge of freshwater inflows to POI Basin.

Isotope Analysis

Isotope analyses will be conducted on the bottom water layer of the manatee mitigation feature monthly (December 1 to April 1) for three years to verify the presence of groundwater within the manatee mitigation feature. USGS conducted studies from 2009 to 2011 of the isotope signatures in the POI Basin and determined that there is currently no groundwater connection in the relatively shallow POI basin; furthermore, they identified the unique isotope signatures of groundwater, water from the Gulf of Mexico, and freshwater from the Faka Union canal. These data can be used to determine the presence or absence of a groundwater connection once the manatee mitigation feature is completed.

Evaluation of Boat Strike and Mortality/morbidity Data

Boat strike and mortality/morbidity data collected by the USFWS and FWC will be evaluated to observe patterns of changes in distribution and occurrence of cold stress in manatees within the POI basin. Collection of these data will not be funded by SFWMD or USACE; however, SFWMD and USACE biologists can utilize these already available data to help evaluate possible post-construction changes in manatee boat strikes and mortality/morbidity patterns.

Manatee Observations

Manatee observations will be performed within the POI Basin and manatee mitigation feature to determine if manatees are using the new refugium. Observations will be conducted once a day within the manatee mitigation feature the next day following a cold event where the ambient water temperature reaches 20°C or less for two days following the cold event. Observations will be conducted in the POI Basin under the same temperature condition and duration with the additional requirement that the stage at the FU-1 is less than 2.34 feet NAVD88 as determined critical by the USGS trigger analysis.

The definition of a moderate to severe cold event is based on a range of actual site conditions (Slone et. al in press) which may include: 1) a shorter time duration for moderate to severe cold events (7-25 days) based on intermittent but low temperatures, 2) a definition that is less than "consecutive" days, since temperatures may exceed the 20 degrees Centigrade for shorter periods of time but could be part of a severe prolonged condition that could lead to chronic cold stress (Mezich, pers. comm. September 24, 2014), and 3) multiple cold events in a single season that could be defined as resulting in a "severe" event.

Manatee observations as described in Table D-1 will be conducted by a qualified marine species observer as outlined within the 2006 Guidelines for Manatee Conservation during Comprehensive Everglades Restoration Plan Implementation (CERP Interagency Task Force 2006).

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Tab E

# APPENDIX E

# SUPPLEMENTAL BIOLOGICAL ASSESSMENT

ENDANGERED SPECIES ACT

SUPPLEMENTAL
BIOLOGICAL ASSESSMENT



PICAYUNE STRAND
RESTORATION PROJECT
SEPTEMBER 2014

U.S. Army Corps
of Engineers
Jacksonville District

# ENDANGERED SPECIES ACT
# SUPPLEMENTAL BIOLOGICAL ASSESSMENT

Picayune Strand Restoration Project

Prepared by
Department of the Army
U.S. Army Corps of Engineers, Jacksonville District

September 2014

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## 9.0 INTRODUCTION

The purpose of a Biological Assessment (BA) is to evaluate the potential effects of a federal action on both listed species and those proposed for listing, including designated and proposed critical habitat, and determine whether the continued existence of any such species or habitat are likely to be adversely affected by the federal action. The BA is also used in determining whether formal consultation or a conference is necessary [Federal Register 51 (USFWS, Biological Opinion for Picayune Strand Restoration Project 2009) (106): Section 402.1 (f), pg. 19960, 3 June 1986]. This is achieved by:

- **Reviewing the results of an on-site inspection of the area affected by the federal action to determine if listed or proposed species are present or occurs seasonally.**
- **Reviewing the views of recognized experts on the species at issue and relevant literature.**
- **Analyzing the effects of the federal action on species and habitat including consideration of cumulative effects, and the results of any related studies.**
- **Analyzing alternative actions considered by the federal agency for the proposed project.**

This document is the fourth supplement to the BA of the Central and Southern Florida Comprehensive Plan, Picayune Strand Restoration Project (PSRP), Final Project Implementation Report (PIR) and Environmental Impact Statement (EIS) dated September 2004. That BA, dated October 15, 2004, made determinations of effect for the following federally listed species: American crocodile (*Crocodylus acutus*) and its critical habitat, Kemp's ridley sea turtle (*Lepidochelys kempi*), Atlantic green sea turtle (*Chelonia mydas mydas*), red-cockaded woodpecker (*Picoides borealis*), Everglade snail kite (*Rostrhamus sociabilis plumbeus*) and its critical habitat, smalltooth sawfish (*Pristis pectinata*), eastern indigo snake (*Drymarchon corais couperi*), loggerhead sea turtle (*Caretta caretta*), and bald eagle (*Haliaeetus leucocephalus*). The 2004 BA also addressed candidate species, including the goliath grouper, (*Epinephelus itajara*), mangrove rivulus (*Rivulus marmoratus*), and sand tiger shark (*Odontaspis taurus*). The 2004 BA also identified and made a determination of effect for West Indian manatee critical habitat.

The 2004 BA determined that the project "may affect, but is not likely to adversely affect" red-cockaded woodpecker, bald eagle, Everglade snail kite, eastern indigo snake, and American crocodile. The 2004 BA further determined that the project "may affect, but is not likely to adversely affect" West Indian manatee critical habitat, and that the project will have "no effect" on Everglade snail kite critical habitat and American crocodile critical habitat. However, due to insufficient information on project design detail, project operations, and project hydrological models, the 2004 BA did not make a determination of effect for wood stork (*Mycteria americana*), Florida panther (*Puma concolor coryi*), and West Indian manatee (*Trichechus manatus*).

In 2004, the National Marine Fisheries Service (NMFS) concurred on determinations stated in 2004 PSRP Final PIR/EIS. Consultation with NMFS was reinitiated under a July 2, 2013 Comprehensive Everglades Restoration Program (CERP) Programmatic BA and addresses

potential impacts to smalltooth sawfish critical habitat. The addition of the manatee mitigation feature and potential loss of mangrove habitat is being coordinated with NMFS through an additional consultation process.

In November 2008, a third supplemental BA with additional information and analyses regarding the wood stork, Florida panther and West Indian manatee allowed determinations of effect to be made for these species. The 2008 supplemental BA determined that the project "may affect, but is not likely to adversely affect" wood stork and West Indian manatee. In the 2008 supplemental BA, the Corps determined that the project was "likely to temporarily adversely affect" Florida panther during the time that construction activities are occurring; however, no long term adverse effects are anticipated.

In a Biological Opinion (BO) dated March 2009, the USFWS concurred with the Corps' determination on the Florida panther and wood stork. Although the USFWS had previously concurred in 2004 that the PSRP "may affect, but was not likely to adversely affect" Eastern indigo snake, based on new information about this species and the risk that construction may pose, the USFWS and Corps agreed in 2008 to formally consult on this species. The USFWS determined that the PSRP, was "not likely to jeopardize" the continued existence of the Eastern indigo snake. The USFWS also concurred with the Corps "may affect, but not likely to adversely affect" determination for West Indian Manatee stating that if ongoing studies, project design or new information was presented that indicated a potential effect to manatee, consultation would be reinitiated. In 2009, the Corps contracted with the U.S. Geological Survey (USGS) to complete a baseline population study of manatees between 2009 and 2011 in order gather more information regarding manatee use of the Port of the Island (POI) Basin. In 2011, the USGS presented information indicating that the PSRP would have an adverse effect on the manatee population at the POI Basin when flows from the Faka Union canal are reduced through the restoration project (Stith, et al., 2011). As a result of the USGS study, the Corps, USFWS, Florida Fish and Wildlife Conservation Commission (FWC), USGS, South Florida Water Management District (SFWMD), Florida Department of Environmental Protection (FDEP), and the Florida Forest Service (FFS) formed a manatee mitigation sub-team with the purpose of formulating alternatives to explore solutions to prevent an adverse effect to manatees in the POI Basin. The manatee mitigation feature described in this BA best achieves the objectives of preventing adverse effects to manatees in the POI Basin and maintains the benefits of hydrologic restoration. This supplemental BA will address the effect of the construction of the manatee mitigation feature at the POI Basin. This BA will also address potential effects to the endangered Florida bonneted bat (*Eumops floridanus)* listed as of November 1, 2013 and the gopher tortoise (*Gopherus polyphemus*), a candidate species for listing.

## 10.0 CONSULTATION SUMMARY

### 10.1 PICAYUNE STRAND PROJECT IMPLEMENTATION REPORT

In October 2003, the USFWS completed consultation with the Corps on the Prairie Canal Early Start portion of the PSRP. The USFWS concurred with the Corps' determination that the backfill of the Prairie Canal on the eastern extent of the project "may affect, but would not likely adversely affect" the Florida Panther, wood stork, Everglades snail kite, manatee and manatee critical habitat, American crocodile, red-cockaded woodpecker, eastern indigo snake, and bald eagle. This project was permitted through a Corps Section 404 permit (SAJ 200308480 [IP-HWB]) and completed by the SFWMD.

During the initial planning phases of the 2004 PIR/EIS, the USFWS provided a Planning Aid Letter (PAL) dated October 27, 1999, that outlined project concerns including federally listed species. On October 17, 2001, the Corps provided an initial BA to the USFWS requesting formal consultation on the West Indian Manatee, red-cockaded woodpecker, Florida panther, wood stork, Everglade snail kite, and Eastern Indigo snake. The USFWS did not respond to this initial request for concurrence for the following reasons:

- several immediate changes in the project development schedule;
- lack of details provided with the identified selected plan;
- subsequent development of new alternatives;
- pending results of several iterations of the hydrological model; and
- a change in the hydrological model platform.

On August 5, 2004, the Corps met with the USFWS to address comments on listed species consistent with the July 13, 2004, PAL and the Department of the Interior (DOI) comments. On September 22, 2004, the USFWS provided a final Fish and Wildlife Coordination Act (FWCA) report recommending the 2004 PIR/EIS Alternative 3D as the preferred alternative. However, the Final Coordination Act Report (FCAR) stated that additional engineering, hydrologic, and biological information would be needed as refinement were made to the project and that an addendum to the FCAR would be provided as necessary. The Corps provided a BA, dated October 20, 2004, that requested initiation of consultation under the Endangered Species Act (ESA) on West Indian manatee, red-cockaded woodpecker, Florida panther, wood stork, Everglade snail kite, and Eastern indigo snake.

On October 24, 2004, a BO was issued for the PSRP in which a "no effect" concurrence was made for Everglades snail kite critical habitat and American crocodile critical habitat, and "may affect, not likely to adversely affect" the Everglades snail kite, American crocodile, red-cockaded woodpecker, bald eagle, eastern indigo snake, and West Indian manatee critical habitat. The Corps determined in this BA that it did not have sufficient information to reach an effect determination for the wood stork, Florida panther, and West Indian manatee.

On March 13, 2014, a revised draft BA was provided to the USFWS. Based on that assessment, previous project commitments, and conservation measures provided in the BA, the Corps determined that the project would have "no effect" on the Florida panther, Florida bonneted bat, Everglade snail kite, wood stork, red-cockaded woodpecker and American crocodile and its critical habitat; and "may affect, but is not likely to adversely affect" the West Indian manatee and its critical habitat, the eastern indigo snake and gopher tortoise. USFWS suggested that additional analysis would support a "may affect, but not likely to adversely affect" determination for the Florida panther, the American crocodile and its critical habitat and the bonneted bat. However, additional information would be required to complete analysis of the West Indian manatee and West Indian manatee critical habitat potentially affected by the project. The additional information and project commitments that were requested included:

1) Consensus on the "Manatee Refugium Success Criteria" with assistance from the Florida Fish and Wildlife Conservation Commission (FWC) and USGS;
2) A detailed design of the refugium based on recent geotech work by the SFWMD;
3) Consensus on a modified Manatee Monitoring Plan.

Subsequently, on August 20, 2014, a multi-agency meeting was held at the USFWS office in Vero Beach to establish consensus on the requested information; which has been incorporated in this document.

## 10.2 MANATEE MITIGATION CONSULTATION SUMMARY

In October 2001, the Corps provided the initial BA that requested initiation of consultation under the ESA on the West Indian manatee and its critical habitat. In the 2001 BA the Corps determined that the project "may affect, but would not likely adversely affect" manatee. However, as stated in Section 2.1 above, the USFWS did not complete consultation at the time.

In August 2004, the USFWS requested additional information concerning the manatee, including project effects on its warm water refugee and critical habitat. The USFWS and USGS provided the Corps with updated information on the status of the southwest Florida regional population of the manatee and USGS manatee studies conducted in the project vicinity.

On October 8, 2004, the USFWS commented on effects to listed species related to the removal and replacement of the Faka Union Weir Number 4 in the Faka Union Canal north of the PSRP. The purpose of the project was to increase groundwater recharge in Northern Golden Gate Estates (NGGE), including an analysis of improved flood protection in NGGE and the regulation of freshwater discharges to PSRP through Faka Union Canal. Based on a meeting on September 23, 2004, the USFWS concurred with a series of permit conditions including the intent to install additional monitoring wells in NGGE to monitor drainage of wetlands; provide additional information on water use allocations from Faka Union Canal and to modify the Big Cypress Basin (BCB) Operations Plan. The intent of the issued permit conditions was to raise wet and dry season water levels consistent with protection of surface water wetlands and groundwater in NGGE. The agreement also intended to maximize the restoration benefits to PSRP and its receiving estuaries by managing the volume flow and seasonal availability of water, and avoiding or minimizing effects to listed species associated with wetland hydroperiod and groundwater management.

On October 22, 2004, the USFWS provided a final Fish and Wildlife Coordination Act (FWCA) Report to the Corps, noting additional information needs including: (1) an accurate description of the anticipated hydrology and its effects on surrounding public lands and federally-threatened and endangered species; (2) a plan for protecting wetlands in the upper project watershed and explaining how project operations would affect flooding concerns, particularly in NGGE; (3) a completed Project Operations Manual; (4) a completed Water Quality and Ecological Monitoring Plan; (5) completion of consultation on threatened and endangered species; and (6) analysis of Off-Road Vehicle (ORV) use if proposed on the project site. The USFWS noted the concurrence of the Florida Fish and Wildlife Conservation Commission (FWC) with the USFWS position on project concerns and a lack of response or concurrence by the National Oceanic and Atmosphere Administration, National Marine Fisheries Service (NMFS).

On October 20, 2004, the Corps provided a second more extensive BA. In that BA, the Corps determined that the project "may affect, but is not likely to adversely affect" West Indian Manatee critical habitat. The Corps determined that they did not have sufficient information to reach an effect determination for the manatee. The USFWS concluded in the BO that monitoring project effects to manatee behavior was necessary to determine effects and potential incidental

take of the manatee population. The BO also stated that funding for pre-construction monitoring for the manatee would become available following project authorization.

Between 2004 and 2006 multiple meetings were held to discuss the design of the PSRP, the operating plan, and the effects of other projects that affect project water delivery to PSRP. Discussions concerning the potential effects of the PSRP on the West Indian manatee also occurred during this period.

In 2006, the USFWS provided comments on the PSRP road removal permit which included project commitments to reduce effects on the manatee and other listed species, including: 1) completion of the committed funding for the project baseline monitoring plan, 2) initiation of an Assessment and Adaptive Management (AAM, now Monitoring and Assessment Group [MAG]), 3) contaminant remediation, 4) compensation for wetland effects, 5) pre-construction wildlife surveys, 6) pre-construction contractor education, 7) site access restrictions, and 6), financial assurances for project completion.

In 2007, USFWS, Corps, and South Florida Water Management District (SFWMD) attended an interagency conference in Gainesville, Florida to discuss the project and southwest West Indian manatee issues with State and Federal manatee experts. At the time, there were a number of uncertainties related to the PSRP effects on manatees, including:

- The effect of PSRP on the thermocline/halocline in the existing thermal refugium at the POI Basin used by manatees.
- The potential for PSRP to affect the volume and timing of freshwater in the Faka Union Canal and at Faka Union Weir Number 1 upstream of the POI Basin used by manatees.
- The effects of the redistribution of freshwater to receiving estuaries and potential effects on the regional distribution/behavior of manatees in the Ten Thousand Islands, including exposure to additional boat traffic leading to injury/mortality.
- The effects of the redistribution of freshwater on manatee critical habitat.

Due to the number of uncertainties identified, the Corps, SFWMD, and USFWS determined that additional information was required to better understand and address potential adverse effects on manatees resulting from PSRP. In order to address the uncertainties identified, the Corps, USFWS and SFWMD negotiated a study with USGS to determine potential effects of changes in hydrology on the thermocline/halocline that supports the manatee warm water refugium in the POI Basin. In March 2007, the USGS submitted a Scope of Work (SOW) entitled "Monitoring and Assessing Effects of the PSRP Restoration Project on the Manatee". The SOW identified three tasks which focus on water in or near the POI Basin:

- Task A - Real-time and deep-water sensors to determine salinity and temperature in POI Basin, the juncture of the POI Basin and the Faka Union Canal; and isotope analysis to verify the presence/absence of a groundwater source in the POI Basin.
- Task B – Compile and analyze data from existing stage stations upstream and downstream of Faka Union Weir Number 1 and establish a salinity/temperature station downstream of Faka Union Weir Number 1 to monitor the freshwater lens at the weir to analyze availability of freshwater for drinking.

- Task C – Monitor temperatures and salinities in the upstream/downstream segments of tributaries surrounding POI Basin by establishing additional monitoring stations in the upper-river estuaries to complement real-time monitoring stations at the Tamiami Trail bridges and in the lower estuaries.
- An additional task, Task E – Interpret hydrology and other data to identify important and sensitive habitat areas associated with tasks A-C, was included in the SOW but was not funded by the Corps. Other manatee monitoring was included in the monitoring plan but was not funded by the project including aerial and telemetry baseline surveys, as well as water quality and quantity assessments funded by USGS and the USFWS.

On November 10, 2008, the USFWS received the PSRP Supplemental BA from the Corps dated November 6, 2008. In the 2004 BA, insufficient information was available for the USFWS to concur with a "may affect, not likely to adversely affect" determination for the West Indian manatee. Based on updated information provided in the November 2008 Supplemental BA, the USFWS concurred with that determination and provided rationale for that concurrence in a BO dated March 2009. In the 2009 BO, the USFWS stated that "if through research, observation, or monitoring it is discovered that manatees are being adversely affected by the PSRP, reinitiation of consultation would be necessary" and outlined a number of potential measures that could be used to alleviate stress on manatees. The USFWS concurred with the Corps' determination of "may affect, not likely to adversely affect" for West Indian manatee based on the project commitments, assumptions, and analyses provide in the 2009 BO (USFWS 2009).

On February 1, 2011, USGS, USFWS, SFWMD, and the Corps met to discuss the results of the Tasks performed under the USGS 2007 SOW entitled "Monitoring and Assessing Effects of the PSRP Restoration Project on the Manatee." Preliminary data indicated that a reduction of freshwater flow to the refugium resulting from the PSRP construction and operation may result in additional manatee morality during the cold, dry season. This was the first interagency meeting to discuss and formulate measures to mitigate for loss of flows in the POI Basin. On May 24, 2011, a second interagency meeting between the Corps, SFWMD, USFWS, USGS, and FWC was held to review alternatives and receive input from agency managers.

On June 29, 2011, the Corps, SFWMD, and USFWS, including managers from all agencies, met to evaluate an initial array of 19 alternatives. At this meeting, the alternatives were reduced to six alternatives. Alternatives were eliminated based on feasibility, negative effect to overall project benefits, enhancements to the refugium, and direct effects on manatees. The agencies also agreed that an initial reduction in freshwater flows over the Faka Union Weir Number 1 would occur after plugging of the Faka Union Canal downstream of the Faka Union pump station. It was also agreed that the solution should not enhance the POI Basin as a refuge for manatees.

Interagency meetings were held September 16, 2011 and October 26, 2011 to discuss alternatives and narrow down the list of feasible alternatives. An additional alternative, Alternative 20, was added to the list of alternatives at the October 26, 2011 interagency meeting. At this meeting, the pros, cons, possible permitting and consultation issues, unknowns, data collection needed, and rough order magnitude costs were discussed for each remaining alternative. Following this meeting, the team chose one alternative to perform a proof of concept model to evaluate the feasibility of a concept presented by USGS. The USGS concept was based on the idea that

reducing the size of the basin would reduce the amount of flow needed to sustain the thermocline/halocline under conditions it would have historically occurred.

On April 10, 2012, an updated species list for this second supplemental BA was requested from USFWS. The updated list was received on April 24, 2012.

On April 5, 2012, the initial results of the proof of concept modeling were presented to managers from the Corps, SFWMD, USFWS, USGS, and FWC. The team presented the recommended plan, Alternative 20, moving the Faka Union Weir Number 1 north, creating a smaller basin north of US-41, for approval. Management from all agencies concurred with the recommendation of Alternative 20 and requested a pre- and post-construction monitoring plan be created. However, further detailed modeling results completed by the U.S. Army Engineer Research and Development Center (ERDC) were inconclusive regarding the effectiveness and potential success of the concept of a smaller basin. In addition, there were significant local residents (Orchid Cove Homeowners' Association) concerns with relocating the Faka Union Weir Number 1. As a result, the team decided to re-evaluate alternatives that would effectively provide a refugium in the POI Basin. The new alternatives were based on the idea of creating a connection to warm saline groundwater in the POI Basin to mimic a natural warm-water refugium.

As stated in Section 2.0, a multi-agency meeting was held on August 20, 2014, where a consensus was reached on the Manatee Refugium Success Criteria and the Manatee Monitoring Plan. In addition, a detailed design of the refugium was completed by the SFWMD and provided to the represented agencies; all of which are contained in this document.

## 10.3 PROJECT AUTHORITY

The PSRP was initially authorized by Section 309(l) of the Water Resources Development Act of 1992 (Public Law 102-580) along with the balance of the Central and Southern Florida Restudy. Subsequent authorization occurred in October 1996 under Section 528 of the Water Resources Development Act of 1996 (Public Law 104-303); Section 208(d) of the Water Resources Development Act of 1999; and Section 601 of the Water Resources Act of 2000 (Public Law 106-541). Construction authorization for the project was provided by Section 1001 of the Water Resources Development Act of 2007 (Public Law 1495).

## 10.4 PROJECT LOCATION

The PSRP, formerly known as Southern Golden Gate Estates (SGGE), encompasses approximately 55,000 acres (241 km2 or 23,995 ha) in Collier County, southwest Florida, between Interstate Highway 75 (I-75) and U.S. Highway 41. The PSRP and the adjacent Belle Meade area to the west together constitute the Picayune Strand State Forest (PSSF) managed by the Florida Division of Forestry (DOF). The project is located northwest of Everglades National Park (ENP), west of Big Cypress National Preserve (BCNP), southwest of the Florida Panther National Wildlife Refuge (NWR), north of the Ten Thousand Islands NWR (TTINWR) and Rookery Bay National Estuarine Research Reserve (NERR), Cape Romano/Ten Thousand Islands (TTI) Aquatic Preserve, northeast of Collier Seminole State Park, west of the Fakahatchee Strand Preserve State Park, and east of the Belle Meade portion of PSSF. The completion of this restoration project in the midst of significant areas of State and Federal conservation lands will result in a total contiguous public land holding of about 2,602,144 acres

in southwest Florida (Figure 2-1). The project features include three pump stations, tieback levee, canal plugs, road removal, and western protection feature (Figure 2-2). Consultation with USFWS on the western (6L's) protection feature will be completed when detailed design for this feature is complete.

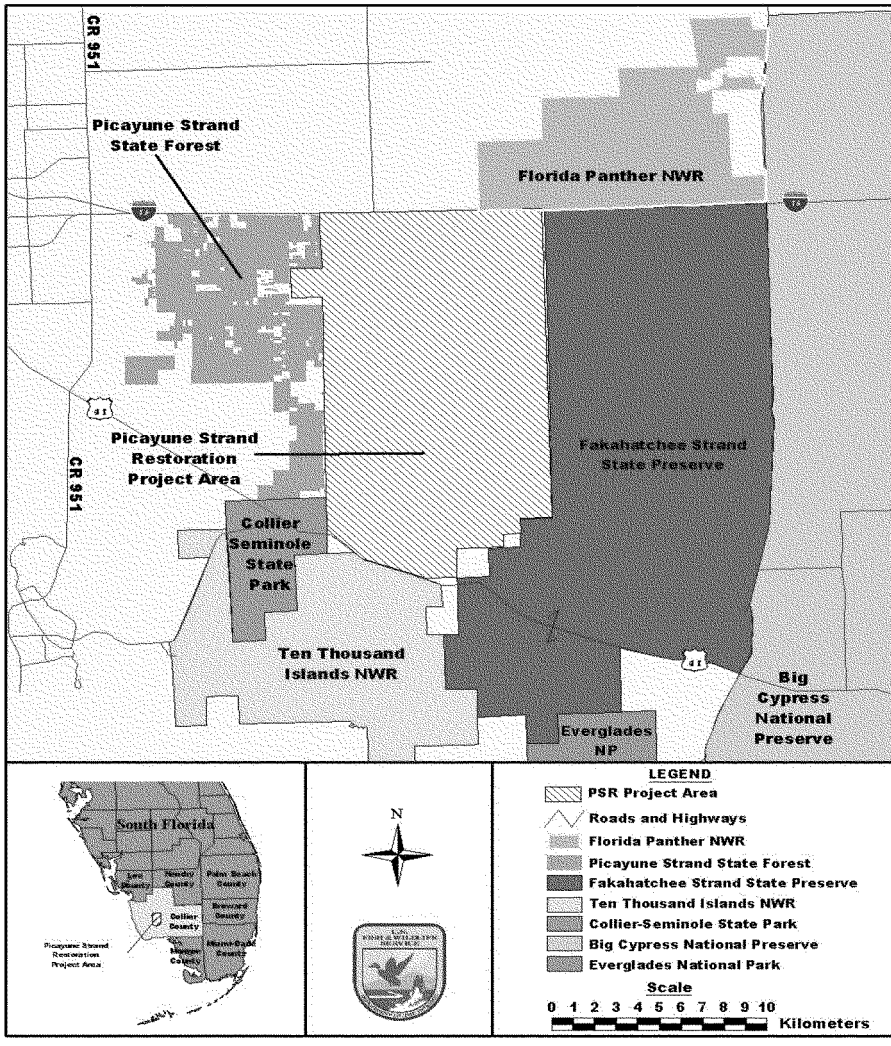


**Figure 2-1. Location of the Picayune Strand Restoration Project and other adjacent public lands.**

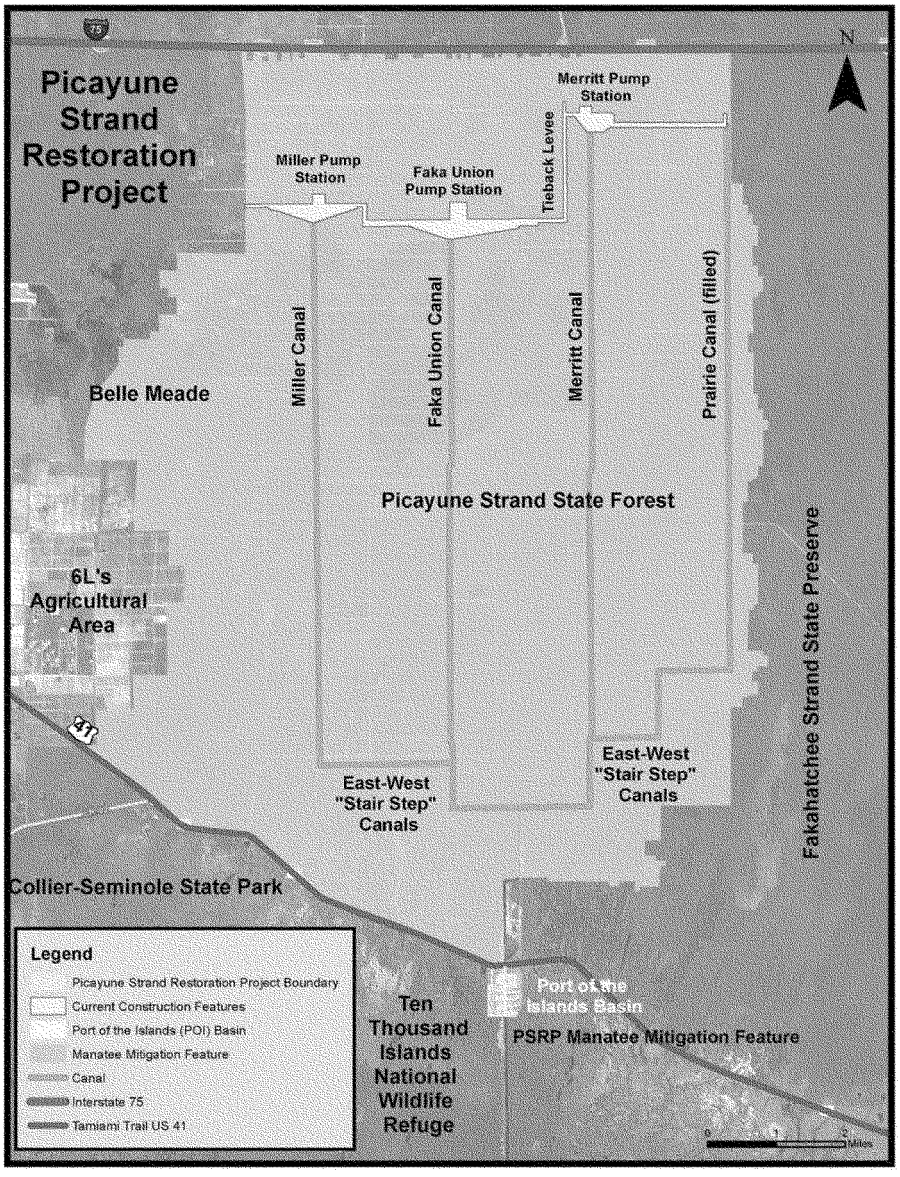



**Figure 2-2. Picayune Strand Restoration Project Location**

## 10.5 MANATEE MITIGATION FEATURE

As discussed in Section 2.2 above, it was determined during an interagency meeting discussing the results of the USGS study, that a solution would be needed to mitigate potential effects to manatee due to a reduction of freshwater flows in the POI Basin due to implementation of the full PSRP.

The manatee mitigation plan will consist of creating a connection to warm saline groundwater in the POI Basin. This will be done by creating a small oxbow in the western spoil berm of the Faka Union Canal just south of the POI Basin (FIGURE 2-3, 2-4). The deeper refugium within the oxbow will be approximately 1.67 acres and have a depth of 20 feet to create a groundwater connection. The entire footprint of the manatee mitigation feature is approximately ten (10) acres, with eight (8) acres being upland habitat on the spoil berm and 1.07 acres within wetland mangroves.

Additionally, the removal of the western spoil berm of the Faka Union Canal is a recommended component part of the Southwest Florida Comprehensive Watershed Plan (Functional Group 70 Coastal Fakahatchee, Component BC89). Placing a berm around the west side of the manatee mitigation feature may help reduce saltwater influences in areas that were originally brackish marsh but have since been converted to wetland mangroves as saltwater moved northward in the Faka Union Canal. Only a small portion of the berm (eight (8) acres) would be removed for the manatee mitigation feature.

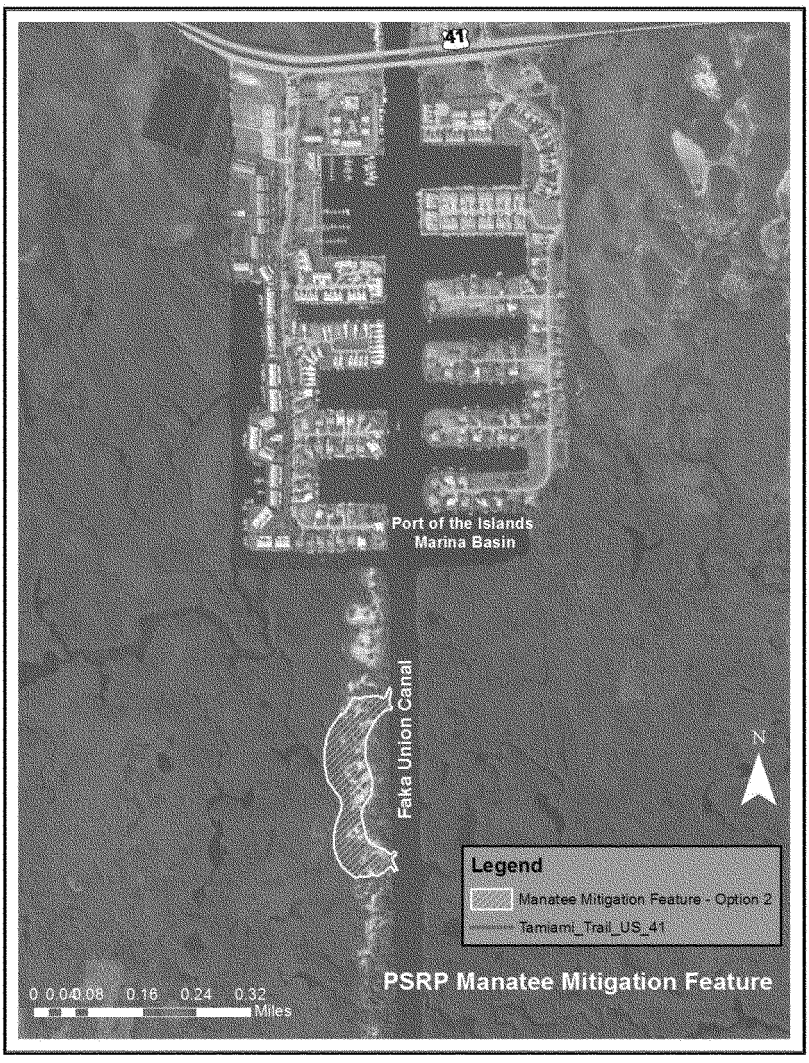



**FIGURE 2-3. PSRP MANATEE MITIGATION FEATURE FOOTPRINT**

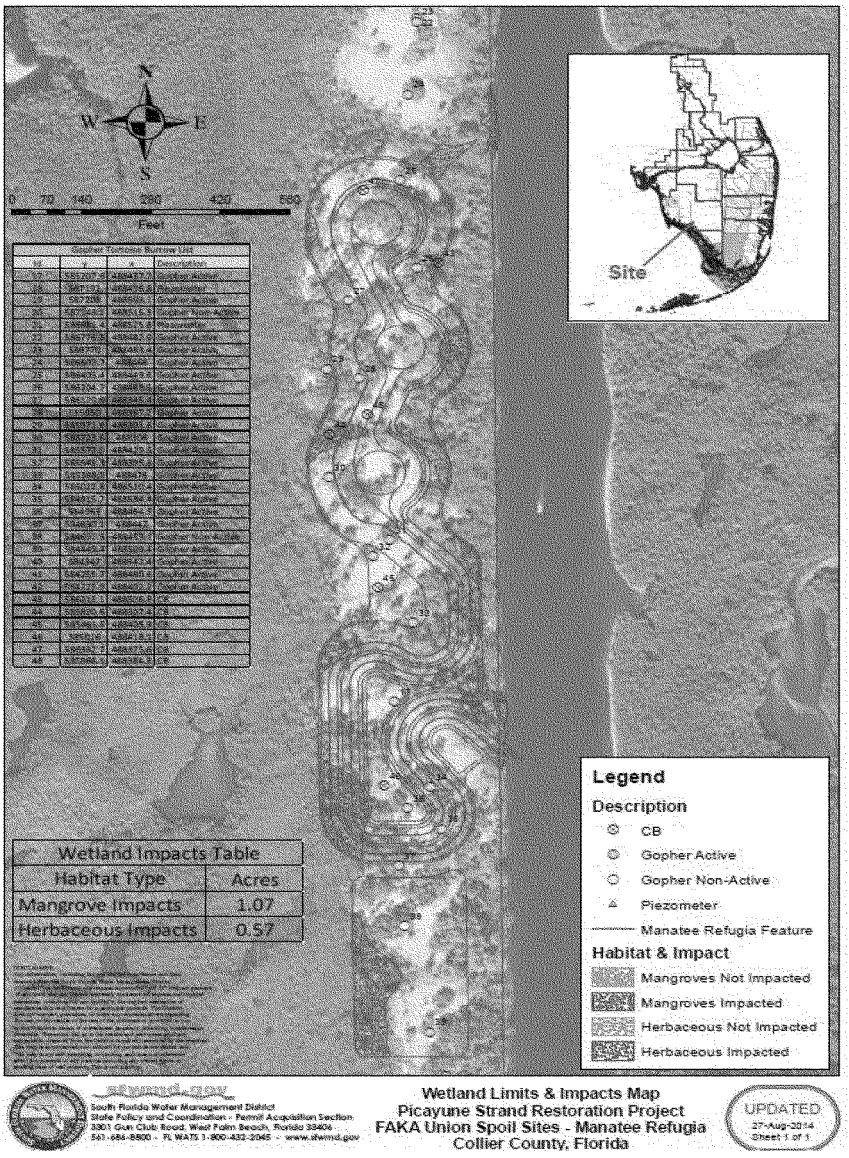



**Figure 2-4. Alternative 27 Option 2 Draft Schematic of Oxbow Manatee Refugium**

A groundwater well transect through the Ten Thousand Islands Region (Figure 2-5) (SGT5W1, SGT5W2, and SGT5W3) shows that the groundwater in this area fluctuates between approximately 24 to 28 degrees Celsius (Figure 2-6, Figure 2-7, and Figure 2-8). Since groundwater monitoring began at these wells in 2006, the groundwater temperature in the area has not dropped below 20 degree Celsius, the threshold for which manatees will seek refuge in thermal refugia (Stith et al. 2011).

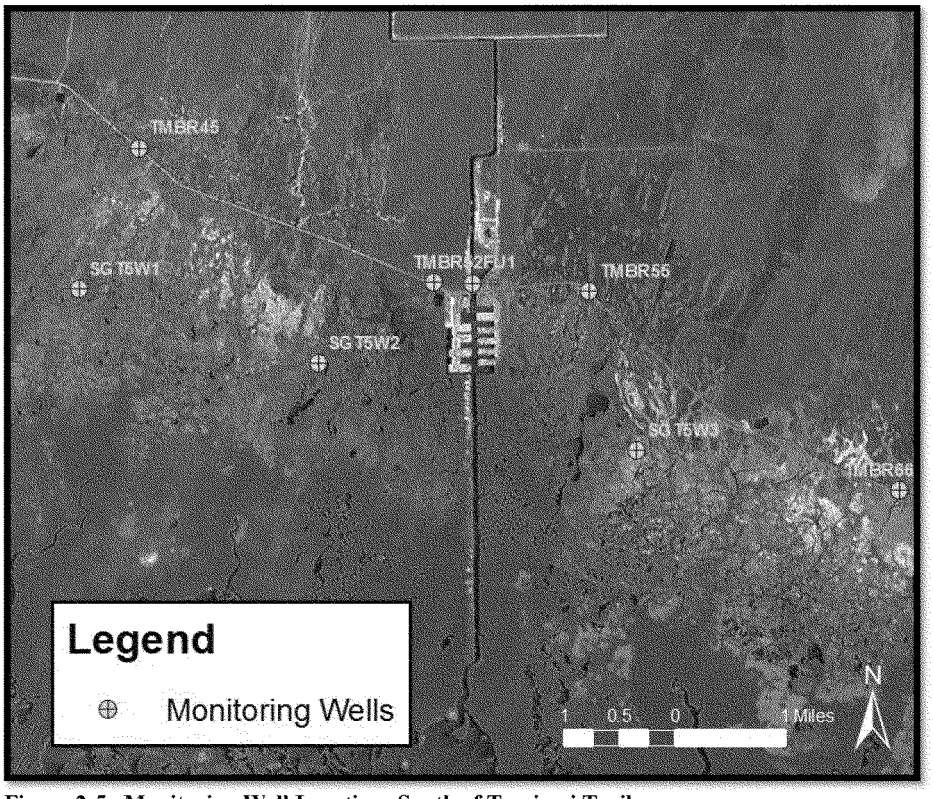



**Figure 2-5. Monitoring Well Locations South of Tamiami Trail**

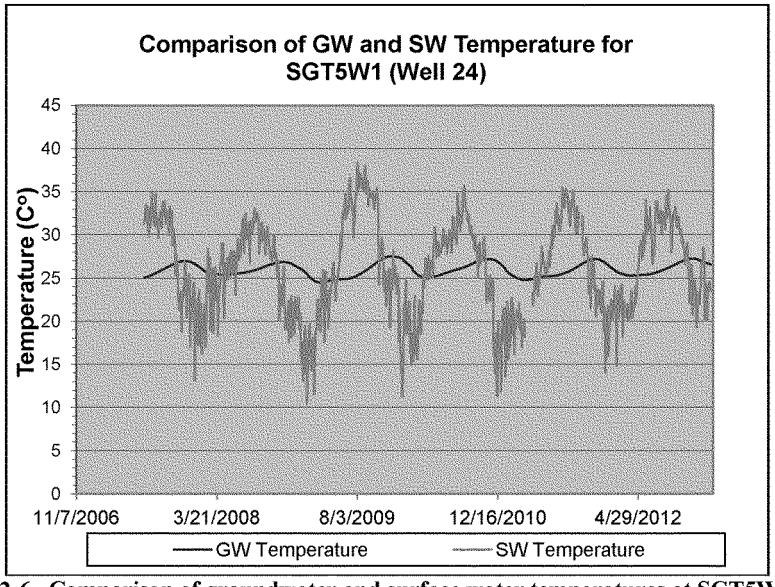



**Figure 2-6. Comparison of groundwater and surface water temperatures at SGT5W1 (Well 24)**

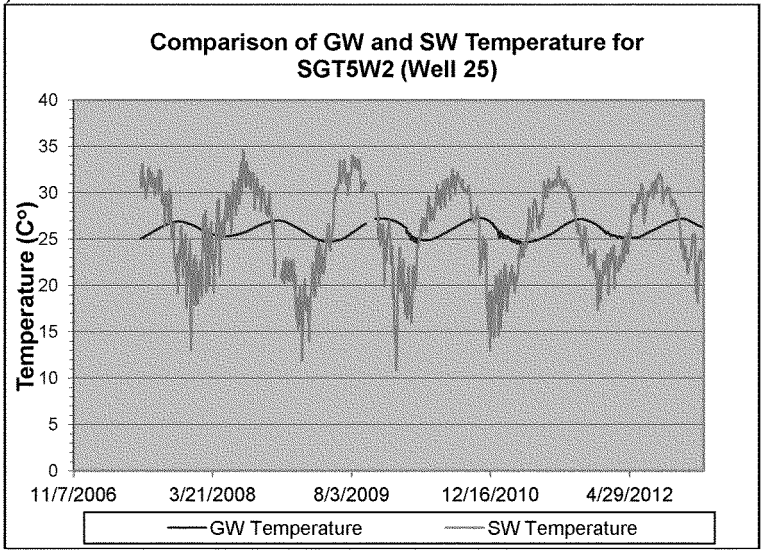


**Figure 2-7. Comparison of groundwater and surface water temperatures at SGT5W2 (Well 25)**

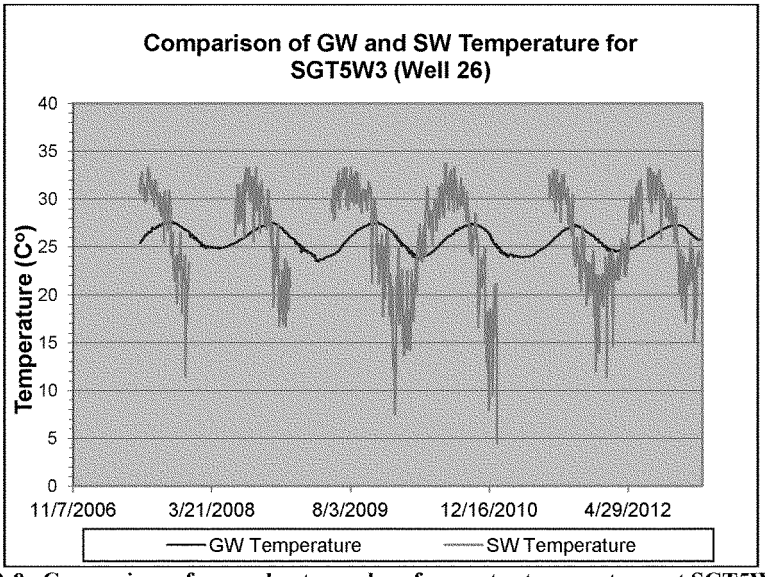



**Figure 2-8. Comparison of groundwater and surface water temperatures at SGT5W3 (Well 26)**

## 11.0 DESCRIPTION OF LISTED SPECIES AND DESIGNATED CRITICAL HABITAT

### 11.1 AFFECTED ENVIRONMENT

A detailed description of the overall PSRP affected environment can be found in the 2004 PSRP Final PIR/EIS though a short summary is included below. Information from the 2004 PSRP Final PIR/EIS is hereby incorporated by reference into this second supplemental BA.

In the late 1950s, Gulf American Corporation began purchasing an area of 173 square miles (110,620 acres) in Collier County, Florida for a vacation and retirement community. The Golden Gate Estates subdivision was approved in 1960, and included 183 miles of drainage canals with 25 water control structures and 813 miles of roads spaced at intervals of one-quarter mile. The area is characterized by nearly flat terrain with cypress wetlands, pine islands, wet and dry prairies, and several deeper wetland strands and sloughs including the adjacent Camp Keais and Fakahatchee Strands. Most of the land is inundated annually from at least July 1 to October 1 after the onset of the rainy season. Historically, water drained over the area to downstream estuaries of the Gulf of Mexico through surface water movement in the form of shallow sheet flow. Two major canal systems, Golden Gate and Faka Union, were constructed in the early 1960s and between 1968 and 1971, respectively, to drain this area into Naples and Faka Union Bays (U.S. Army Corps of Engineers 1980). These drainage systems channelized surface water

runoff and altered each sub-basins hydrologic response to rainfall. The canals also circumvented drainage to downstream estuaries of the Blackwater, Pumpkin, Wood, and Little Wood Rivers. On December 16, 1966, a Corps permit was issued to dredge an entrance channel connecting the Faka Union Canal with the mouth of the Faka Union River. The construction of this canal generated a major point source freshwater discharge in Faka Union Bay which has altered estuarine resources in portions of the Ten Thousand Islands (TTI).

The major effects of the drainage associated with the existing canal and water management infrastructure within the project are the loss of cypress forest and herbaceous wet prairies. Historically, small areas of pine flatwoods normally designated as uplands were located in narrow strands in elevated areas of the project and in the northwest project corner. Hydric flatwoods, which often have water at or above the ground surface for at least short periods during wetter portions of the year, were the majority of the remaining flatwoods. Due to the variable nature of shallow wetland hydroperiods and site topography over time, many on-site plant communities historically contained elements of both uplands and wetlands which were periodically affected by fire, freeze, drought, flood, and hurricane events. After drainage, upland pines, cabbage palms, and hardwoods invaded many of the cypress forests. Severe and frequent fires eliminated many of the pine and cypress trees, furthering the conversion of these lands to earlier successional shrubby states of upland or shallow wetland plant communities. Exotic plant species, particularly Brazilian pepper, have changed the character of many habitats, especially adjacent to the site's extensive canal and roadway network (Duever 2004).

A large portion of the Faka Union Canal watershed is part of the Golden Gate Estates development, zoned for single-family residential land use. The residential zoning in the Golden Gate Estates is low density with a minimum lot size of 1.25 acres. The remaining area is used for agriculture, predominantly vegetable farming, except in areas of persistent flooding. The most populated areas of Golden Gate Estates are north of Alligator Alley (Interstate 75 [I-75]) and west of Everglades Boulevard in Northern Golden Gate Estates. An exception is a small urban area, POI, located south of the PSRP adjacent to the northern portion of the main Faka Union Canal (USFWS 2009). The manatee mitigation feature will be constructed just south of the POI Basin in the spoil berm adjacent to the Faka Union Canal (FIGURE 2-3).

The POI marina, originally known as Remuda Ranch, was initially constructed by the Gulf American Corporation (GAC), who also developed Golden Gate Estates. The construction of the Faka Union Canal began in 1966, under a dredge and fill permit issued by the U.S. Army Corps of Engineers on December 14, 1966 under the jurisdiction of Section 10 of the Rivers and Harbors Act of 1899; however, at the time of issuance, no permitting systems were in place to issue permits for the discharge of refuse under Section 13 of the Rivers and Harbors Act of 1899. The original layout for Remuda Ranch closely resembles the western side of the POI marina today (Figure 3-1).

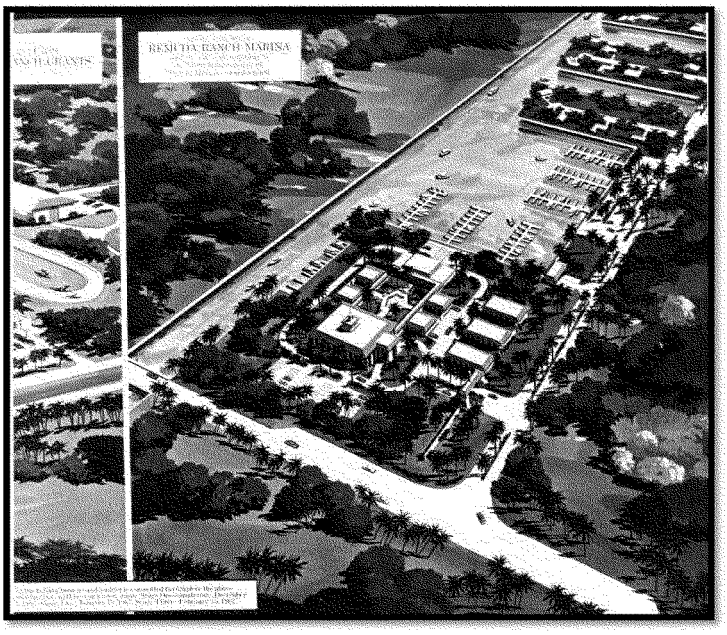



**Figure 3-1. 1966 Remuda Ranch Original Layout Press Photo**

## 11.2 FEDERALLY LISTED SPECIES

Threatened and endangered species that may occur in this area include American crocodile, Eastern indigo snake, gopher tortoise, loggerhead sea turtle, Kemp's ridley sea turtle, Atlantic green sea turtle, hawksbill sea turtle, wood stork, red-cockaded woodpecker, Everglade snail kite, Florida bonneted bat, Florida panther, West Indian manatee, smalltooth sawfish, goliath grouper, mangrove rivulus , and sand tiger shark.

The Corps coordinated potential effects to federally listed species with the USFWS and NMFS. Specifically, coordination with NMFS included listed fish, marine plants, and sea turtles. A list of species that may occur within the PSRP area is shown below in Table 3-1. There are no federally listed plant species in the project area. Many of these listed species have been previously affected by habitat changes resulting from wetland drainage, alteration of hydroperiod, wildfire, and water quality degradation. The PSRP has the potential to greatly benefit most, if not all, of these species. Those species not directly affected by the project include species that are rare in the project area or utilize estuarine habitat indirectly affected by the restoration project. Table 3-2 list threatened and endangered species that may occur within the PSRP, which fall under the purview of the USFWS, and are addressed in this BA.

Consultation on the red-cockaded woodpecker, bald eagle, Everglade snail kite, Eastern indigo snake, American crocodile, and West Indian manatee critical habitat occurred in 2004 and 2008. Consultation with NMFS regarding the smalltooth sawfish, goliath grouper, mangrove rivulus,

and sand tiger shark was completed in 2004. Smalltooth sawfish critical habitat has been addressed with NMFS in a CERP Programmatic BA. Since the manatee refugium is outside of designated critical habitat for the smalltooth sawfish, concurrence from the NMFS is anticipated. Consultation on wood stork, Florida panther, and West Indian manatee occurred through the 2008 supplemental BA and the 2009 BO. As a result of new information from USGS, consultation on the potential effects of the PSRP on West Indian manatee has been reinitiated and will be addressed in this supplemental BA. This supplemental BA will also address the addition of the manatee mitigation feature to the PSRP and its potential effects to other threatened and endangered species within the POI region.

**Table 3-1. Federally listed threatened (T), endangered (E), candidate (C) species, or similarity of appearance (SA) that may occur within the overall PSRP area**

| Common Name | Scientific Name | Federal Status |
|---|---|---|
| **Reptiles** | | |
| American **alligator** | Alligator **mississippiensis** | **SA** |
| **American crocodile** | **Crocodylus acutus** | **E** |
| **Eastern indigo snake** | **Drymarchon corais couperi** | **T** |
| **Gopher tortoise** | **Gopherus polyphemus** | **C** |
| **Green sea turtle** | **Chelonia mydas** | **E** |
| **Fishes** | | |
| **Gulf sturgeon** | **Acipenser oxyrinchus desotoi** | **T** |
| **Smalltooth sawfish** | **Pristis pectinata** | **E** |
| | | |
| **Insects** | | |
| **Bartram's Hairstreak butterfly** | **Strymon acis bartrami** | **C** |
| **Florida Leafwig butterfly** | **Anaea troglodyte floridalis** | **C** |
| **Miami Blue butterfly** | **Cyclargus (=hemiargus) thomasi bethunebakeri** | **E** |
| **Birds** | | |
| **Audubon's Crested caracara** | **Polyborus plancus audubonii** | **T** |
| **Cape Sable Seaside sparrow** | **Ammodramus maritimus mirabilis** | **E** |
| **Everglade snail kite** | **Rostrhamus sociabilis plumbeus** | **E** |
| **Florida Grasshopper sparrow** | **Ammodramus savannarum floridanus** | **E** |
| **Florida scrub-jay** | **Aphelocoma coerulescens** | **T** |
| **Ivory-Billed woodpecker** | **Campephilus principalis** | **E** |
| **Kirtland's warbler** | **Dendroica kirtlandii** | **E** |
| **Piping plover** | **Charadrius melodus** | **T** |
| **Red knot** | **Calidris canutus rufa** | **C** |
| **Red-cockaded woodpecker** | **Picoides borealis** | **T** |
| **Wood stork** | **Mycteria americana** | **E** |

| Mammals | | |
|---|---|---|
| **Florida panther** | **Puma concolor coryi** | **E** |
| **Puma** | **Puma (=felis) concolor (all subspecies except coryi)** | **SA** |
| **West Indian manatee** | **Trichechus manatus** | **E** |
| **Florida bonneted bat** | **Eumops floridanus** | **E** |

**Table 3-2. Federally listed threatened (T), endangered (E), or candidate (C) species under the purview of USFWS that are included in this consultation.**

| Common Name | Scientific Name | Federal Status |
|---|---|---|
| **Reptiles** | | |
| American crocodile | Crocodylus acutus | E |
| Eastern indigo snake | Drymarchon corais couperi | T |
| Gopher tortoise | Gopherus polyphemus | C |
| **Birds** | | |
| Everglade snail kite | Rostrhamus sociabilis plumbeus | E |
| Red-cockaded woodpecker | Picoides borealis | T |
| Wood stork | Mycteria americana | E |
| **Mammals** | | |
| Florida panther | Puma concolor coryi | E |
| West Indian manatee | Trichechus manatus | E |
| Florida bonneted bat | Eumops floridanus | E |

## 12.0 EFFECT OF THE MANATEE MITIGTION FEATURE

The manatee mitigation feature will be constructed adjacent to the Faka Union Canal just south of the POI Basin as described in Section 2.5 above.

## 12.1 WEST INDIAN MANATEE AND WEST INDIAN MANATEE CRITICAL HABITAT

### 12.1.1 SPECIES DESCRIPTION

The West Indian manatee, was listed as endangered throughout its range for both the Florida and Antillean subspecies (*Trichechus manatus latirostris* and *Trichechus manatus manatus*) in 1967 (32 FR 4061) and received federal protection with the passage of the ESA in 1973. It should be noted that the manatee was designated as an endangered species prior to enactment of the ESA, therefore there was no formal listing package identifying threats to the species, as required by Section 4(a)(1) of the ESA. Critical habitat was designated in 1976 for the Florida subspecies, *Trichechus manatus latirostris* (50 CFR Part 17.95(a)) as show in Figure 4-1. Recovery Plans were published for the Antillean manatee in 1986 and for the West Indian manatee in 1989, 1996, and in 2001. Five-year listing-status reviews for West Indian Manatee were noticed in the Federal Register on July 22, 1985 (50 FR 29903), November 6, 1991 (56 FR 56884) and April 14, 2005 (70 FR 19780) with reopening and expansion of the review on March 24, 2006 (71 FR 14940) to include both the Florida and Antillean manatee subspecies. The five-year review was completed during April 2007. This BA will focus on the effects of the PSRP to the Florida subspecies of the West Indian manatee, commonly known as the Florida manatee.

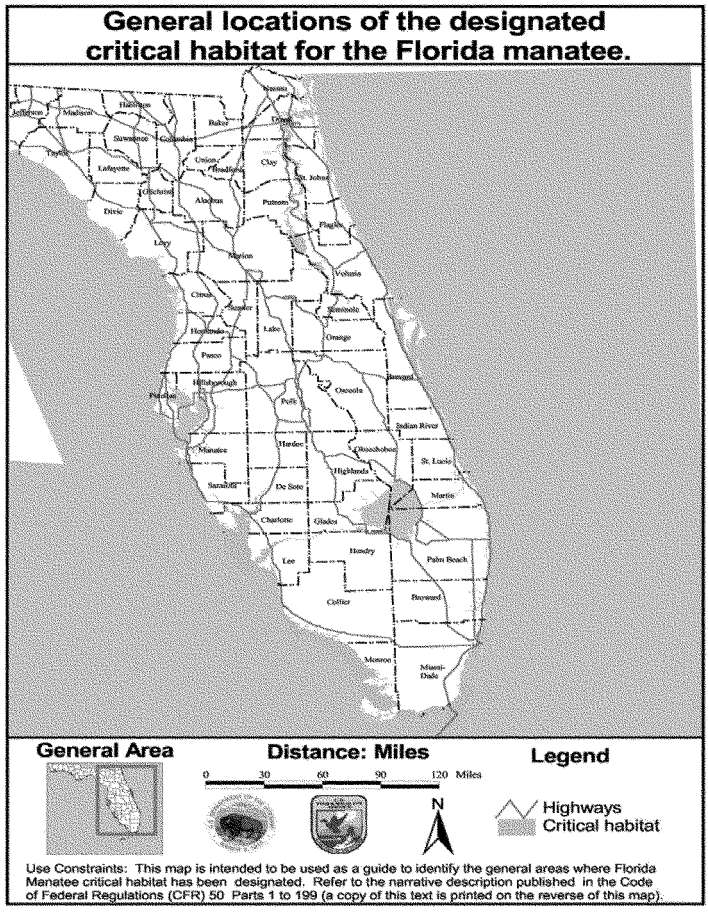



Figure 4-1. Critical habitat for the Florida manatee.

West Indian manatees also are protected under the Marine Mammal Protection Act (MMPA) of 1972, as amended (16 U.S.C. 1461 et seq.). The MMPA establishes, as national policy, the maintenance of the health and stability of marine ecosystems, and whenever consistent with this primary objective, obtaining and maintaining optimum sustainable populations of marine mammals. It also establishes a moratorium on the taking of marine mammals, which includes harassing, hunting, capturing, killing, or attempting to harass, hunt, capture, or kill any marine mammal.

In the southeastern United States, manatees occur primarily in Florida and southeastern Georgia, but individuals can range as far north as Rhode Island on the Atlantic coast, and as far west as Texas on the Gulf coast. The manatee population appears to be divided into at least two isolated

areas, one on the Atlantic coast and the other on the Gulf of Mexico coast of Florida. Each group is further divided into two regional groups for each coast: Northwest, Southwest, Atlantic, and Upper St. Johns River (USFWS 2001). A full description of life history, distribution, and other relevant information can be found in the 2004 PSRP Final PIR/EIS, 2008 BA, and 2009 BO and are incorporated by reference into this document.

### 12.1.2 ENVIRONMENTAL BASELINE

The following discussion of the environmental baseline will focus on the status of the Florida manatee and key factors affecting manatee population sustainability within the TTI National Wildlife Refuge (NWR). One of the main sources of information and research data is provided in the USGS's Review and Synthesis of Manatee Data in ENP, an administrative report authored by the USGS Florida Integrated Science Center and published in November 2006. This USGS manatee report also includes the TTI National Wildlife Refuge within its scope, and provides a timely and comprehensive discussion of manatee biology specific to the TTI and ENP. Unless otherwise cited, the Environmental Baseline relies upon manatee related data and discussion from the USGS manatee report (Stith et al. 2006) Additional baseline information was presented in a study of the warm-water refugia at the POI Basin (Stith, Reid, et al. 2011)(Stith et al. 2011)

### 12.1.3 ACTION AREA

The action area for effects on the West Indian manatee covers areas of potential hydrological effects in the upper estuaries of the TTI National Wildlife Refuge. This estuarine area extends along the coastline from Fakahatchee Bay in the southeast to Blackwater Bay in the northwest. Also included in the action area for the manatee is the POI Basin and Faka Union Canal from Faka Union Bay upstream to the weir above POI Basin.

### 12.1.4 STATUS OF THE SPECIES WITHIN THE ACTION AREA

#### 12.1.4.1 Manatee Habitat Requirements in the Ten Thousand Islands

##### 12.1.4.1.1 Manatee Forage (Submerged Aquatic Vegetation)

Submerged aquatic vegetation (SAV) in the TTI and ENP region includes marine seagrasses primarily turtle grass (*Thalassia testudinum)*, manatee grass (*Syringodium filiforme*), and shoal grass (*Halodule wrightii*); macroalgae beds along the gulf coast, and freshwater tolerant vascular pants and algae periodically occurring among the inner bays and rivers (*Ruppia maritime*, *Potemogeton* sp., *Chara* sp., etc.). Although there appears to be preferential use among areas, all of these species are used by manatees as forage in the greater Everglades. Manatees are also known to occasionally feed on mangrove leaves, and mangroves have been mapped throughout the region (http://gapanalysis.nbii.gov). Manatees also have opportunities to access floating plants and bank grasses as forage.

There is a major gap in information about food resources available to manatees in the TTI/ENP region. Manatees likely are foraging on a wide variety of resources, and these resources differ among landscape zones. Resources in the offshore zone are associated with seagrass beds consisting of turtle grass, shoal grass and manatee grass, all of which are likely to be abundant throughout the region. Researchers following radio tracked manatees in the TTI have documented the occurrence of these species and their use as forage by manatees. Seagrasses are almost certainly more extensive than is indicated by the mapping data available for this region.

Little is known about long term changes in these seagrass beds, and whether they change significantly in composition or extent seasonally.

Even less is known about the potential food resources within bays, river systems, or freshwater marshes used by manatees. The home range analysis and telemetry maps show that the offshore zone is a major focus of activity for most individuals, but some individuals spend a substantial proportion of their time within inshore bays, rivers, and a few accessible marshes. The food resources available in these less saline ecozones may vary significantly both seasonally and annually, and the plant communities are likely to be much more dynamic compared to the offshore seagrass beds. For example, during the wet season, species that favor less saline conditions, such as *Ruppia* and *Chara*, may establish and grow rapidly in river mouths and nearby bays, only to die back during the dry season when conditions favor species such as shoal grass that prefer higher salinities. Human modifications to freshwater inflow into these bays may have greatly altered the composition and abundance of SAV in many of these bays, probably favoring more salt tolerant species. Restoration activities may favor the re-establishment and growth of new SAV communities in these bay and river systems through increased and prolonged freshwater discharge.

Throughout the year, and especially during the summer and fall, high relative densities of manatees were found in offshore seagrass beds. The aerial survey and telemetry data show that the relative use of these offshore areas was non-uniform, with some areas showing much higher use than others. In general, aerial survey data showed that during the winter and dry season, relative densities in offshore areas of ENP were highest near Lostmans and Broad Rivers, which are the seagrass beds closest to inshore hotspots for these two seasons. During the summer and fall, offshore use was more widely distributed and extensive, shifting into the more northerly portions of ENP and TTI. Telemetry data suggest that some manatees forage preferentially within inshore bays, especially during the winter, although the majority of manatee foraging occurred in offshore seagrass beds.

#### 12.1.4.1.2 Water Temperature and Manatee Avoidance of Cold Stress

Typically during December through February, water temperatures in the Gulf fall below 20° Celsius for several weeks at a time. These cold-water conditions can be fatal or debilitating to manatees, and induce them to seek out small scale thermal refuges that are found throughout inshore areas of the TTI. Manatees in the TTI and ENP may be more vulnerable to cold stress, especially during severe winters, due to the absence of significant springs or warm water effluent. Anecdotal evidence for cold stress includes observations of dead manatees in the region following strong cold fronts. In some years, physical examination of manatees captured at POI during winter showed signs of acute cold stress. The carcass data analysis for cold stress shows that POI, which is the largest winter aggregation site in this region, had very high relative mortality during the winter. The undetermined mortalities are very high in the Whitewater Bay and these numbers peak strongly during the winter. While these data are suggestive of cold stress, boater density also peaks in the winter, so that cold stress or watercraft/manatee collision or both factors may contribute to increased winter mortality.

Analysis of the 1991 through 2004 winter synoptic survey data indicated that Whitewater Bay, including adjacent areas such as Mud Bay, Joe River, Rogers River, and North River, are important winter aggregation sites for manatees in ENP. Several other inland sites north of

Whitewater Bay also are important, including Broad River Bay, Wood River Bay, Rogers River Bay, and Lostmans Creek. The 1990 through 1993 aerial survey showed a similar spatial pattern for winter season densities. Counts in these sites tend to vary considerably from year to year, presumably depending in part on the severity of the winter and timing of surveys with cold fronts. Large numbers of manatees overwinter in ENP, but they are scattered across the landscape in smaller aggregations as compared to the larger winter aggregations at POI in the TTI. The winter synoptic surveys likely underestimate the use at identified sites, due to the turbid conditions where manatees aggregate, and because they do not include some winter use sites that may exist outside of the surveyed area.

Analysis of tracking data has revealed insights to manatee overwintering strategies in the TTI and ENP region. Winter aggregation sites north of ENP in the TTI area are mostly associated with deep, dredged canals. As cold fronts pass, temperatures in these deeper waters drop more slowly than in the adjacent shallow bays and gulf. These canals often have a pronounced thermocline/halocline with warmer, salty water on the bottom. In ENP, few accessible canals exist; the Buttonwood canal has rather small winter aggregations compared to the deeper canal systems in the TTI region. Instead, manatees in ENP seem to be using small dead end bays (e.g. Mud Bay) or deeper, bay like sections of rivers (e.g. Broad River Bay, Tarpon Bay, and Wood River).

Physical mechanisms that produce warm water used by manatees during the winter are poorly understood in this region. There are no artificially warmed water sources in the entire study region. The largest winter aggregation site, the POI Basin, is an artificial but passively warmed refuge. One mechanism by which the POI Basin retains its warm water is by a thermal inversion layer, where warm salt water is trapped under a layer of fresh water (Stith, Reid, et al. 2011). Analyses of the isotope signatures in the POI Basin shows that the warm bottom layer of water is from the Gulf of Mexico and not a result of upwelling of ground water (USGS 2011). It is unclear if the mechanisms operating in natural sites in ENP are similar to those of deeper canal sites, where warm water attraction seems to be associated with haloclines.

The mechanisms that create the warmer water may vary among these sites. During strong cold fronts, shallow water cools rapidly, while deeper pockets of water may show a lag in cooling that allow manatees to bottom rest. The temperature of groundwater in this region is much warmer than the ambient water temperature during much of the winter, so areas with significant groundwater seepage may accumulate layers of warm water. If the groundwater beneath tidally influenced rivers is saline, groundwater seepage may establish haloclines with heavier saline water on the bottom, which maintain temperature inversions such as those observed at the POI Basin.

Haloclines have been recorded in association with manatee sightings during the winter at Rogers River. Following the passage of cold fronts, shallow areas heat up rapidly due to solar radiation and become the focus of manatee use. Also, soft sediments likely provide additional insulation and reduce heat loss for bottom resting manatees. There is speculation that bacterial decomposition of organic matter in the muddy substrate may provide additional warmth. Submerged and emergent aquatic vegetation also may have an effect on winter water temperature.

At the POI Basin, freshwater input from the Faka Union canal, entering the basin over the Faka Union Weir Number 1, provides a freshwater lens that forms a blanket over the warmer salt water on the bottom, thus creating a temperature inverted halocline during the cold dry winter months (Stith, Reid, et al. 2011). The PSRP is expected to greatly reduce the freshwater flows in the POI Basin. Research has shown that approximately 100 cubic feet per second (cfs) are needed to maintain the halocline when ambient temperatures fall below 20° Celsius (Slone 2011). As a result, the PSRP is proposing the construction of the manatee mitigation feature to compensate for the loss of freshwater flows into the POI Basin.

#### 12.1.4.1.3 Salinity and Manatee Need for Fresh Drinking Water

Some evidence indicates that manatees need regular access to freshwater, presumably for drinking and osmoregulation. Manatees in the TTI need to travel inland to find water sources of less than five parts per thousand (ppt) salinity for a significant proportion of each year, especially during the winter dry season. Manatees seeking freshwater may travel far upstream into tidal creeks and rivers. The availability of freshwater changes dramatically with season; low salinities in the TTI estuaries typically begin in July or August, showing much less variability than ENP estuaries and reflecting the high discharge rates associated with Faka Union Canal. Aerial survey data shows that during the dry season, more manatees are seen in inland canals, rivers and creeks. Seasonal patterns developed from telemetry data are very similar to the aerial survey patterns. Analysis of tagged individuals shows that manatees make frequent trips between the offshore to reach narrow and shallow rivers and creeks, especially during the cold and dry season.

### 12.1.5 MANATEE MOVEMENTS (AERIAL SURVEY AND TELEMETRY DATA)

The USGS Florida Integrated Science Center examined data from aerial surveys flown from 1979 – 2004 and looked for patterns in spatial and temporal manatee distributions. In the northern part of ENP and TTI area, sightings are common in or near Chokoloskee Bay, Broad River, Turner River, East River, Fakahatchee River, House Hammock Bay, Rabbit Key, Demijohn Key, POI Basin, Faka Union Canal, Barron River, Wootens and Big Cypress basins, White Horse Key, Round Key, and Cape Romano. Marco Island also has high relative densities (Figure 4-2).

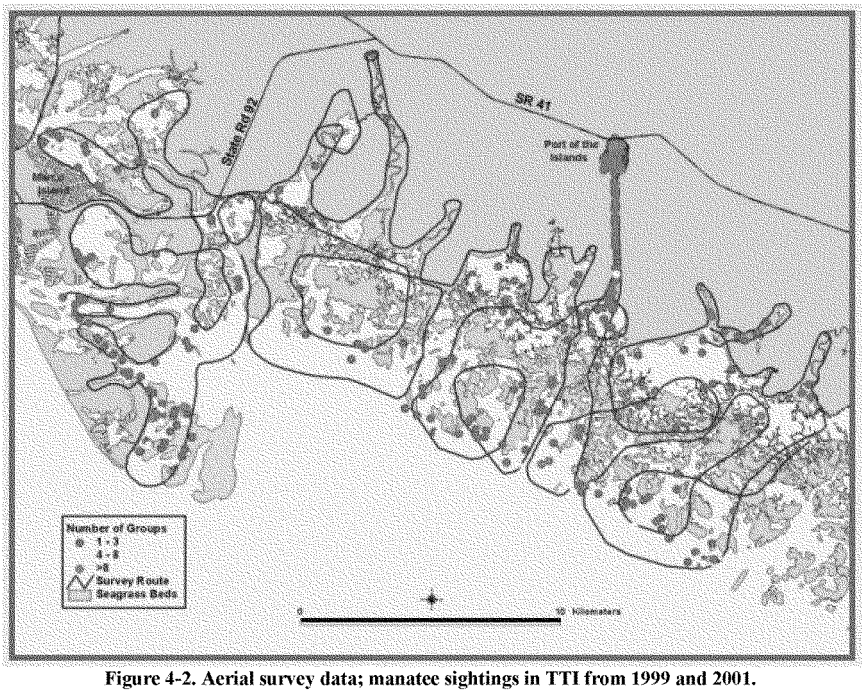



**Figure 4-2. Aerial survey data; manatee sightings in TTI from 1999 and 2001.**

Summer and fall sightings are prevalent in offshore seagrass beds and Chokoloskee Bay, while relative densities in winter and spring are greater in riverine systems and basins, where warm or fresh water are available. The winter synoptic surveys flown from 1991 – 2004 show heavy use of the inland areas, similar to those in the cold season distributional aerial surveys, such as Mud Bay, Wootens and Big Cypress basins, and POI. Other winter use areas include Tarpon Bay, Broad River Bay, Fakahatchee River, Marco Island canals, and the Glades canal system (just north of Manatee Bay).

The global positioning system (GPS)-based corridor analysis show high use of areas that connect offshore feeding areas with inshore access points for fresh water. The aerial survey and telemetry data show concordant patterns of how manatees use the landscape within ENP and TTI. Throughout the year, manatees are present within most coastal-accessible waters in ENP and TTI. Although offshore seagrass foraging areas are used throughout the year, manatee distribution shifts inland during the winter and spring. During summer and fall, the distribution shifts toward offshore areas. The inland focus during winter is likely associated with manatees seeking thermal refuges, whereas during the spring this inland focus may be associated with access to fresh water. In summer and fall, fresh water is more readily available, allowing the manatees to shift to offshore areas (Figure 4-3).

12.1.5.1 Home Ranges

Broad patterns in the movements of individuals indicate that manatees change their high use areas seasonally. The Cape Romano Shoals is a high use area. Other areas of high or moderate use include within TTI, Caxambas Pass, and shoals near Turtle Key and Round Key. Within ENP, Demijohn Key and Pavilion Key are high use areas. These sites also have high numbers of manatees in the aerial survey data, except that telemetry-based home ranges for wild-caught manatees do not generally extend into southern ENP (excluding winter). This northerly habitat usage in the telemetry home ranges is probably because nearly all wild-caught, tagged animals in this study were caught at POI, a northern site.

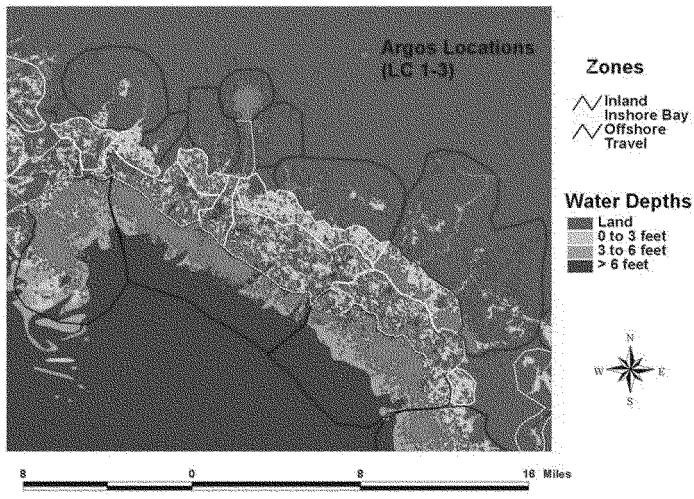



**Figure 4-3. Satellite based radio tracking of tagged manatees by Service Argos, Inc.**

The telemetry data show individual patterns and heterogeneous behavior of manatees that could not be discovered with aerial surveys or carcass data. For example, tagged, wild-caught animals show substantial individual variation in winter behavior, with five individuals moving south to Whitewater Bay from TTI, six individuals moving north out of the study area, and the remainder wintering in the TTI area. Such behavioral heterogeneity is encouraging from a conservation standpoint, since it means that animals employ different strategies when seeking out thermal refugia, making the population less vulnerable to a particular type of environmental change (e.g., plant shutdowns) than a population with a single migratory strategy. This heterogeneity is consistent with the well documented migratory behavior on the east coast of Florida.

Composite home ranges for the wild caught animals were mostly within the TTI area and northwest portion of ENP. The winter range of 16 of 21 manatees tagged at POI was within 10 – 20 km of POI, but the other five animals made a winter movement to Whitewater Bay. For other seasons, all tagged manatees had home ranges that were within 30 to 40 kilometers of the POI Basin. Areas of high use during winter included the POI capture site (a major winter refuge), the mouth of the Fakahatchee River, and shoals near Cape Romano and Round Key. The other

seasonal home ranges are all in or near the TTI area and northwest portion of ENP. The POI Basin is an important refugium for manatees especially during winter and spring. During spring, areas of high use included the POI capture site, shoals off Cape Romano, and areas near Turtle Key and Round Key. Summer and fall home ranges are more dispersed, centering on offshore areas. The Cape Romano shoals are frequented in all seasons, highlighting their importance to manatees as a feeding area. The Pavilion Key shoals are frequented by manatees mainly in summer and fall.

The telemetry tracking of one manatee, Santina, provides a typical example of seasonal movement with a home range. During the dry season, Santina's home range included the POI Basin as a regular inland site. During the wet season, she shifted away from this inland site and her home range was focused more on the offshore areas or inland bays. Manatee in the TTI use inland sites more often during the dry season, especially those sites with more reliable sources of fresh water such as POI. During the wet season, manatees spend more time offshore, foraging on seagrass beds.

Irrespective of season, most manatees showed a similar pattern of frequent, regular movement between offshore and inland zones (Figure 4-4). Tagged manatees typically spent less than a day at inland sites, but often remained on offshore seagrass beds for several days or more. Nearly all manatees showed a similar pattern of alternating between the offshore and inshore zones at regular intervals ranging from 2 to 8 days throughout the year.

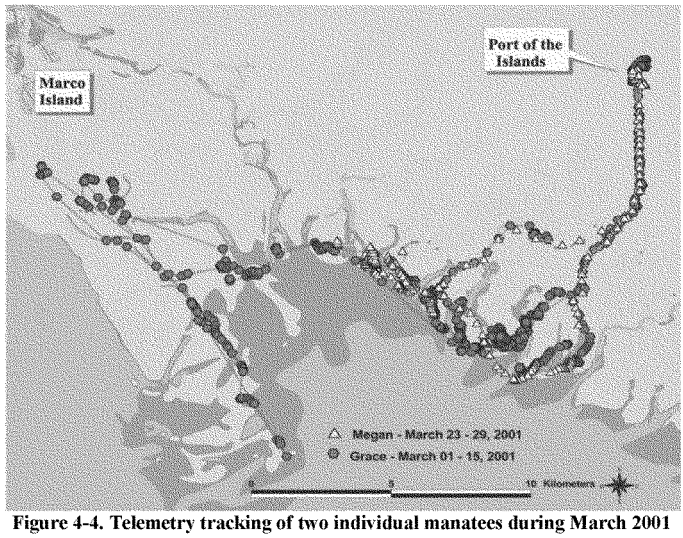



**Figure 4-4. Telemetry tracking of two individual manatees during March 2001**

12.1.5.2 Seasonal Migration Patterns

Resources used by manatees in the TTI and ENP can be viewed as occurring on a seasonally changing network, where the network consists of warm water sites, sources of fresh water, and foraging areas. On a broad scale, some manatees migrate into the ENP from the north during the

winter, and others migrate north out of the region, while a very few migrate to or from the Atlantic population. The limited telemetry data for wild caught individuals suggest that the majority of manatees in the region are year round residents. The winter network for these year round residents may be smaller than during other seasons, consisting of warm water nodes in inland canals, rivers, creeks and bays, all connected to nearby foraging areas by corridors formed by rivers or tidal channels.

As water temperatures climb with the approach of spring, warm water nodes may become less important, and nodes providing increasingly scarce freshwater may become more important. However, there is considerable overlap in the winter and dry season inland sites. These nodes commonly are located up narrow creeks and shallow marshes. During the spring, the high use nodes increasingly extend into offshore areas where good forage is available.

As summer approaches, freshwater nodes become less important, and high use areas increasingly shift towards offshore areas or inshore bays with good forage. The advent of low salinities is generally delayed in the southern part of the ENP relative to the TTI area, so the shift to offshore areas may be delayed in those areas as well.

### 12.1.6 MANATEE MORTALITY (WATERCRAFT COLLISIONS)

Wherever manatee and watercraft share waterways or open water, manatees are vulnerable to potentially fatal manatee/boat collisions. Manatees feeding in offshore seagrass beds are in very shallow water and are especially vulnerable to boat strikes. Manatee carcass data indicate that Chokoloskee Bay has disproportionately high manatee/watercraft collision mortality. The boat density data also show this area is heavily used by boats. Several major manatee travel corridors cross this region from the offshore grass beds, through the inshore bays and passes, and up into river systems. These include Chokoloskee Pass and Rabbit Key Pass, Chokoloskee Bay, Baron River, Turner River, Cross Bays, and Lopez River. Speed zones in the inland bay portion of ENP from Gate Bay to Chokoloskee Bay are generally less restrictive (or non-existent) compared to adjacent portions of Collier County, where speed limits are typically 30 mph in channels and 20 mph outside of channels.

#### 12.1.6.1 Boating and Manatee Use Patterns

The winter peak in boating activity corresponds with the greatest number of manatee deaths in the Ten Thousand Islands. Manatees periodically travel between freshwater rivers, including the Port of the Islands, and offshore feeding areas. Boats seem to follow the same pattern using similar travel routes. Boating destinations overlap with the offshore manatee feeding grounds, while the primary point of origin (POI) is also an important manatee thermal refugium and freshwater drinking source.

### 12.1.7 MANATEE MORTALITY (ALL KNOWN CAUSES)

Salvage records documented 520 manatee carcasses from 1977 through 2004 in the TTI and ENP. The cause of mortality could not be determined for 45% of the carcasses recovered in the Everglades area. In cases where the mortality cause was known, over 40% were from watercraft collisions. Nearly all human related mortality resulted from watercraft collisions: only 2% were caused by other human-related means, and no manatees were killed by flood gates or canal locks. Red tide and other natural causes accounted for 27%, and perinatal mortality was the cause in 20% of the known cases. Inland sites were overrepresented in the carcass database, possibly

because the carcass of a manatee that dies offshore might drift inland and be found, or float out to sea and be lost, depending on currents and tides. The Everglades City through Chokoloskee area showed very high numbers of manatees killed by watercraft relative to the entire Everglades region. Marco Island and Whitewater Bay had high numbers of perinatal deaths, and Marco Island also had high numbers of manatees killed by red tide. The relatively few cases of mortality due to cold stress were found in disproportionately high numbers in the POI and Whitewater Bay areas. Overall, the regions with the highest density of carcasses were POI, Marco Island, Chokoloskee Bay, and the east side of Whitewater Bay. There is large annual variation in carcass counts for various mortality categories (USGS data).

### 12.1.8 SPATIAL PATTERNS IN CARCASS RECOVERY (USGS DATA)

The spatial distribution of carcasses in the TTI and the ENP was non-uniform, with a large majority occurring in the northwest area, especially near Chokoloskee Bay, Faka Union Canal, and Marco Island – all areas with a large human population. Watercraft deaths and natural deaths due mostly to red tide also were concentrated in this northwest area. The cause of death could not be determined for a large proportion of the carcasses in the middle and southern portion of the study area, and a large majority of these undetermined or decomposed deaths occurred during the winter.

Undetermined Cause: Approximately 45% (234 of the 520 carcasses) recorded in the study area were caused by an unknown mortality agent. Whitewater Bay showed a significantly higher proportion of undetermined mortality carcasses, possibly due to the remoteness of the area and the low probability of finding a carcass before it decomposes. Conversely, the heavily-populated areas of Marco Island and the POI, along with the Florida Keys showed significantly lower proportions of undetermined cause.

Known Causes:

Watercraft mortality: Approximately 40% (115 of the 286 carcasses) that were recorded with known mortality agents were killed by watercraft collisions. Chokoloskee Bay showed very high numbers of manatees killed by watercraft relative to the entire Everglades region, while the POI and especially Marco Island had disproportionately low numbers. The Florida Keys area showed high numbers of carcasses killed by watercraft.

Perinatal mortality: Approximately 20% (56 of 286 manatee carcasses) were perinatal. Marco Island and Whitewater Bay showed high numbers of perinatal carcasses, and the southern portion of the TTI plus Big Cypress showed low relative numbers of perinatal carcasses.

Cold stress mortality: Approximately 11% (31 of 286 manatee carcasses) died of cold stress. Almost 66% of the manatees killed by cold stress were found at the POI. Whitewater Bay also showed high numbers in comparison with other areas where cold stress mortality occurred.

Other human mortality: Only 2% (2 of 286) manatee carcasses showed mortality due to human causes other than watercraft.

Other natural mortality: Approximately 27% (78 of 286 manatees) died of natural causes other than cold stress. Marco Island showed very high relative numbers, and many of these deaths may

have been due to red tide. Of the relatively few known-cause deaths in the Lostmans River/Shark River area, more than half were from "other natural mortality". The POI and the southern part of the TTI showed low numbers of "other natural" causes.

### 12.1.9 SEASONAL PATTERNS IN CARCASS RECOVERY

Most carcasses (300 of 520; 58%) were recovered during the cold months of December, January, and February, and consisted mainly of cold stress and undetermined deaths. The undetermined deaths peaked during and just after the winter months, and natural mortality, mostly red tide, was disproportionately high during March and April. During the winter, high numbers of carcasses were recovered in the Whitewater Bay region and the POI. During the spring quarter, west of Chokoloskee to Marco Island, high numbers of carcasses were recovered, showing high losses due to red tide in those areas. During the summer and fall quarters, in the southern part of the TTI to Lostmans River, high numbers of carcasses were recovered, all of which were either from watercraft collisions or undetermined causes.

### 12.1.10 FACTORS AFFECTING SPECIES ENVIRONMENT WITHIN THE ACTION AREA

#### Manatee Habitat Requirements in the Ten Thousand Islands

##### 12.1.10.1.1 Access to Foraging Areas

Large numbers of manatees were seen during aerial surveys in several of the larger inshore bays. Chokoloskee Bay had high counts in all seasons, while eastern Whitewater Bay, was occupied year-round, but had high counts only during winter. Smaller bays were also seasonally important, especially in the cold and dry season. Analysis of telemetry data suggest that some manatees remained within inshore bays, although the majority of use by tagged animals occurs in offshore seagrass beds. As an example of a tagged animal that spent a large proportion of time in inshore bays, Santina spent most of the time feeding in Chokoloskee Bay during the wet seasons of 2001 and 2002.

##### 12.1.10.1.2 Access to Freshwater

Several lines of evidence indicate that manatees need regular access to freshwater, presumably for drinking and osmoregulation. Aerial survey data show that manatees were present in rivers and inland areas year-round, but especially during the dry season. The availability of freshwater changes dramatically with season, and during the dry season more manatees were seen inland as compared with the wet season. Seasonal patterns developed from the telemetry data are very similar to the aerial survey patterns, and analysis of tagged individuals show that all tagged manatees make frequent trips up rivers and creeks, apparently to access freshwater, especially during the cold and dry season.

##### 12.1.10.1.3 Avoidance of Cold Stress

Manatees in southwest Florida may be vulnerable to cold stress, especially during severe winters, due to the absence of freshwater springs or industrial warm water effluents. Several passively warmed winter aggregation sites have been documented in this region outside of the ENP, but little is known about the characteristics of aggregation sites within the ENP. Analysis of the 1991 through 2004 winter synoptic surveys indicated that Whitewater Bay, including adjacent areas such as Mud Bay, Joe River, Rogers River, and North River, had the highest counts of manatees in winter in the ENP. Several other inland sites north of Whitewater Bay also were

important, including Upper Broad River, Broad River Bay, Wood River Bay, Rogers River Bay, and Lostmans Creek. Usage of these sites tended to vary considerably from year to year and among surveys, presumably depending in part on the severity of cold winter weather. During cold weather, large numbers of manatees use the canals and basins at the POI Basin, Wooten's Basin, and Big Cypress headquarters as thermal refuges (Figure 4-5).

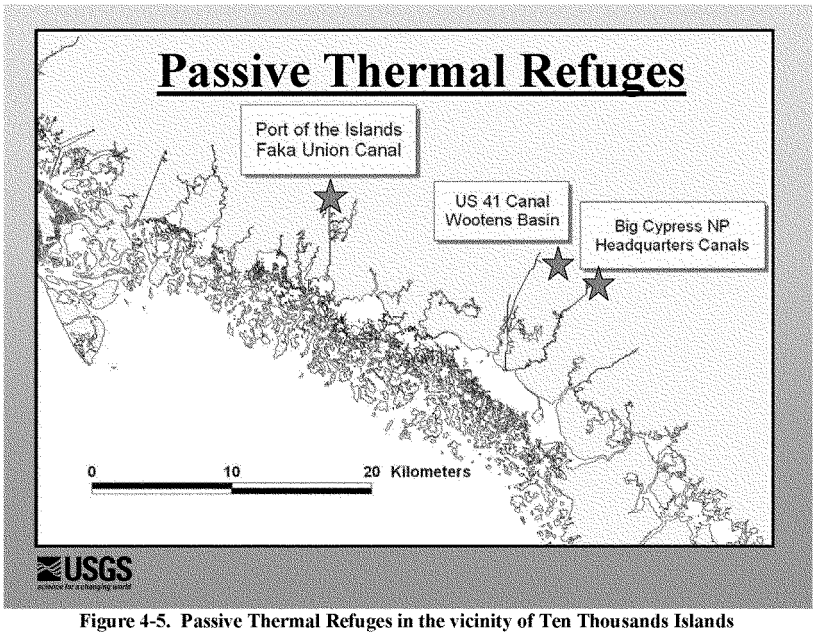



**Figure 4-5. Passive Thermal Refuges in the vicinity of Ten Thousands Islands**

12.1.10.1.4 Manatee Seasonal Distribution and Movement Patterns

All tagged individuals show regular movement between access points for freshwater and areas with preferred forage. When these two resources are close together, manatee movements may be relatively small, but all of the wild manatees tracked for significant periods show regular, multi-kilometer movements between different habitat zones. Manatees with home ranges are likely traveling regularly between offshore and inland zones.

Resources used by manatees in the ENP can be viewed as occurring on a seasonally changing network, where the network consists of warm water sites, sources of fresh water, and foraging areas. On a broad scale, some manatees migrate into the ENP from the north during the winter, while others migrate north out of the region. The limited telemetry data suggest that the majority of manatees in the region are year round residents. The network for these year round residents appears to be smaller in winter than during other seasons, consisting of warm water nodes in inland canals, rivers, creeks and bays, all connected to nearby foraging areas by corridors formed by rivers or tidal channels.

As water temperatures climb with the approach of spring, these warm water nodes may become less important, and nodes providing increasingly scarce freshwater may become more important. However, there is considerable overlap in the winter and dry season inland sites. These nodes commonly are located up narrow creeks and shallow marshes where manatees have difficulty evading fast-moving powerboats. During the spring, the high use nodes increasingly extend into offshore areas where good forage is available.

With the advent of the summer wet season, freshwater nodes become less important, and manatees make more use of offshore areas or inshore bays that provide good forage. During summer and fall, manatee and boat densities showed the highest overlap, generally in the offshore seagrass beds or inshore bays, especially in the Chokoloskee region.

12.1.10.2 POI Basin Isotope Analysis

The USGS baseline study examined the isotope signatures of water in and around the POI Basin to determine the source of warm saline water in the bottom layer of the halocline. Isotopes were collected from a variety of locations designed to present a range of potential water sources, including surface water from rainfall runoff, groundwater from the surficial aquifer, Gulf of Mexico water, several points within the Faka Union Canal, and two deep holes within the POI Basin where manatees are known to congregate. Analysis of the water samples identified the source of the warm saline water in the bottom layer of the halocline as tidal water from the Gulf of Mexico. There is no evidence of a groundwater connection in the POI Basin (Slone, et al. 2013)

12.1.11 POTENTIAL EFFECTS OF THE ACTION

12.1.11.1 Direct Effects of the PSRP

12.1.11.1.1 Access to Freshwater

Implementation of the PSRP would reduce point source discharge via the Faka Union Canal; however, as a whole, the restoration will increase overland flow of freshwater into estuarine waters. Some manatee may alter their behavior and movement patterns to take advantage of these freshwater sources, especially those sources that have a significant freshwater discharge during the dry season. If combined with foraging on SAV in estuarine rivers and bays, this alteration of movement pattern may have a beneficial effect for individual manatees. The reduction of the point discharge via the Faka Union Canal should improve SAV in the estuaries downstream of the PSRP. Access to a stable water source and nearby inshore foraging is beneficial to manatee because they spend less time traveling to offshore seagrass beds resulting in lower energy expenditures and reduced risk of watercraft collisions.

Manatees rely on the Faka Union Weir Number 1 as a source of freshwater during the winter dry season. The PSRP will lead to a reduction of surface flows over the Faka Union Weir Number 1 in the dry season. The weir appears to provide freshwater even under minimal flow conditions. After restoration, surface flows in the Faka Union Canal will be reduced from current dry season conditions; however, during the drier parts of the year after surface flows cease, increased groundwater storage in the undrained PSRP will continue to provide groundwater flows into the remaining unfilled portion of the Faka Union Canal above the POI Basin at higher rates for longer into the dry season than those prior to restoration (Feng, et al. 2010) . However, after

several studies on the potential effect of the PSRP on the thermal refugium at POI Basin, the interagency team has agreed to mitigate for the loss of freshwater flows in the Faka Union Canal.

The proposed action that will mitigate for the loss of freshwater flows in the Faka Union Canal involves creating an oxbow with a warm saline groundwater connection adjacent to the Faka Union Canal just south of the POI Basin. This feature will provide a thermal refugium to manatees during cold, dry periods. The footprint of the feature will be approximately 10 acres, with two (2) acres at a depth of 20 feet to ensure a connection to the groundwater is made (Figure 2-4). Monitoring of groundwater isotopes within the new manatee feature will be used to confirm the presence of groundwater.

12.1.11.1.2 Avoidance of Cold Stress

There are three major thermal refuges for manatees in or relatively close to TTI: POI Basin on Faka Union Canal, Wooten's Basin on U.S. Highway 41 Canal, and the Big Cypress National Preserve Headquarters Canals. These canals were created by dredging, and are deeper than surrounding waters or natural channels. The increased canal or basin depth seems to be a factor in the formation of thermoclines during the winter dry season.

POI Basin provides a thermal refuge to the largest winter aggregation of manatees in TTI. During the dry season months of December through February and into mid-March, both a thermocline and a halocline form in the bottom layer of water at the POI Basin. This layer of relatively warm, salty water appears to form where the basin has been dredged to a depth of 3 to 4 meters (Figure 4-6).

There are multiple factors in the formation and stability of the thermocline. One mechanism by which the POI Basin retains its warm water appears to be a thermal inversion layer, where warm salt water is trapped under a layer of freshwater. The origin of this salt water layer has been shown, through isotope analysis, to be warm salt water from the Gulf of Mexico.

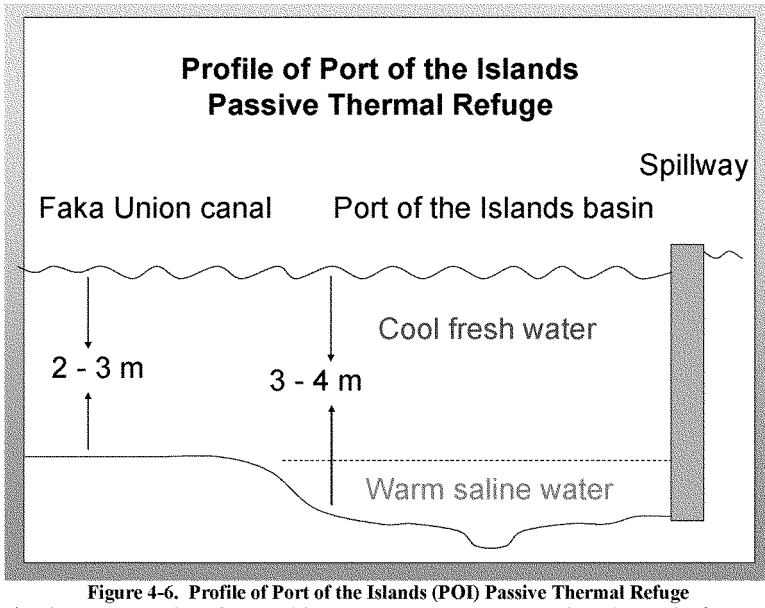



**Figure 4-6. Profile of Port of the Islands (POI) Passive Thermal Refuge**

USGS scientists measured surface and bottom water temperatures in POI Basin from December 1, 2004, through March 30, 2005 (Figure 4-7). The data showed the influence of a strong cold front between December 11 and 15, with surface water temperatures dropping rapidly from 25 degrees Celsius to a low around 18 degrees Celsius. There was a lag of about two days, then bottom temperatures also dropped suddenly and reached a low around 18 degrees Celsius. On seven subsequent occasions from December 22, 2004 through March 12, 2005 (see circles surrounding bottom temperature spikes on graph), bottom temperatures were significantly warmer than surface temperatures, indicating the formation of a thermocline. The thermocline formed between January 15 and January 19, 2005 apparently resulted from thermal lag; however, the other spikes in bottom temperature appeared to result from another mechanism, possibly saline groundwater seepage. Overall, the thermocline appeared unstable, and formed, then dissipated after a few days as surface and bottom temperatures equalized. This cycle repeated several times throughout the period from mid-December 2004 through mid-March 2005.

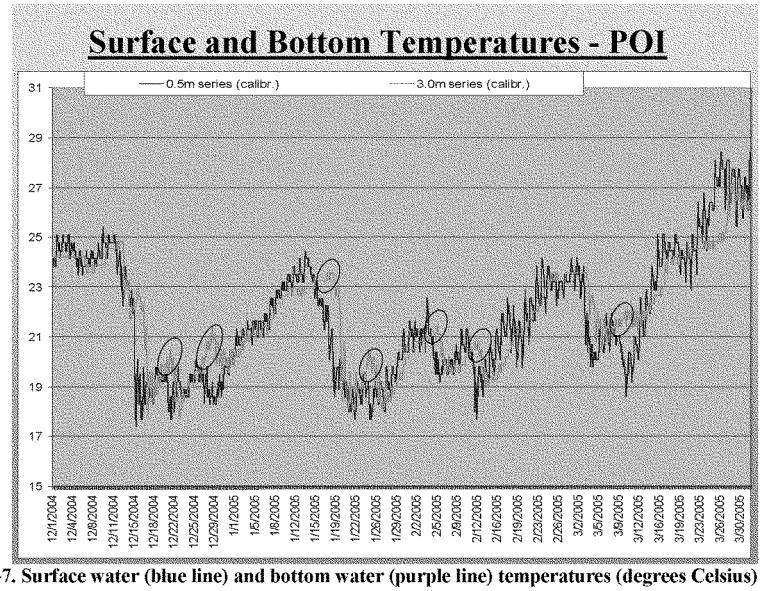



**Figure 4-7. Surface water (blue line) and bottom water (purple line) temperatures (degrees Celsius) at Port of the Islands Marina, from December 2004 through March 2005**

Based on research results provided by USGS (Stith et al. 2011), the original PSRP as outlined in the 2004 PSRP Final PIR/EIS may affect the stability of the thermocline/halocline during the winter at the POI Basin which could potentially lead to an increased risk of cold stress to manatees wintering in the POI Basin. An interagency team formulated the manatee mitigation feature to reduce the risk associated with the loss of the thermocline/halocline in the POI Basin thereby reducing the risk of cold stress to manatees in the area. As a result of the addition of the manatee mitigation feature to the PSRP, the Corps determines that the PSRP will not have a direct effect the warm water refugium in the POI Basin and therefore, will not increase the likelihood of cold stress mortality on manatee within the POI Basin due to implementation of PSRP.

#### 12.1.11.1.3 USGS Predictive Carcass Count Model for Cold Stress

The USGS baseline study shows that the POI Basin does not connect currently connect to warm groundwater, which could provide a constant source of warm water for the manatee refugium. When the freshwater stage Faka Union Weir Number 1 is less than 2.34 feet (NAVD88), no halocline is formed, and there is generally no warm water found during cold periods. This scenario increases manatees risk to cold-stress syndrome which can lead to morbidity and mortality (Slone, et al. 2013). Data on the daily water temperature and manatee mortality from the POI Basin from 2000 to 2011 were used to create a predictive model. Results indicated that the number of days where the ambient water temperature was less than 20 degrees Celsius during the winter was a significant predictor; however, separating the number of days when the stage at the Faka Union Weir Number 1 was above or below 2.34 feet led to a significant increase in predictive power. The model indicated that there was a 49% higher cold-stress mortality rate per days when the stage was low versus when the stage was higher when the ambient temperature is

below 20 degrees Celsius (Slone, et al. 2013). When the PSRP reduces flow over the Faka Union Weir Number 1, it is likely that the number of manatees experiencing cold-stress in the POI Basin will increase.

12.1.11.2 Indirect Effects

12.1.11.2.1 Access to Foraging Areas

Within the action area for manatees, the primary effect of PSRP will be hydrological changes in seasonal discharges to the estuaries in TTI. These hydrological changes would affect freshwater discharges through Faka Union Canal and into the southern estuaries ranging from Fakahatchee River and Bay in the southeast corner of TTI to Blackwater River and Bay in the northwest. During a typical wet year and during the wet season, the amount of rainfall and subsequent runoff within the project area is significant. Currently, Faka Union Canal collects most of the water draining from the project area and channels the flow as an unnaturally large point source discharge into Faka Union Bay. Since most of the runoff that would otherwise go to the estuaries is captured by Faka Union Canal, wet season discharges to the estuaries are significantly decreased compared to predevelopment conditions.

Currently, by the peak of the dry season, runoff from the project area is diminished and flows through Faka Union Canal and the estuaries are minimal. A reduction in runoff would have occurred naturally during the dry season, but the seasonal reduction in surface runoff and ground water flow is amplified by increased drainage from the existing canal system and associated lowering of the water table. The effects of this changed hydrology are not fully known, but salinity envelopes and inshore SAV communities in the TTI estuaries have likely been altered.

Despite an aquatic environment that is altered from pre-development conditions, manatees have adapted to the hydraulic changes and exhibit movement patterns that allow then to successfully access both fresh water for drinking and SAV for forage. Although the offshore zone is a major focus of activity for manatees, some individuals spend a substantial proportion of their time within inshore rivers and bays. The food resources available in these less saline ecozones may vary significantly both seasonally and annually, and the plant communities are likely to be more dynamic compared to the offshore seagrass beds. Human modifications to freshwater inflow into these bays may have greatly altered the composition and abundance of SAV in many of these bays, probably favoring more salt-tolerant species.

Irrespective of season, most manatees show a pattern of frequent, regular movement between offshore and inland zones. Tagged manatees typically spent less than a day at inland sites, but often remained on offshore seagrass beds for several days or more. Nearly all manatees show a similar pattern of alternating between the offshore and inshore zones at regular intervals ranging from 2 to 8 days throughout the year.

With implementation of PSRP and the filling of canals in the project area, the water table will raise and likely remain higher throughout the year. During the wet season, most of the runoff will no longer be collected by Faka Union Canal. Instead, increased volumes of run-off will flow out to TTI bays through various estuarine rivers and creeks. Salinity envelopes in the estuaries will shift, and the types of SAV communities that existed prior to development may become reestablished or shift in response to salinity changes.

With the raised water table resulting from restoration, dry season discharges to the estuaries, while diminished as compared to the wet season, will likely be significantly greater than under current conditions. After restoration, surface flows in the Faka Union Canal will be reduced from current dry season conditions; however, during the drier parts of the year after surface flows cease, increased groundwater storage in the undrained PSRP will continue to provide groundwater flows into the remaining unfilled portion of the Faka Union Canal above the POI Basin at higher rates for longer into the dry season than those prior to restoration (Feng, et al. 2010).

Offshore seagrass beds will not change as a result of restoration; because these foraging areas are located too far offshore to be affected by changes in salinity conditions resulting from restoration. In estuarine river systems and bays, restoration activities will likely favor the reestablishment and growth of new SAV communities through exposure to increased and prolonged freshwater discharge. The likely reestablishment of new SAV communities in estuarine and inshore aquatic areas would have the beneficial effect of providing more foraging habitat for manatees in the TTI.

Manatees are opportunistic in their search for forage. Some individuals may alter their movement patterns and spend more time during the wet season, and perhaps the dry season, foraging on new SAV communities in estuarine rives and bays. This change in foraging behavior and movement pattern may have a significant beneficial effect on these individuals. Access to a stable water source and nearby inshore foraging is beneficial to manatee because they spend less time traveling to offshore seagrass beds resulting in lower energy expenditures and reduced risk of watercraft collisions.

12.1.11.2.2 Manatee Mortality from Boat Collisions

According to manatee mortality data for the TTI region, 115 of the 286 manatee carcasses (40%) that were recorded with known mortality agents were killed by watercraft collisions. However, POI had disproportionately low numbers, probably resulting from regulatory and educational influences on human behavior. Faka Union Canal has manatee speed limits, with apparently some successful enforcement by authorities. Also, educational efforts to teach manatee conservation may have persuaded many boaters at POI to voluntarily comply with speed restrictions, resulting in a relative reduction in manatee/watercraft collisions.

Manatees in TTI use a network of resources, and have daily, weekly, and seasonal movement patterns to access forage, most frequently at offshore seagrass beds, to access freshwater available in the upper estuaries or at the POI weir, and to seek warm water refuge during the winter. Irrespective of season, most manatees exhibit a pattern of frequent, regular movement between offshore and inland zones. Manatees typically spend less than a day at inland sites, but often remain on offshore seagrass beds for several days or more. Nearly all manatees show a similar pattern of alternating between the offshore and inshore zones at regular intervals ranging from 2 to 8 days throughout the year.

In addition, the channels used by manatees to access resources are also frequently used by boaters, resulting in the risk of manatee/watercraft collisions which may be harmful or fatal to manatees. However, the restoration project will have no effect on recreational boating in TTI.

There remains the possibility that manatees may alter their movement patterns as a result of restoration, perhaps indirectly increasing the risk of manatee/watercraft collisions.

For those individual manatees traveling between inshore resources and offshore seagrass beds, the risk of manatee/boat collisions would not be changed by restoration. Manatee use of POI would remain unchanged, or would be reduced as manatees seek freshwater and potentially new forage in restored upper estuaries. For individual manatees foraging on new SAV communities inshore, or seeking freshwater in upper estuarine creeks and rivers instead of POI, restoration would result in less manatee travel through corridors heavily used by boats, with the beneficial result of reduced risk of manatee boat collisions.

### 12.1.12 PROPOSED MANATEE MONITORING

#### 12.1.12.1 Evaluation of Effects of Backfilling Merritt Canal on Flows to Port of the Islands Basin

When the north-south portion of Merritt Canal is plugged, the east-west portion of the canal at the southern end of the Picayune Strand Restoration Project (PSRP) will remain open and continue to capture flows moving to the south. Thus, the current level of flow into the Port of the Islands (POI) Basin should remain essentially the same after the north-south section of Merritt Canal down to 126$^{th}$ Avenue is plugged. However, monitoring will be conducted to ensure that plugging the Merritt Canal does not cause significant changes to the conditions in the POI Basin.

The South Florida Water Management District (SFWMD) currently monitors flows over Faka Union Weir #1 and three rainfall stations; SGGEWX (NW), Collier Seminole State Park (SW) and Dan House Prairie (SE), within or near the PSRP. The data are stored within SFWMD's DBHydro database. An equation developed by the United States Geological Survey (USGS) uses these four datasets to correlate canal flows from the lower Faka Union Canal into POI Basin with rainfall within the upstream watershed.

The USGS equation described above will be used to assess whether the monthly flow-rainfall relationship has been significantly altered by filling the north-south portion of Merritt Canal. This relationship will be evaluated for one winter season (December 1 to April 1) following the start of Merritt Canal plugging. If canal plugging begins between December 1 and April 1, monitoring will occur through April 1 of that dry season and be repeated the next winter season from December 1 through April 1. If canal plugging begins between April 1 and November 30, monitoring will occur during the next winter season from December 1 through April 1. The actual plugging of the canals will take approximately three to four months. If no significant changes to flows are observed, the evaluations will be discontinued after one full winter season (December 1 to April 1); however, if a significant change is observed using the equation developed by USGS, as a function of plugging Merritt Canal, the U.S. Army Corps of Engineers (Corps) and SFWMD will consult with U.S. Fish and Wildlife Service (USFWS) and Florida Fish and Wildlife Conservation Commission (FWC) to determine if any additional action(s) are needed or required. Information will be analyzed and reported on a monthly basis.

Additionally, the "Guidelines for Manatee Conservation During Comprehensive Everglades Restoration Plan Implementation" (CERP Interagency Manatee Task Force 2006) and the

Standard Manatee Construction Guidelines will be implemented for all construction phases while working in canals accessible to manatees.

12.1.12.2 Post-construction Manatee Monitoring

Post-construction manatee monitoring for the PSRP will begin with the plugging of all canals within the project. The Faka Union Canal conveys the largest amount of water to POI Basin; therefore, plugging the Faka Union Canal will likely alter freshwater flows into POI Basin more significantly than plugging of the Merritt or Miller canals. Therefore, if the Faka Union Canal is plugged prior to the Miller Canal, post-construction monitoring will begin following the construction of the first Faka Union Canal plug. As freshwater flows into POI Basin are reduced, the manatee refugium at POI Basin will likely be altered.

The Faka Union and Miller Canals will not be plugged until the Endangered Species Act (ESA) consultation on the West Indian Manatee is complete and a manatee mitigation feature has been implemented in the POI Basin to compensate for the reduction in freshwater flows into POI Basin. The project is phased so that each pump station will begin operations when complete, with the Miller pump station completed last. When all pump stations are completed, the manatee mitigation feature and western protection features are functional, and all canals are plugged, the project can begin to achieve estuarine benefits. One goal of PSRP was to redistribute freshwater flows to the estuaries and reduce the point discharge from the Faka Union Canal. It is this point source discharge from the Faka Union Canal that is responsible for the current manatee refugium within the POI Basin. As a result of restoration, this artificial refugium will be altered, thus the need for the manatee mitigation feature. As natural freshwater flows are reestablished in the estuaries south of Picayune Strand, it is anticipated that manatees will begin to utilize these natural areas once again. The PSRP acknowledges that manatees have become reliant upon the POI Basin refugium; therefore monitoring will be conducted in the POI Basin beginning the first winter season from December 1 through April 1 as identified in Table 4-1. Manatee observations as described in Table 4-1 will be conducted by a qualified marine species observer as outlined within the 2006 Guidelines for Manatee Conservation during Comprehensive Everglades Restoration Plan Implementation (CERP Interagency Task Force 2006). Post-construction seagrass surveys are included in the overall PSRP Monitoring Plan and will be included in results of manatee monitoring.

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**Table 4-1. Proposed Picayune Strand Restoration Project Manatee Monitoring Plan**

| FEATURE | OBJECTIVE | TASK | DURATION | TARGET |
|---|---|---|---|---|
| Merritt Canal (begin monitoring with construction of first plug) | | | | |
| Begin evaluating flows at Faka Union-1 (FU-1) and rainfall after the start of Merritt canal plugging | Determine if significant changes occur to flows at FU-1 at times when rainfall would historically maintain the manatee refugium at POI | Evaluate stage and rainfall at FU-1 using DBHydro and rainfall (SGGEWX [NW], Collier Seminole State Park [SW] and Dan House Prairie [SE]) monthly using equation developed by USGS (Sloan et al., 2013) to determine if significant changes occur.<br><br>Assumption: Headwater stages above 2.34 feet NAVD88 at FU-1 would result in halocline formation and resultant thermal refuge. | Maintain stage/rainfall correlation within 95% confidence limits of prediction based on 7 years of winter rainfall data for first full winter season following canal plugging. If stage/rainfall correlations met after one year (December 1-April 1 time period), determine no effect.<br><br>If stage/rainfall correlations not met after one year, identify if rainfall patterns were outside of original model period of record (2003-2004 to 2009-2010). If yes, repeat analysis for one more year. If no, initiate consultation with FWS/FWC on manatee effects due to Merritt and potential additional effects from Miller and Faka Union canal plugging. | If the canal plugging begins between December 1 and April 1, monitoring will occur through April 1 of that winter season and be repeated the next winter season from December 1 through April 1.<br><br>OR<br><br>If canal plugging begins between April 1 and November 30, monitoring will be conducted for one full winter season from December 1 through April 1. |
| Post-Construction Monitoring (all canals plugged – Prairie, Merritt, Miller, Faka Union) | | | | |

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| If construction of the manatee mitigation feature is completed between April 1 through November 30 monitoring will start the following December 1.<br><br>OR<br><br>If construction of the manatee mitigation feature is completed from December 1 through April 1 monitoring will start immediately through April 1 and restart the next winter season (December 1 to April 1). | Determine success of the manatee mitigation feature following the completion of the PSRP at times when rainfall would historically maintain the manatee refugium at POI. | 1. Monitoring of vertical temperature strata using data loggers. Vertical temperature strata to include bottom, middle, and upper depths. These depths will be determined during mitigation feature design. At least one temperature logger would be telemetry-based for real time transmission of data to determine cold events.<br><br>2. Isotope analysis – collect water isotopes to determine 18O/16O and 2H/1H ratios. Monthly (December 1 to April 1) The bottom depth would be determined during mitigation feature design. | 1. Maintain vertical temperature strata with bottom layer at least 20°C during moderate to severe cold weather events at times when rainfall would historically maintain the manatee refugium at POI.<br><br>2. Confirm presence of groundwater isotopes and trend in bottom layer.<br><br>Moderate to severe weather events occurred:<br>a) If groundwater isotopes are confirmed within mitigation refugium area and bottom temperatures remain at or above 20 degrees Celsius during moderate to severe cold weather events for 3 full winter seasons - monitoring will be discontinued.<br>b) If isotopes are confirmed but temperature threshold is exceeded, monitor for additional 3 years and reevaluate.<br>c) If isotopes are not confirmed, evaluate rainfall/stage equation to determine if halocline formation would have likely formed. If no, continue monitoring for additional 3 years. If yes, initiate consultation with USFWS and FWC on potential manatee effects.<br>d) If no moderate to severe whether events occur, continue monitoring for 3 more years. | 1. Collect and evaluate temperature data monthly during winter season (15 to 30 minute intervals with data loggers) collected and evaluated monthly from December 1 to April 1. Monitor for 3 years then re-evaluate in consultation with USFWS and FWC using decision matrix with options to continue or discontinue monitoring. Isotope data would be collected monthly (December 1 to April 1) and during moderate to severe cold weather events.<br><br>2. First test performed immediately following completion of construction of the manatee mitigation feature (construction contract). Duration: Monthly (December 1 to April 1) for 3 years at the beginning of winter season. Re-evaluate after 3 years in consultation with USFWS and FWC. |

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|---|---|---|---|---|
| Manatee Observations | Determine if manatees are using the manatee mitigation feature | Manatee use*:<br>1. Manatee mitigation feature and;<br><br>2. POI Basin<br><br>* Manatee Observation protocol will be developed in conjunction with USFWS and FWC. | Determine presence and number of manatees within:<br><br>1. Manatee mitigation feature<br>Confirm presence of manatees within the feature for 3 cold weather events (2 moderate and 1 severe during the period between December 1 to April 1.<br><br>2. POI Basin<br>Confirm presence of manatees within the POI Basin for 3 cold weather events (2 moderate and 1 severe) during the period between December 1 to April 1.<br>Discontinue task if target (letter a below) reached.<br><br>a. If manatees are present in manatee mitigation feature during 3 cold events (2 moderate and 1 severe) and the feature is working (hydrology/temperature criteria), then reevaluate monitoring.<br>b. If moderate to severe cold events occur and manatee mitigation feature is not working (hydrology/temperature criteria) and halocline would not have formed based on USGS equation analysis of rainfall and stage, then continue monitoring for additional 3 years.<br>c. If manatees are not present in manatee mitigation feature during cold events and mitigation feature is working (hydrology/temperature criteria), then coordinate with FWC/USFWS to evaluate potential manatee effects.<br>d. If manatees are not present in manatee mitigation feature during cold events and mitigation feature is not working (hydrology and temperature criteria), and halocline would have formed based on USGS equation analysis of rainfall and stage, then coordinate with FWC/USFWS. | Winter season for up to 10 years following completion of the manatee mitigation feature within:<br><br>1. Manatee mitigation feature area beginning the next day following a cold event (water temperature below 20°C) for 2 days. Based upon information provided from data loggers described in post-construction monitoring.<br><br>2. POI Basin area for 2 days beginning the next day following a cold event (water temperature below 20°C) **and** when FU-1 stage is below 2.34 feet NAVD88.<br><br>The PSRP Monitoring and Assessment Group (MAG) will meet annually to assess monitoring data. After three cold events (two moderate and one severe), the PSRP MAG will reassess need for further manatee observation monitoring requirements. |

*A moderate cold event is described as ambient water temperatures fall below 20°C for a period of 14 days. A severe cold event is defined as ambient water temperatures (as indicated by monitoring well located at mouth of Faka Union Canal) fall below 20°C for 25 days or fall below 15°C for a period of 14 days.

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12.1.12.3 Vertical Temperature Strata

Three vertical temperature strata will be continuously monitored, as defined in Table 4-1, during the winter season from December 1 through April 1 for three full winter seasons following the beginning of plugging the Faka Union and Miller Canals to determine the temperature in the water column within the manatee mitigation feature. Vertical temperature strata will include bottom, middle, and upper depths. These depths will be determined during mitigation feature design. Prolonged water temperatures below 20 degrees Celsius can lead to cold stress syndrome in manatees (Bossart et al. 2003). The current refugium in the POI Basin functions as a temperature inverted thermocline/halocline; it is expected that the manatee mitigation feature will serve as a manatee refugium by establishing a connection with warmer saline groundwater. It is important to monitor the vertical temperature strata to determine whether the manatee mitigation feature serves as a refugium in light of the post-construction reduction in point source discharge of freshwater inflows to POI Basin.

12.1.12.4 Isotope Analysis

Isotope analyses will be conducted on the bottom water layer of the manatee mitigation feature monthly (December 1 to April 1) for three years to verify the presence of groundwater within the manatee mitigation feature. USGS conducted studies from 2009 to 2011 of the isotope signatures in the POI Basin and determined that there is currently no groundwater connection in the relatively shallow POI basin; furthermore, they identified the unique isotope signatures of groundwater, water from the Gulf of Mexico, and freshwater from the Faka Union canal. These data can be used to determine the presence or absence of a groundwater connection once the manatee mitigation feature is completed.

12.1.12.5 Evaluation of Boat Strike and Mortality/morbidity Data

Boat strike and mortality/morbidity data collected by the USFWS and FWC will be evaluated to observe patterns of changes in distribution and occurrence of cold stress in manatees within the POI basin. Collection of these data will not be funded by SFWMD or USACE; however, SFWMD and USACE biologists can utilize these already available data to help evaluate possible post-construction changes in manatee boat strikes and mortality/morbidity patterns.

12.1.12.6 Manatee Observations

Manatee observations will be performed within the POI Basin and manatee mitigation feature to determine if manatees are using the new refugium. Observations will be conducted once a day within the manatee mitigation feature the next day following a cold event where the ambient water temperature reaches 20°C or less for two days following the cold event. Observations will be conducted in the POI Basin under the same temperature condition and duration with the additional requirement that the stage at the FU-1 is less than 2.34 feet NAVD88 as determined critical by the USGS trigger analysis. Manatee observations as described in Table 4-1 will be conducted by a qualified marine species observer as outlined within the 2006 Guidelines for Manatee Conservation during Comprehensive Everglades Restoration Plan Implementation (CERP Interagency Task Force 2006).

12.1.12.7 Manatee Mitigation Success Criteria

In conjunction with the proposed manatee monitoring plan, an inter-agency meeting including the SFWMD, the FWC, the USFWS, and the Corps was held on 20 August 2014 to discuss factors in determining the success of the manatee refugium.

The Success Criteria Objectives are as follows:

1. The new manatee refugium (POI berm refugium) will maintain the thermo-regulating functions of the existing manatee refugium (POI marina refugium) with sufficient warm water supply, temperature and longevity to attract and protect manatees from cold stress during a moderate to severe cold weather event. Warm water supply, temperature and longevity are sufficient to attract and protect manatees from cold stress and mortality during moderate to severe cold weather event.
    a. A groundwater connection (as demonstrated by isotope analysis) to warm saline water will be established and maintained at the new refugium site.
    b. Water temperature within the refugium will remain at or above 20 degrees Celsius; supporting a manatee refugium during a moderate to severe cold weather event lasting up to 3 weeks.

    Groundwater isotopes and water temperature monitoring is included as monitoring success criteria for the manatee refugium mitigation feature. The goal is to create a refugium with groundwater signatures at or above temperature thresholds of 20 degrees Celsius during moderate to severe cold weather events. In addition, analysis of the FU-1 stage, flow and area rainfall is included to assess whether these variables would have created a halocline in POI Basin under pre-restoration conditions.

2. Manatees use the new refugium without definitive changes (as defined by the USFWS, FWC, and USGS) in manatee demographics and health:

    a. Manatee cold stress-related deaths in the POI area do not exceed the Predictive Carcass Count Table for POI and Faka Union Canal (USGS citation).

    The goal of the monitoring plan is to determine if the Manatee Mitigation feature warm-water refugium was created based on groundwater signatures and whether the constructed feature meets the temperature threshold as described in response to #1 above. The monitoring plan to be funded by USACE/SFWMD as part of the PSRP Manatee Mitigation Feature does not include any monitoring to identify whether manatee cold stress-related deaths in POI Basin exceed the Predictive Carcass Count Table for POI Basin and Faka Union Canal. There is concern regarding the complexity and accuracy

of monitoring cold-stress specific mortality to determine whether the feature may or may not be creating unintended consequences. USACE and SFWMD recognize that FWC/USFWS may fund and provide this information per their species conservation monitoring efforts to understand manatee species conditions in the area. Language was incorporated into the monitoring plan at the request of USFWS and FWC to address mortality/morbidity data, however, it was always acknowledged that this monitoring data would be funded and evaluated by USFWS/FWC and the valuation and associated results provided to USACE and SFWMD for review. If the evaluation and results are provided, data and analysis should explain how predictive carcass count table was used to confirm whether or not results indicate potential manatee refugium mitigation performance issues. FWC will continue to uphold the responsibility of carcass recovery and determination of cause of death. FWC will coordinate with USFWS on evaluation of the data. USACE and SFWMD are not responsible for obtaining or analyzing data related to manatee cold stress deaths.

b. Comparable numbers of manatees that used the POI marina refugium site are using the POI berm refugium site under a moderate to severe cold weather event.

Identifying whether manatees are using the manatee mitigation feature (through observation of manatee presence) is another important criterion to confirm whether the refugium is working. The monitoring plan includes manatee observations at the manatee mitigation feature, POI Basin and FU-1 to determine presence of manatees under a moderate to severe cold weather event. Due to natural population variability, it is not feasible to make accurate comparisons of manatee usage. The success of the refugium will be based upon whether a groundwater interaction has been created and presence of manatees within the manatee mitigation feature. The USFWS and FWC will continue to conduct surveys to confirm that comparable numbers are present. USACE and SFWMD will monitor manatees are described in Table 4-1: Picayune Strand Restoration Project Manatee Monitoring Plan.

c. Manatee population health assessments at the POI berm refugium (cold stress symptoms, morbidity/mortality due to cold stress) are comparable to the existing refugium, unless those symptoms are attributed to area habitat or climatic changes.

The monitoring plan to be funded by USACE/SFWMD as part of the PSRP Manatee Mitigation Feature does not include monitoring to assess manatee population health at the manatee mitigation feature. Manatee health assessment monitoring is both complicated and challenging to pinpoint to the

manatee mitigation feature to determine whether the project was successful and did not result in unintended consequences. Climate variability, food source availability throughout the year prior to entering the manatee mitigation feature and stressors unrelated to the manatee mitigation feature could confound the animal's stress level and compromise the ability to detect any changes due to the manatee mitigation feature or changes in POI Basin due to PSRP. USACE and SFWMD recognize that FWC/USFWS may fund and provide information per their species conservation monitoring efforts to understand manatee species conditions in the area. If provided, data and analysis should explain how the predictive carcass count table was used to confirm whether or not results indicate potential manatee mitigation feature performance issues. FWC will continue to conduct health assessments. Health assessments are not an appropriate activity for the project to fund. USACE and SFWMD are not responsible for conducting manatee population health assessments.

The POI berm manatee refugium shall be determined to be a success when monitoring indicates that the two objectives listed above are achieved over a time period that includes one moderate and two severe cold weather events. A moderate cold weather event is defined as: Ambient water temperatures fall below 20 degrees Celsius for a period of 14 days. A severe cold weather event is defined as: Ambient water temperatures fall below 20 degrees Celsius for a period of 25 days or fall below 15 degrees Celsius for a period of 14 days. Ambient temperature will be as measured by Faka Union Canal monitoring well (near mouth of canal- station number to be identified).

Monitoring of the refugium and manatee sub-population shall occur consistent with the monitoring plan presented in Table 4-1. After at least one moderate and one severe cold weather events and at least three years of data, a panel of manatee experts that includes the U.S. Fish and Wildlife Service, Florida Fish and Wildlife Conservation Commission, and U.S. Geological Survey shall meet to determine if additional monitoring is necessary.

The original recommendation to discuss discontinuance of monitoring after one moderate and two severe cold weather events occurrence and after 10 years have experienced was confusing and too long a period before the discussion of discontinuing the monitoring should occur. Discussion and determination of whether monitoring should continue needs to occur at a minimum of three year intervals. The actual determination should be based on whether moderate and/or severe cold events have occurred and the new manatee mitigation feature success criteria have been met. These decision statements have been added to the monitoring plan to help aid determinations of whether or not to continue monitoring. Once the success criteria have been met during a moderate and/or extreme cold weather event, then the decision to discontinue monitoring will be made by USACE/SFWMD in coordination with USFWS and FWC. USACE and SFWMD will monitor manatees are described in Table 4-1: Picayune Strand Restoration Project Manatee Monitoring Plan.

12.1.12.8 Additional Monitoring:

The following monitoring data is included in this monitoring plan solely per request of FWC and USFWS. All data are collected and funded by FWC/USFWS and will be considered in determining manatee use in area. Any data that are available and determined to be of use by FWC/USFWS will be coordinated with the Corps/SFWMD.

3. Boat Strike Data: FWC and USFWS boat strike data may be used to assess post-construction manatee distribution changes in POI Basin area. Data will be provided to Corps and SFWMD for review, if available and produced by FWC/FWS. Data will be assessed until manatee mitigation feature success criteria are met.
4. Mortality/Morbidity Data: FWC/FWS data regarding manatee mortality and morbidity related to regional cold stress data may be used to assess post-construction cold stress effects on manatees in the POI Basin area. Data will be provided to Corps and SFWMD for review, if available and produced by FWC/FWS. Data will be assessed until manatee mitigation feature success criteria are met.

In addition to the monitoring listed above, the following list of estuarine water quality and hydrological monitoring stations as well as the project-specific hydrological monitoring stations located in the upper estuary are considered important to evaluating project effects on manatees and their critical habitat. Funding sources for these stations have varied and have included RECOVER, USGS, PES, and the SFWMD. If funding of these stations is proposed to be discontinued, the MAG will be notified and the effect that the loss of the stations would have on manatees and their critical habitat will be evaluated.

7. **POI Boat Basin** – floating salinity/temperature sensor, near bottom salinity/temperature sensor, and 8 sensor thermistor string – monitoring salinity stratification and temperature inversions (re-starting in November 2013; only winter months) – **Funded by PES**
8. **East River** – salinity, temperature, water level – **funded by RECOVER**; discharge (*re-starting in November 2014*) – **funded by PES**
9. **Faka Union Canal near the mouth** – salinity, temperature, water level, and discharge – **funded by RECOVER**
10. **Pumpkin River** – salinity, temperature, water level, and discharge – **funded by RECOVER**
11. **Blackwater River** – salinity, temperature, water level, and discharge – **funded by RECOVER**
12. **Palm River** – salinity, temperature, and water level – **funded by RECOVER**

## 12.1.13 DETERMINATION OF EFFECT

With implementation of the PSRP and the filling of canals in the project area, the water table will raise and likely remain higher throughout the year. During the wet season, most of the runoff will no longer be collected by Faka Union Canal. Instead, increased

volumes of run-off will flow out to TTI bays through ground water and various estuarine rivers and creeks. Salinity envelopes in the estuaries will shift, and the types of SAV communities that existed prior to development may become reestablished or shift in response to salinity changes.

With the implementation of the PSRP, dry season discharges to the POI Basin that maintain the thermal refugium will likely be reduced from current conditions; therefore, PSRP will implement a manatee mitigation feature as described in Section 2.5, to compensate for the loss of dry season flows. The presence of a manatee refugium at the POI Basin will not be affected by the PSRP during the wet season with implementation of the feature described in Section 2.5.

There may be a direct effect to manatees as a result of the PSRP implementation; however, the manatee mitigation feature was designed to mitigate for the loss of dry season freshwater flows that maintain a thermal refugium at the POI Basin. The West Indian manatee's critical habitat includes all waters of TTI estuaries and the POI Basin. Based on the USGS studies and the implementation of the manatee mitigation feature, the Corps determines that the PSRP "may affect, but is not likely to adversely affect" manatee or its critical habitat at the POI Basin or in the TTI region. A manatee monitoring plan has been developed to confirm the existence of a groundwater connection following the implementation of the manatee mitigation feature. If monitoring indicates that the manatee mitigation feature is not able to provide a thermal manatee refugium, further monitoring or measures may have to be implemented to ensure the maintenance of the refugium at the POI Basin.

## 12.2 FLORIDA PANTHER

### 12.2.1 SPECIES DESCRIPTION

The Florida panther was listed as endangered throughout its range in 1967 (32 FR 4001), and received Federal protection under the passage of the ESA of 1973, as amended (16 U.S.C. 1531 *et seq.*). Since the panther was designated as an endangered species prior to enactment of the ESA, there was no formal listing package identifying threats to the species as required by section 4(a)(1) of the ESA. No critical habitat has been designated for the panther. An extensive description of life history traits of the Florida panther is included in the 2009 BO (USFWS 2009) and is hereby incorporated into this fourth supplemental BA by reference.

### 12.2.2 DETERMINATION OF EFFECT

The project area is known to support the Florida panther, panther prey, and to include panther habitat as discussed in the 2004 PSRP Final PIR/EIS, 2008 BA, and 2009 BO. However, the manatee mitigation feature is constructed outside of the Florida Panther Focus Area or ESA consultation area as described in the 2009 BO. The inclusion and implementation of the manatee mitigation feature at the POI Basin will not significantly affect panther habitat and most of the effect will be temporary. Therefore, the Corps determines the manatee mitigation feature "may affect, likely to adversely affect" the Florida panther.

## 12.3 FLORIDA BONNETED BAT

### 12.3.1 SPECIES DESCRIPTION

The Florida bonneted bat is Florida's largest bat, weighing approximately 1.1 to 2.0 ounces, with a 19 to 21 inch wingspan, and a body length of 5.1 to 6.5 inches. The species has dark brown fur and large broad ears that join together and slant forward over the eyes. Relatively little is known regarding the ecology and habitat requirements of this species (USFWS 2013). In general, bats will forage over ponds, streams and wetlands and require roosting habitat for daytime roosting, protection from predators and rearing of young (Marks and Marks 2008). Florida bonneted bats roost in tree cavities, rocky outcrops and dead palm fronds. In residential communities, the bats roost in Spanish tile roofs, but have also been found in attics, rock or brick chimneys and fireplaces of old buildings (NatureServe 2013). Colonies are small, with the largest reported as just a few dozen individuals. The bat is a nocturnal insectivore and relies upon echolocation to navigate and detect prey. Females give birth to a single pup from June through September (Marks and Marks 2008, Florida Bat Conservency 2005); however limited data suggests that a female may undergo a second birthing season possibly in January or February (USFWS 2013).

The Florida bonneted bat is Florida's only endemic bat and is listed by FWC as a state listed endangered species and is listed as endangered under the Endangered Species Act as of November 1, 2013. The range of this species is limited to southern Florida, although this species was encountered in 2008 in two locations within the Kissimmee River Wildlife Management Area north of Lake Okeechobee. Records indicate that it was once common in the 1950s and early 1960s near Coral Gables and Miami (Belwood 1992). The Florida bonneted bat has only been documented in 12 locations within Florida, including areas within Coral Gables, Homestead, Naples, Everglades City and North Fort Myers. Seven of the locations are under public ownership with the Florida bonneted bat found in discrete and specific areas within Big Cypress National Preserve, Fakahatchee Strand Preserve State Park, Kissimmee River Wildlife Management Area, Babcock Ranch and Fred C. Babcock and Cecil M. Webb Wildlife Management Area (USFWS 2013). The capture of a juvenile male at Picayune Strand State Forest on December 17, 2009 indicated that breeding was occurring in the area (Smith 2010). FWC biologists and volunteers caught a free-flying juvenile male Florida bonneted bat using a mist net in the PSSF (PSRP). Habitat composition of PSSF includes wet prairie, cypress stands, and pine flatwoods in the lowlands and subtropical hardwood hammocks in the uplands, and the individual was captured in the net above the fresh water portion of Faka Union Canal (Smith 2010, p. 1). The species has been detected at nine locations within PSSF (i.e. captured at one location, heard while mist netting at eight other locations), and each site was located near freshwater canals (K. Smith, pers. comm. 2013). In 2000, the species was recorded within mangroves at Dismal Key within the Ten Thousand Islands (Timm and Genoways 2004, p. 861; Marks and Marks 2008a, pp. 6, A9, B53; 2012, p.14. Habitat loss and alteration in forested and urban areas are major threats to the Florida bonneted bat (Belwood 1992, p.220; Timm and Arroyo-Cabrales 2008, p.1). In natural areas, this species may be impacted when forests are converted to other uses or when old trees with cavities are removed (Belwood 1992, p. 220; Timm and Arroyo-Cabrales 2008, p.1). In urban settings, this species may be impacted when

buildings with suitable roosts are demolished (Robson 1989, p.15; Timm and Arroyo-Cabrales 2008, p.1) or when structures are modified to exclude bats. Although the species' habitat preferences and extent of range are not well understood, significant land use changes have occurred in south Florida and additional habitat losses are expected in the future, placing the species at risk. Uncertainty regarding the species' specific habitat needs and requirements arguably contributes to the degree of this threat. Loss of suitable habitat is believed to be the primary cause of population decline. Other perceived threats include pesticide and herbicide use, which decrease populations of insects, the bats primary prey. Since the Florida bonneted bat is suspected to have high roost site fidelity, the loss of a roost site may cause greater hardship to the species than the loss of a roost site for other, more labile species (H. Ober, *in litt.* 2012). Current roosting sites include only manmade, artificial structures, although bats have been documented to roost in pine tree cavities and in palm fronds (FWS 2013).

#### DETERMINATION OF EFFECT

Evidence of direct impacts to the Florida bonneted bat as a result of the construction of the manatee mitigation feature is lacking, and negative impacts to the species is unlikely. The restoration of natural hydrology in Picayune Strand and the surrounding protected public lands would likely increase available nesting and foraging habitat for the Florida bonneted bat. Only limited removal of open areas of scattered live oak, cabbage palm, some mangroves and sandy, xeric habitat will occur at the project site. No artificial structures suitable for roosting are located on the site. As a condition for construction, pre-construction wildlife surveys for all listed species and migratory birds will be conducted and any cavities that are identified will be surveyed for roosting bats. Therefore, the manatee mitigation feature, "may affect, but is not likely to adversely affect" the Florida bonneted bat.

## 12.4 AMERICAN CROCODILE

### 12.4.1 SPECIES DESCRIPTION

The current distribution of the American crocodile is limited to extreme south Florida, including coastal areas of Collier and Lee Counties along Florida's southwest coast. The majority of crocodiles are present in the vicinity of core nesting areas, located near Biscayne and Florida Bays (Kushlan and Mazzotti 1989). Several small groups and individual crocodiles have been documented from Sanibel and Pine Islands, Lee County, south to Fakahatchee River, Collier County (USFWS 1999), including the Port of the Island marina basin and surrounding estuaries. The 35,000-acre TTI National Wildlife Refuge is located directly south and southwest of the PSRP in Collier County and ½ mile west of the manatee mitigation feature, and was created to protect important mangrove and marsh habitats, native wildlife, and the endangered species of the area including the American crocodile. The PSRP area does not include designated critical habitat for the American crocodile, therefore, none will be affected.

The American crocodile is found primarily in mangrove swamps and along low-energy mangrove-lined bays, creeks, and inland swamps (Kushlan and Mazzotti 1989). In

Florida, patterns of crocodile habitat use shift seasonally. During the breeding and nesting seasons, adults outside of Key Largo and Turkey Point use the exposed shoreline of Florida Bay. Males tend to stay more inland than the females at this time (Mazzotti 1998, Moler1998). During the non-nesting season, they are found primarily in the fresh and brackish-water inland swamps, creeks and bays, retreating farther into the back country in fall and winter (Kushlan and Mazzotti 1989). Natural nesting habitat includes sites with sandy shorelines or raised marl creek banks adjacent to deep water. Crocodiles also nest on elevated man-made structures such as canal berms and other places where fill has been introduced. The American crocodile is typically active from shortly before sunset to shortly after sunrise (Lang 1975, Mazzotti 1983). During these times crocodiles forage opportunistically, eating whatever animals they can catch. Juveniles typically eat fish, crabs, snakes, and other small invertebrates, whereas adults are known to eat fish, crabs, snakes, turtles, birds, and small mammals (Ogden 1978b, Ross and Magnusson 1989). A crocodile was killed on U.S. 41 near the Faka Union Canal (south of Faka Union weir No. 1) in 1997 (Jones 1998). Crocodiles have been reported to feed at the POI marina basin downstream of the PSRP project (Dryden 1998) and adjacent to the manatee mitigation feature site. Crocodiles do nest in southwest Florida, but successful crocodile reproduction has not been documented in this area. Crocodiles have also been identified at Blue Crab Key (Pine Island) and Bonita Bay developments in Lee County (Repenning 1998, Dryden 1998), at the Eagle Creek Country Club just southwest of State Road (SR) 951 and U.S. 41 (Mazzotti 1998, Bertone 2009), in the Fakahatchee River southeast of theproject site by National Park Service (NPS) and DEP staff in 2002 and 2003 and at CSSP (Doyle 1993). As many as 11 adult crocodiles have frequented manmade borrow pits at the Marco Airport site, approximately 9 miles southwest of the PSRP and manatee mitigation feature. The timing and frequency of the freshwater inputs to estuaries influences the health of the estuarine environment in south Florida and may be one of the most important large-scale factors influencing crocodile populations. Drainage canals and impervious surface runoff have changed the seasonal timing and discharge of sheetflow to Pumpkin, Blackwater, Faka Union, and to a lesser extent, Fakahatchee Bay downstream of the PSRP project. Point-source discharges into Faka Union Bay and disruption of fresh water flows to Pumpkin and Blackwater Bays have potentially reduced the production of fish and other aquatic species that provide forage for the American crocodile. Temperature changes related to freshwater input may also be a factor in influencing forage activities. Because juvenile crocodiles require access to low salinity water for maintenance of osmotic balance, changes in freshwater flows may also affect juvenile crocodiles. Restoration of natural flows from the PSRP should improve the existing estuarine condition and habitat conditions for the American crocodile by enhancing the forage base in adjacent estuaries and would likely provide sufficient fresh water to meet crocodilian needs.

### 12.4.2 DETERMINATION OF EFFECT

The addition of the manatee mitigation feature to the PSRP will result in excavation and/or stockpiling of fill on the existing artificially constructed Faka Union canal berm. Small numbers of American crocodiles occasionally forage in the Faka Union canal and estuaries adjacent to the project. However, no known crocodile nesting or resting areas have been documented on the Faka Union spoil berm where the manatee mitigation feature will be constructed. Pre-construction wildlife surveys will be conducted as part of

the project commitments. Turbidity barriers will be constructed in order to avoid impacts to estuarine waters at the project location. Vessel speed restrictions and observers that will be required as part of the Standard Manatee Construction Conditions that will be employed for the project construction to avoid manatee impacts, will also provide for avoiding construction-related injuries or death of any foraging American crocodiles. Therefore, the Corps maintains the determination reached in the 2004 BA and 2009 BO that the PSRP would have "no effect" to American crocodile or its designated critical habitat.

## 12.5 EASTERN INDIGO SNAKE

### 12.5.1 SPECIES DESCRIPTION

An extensive description of life history of the Eastern indigo snake is included in the 2004 PSRP Final PIR/EIS, 2008 BA, and the 2009 BO. The descriptions contained within these documents are incorporated by reference into this fourth supplemental BA.

### 12.5.2 DETERMINATION OF EFFECT

The manatee mitigation feature will permanently affect approximately 2 acres of Eastern indigo snake habitat associated with the wetlands portion of the manatee mitigation features and temporarily affect 10 acres of habitat associated with stockpiled fill areas and re-constructed berms surrounding the manatee mitigation feature. Gopher tortoise burrows are located in the proposed construction area and could function as refugia for the indigo snake although burrows are not required as refugia in the southern portion of the indigo snake's range. Consistent with the analysis in the 2009 BO, it is not easy to estimate the density of indigo snakes at the project site due to a general lack of existing data for the action area. We anticipate that the actual density of indigo snakes and their prey within the project footprint may be low due to the disturbed habitat condition and geographic location (narrow spoil berm adjacent to canal and bordered by a mangrove swamp). In the 2009 BO, the FWS anticipated up to 2 indigo snakes may be harmed (injury or mortality) incidental to project construction and initial re-hydration of the manatee mitigation feature. As a result, the Standard Eastern Indigo Snake Construction Guidelines will be implemented during the construction of the manatee mitigation feature and other project commitments and Terms and Conditions as contained in the 2009 BO will be in effect. Therefore, the Corps has determined that the construction of the manatee mitigation feature "may affect, but is not likely to adversely affect" the Eastern indigo snake during and following the construction of the manatee mitigation feature.

## 12.6 GOPHER TORTOISE

### 12.6.1 SPECIES DESCRIPTION

The gopher tortoise, an upland dwelling reptile, is currently listed as a candidate species in the Eastern U.S. by the USFWS (USFWS 2013). The gopher tortoise shell can be from 5.9 to 14.6 inches long, is dark-brown to grayish-black terrestrial turtle, has large hind feet, and shovel-like forefeet (Ernest and Barbour 1972). In Florida, individuals from coastal areas are generally darker than more central populations. Gopher tortoises excavate deep burrows that provide shelter from weather extremes and refuge from

predation (Diemer 1989). The gopher tortoise commonly occupies habitats with a well-drained sandy substrate, ample herbaceous vegetation for food, and sunlit areas for nesting (Landers 1980, Landers, Garner and McRae 1980, Diemer 1989). Diemer (1992) found that gopher tortoise activity increased in April, peaked in July, and remained high through October. Many vertebrate and invertebrates species are known to seek refuge in gopher tortoise burrows, including protected species like the Eastern Indigo snake (Franz 1986, Jackson and Milstrey 1989, Lips 1991, Witz, Wilson and Palmer 1991).

One small population (less than 30 individuals) of relocated gopher tortoises currently reside on the Faka Union Canal spoil berm, which acts as an island. Comparisons of tortoise populations on true islands with populations on the mainland suggested that tortoises do respond to relatively small, isolated habitats (Mushinsky and McCoy 1994). This study found that the density of burrows decreased as area increased on the mainland, but density of burrows was not related to area on the islands. Findings suggest that tortoises have a greater selection of habitats on the mainland than on islands. Tortoises on islands are confined and may be forced to live in less than ideal conditions. The implications of these findings are profound for tortoises living in small, fragmented "habitat islands" on the mainland. As the quality of their habitat island is degraded; mature adults may be forced to abandon a site in search of better habitat quality. From a practical perspective, prior to this study (Mushinsky and McCoy 1994),observations of large numbers of active and inactive gopher tortoise burrows in a confined area likely would have been viewed as indicators of a "healthy" population; however, these findings suggest just the opposite. Rather than a signal of a healthy population, large numbers of active and inactive gopher tortoise burrows, relative to the actual number of tortoises, may signal a stressed population (Stewart, Austin and Bourne 1993).

#### 12.6.2 DETERMINATION OF EFFECT

A small population of gopher tortoises has been relocated to the Faka Union Canal spoil berm just south of the POI Basin. These tortoises would be relocated prior to construction of the manatee mitigation feature and would be moved to suitable habitat in a nearby location. The tortoises may be returned to the site following the completion of the feature. The Corps determines that the manatee mitigation feature "may affect, but is not likely to adversely affect" the gopher tortoise during and following the construction of the manatee mitigation feature.

### 12.7 WOOD STORK

#### 12.7.1 SPECIES DESCRIPTION

An extensive description of life history traits of the wood stork is included in the 2004 PSRP Final PIR/EIS, 2008 BA, and the 2009 BO. In addition, these documents contain a full discussion of the wood stork colonies located near the PSRP. The descriptions contained within these documents are incorporated by reference into this second supplemental BA.

#### 12.7.2 DETERMINATION OF EFFECT

The addition of the manatee mitigation feature to the PSRP will not change the original effects to the wood stork as stated in the 2004 PSRP Final PIR/EIS and the 2009 BO;

therefore, the Corps determines that the addition of the manatee mitigation feature will have "no effect" on the wood stork.

## 12.8 EVERGLADE SNAIL KITE

### 12.8.1 SPECIES DESCRIPTION

An extensive description of life history traits of the Everglade snail kite is included in the 2004 PSRP Final PIR/EIS, 2008 BA, and the 2009 BO. The descriptions contained within these documents are incorporated by reference into this second supplemental BA.

### 12.8.2 DETERMINATION OF EFFECT

The addition of the manatee mitigation feature will not have an effect on the Everglade snail kite; therefore, the Corps maintains the original determination of "no effect" received in the 2009 BO.

## 12.9 RED-COCKADED WOODPECKER

### 12.9.1 SPECIES DESCRIPTION

South Florida supports populations necessary for the recovery of red-cockaded woodpeckers. Statewide protection and restoration efforts focus on acquiring, managing, and restoring habitat surrounding these populations. Lands acquired in southwest Florida for red-cockaded woodpecker conservation should be contiguous with publicly-owned conservation lands that contain red-cockaded woodpecker clusters (Beever and Dryden 1992).

Pine stands, or pine-dominated pine/hardwood stands, with a low or sparse understory and ample old-growth pines, constitute primary red-cockaded woodpecker nesting and roosting habitat. In southwest Florida (Charlotte, Collier, and Lee Counties), hydric slash pine (*P. elliotii* var. *densa*) flatwoods provide the preferred nesting and foraging habitat for the red-cockaded woodpecker (Beever and Dryden 1992). This community has been maintained by fire and hydroperiod, and therefore does not have the dense midstory more typical of xeric and mesic flatwoods in southwest Florida. Also, hydric pine flatwoods were not as accessible to historic forestry, agriculture, and land clearing practices as the xeric and mesic communities due to their wetland status.

Currently, the PSSF has 13 active red-cockaded woodpecker clusters with 10 potential breeding groups, and the remaining three with solitary birds; however, only one of these clusters occur within the SGGE tract (PSRP area) (Sowell 2012). The majority of the clusters are located in Belle Meade, west of the PSRP area. Figure 4-8 shows the locations of the red-cockaded woodpecker clusters in the Belle Meade tract.

An extensive description of life history traits of the red-cockaded woodpecker is included in the 2004 PSRP Final PIR/EIS, 2008 BA, and the 2009 BO. The descriptions contained within these documents are incorporated by reference into this second supplemental BA.

### 12.9.2 DETERMINATION OF EFFECT

The addition of the manatee mitigation feature will not have an effect on the red-cockaded woodpecker. Therefore, the Corps determines that the addition of the manatee mitigation feature will have "no effect" on the red-cockaded woodpecker.

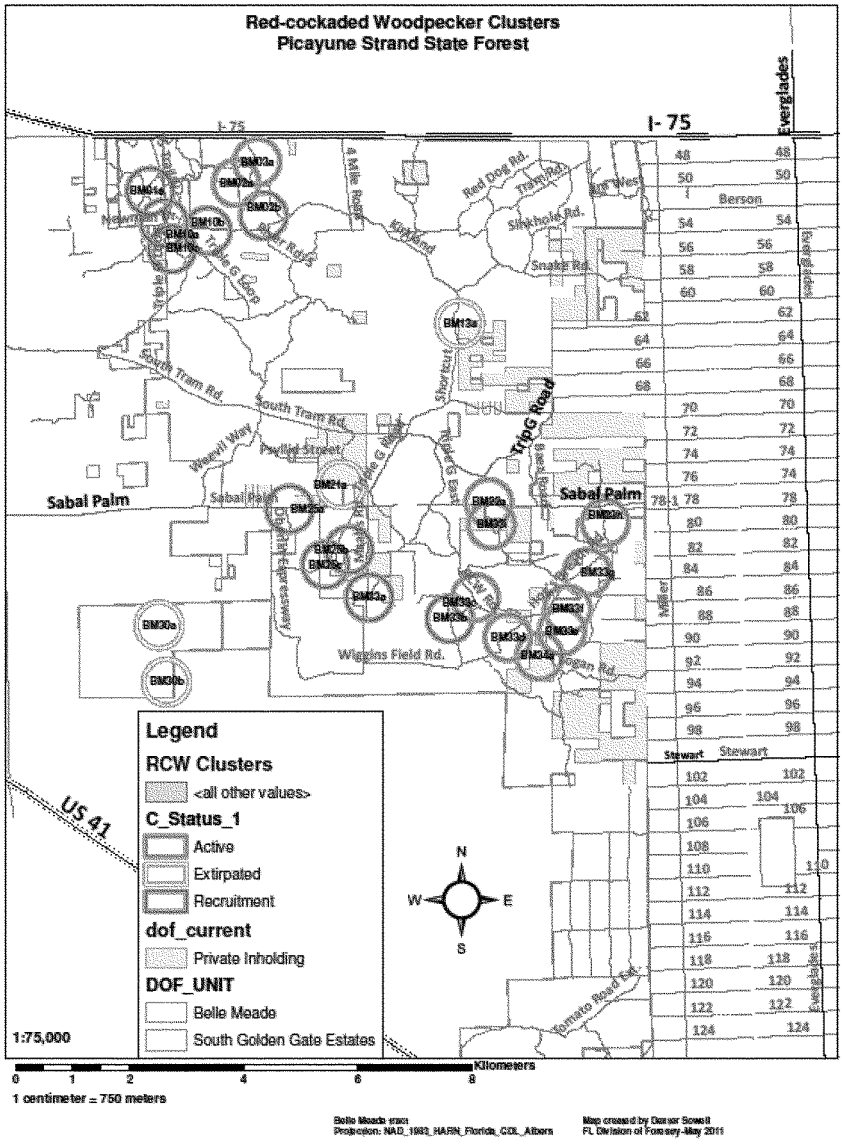



**Figure 4-8. Red-cockaded Woodpecker Clusters at Picayune Strand State Forest**

## 12.10 NMFS CONSULTATION

The species designated under the purview of the NMFS was included in a 2 July 2013 CERP Programmatic BA. The species found at or near the PSRP include: loggerhead sea turtle, Kemp's ridley sea turtle, Atlantic green sea turtle, smalltooth sawfish and its critical habitat, goliath grouper, mangrove rivulus, and sand tiger shark. NMFS provided a CERP Programmatic BO on 17 December 2013 which included concurrences to the PSRP effect determinations.

The manatee mitigation feature will have "no effect" on the above listed species or critical habitat under NMFS jurisdiction. A more detailed design of the manatee refugium was provided to the NMFS on 3 September 2014. A small area (two acres) of Essential Fish Habitat may be affected by the placement of the manatee mitigation feature (Figure 4-9) and this effect has been coordinated with NMFS. A discussion of the essential fish habitat (EFH) near the PSRP is included in Section 3.6.11 of the 2004 PSRP Final PIR/EIS. These areas consist of mangroves in the Faka Union Bay and Ten Thousand Islands Region. The manatee mitigation feature, located adjacent to the Faka Union Canal south of the POI Basin, will be adjacent to mangrove wetlands, identified by the Gulf of Mexico Fishery Management Council as EFH for post-larval, juvenile and sub adult shrimp; post-larval, juvenile and adult red drum; post-larval, juvenile and adult gray snapper; juvenile red and gag groupers; and juvenile and adult yellowtail and lane snappers. The area has also been designated as Essential Fish Habitat by NMFS for highly migratory species including bull, lemon, and bonnethead sharks (Sramek 2013).

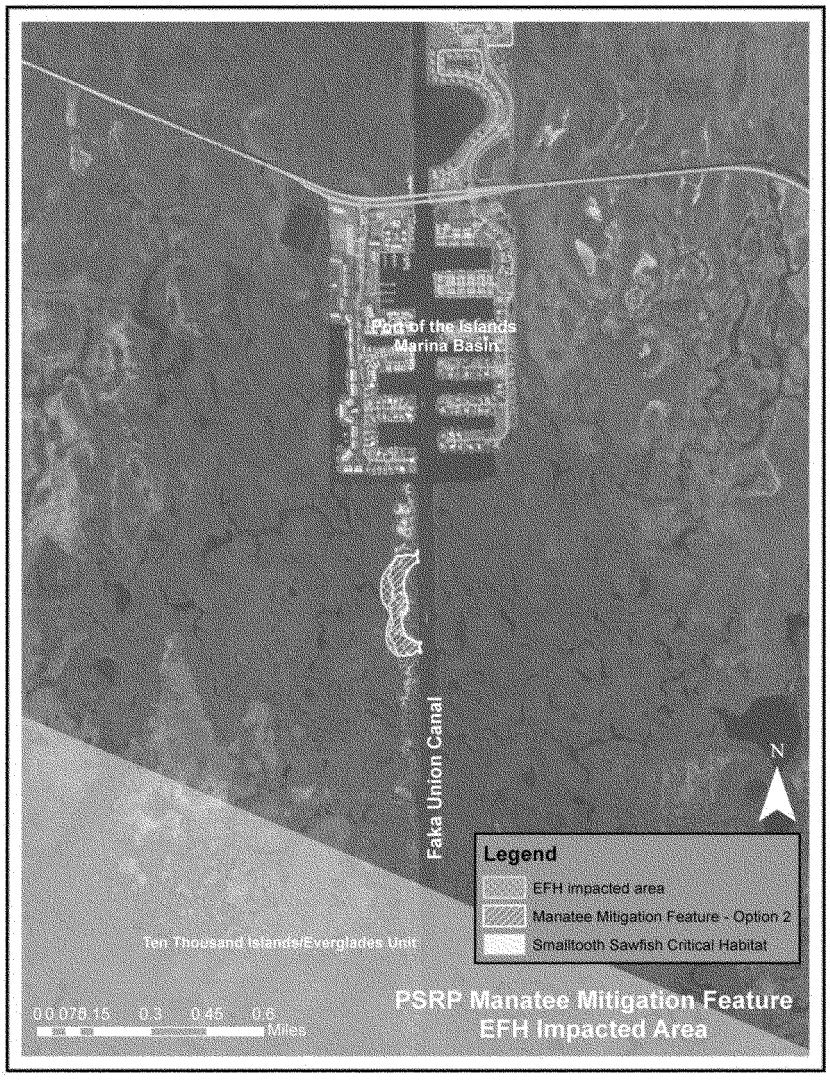



**Figure 4-9: Essential Fish Habitat Potentially Affected by the Manatee Mitigation Feature**

## 13.0 CONSERVATION MEASURES

This project will follow the Standard Operating Procedures (SOPs) outlined in the October 2006 Guidelines for Manatee Conservation during Comprehensive Everglades Restoration Implementation. The project commitments and conservation measures outlined in the 2004 BA as well as the terms and conditions of the 2009 BO are included

in this BA by reference and will be followed with the implementation of the manatee mitigation feature.

## 14.0 DETERMINATION OF EFFECT SUMMARY

Table 6-1 below summarizes the Corps' effects determinations specifically for the addition and implementation of the manatee mitigation feature. The Corps' has determined the manatee mitigation feature will have "no effect" on, the Florida panther, American crocodile, Everglade snail kite, red–cockaded woodpecker, and wood stork; and "may affect, but not likely to adversely affect" the gopher tortoise, Florida bonneted bat, Eastern indigo snake, and West Indian manatee . The Corps and SFWMD will implement the Terms and Conditions of the 2009 PSRP BO for the panther and indigo snake while constructing the manatee mitigation feature.

**Table 6-1. Federally listed threatened (T), endangered (E), or candidate (C) species that are included in this BA and are under the purview of the USFWS.**

| Common Name | Scientific Name | Federal Status | Effect Determination |
|---|---|---|---|
| **Reptiles** | | | |
| American crocodile | Crocodylus acutus | E | No effect |
| Eastern indigo snake | Drymarchon corais couperi | T | May affect, but not likely to adversely affect |
| Gopher tortoise | Gopherus polyphemus | C | May affect, but not likely to adversely affect |
| **Birds** | | | |
| Everglade snail kite | Rostrhamus sociabilis plumbeus | E | No effect |
| Red-cockaded woodpecker | Picoides borealis | T | No effect |
| Wood stork | Mycteria americana | E | No effect |
| **Mammals** | | | |
| Florida panther | Puma concolor coryi | E | May affect, but not likely to adversely affect |
| West Indian manatee | Trichechus manatus | E | May affect, but not likely to adversely affect |
| Florida bonneted bat | Eumops floridanus | E | May affect, but not likely to adversely affect |

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Tab F

# APPENDIX F

# MANATEE MITIGATION MEETING SUMMARIES

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Picayune Strand Restoration Project
Manatee Mitigation Consultation Issue Resolution Meeting
20 August 2014
South Florida Ecological Services Office, USFWS, Vero Beach, Florida
Meeting Notes

20 August 2014 12:00-4:00pm

Attendees:
USFWS: Kim Dryden, Larry Williams, Bob Progalski, Miles Myer
FDEP: Frank Powell, Jordan Pugh
FWC: Ron Mezich; Carol Knox
USGS: Dan Sloane (on phone)
SFWMD: Tom Teets, Rod Braun, Janet Starnes, Mike Duever, Cesar Pena, Karyn Allman, John Leslie, Nimmy Jeyakumar (on phone)
USACE: Eric Bush, Gina Ralph, Brad Tarr, Lacy Shaw

NOTES:
The history of consultation was presented, focusing on the submissions of the monitoring plan and the Biological Assessment (BA) for the Manatee Mitigation Feature. The latest submission of the BA left the following remaining un-resolved items: manatee success criteria, design of manatee refugium and the manatee monitoring plan. USFSW (Kim Dryden) confirmed that there are no outstanding issues other than the three items identified as unresolved (success criteria, monitoring plan and design). All concerns related to the meeting of March 2014 were communicated by USFWS in a letter dated April 2014.

SFWMD presented the Manatee Mitigation Feature. USFWS concurred with the design and agreed that the presentation gave the appropriate level of detail needed for the USFWS to make a determination.

USFWS stated that there will be many sources of information that will be used to analyze the performance of the mitigated manatee refugium and other project-related manatee effects. USFWS would like to include this information in the concurrence letter but recognize that the other information will not be the responsibility of USACE or SFWMD. USFWS requested that this information be included in the BA to support the USFWS determination. The information the USFWS will use is captured in the Manatee Refugium Success Criteria (Appendix E, Supplemental Biological Assessment, Section 12.1.12.7).

USFWS agreed with all aspects of the Manatee Monitoring plan except for the observation portion of the table. Their changes are included in the Manatee Monitoring Plan (Appendix D). FWC committed to providing a draft manatee observation protocol for review and approval by USCAE/SFWMD/FWS. USFWS, Corps, and SFWMD agreed to acknowledge the importance (to manatees and their critical habitat) of estuarine water quality and hydrological monitoring stations that are currently funded as part of the project or by RECOVER, PES, or USGS. If these stations are defunded, the monitoring plan lists the evaluation process.

Long-term maintenance of the refugium was discussed. At this time, the SFWMD will likely be responsible for long-term maintenance.

Long-term maintenance of the refugium was discussed. At this time, the SFWMD will likely be responsible for long-term maintenance.

USACE committed to completing the BA by 3 September 2014 but will share a draft with USFWS next week (28 August 2014). USFWS committed to completing the concurrence letter by 11 September 2014 with the signed copy delivered to USACE by the end of September 2014.

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