

**CENTRAL AND SOUTHERN FLORIDA PROJECT  
WATER PRESERVE AREAS FEASIBILITY STUDY**

**DRAFT  
INTEGRATED FEASIBILITY REPORT  
AND  
SUPPLEMENTAL ENVIRONMENTAL IMPACT  
STATEMENT**

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U.S. ARMY CORPS OF ENGINEERS  
JACKSONVILLE DISTRICT

SOUTH FLORIDA WATER  
MANAGEMENT DISTRICT

OCTOBER 2001



# CENTRAL AND SOUTHERN FLORIDA PROJECT WATER PRESERVE AREAS FEASIBILITY STUDY

## DRAFT INTEGRATED FEASIBILITY REPORT AND SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

**Responsible Agencies:** The responsible lead agency is the U.S. Army Corps of Engineers, Jacksonville District. The South Florida Water Management District is the responsible non-Federal cost sharing partner for the study. The responsible cooperating agencies are the U.S. Fish and Wildlife Service, the U.S. Environmental Protection Agency, the National Park Service, the Florida Fish and Wildlife Conservation Commission, the U.S. Geological Survey, the Natural Resources Conservation Service, and the Florida Department of Environmental Protection.

**Abstract:** The Water Preserve Areas (WPA) Plan in Palm Beach, Broward and Miami-Dade Counties, is an essential element of the Comprehensive Everglades Restoration Plan (CERP), comprising an interconnected series of marshlands, impoundments, stormwater treatment areas, conveyance, and aquifer recharge areas. This report addresses partially or wholly 12 components of CERP and formed these components into four separable elements. Ecologic restoration of the Everglades will require a significant increase in the quantity of water available. The WPA provides a critical source for this new water by 1) reducing undesirable losses from the natural system through seepage and 2) capturing and storing stormwater runoff that was previously discharged to tide. Further, the WPA meets a significant environmental restoration objective by providing a buffer between the natural system and developed areas to the east while preserving, protecting, enhancing and increasing the spatial extent of wetlands located outside the Everglades. This Report also addresses other water-related needs such as urban and agricultural water supply, water quality and incidental flood protection. The WPA Plan provides a mechanism for increased aquifer recharge and surface and subsurface water storage capacity that will enhance regional water supplies for the lower east coast urban areas, thereby reducing regional system water supply demands on an already degraded natural system.

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Mr. Steve Sutterfield  
U.S. Army Corps of Engineers  
P.O. Box 4970  
Jacksonville, Florida 32232-0019  
Telephone: (904) 232-1104

**NOTE:** This report includes an integrated Supplemental Environmental Impact Statement (SEIS) within the draft feasibility report; sections required for compliance with the National Environmental Policy Act (NEPA) are noted by an asterisk in the Table of Contents.



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### SUMMARY

The recommended Water Preserve Areas Plan contained within this report will, when implemented, help restore, protect, and preserve a natural resource treasure – the south Florida ecosystem. The greater Everglades ecosystem is nationally significant and unique in the world. If actions are not taken now, irretrievable loss of this extraordinary resource will occur. The Water Preserve Areas Plan affords the opportunity to begin to reverse the course of declining ecosystem health and leave an Everglades legacy for generations to come. Specifically, the Water Preserve Areas Plan meets the following objectives: 1) Improves water supply by reducing seepage and retaining water in the natural system and captures and stores water currently discharged to tide; 2) Enhances environmental restoration by providing a buffer between the natural system and developed areas to the east and preserving, protecting and increasing the spatial extent and enhancing wetlands areas outside the Everglades.

The Central and Southern Florida (C&SF) Project, first authorized by Congress in 1948, 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. The primary system includes about 1,000 miles each of levees and canals, 150 water control structures, and 16 major pump stations.

The C&SF Project Comprehensive Review Study includes the Water Preserve Areas Feasibility Study. The C&SF Project Comprehensive Review Study, known as the Restudy, is authorized by *Section 309(l) of the Water Resources Development Act of 1992* (P.L.102-580). This study is also authorized by two resolutions of the Committee on Transportation and Infrastructure, United States House of Representatives, dated September 24, 1992. *Section 528 of the Water Resources Development Act of 1996* provides specific direction and guidance for the Restudy. *Section 601 of the Water Resources Development Act of 2000* authorized a framework and guide for modifications to the C&SF Project to restore the south Florida ecosystem and to provide for the other water-related needs of the region.

The Water Preserve Areas (WPA) Feasibility Study investigates concepts to capture and store excess surface waters by backpumping water from the lower east coast urban areas that is normally discharged to tide via the C&SF Project canal system and to reduce seepage and retain more water in the natural system. The reconnaissance and feasibility phases of the C&SF Project Comprehensive Review Study demonstrated that the WPA concept is an integral part of the Comprehensive Everglades Restoration Plan (CERP). Ecologic restoration of the Everglades will require a significant increase in the quantity of water available. The WPA provides a critical source for this new water. Further, development continues to encroach on the remaining natural areas adjacent to the Everglades. These remaining wetland areas can serve a critical role in the restoration of the Everglades by increasing the overall spatial extent of healthy wetlands, by generally protecting, preserving and enhancing these wetlands. The WPA Feasibility Study addresses other water-related needs such as urban and agricultural water supply and water quality. The WPA also provides a mechanism for increased aquifer recharge and surface and subsurface water storage capacity to enhance regional water supplies for the lower east coast urban areas, including protection of the surficial aquifer.

The purpose of this feasibility study was to further develop the CERP components for the lower east coast and to develop the tools necessary to evaluate these components as well as separable and incremental portions of the project. The WPA recommended plan includes features necessary to provide for the regional water-related needs of the lower east coast area. This WPA Feasibility Study includes an adaptive implementation and operational strategy based on monitoring, evaluation, and modeling. Additional hydrologic modeling, environmental modeling, water quality analyses, and water supply studies were conducted to further refine the information developed in the CERP.

Although this document meets the requirements of Section 404 (r) of the Clean Water Act (Public Law 92-500, as amended), as addressed in Annex C, the Corps will request a Section 401 State water quality certificate during subsequent phases of this project.

Following public review of this draft feasibility report and supplemental environmental impact statement, the final documents will be transmitted through the Division Engineer and the Washington-level Federal report review process, which will include reviews by the Chief of Engineers and the Secretary of the Army. The Assistant Secretary of the Army for Civil Works, representing the Secretary of the Army, will coordinate the documents with the Office of Management and Budget, and send them to Congress.

## MAJOR CONCLUSIONS

The Everglades has molded the regional character of central and southern Florida and sustains the economic and cultural growth of the region. The Everglades has influenced the regional mosaics of space and landscape patterns - urban, agricultural and natural. As such, it epitomizes the region's sense of definition and place. As importantly, the Everglades is unique -- unlike any other place in the world.

The remaining Everglades and other natural ecosystems in south Florida no longer exhibit the functions, richness, and spatial extent that defined the pre-drainage systems. There have been substantial and irreversible reductions in the spatial extent of the wetland systems (including an approximately 50 percent reduction in the extent of the true Everglades) and in the total water storage, timing, and flow capacities of these systems. These natural systems will not recover their defining characteristics under current conditions and will not be sustained into the future. Indeed, the health of the ecosystem will continue to decline unless corrective actions are taken. For example, wading birds, whose numbers have already decreased by 85-90 percent, are key indicators of broad, regional patterns of aquatic production. There is a continuing reduction in the total number of birds initiating breeding in south Florida. Fisheries, including economically important recreational and commercial species, continue to decline steadily in many areas of south Florida, affecting the natural and the human environment.

Water quality throughout south Florida has also deteriorated over the past 50 years since construction started on the C&SF Project. Many wetlands that acted as natural filters and retention areas either can no longer serve these purposes or have been lost to drainage or development. Urban and agricultural development drainage systems result in the rapid discharge of runoff containing pollutants into south Florida's water bodies. As a result, many water bodies throughout south Florida presently do not meet water quality standards. Untreated urban and agricultural storm water that does not meet water quality standards is sometimes sent to natural areas. Excessive nutrients entering the Everglades have led to an overabundance of cattails, a visible sign of unfavorable water quality conditions and a potential decline in ecological productivity.

Adequately and reliably meeting water supply for all sectors is also a problem. Historically, most rainwater soaked into the ground in the region's vast wetlands. As south Florida developed, the canal network worked too effectively and drained too much water off the land too quickly. The result is that not enough water is stored for all uses. Water shortages that occur today are expected to become more frequent without any changes to the water management system. Without the steps outlined in CERP, conflicts over the allocation of water needed for natural, agricultural, and urban areas will only increase.

Flooding is also a problem. Florida is a low-lying, flat, and wet state. Today, the Project provides flood protection on a regional basis for south Florida, supported by many locally operated canal networks. The WPA Plan will maintain, and in some situations improve, this important protection from flooding.

### **What Is Expected to Happen Without the Recommended WPA Plan**

Although some level of ecological improvement will occur in the south Florida ecosystem as a result of implementation of projects currently planned outside of the CERP, the cumulative, regional benefits from these projects would not result in a sustainable south Florida ecosystem. Specifically, based on an evaluation of conditions in the year 2050 without the CERP, it was determined that the overall health of the ecosystem will have substantially deteriorated. This type of assessment was carried out for all planning alternatives evaluated during the course of the WPA Feasibility Study. The analyses show that making modifications to only some portions of the C&SF Project in order to achieve sustainable natural systems will not succeed. Conditions predicted in 2050 fail to meet the basic needs of the south Florida ecosystem. Therefore, the WPA components are only part of the plan for restoration needed for a sustainable south Florida ecosystem.

Demands placed on Lake Okeechobee result in damaging water levels and extreme harm to the littoral zone. Damaging high flows alter salinity balances in Lake Worth Lagoon. Hydropatterns predicted for the Water Conservation Areas are harmful to tree islands. Everglades National Park does not receive enough freshwater flow to maintain important aquatic habitat in Shark River Slough. Low flows to Florida and Biscayne bays also result in harm to the resources in these areas. These ecological problems would not be corrected solely by implementation of currently planned or ongoing projects.

Relatively greater levels of improvement were identified for water quality conditions in the future compared to existing conditions in south Florida. It is expected that state, tribal, regional, and local programs to improve water quality will be implemented to varying degrees throughout the study area during the next 50 years. Ongoing restoration projects in the Kissimmee River watershed are expected to beneficially affect water quality. Current efforts to reduce inputs of excessive nutrients into the Everglades through the Everglades Construction Project should substantially slow the spread of cattails and other plants with high nutrient tolerances and result in a slow recovery of natural vegetation patterns in some nutrient-stressed parts of the system. Proposed modifications to the Lake Okeechobee regulation schedule and water quality improvement projects suggested by the South Florida Ecosystem Restoration Working Group's Lake Okeechobee, St. Lucie, and Caloosahatchee Issue Teams should improve water quality conditions in

those water bodies. Nonetheless, the future without plan condition, while resulting in water quality improvements over existing conditions in certain subregions of the area, was still determined by the WPA's water quality team to be unacceptable for sustainable ecosystems.

The future demand for suitable water is expected to exceed the limits of readily available sources. Predictions of water restrictions in the future indicate serious – and probably unacceptable – levels of water supply cutbacks. Modeling of the future without plan condition shows that for the Lake Okechobee Service Area, 24 percent of water supply demands could not be met over a 30-year period. This translates into water supply restrictions every other year. In the Lower East Coast, water restrictions would be expected to occur every other year in Palm Beach, Miami-Dade, and the Florida Keys portion of Monroe County. In Broward County water restrictions would occur on nearly an annual basis. The ability to sustain the region's natural resources, economy, and quality of life depends, to a great extent, on the success of the efforts to enhance, protect, and better manage the region's water resources.

### **How the WPA Team Developed the Recommended Plan**

An interagency, interdisciplinary team was created to develop plans that addressed the problems within the study area. This team included biologists, ecologists, economists, engineers, geographic information system specialists, hydrologists, planners, public involvement specialists, and real estate specialists from a number of Federal, state, tribal, and local government agencies.

Between November 1998 and November 2000, alternative plans were formulated and evaluated. Beginning with a "Starting Point" alternative and continuing until the tentative selected plan was chosen, each iterative formulation and evaluation cycle built upon the strengths of the previous alternative while addressing its shortfalls. Four teams within the full WPA team were formed to evaluate the alternatives. The Natural Areas team was responsible for plan evaluation within the natural areas for the sub-regional models. The Lower East Coast team was responsible for plan evaluation within the urban areas for the sub-regional models. The Water Quality team was responsible for plan evaluation within the water preserve area components for the sub-regional models. The Multi-Agency Design (MAD) team was responsible for identification and design of specific features to be simulated in both the South Florida Water Management Model and the sub-regional groundwater models with the intent to improve the performance of each alternative plan and to test different strategies for component modification identified by the full WPA team. The MAD team also developed the detailed design of the plans for the Geographical Information Systems coverages, the model data input set to the South Florida Water Management District models and the Corps of Engineers hydraulic design, quantities and cost estimates. All modeling results and

evaluations were posted on the WPA web site for the team and general public to review.

The WPA team focused on the components of CERP within the WPA study area. This focus of the plan formulation process was on increasing regional storage capacity and increasing water management flexibility to meet water quantity objectives.

A major advantage of the Water Preserve Areas Feasibility Study is that it has used tools and methods to evaluate the entire C&SF Project area together as an integrated system. Thus, the effects of making modifications in the WPA were able to be seen and then used to develop a plan that maximized regional benefits and maximized system-wide benefits as well. The South Florida Water Management Model is the tool that demonstrates the hydrologic effects of changes on a system-wide basis. Sub-regional groundwater models for Palm Beach, Broward, and North Miami-Dade were used to regionally assess the plan benefits.

The WPA team developed measures to evaluate alternative plan affects on the WPA region and utilized the measures to evaluate the effect of the alternative plans on the entire C&SF Project area. The use of system-wide and regional tools and a science-based analytical approach support the conclusion, that the future without plan condition is not favorable - nor is it sustainable - for the south Florida ecosystem.

The WPA team recognized that, from a regional perspective within the three county WPA area, water quality impacts weigh most heavily on waters discharging to the Everglades Protection Area. While the water quality impacts in other receiving bodies may not receive the same level of attention as the Everglades, water quality is still a factor in the major canals leading to the estuaries and the estuaries themselves.

### **Separable Elements of the Recommended Plan**

The WPA team formulated and evaluated five alternative plans and several scenarios. From the components of the preliminary selected plan, the tentative selected plan was selected. The estimated first cost of the recommended plan is \$732,839,000; and the annual operation and maintenance costs, including adaptive assessment and monitoring, are \$3.3 million. The plan modifies the existing CERP components into the following separable elements and recommends this as the Water Preserve Areas:

### ***Strazzulla Wetlands***

This separable element includes water control structures, levees, canal relocation and the acquisition of approximately 3,335 acres of land located east of the Loxahatchee National Wildlife Refuge (LNWR) in central Palm Beach County.

The purpose of this component is to provide a hydrological and ecological connection to the LNWR and expand the spatial extent of protected natural areas. This land will act as a buffer between higher water stages to the west and lands to the east that must be drained. The increase in spatial extent will provide vital habitat connectivity for species that require large unfragmented tracts of land for survival. The land also contains the only remaining cypress habitat in the eastern Everglades and one of the few remaining sawgrass marshes adjacent to the coastal ridge. This is a unique and endangered habitat that must be protected, as it provides an essential Everglades landscape heterogeneity function.

### ***Hillsboro Impoundment***

This separable element includes canal and structure relocations, canal conveyance improvements, water control structures and an aboveground impoundment with a total storage capacity of approximately 13,500 acre-feet located in the Hillsboro Canal Basin in southern Palm Beach County. The design of the impoundment includes one compartment totaling 1,660 acres with water levels fluctuating up to eight feet above grade. The S-39A structure will be replaced and redesignated as S-527B. North Springs Improvement District flows were redirected from Water Conservation Area (WCA) 3 into the Hillsboro Canal and then to the impoundment. The conveyance capacity of the Hillsboro Canal will be increased from the impoundment inflow structure east to the Lake Worth Drainage District E-1 canal to allow backpumping of additional flows from the western Hillsboro Canal basin.

The purpose of this component is to supplement water deliveries to the Hillsboro Canal by capturing and storing excess water currently discharged to the Intracoastal Waterway. These supplemental deliveries will reduce demands on Lake Okeechobee and LNWR. The impoundment pool will also provide groundwater recharge, reduce seepage from adjacent natural areas, and prevent saltwater intrusion by releasing impounded water back to the Hillsboro canal when conditions dictate. Some measure of flood protection may also be provided along with water quality improvements.

### ***Broward County WPA***

This separable element includes buffer marsh areas, canals, levees, water control structures and above-ground impoundments with a total storage capacity of

approximately 6,000 acre-feet located in the western C-11 Canal basin and 6,600 acre-feet located in the western C-9 Canal basin in western Broward County.

The multi-purpose separable element is designed to direct runoff events from the western C-11 drainage basin into the C-11 impoundment instead of pumping the untreated runoff into WCA-3A through the S-9 pump station. The purpose of the C-9 Impoundment features are to pump storm events from the western C-9 drainage basin into the impoundment along with runoff transferred from the western C-11 basin. The impoundment pools will assist in reducing seepage from adjacent natural areas WCA-3A/3B, WCA-3A/3B Seepage Management areas, providing groundwater recharge, meeting the urban area water demands and preventing saltwater intrusion in the surficial aquifer. Another function of this separable element is the ability to reduce seepage from WCA-3A to improve hydropatterns within the WCA by allowing higher water levels in the borrow canals and maintaining longer duration inundation within the marsh areas that are located east of the WCA and west of US Highway 27. This component also will attenuate high stages in WCA-2B and divert this excess water to Northeast Shark River Slough via C-500 if there are unmet demands or for storage in the future Central Lake Belt Storage Area. This component will also reroute water supply deliveries to Miami-Dade County. The proposed backfilling of the Miami Canal as part of the decompartmentalization of WCA-3 requires a revised conveyance route. The new conveyance route runs through an upgraded North New River Canal, via C-502, to the Miami Canal east of WCA-3. From that point the conveyance system deliveries are routed through the revised Dade-Broward Levee Canal as indicated below.

### ***Dade-Broward Levee and Canal***

This separable element includes water control structures, canal conveyance improvements and modifications to the Dade-Broward Levee and C-4 Canal located in Miami-Dade County.

The purpose for the C-503 Canal (Dade Broward Levee Canal) is to convey Lake Okeechobee dry-season water supply deliveries to the South Dade Conveyance System and C-4/C-2 Canal basins. Another purpose of the C-503 Canal is to reduce seepage from the Pennsuco Wetlands and WCA-3B to the east by maintaining elevated control stages when deliveries are not being made. An additional purpose of the C-503 Canal is to provide the North West Wellfield a groundwater recharge water source to limit impacts of seepage management of the Pennsuco Wetlands and WCA-3B.

The purpose for the C-501 Canal (L-30 Borrow Canal) is to convey natural system deliveries to the Northeast Shark River Slough. The C-501 Canal also maintains one of the existing purposes of the L-30 Borrow Canal in reduction of

seepage loss from WCA-3B by maintaining an elevated control stage when deliveries are not being made. The existing L-30 Borrow Canal is currently used to make regional dry-season water supply deliveries to the South Dade Conveyance System via the L-31N system south of US-41 (Tamiami Trail). This conveyance purpose of L-30 Borrow Canal is supplanted by C-503 or the Dade-Broward Levee Canal as explained in the paragraph above. The upgraded L-30 Canal (C-501) will convey the seepage and excess WCA-2B water in the future as this is a better quality water than the regional water supply.

The primary purpose of S-380E (eastern C-4 Structure) is to direct water south in the C-2 Canal for groundwater and wellfield recharge. The ability to direct flows south in the C-2 Canal will provide more freshwater flows to the central Biscayne Bay area. The structure can also be operated to maximize the flow in both canals during the wet season to optimize flood protection.

### **What the WPA Plan Will Accomplish**

Implementation of the Water Preserve Areas Project will begin the recovery of healthy, sustainable ecosystems throughout south Florida. Specifically, implementation of the WPA Plan will reduce discharges to WCA 3A, through the S-9 Pump Station, by 99 percent; increase spatial extent and protect the 3,335 acres of wetland in the Strazzulla tract adjacent to Loxahatchee National Wildlife Refuge; reduce seepage flow from WCA 3A/3B by 75 percent; and will increase water to the system by approximately 19 percent more than was anticipated by the Comprehensive Plan for the same components. Some flood protection and water quality benefits will also be realized.

Therefore, the water supply and environmental restoration objectives of the Water Preserve Areas Project will be met: More water is retained in the natural system; water currently discharged to tide is captured and stored; a buffer between the natural system and developed areas is provided where feasible; and, wetlands outside the Everglades have increased spatial extent and are protected and enhanced.

### **How the WPA Plan Will Be Implemented**

A Project Management Plan (PMP) will be prepared for the recommended plan after completion of the draft report. The plan will identify specific tasks to be accomplished during preconstruction engineering and design.

A follow-on Special Project Implementation Report will be completed to address the water reservations issues associated with the Water Preserve Areas as

required by the Water Resources Development Act of 2000 and Chapter 373.470, Florida Statutes.

The Water Preserve Areas Plan is divided into four separable elements. They are the Strazzulla Wetlands, Hillsboro Impoundment, Broward County Water Preserve Areas and Dade-Broward Levee and Canal. The Strazzulla Wetlands are recommended under Section 601 (c) of WRDA 2000 (Program Authority) and Hillsboro Impoundment is recommended under Section 601(b)(2)(D)(iii) of WRDA 2000 (Initial Project Authorizations).

The Broward County WPA is recommended for WRDA 2002, which includes WRDA 2000 Initial Projects North New River Improvements, C-11 Impoundment, C-9 Impoundment, and WCA 3A/3B Levee Seepage Management. The separable element also includes advancing part of WCA 2B Flows to Central Lake Belt Storage Area and WCA 3 Flows to Central Lake Belt Storage Area. Since these projects work together to reduce the pumping of untreated urban water into the natural area, they are combined in one separable element.

Dade Broward Levee and Canal will also be recommended in WRDA 2002. Included in this separable element is Central Lake Belt Storage Area L-30 improvements, North Lake Belt Storage Area (Turnpike Deliveries), the Dade Broward Levee and Canal and the C-4 structure.

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AND  
SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT**

**TABLE OF CONTENTS**

**\*SUMMARY** ..... i

**SECTION 1 - INTRODUCTION**

1.1 STUDY AUTHORITY..... 1-4

1.2 STUDY PURPOSE & SCOPE..... 1-5

    1.2.1 Study Purpose ..... 1-5

    1.2.2 Study Scope ..... 1-6

    1.2.3 Report Organization ..... 1-7

1.3 STUDY AREA ..... 1-7

1.4 NATIONAL ENVIRONMENTAL POLICY ACT REQUIREMENTS ..... 1-10

1.5 STUDY PROCESS ..... 1-12

1.6 THE CENTRAL AND SOUTHERN FLORIDA PROJECT ..... 1-13

1.7 THE COMPREHENSIVE EVERGLADES RESTORATION PLAN..... 1-16

1.8 OTHER STUDIES, REPORTS, AND PROJECTS..... 1-19

    1.8.1 C&SF Project Authorizations ..... 1-19

    1.8.2 Other Studies ..... 1-19

**SECTION 2 - PRE-DRAINAGE CONDITION**

2.1 SYSTEM-WIDE REGION ..... 2-1

2.2 WATER PRESERVE AREAS REGION ..... 2-2

**SECTION 3 - \*EXISTING CONDITIONS**

3.1 GEOLOGY AND SOILS ..... 3-1

3.2 CLIMATE ..... 3-2

3.3 AIR QUALITY ..... 3-3

3.4 NOISE ..... 3-3

3.5 VEGETATION ..... 3-3

    3.5.1 Acme Basin B Stormwater Treatment Area ..... 3-7

    3.5.2 Acme Basin B Impoundment..... 3-7

    3.5.3 Strazzulla Wetlands ..... 3-7

    3.5.4 Hillsboro Impoundment..... 3-8

    3.5.5 C-11 Impoundment ..... 3-9

    3.5.6 C-9 Impoundment ..... 3-9

    3.5.7 Water Conservation Area 3A Seepage Management Area – Broward  
County ..... 3-10

3.5.8	Water Conservation Area 3B Seepage Management Area - Miami-Dade County .....	3-10
3.5.9	Dade Broward Levee and Canal .....	3-11
3.5.10	Bird Drive Recharge Area .....	3-11
3.6	FISH AND WILDLIFE.....	3-12
3.7	THREATENED, ENDANGERED AND STATE LISTED SPECIES.....	3-14
3.8	ESSENTIAL FISH HABITAT.....	3-16
3.9	WATER MANAGEMENT .....	3-16
3.10	WATER QUALITY .....	3-18
3.10.1	Conditions Specific to Component Areas.....	3-18
3.10.1.1.	Group 1 – Northern Region of WPAs .....	3-19
3.10.1.2.	Group 2 – Central Region of WPAs .....	3-23
3.10.1.3.	Group 3 – Southern Region of WPAs .....	3-27
3.10.2	GROUNDWATER.....	3-29
3.11	WATER SUPPLY .....	3-31
3.12	SOCIO-ECONOMICS.....	3-33
3.13	LAND USE .....	3-33
3.14	RECREATION RESOURCES.....	3-34
3.15	AESTHETICS .....	3-34
3.16	CULTURAL RESOURCES .....	3-35
3.17	HAZARDOUS, TOXIC AND RADIOACTIVE WASTE .....	3-37
3.17.1	Bird Drive Recharge Area .....	3-38
3.17.2	Hillsboro Impoundment and ASR Area.....	3-38
3.17.3	Acme Basin B STA & Impoundment and Strazzulla Wetlands .....	3-38
3.17.4	North New River Project Area .....	3-38
3.17.5	Central Broward Area, Southwest Broward, and North and Central Lake Belt Storage Area.....	3-38

**SECTION 4 - \*FUTURE “WITHOUT PLAN” CONDITION**

4.1	“WITH AND WITHOUT” COMPARISONS.....	4-1
4.1.1	“With-and-Without” Versus “Before-and-After”.....	4-1
4.2	PLANNING HORIZON.....	4-2
4.3	INCLUSION OF AUTHORIZED CERP COMPONENTS.....	4-3
4.4	CLIMATE .....	4-3
4.5	SOCIO-ECONOMIC CONDITIONS.....	4-4
4.5.1	Urban and Agricultural Water Supply Demands .....	4-5
4.6	LAND USE AND LAND COVER .....	4-6
4.7	WATER QUALITY .....	4-7
4.8	PHYSICAL FACILITIES AND OPERATIONS .....	4-9
4.8.1	C&SF Project Modifications .....	4-9
4.8.2	Other Water Resources Projects .....	4-11
4.9	RECREATION .....	4-12
4.10	CULTURAL RESOURCES .....	4-12
4.11	WETLAND RESOURCES.....	4-12
4.12	HAZARDOUS, TOXIC AND RADIOACTIVE WASTES .....	4-12

**SECTION 5 - PROBLEMS AND OPPORTUNITIES**

5.1	PUBLIC CONCERNS.....	5-1
-----	----------------------	-----

5.2	ECOLOGICAL PROBLEMS AND OPPORTUNITIES .....	5-2
5.3	WATER QUALITY PROBLEMS AND OPPORTUNITIES.....	5-4
5.3.1	Regional Overview .....	5-4
5.3.2	Everglades Protection Area Inflows.....	5-5
5.3.3	Inflows into Major Canals .....	5-6
5.3.4	Flow into Estuaries (Discharge to Tide).....	5-6
5.4	ECONOMIC AND SOCIAL WELL-BEING PROBLEMS AND OPPORTUNITIES	5-6
5.5	RECREATION AND PUBLIC ACCESS PROBLEMS AND OPPORTUNITIES.....	5-7
5.6	PLANNING GOALS AND OBJECTIVES.....	5-8
5.6.1	Enhance Ecologic Values.....	5-8
5.6.1.1	Spatial Extent.....	5-9
5.6.1.2	Habitat and Functional Quality .....	5-10
5.6.1.3	Species Abundance and Diversity .....	5-11
5.6.2	Enhance Economic Values and Social Well Being .....	5-13
5.6.2.1	Water Supply .....	5-13
5.6.2.2	Flood Damage Reduction .....	5-14
5.6.2.3	Recreation and Navigation .....	5-14
5.6.2.4	Social and Cultural .....	5-15

**SECTION 6 PLAN FORMULATION AND EVALUATION**

6.1	PLAN FORMULATION AND EVALUATION METHODOLOGY .....	6-1
6.2	IDENTIFICATION AND SCREENING OF PLAN COMPONENTS .....	6-2
6.2.1	The Components of the Comprehensive Plan .....	6-2
6.2.2	Pilot Projects 6-4	
6.2.3	Ongoing Studies and Projects .....	6-6
6.2.3.1	North Palm Beach County PIR.....	6-6
6.2.3.2	Modified Water Deliveries to Everglades National Park (MWD).....	6-6
6.2.3.3	C-111 Project .....	6-6
6.2.3.4	Biscayne Bay Feasibility Study.....	6-7
6.2.3.5	Additional Water to the Southern Everglades and Biscayne Bay .....	6-7
6.2.4	Screening Conclusions .....	6-8
6.3	FORMULATION AND EVALUATION OF ALTERNATIVE PLANS .....	6-11
6.3.1	Methodology for Formulation and Evaluation of the Alternative Plans .....	6-11
6.3.1.1	Natural Areas Team.....	6-13
6.3.1.2	Lower East Coast Team .....	6-13
6.3.1.3	Water Quality Team.....	6-13
6.3.1.4	Multi-Agency Design Team.....	6-13
6.3.2	Evaluation Tools .....	6-14
6.3.2.1	South Florida Water Management Model.....	6-14
6.3.2.2	Sub-Regional Groundwater Models.....	6-15
6.3.2.3	Water Quality Models .....	6-15
6.3.3	Performance Measures .....	6-15
6.3.4	Basis for Formulation and Tradeoffs for the Alternative Plans.....	6-16
6.3.5	Formulation of Alternative Plans .....	6-17
6.3.5.1	The Starting Point.....	6-17
6.3.5.2	Alternatives 1-3 .....	6-18

6.3.6	Formulation of the Preliminary Selected Plan.....	6-32
6.3.6.1	Acme Basin B Discharge.....	6-32
6.3.6.2	Strazzulla Wetlands.....	6-33
6.3.6.3	Agricultural Reserve Impoundment.....	6-33
6.3.6.4	Hillsboro Impoundment.....	6-34
6.3.6.5	Divert WCA 2B flows to Central Lake Belt Storage Area ....	6-35
6.3.6.6	North New River Improvements (US 27 Conveyance).....	6-35
6.3.6.7	Divert WCA 3 flows to Central Lake Belt Storage Area .....	6-36
6.3.6.8	Water Conservation Area 3A and 3B Levee Seepage Management.....	6-36
6.3.6.9	C-11 Impoundment.....	6-36
6.3.6.10	C-9 Impoundment.....	6-37
6.3.6.11	North Lake Belt Storage Area .....	6-37
6.3.6.12	Central Lake Belt Storage Area .....	6-38
6.3.6.13	Dade-Broward Levee and Canal.....	6-38
6.3.6.14	C-4 Structure .....	6-38
6.3.6.15	Bird Drive Recharge Area.....	6-38
6.3.7	Evaluation of the Alternative Plans and the PSP.....	6-39
6.3.7.1	Natural Areas Evaluation.....	6-39
6.3.7.2	Lower East Coast Evaluation (Water Supply and Flood Damage Reduction) .....	6-43
6.3.7.3	Water Quality Evaluation.....	6-47
6.3.7.4	Design Evaluation.....	6-50
6.3.7.5	C-11 Impoundment.....	6-53
6.3.7.6	C-9 Impoundment.....	6-54
6.3.7.7	North New River Improvements .....	6-55
6.3.7.8	North Lake Belt Storage Area .....	6-55
6.3.7.9	Divert Water Conservation Area 3 Flows to Central Lake Belt Storage Area .....	6-55
6.3.7.10	Central Lake Belt Storage Area .....	6-55
6.3.7.11	C-4 Control Structure.....	6-55
6.3.7.12	Dade-Broward Levee and Canal.....	6-55
6.3.7.13	Bird Drive Recharge Area.....	6-56
6.3.8	Conclusions of Preliminary Selected Plan.....	6-56
6.4	<b>COST EFFECTIVENESS AND INCREMENTAL COST ANALYSES .....</b>	<b>6-58</b>
6.4.1	Acme Basin B.....	6-63
6.4.2	Strazzulla Wetlands .....	6-63
6.4.3	Hillsboro Impoundment.....	6-64
6.4.4	Broward County WPA .....	6-64
6.4.5	Dade Broward Levee and Canal .....	6-64
6.4.6	Bird Drive Basin .....	6-64
6.4.7	Combined Separable Elements .....	6-65
6.5	<b>TENTATIVE SELECTED PLAN.....</b>	<b>6-66</b>
6.5.1	Hauling vs. Side Casting Excavated Material .....	6-66
6.5.2	Component Redesign .....	6-66
6.5.2.1	Hillsboro Impoundment .....	6-67
6.5.2.2	C-9 Impoundment.....	6-67
6.5.2.3	Model Verification .....	6-67
6.6	<b>RECOVER .....</b>	<b>6-68</b>

6.6.1	Regional Evaluation of Alternative Plans .....	6-68
6.6.1.1	Evaluation of the Water Preserve Areas.....	6-68
6.6.1.2	Evaluation Conclusions.....	6-70
6.6.2	CERP Refinement.....	6-70
6.6.2.1	Consistency with CERP (performance).....	6-71
6.6.2.2	Refinement to CERP Base Conditions .....	6-71
6.6.2.3	Refinement to Other CERP Components.....	6-72
6.7	ECONOMIC EFFECTS.....	6-73
6.7.1	Water Supply .....	6-73
6.7.2	Flood Damage Prevention .....	6-73
6.7.3	Navigation, Recreation, and Fishing .....	6-74
6.7.4	Regional Economic Impacts.....	6-75
6.8	WETLAND MITIGATION PLAN.....	6-76
6.8.1	Existing Mitigation .....	6-76
6.8.1.1	Weston Increment 3 .....	6-79
6.8.1.2	White Construction .....	6-79
6.8.1.3	Sivore Construction.....	6-79
6.8.1.4	Sunset Lakes .....	6-79
6.8.1.5	Florida Department of Transportation Mitigation.....	6-80
6.8.2	WPA Impact On Existing Mitigation.....	6-80
6.8.2.1	C-11 Impoundment.....	6-81
6.8.2.2	C-9 Impoundment.....	6-81
6.8.2.3	Florida Department of Transportation Mitigation.....	6-81
6.8.3	Proposed WPA Compensatory Mitigation Measures .....	6-82
6.8.3.1	Backfilling Borrow Pits.....	6-82
6.8.3.2	Littoral Shelves .....	6-82
6.8.3.3	Fish Refugia.....	6-83
6.8.3.4	Marsh Wetlands .....	6-83
	6.8.3.5 Exotic Plant Removal.....	6-83
6.8.4	REGULATORY EVALUATION OF MITIGATION MEASURES.....	6-83
6.8.5	MITIGATION PLAN CONCLUSIONS .....	6-86
6.9	UNCERTAINTY ANALYSIS .....	6-87
6.10	PLANNING CRITERIA AND EVALUATION OF ACCOUNTS.....	6-88
6.11	PLAN FORMULATION CONCLUSIONS .....	6-93

**SECTION 7 - \*ENVIRONMENTAL EFFECTS**

7.1	SOILS .....	7-2
7.2	GEOLOGY .....	7-2
7.3	CLIMATE .....	7-2
7.4	AIR QUALITY .....	7-2
7.5	NOISE .....	7-2
7.6	WETLANDS/VEGETATION.....	7-3
7.6.2	Hillsboro Impoundment.....	7-4
7.6.3	C-9 and C-11 Impoundments .....	7-4
7.6.4	WCA 3 Buffer Strip, with Melaleuca (North and South).....	7-5
7.6.5	WCA 3 Buffer Strip, with Melaleuca removal (North and South) .....	7-5
7.6.6	WCA 3 Buffer Strip South, Cell 16 .....	7-5

7.6.7	Florida Power and Light Strip .....	7-6
7.7	FISH AND WILDLIFE.....	7-9
7.8	THREATENED AND ENDANGERED SPECIES .....	7-9
7.9	ESSENTIAL FISH HABITAT.....	7-10
7.10	WATER QUALITY .....	7-11
	7.10.1 Strazzulla Wetlands .....	7-12
	7.10.2 Hillsboro Impoundment.....	7-13
	7.10.3 Broward County WPAs.....	7-13
	7.10.3.1 Diversion of WCA 2 flows to Central Lake Belt Storage (CLBSA) .....	7-14
	7.10.3.2 WCA 3A and 3B Levee Seepage Management .....	7-14
	7.10.3.3 C-11 Impoundment.....	7-14
	7.10.3.4 C-9 Impoundment.....	7-15
	7.10.3.5 North New River Impoundment.....	7-15
	7.10.3.6 Water Conservation Area 3 Flow Diversion to Central Lake Belt Storage Area .....	7-16
	7.10.4 Dade Broward Levee and Canal .....	7-16
	7.10.4.1 C-4 Structure .....	7-16
	7.10.4.2 Central and North Conveyance .....	7-16
	7.10.5 Summary .....	7-17
7.11	WATER SUPPLY .....	7-17
7.12	LAND USE .....	7-18
7.13	RECREATION RESOURCES .....	7-19
7.14	AESTHETIC RESOURCES .....	7-20
7.15	CULTURAL RESOURCES .....	7-20
7.16	HAZARDOUS, TOXIC, AND RADIOACTIVE WASTES .....	7-22
7.17	UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS .....	7-22
	7.17.1 Land Use (Agriculture).....	7-22
	7.17.2 Wetlands .....	7-22
	7.17.3 Water quality .....	7-22
	7.17.4 Air quality .....	7-23
	7.17.5 Soils .....	7-23
	7.17.6 Wildlife .....	7-23
	7.17.7 Recreation .....	7-23
	7.17.8 Cultural Resources.....	7-23
7.18	RELATIONSHIP BETWEEN SHORT TERM USES AND LONG TERM PRODUCTIVITY .....	7-23
7.19	IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES ..	7-24
7.20	CUMULATIVE EFFECTS .....	7-24

**SECTION 8 - THE RECOMMENDED PLAN**

8.1	CONSTRUCTION FEATURES .....	8-1
	8.1.1 Strazzulla Wetlands .....	8-1
	8.1.2 Hillsboro Impoundment.....	8-2
	8.1.3 Broward County WPA .....	8-3
	8.1.3.1 C-11 Impoundment.....	8-5
	8.1.3.2 C-9 Impoundment.....	8-6
	8.1.3.3 Water Conservation Area 3A/3B Levee Seepage	

	Management .....	8-6
	8.1.3.4 Divert WCA 2B Flows to Central Lake Belt Storage Area .....	8-7
	8.1.3.5 Divert WCA 3 Flows to Central Lake Belt Storage Area .....	8-7
	8.1.3.6 North New River Improvements (US 27 Conveyance) .....	8-8
8.1.4	Dade-Broward Levee and Canal .....	8-8
	8.1.4.1 Dade Broward Levee and Canal and North Lake Belt Storage Area (Turnpike Deliveries) .....	8-9
	8.1.4.2 Central Lake Belt Storage Area (L-30 Improvements) .....	8-9
	8.1.4.3 C-4 Structure .....	8-10
8.2	REAL ESTATE .....	8-20
	8.2.1 Land Acquisition .....	8-20
	8.2.2 Relocation Assistance (Public Law 91-646) .....	8-20
	8.2.3 Construction Relocations .....	8-21
	8.2.3.1 Public Highways and Bridges .....	8-21
	8.2.3.2 Utilities Relocations .....	8-21
	8.2.3.3 Relocations of Towns and Cemeteries .....	8-21
8.3	MONITORING AND ASSESSMENT PLAN .....	8-21
	8.3.1 Monitoring Plan .....	8-22
	8.3.2 Adaptive Assessment Plan .....	8-22
8.4	WATER CONTROL PLANS .....	8-23
8.5	MANATEE PROTECTION PLAN .....	8-23
8.6	RECREATION PLAN .....	8-24
	8.6.1 Impoundments .....	8-24
	8.6.2 Water Conservation Areas 3A and 3B Seepage Management Areas .....	8-25
	8.6.3 Canals .....	8-25
	8.6.4 Strazzulla Wetlands .....	8-25
	8.6.5 Lox Road .....	8-25
	8.6.6 Krome Avenue Campground .....	8-26
8.7	COST ESTIMATE .....	8-26
	8.7.1 Initial Costs .....	8-26
	8.7.2 Investment Costs .....	8-26
	8.7.3 Adaptive Assessment and Monitoring Costs .....	8-26
	8.7.4 Operation, Maintenance, Repair, Replacement, and Rehabilitation (OMRR&R) Costs .....	8-27
	8.7.5 Annual Costs .....	8-28
8.8	COST SHARING .....	8-28
	8.8.1 Cost Sharing of Construction and Land Costs .....	8-29
	8.8.2 Cost Sharing of Adaptive Assessment and Monitoring .....	8-29
	8.8.3 Cost Sharing of Operations, Maintenance, Repair, Replacement and Rehabilitation .....	8-30
8.9	AUTHORIZATION OF THE RECOMMENDED PLAN .....	8-30
8.10	IMPLEMENTATION .....	8-31
	8.10.1 Project Management Plan .....	8-32
	8.10.2 Special Project Implementation Report .....	8-32
	8.10.3 Detail Design .....	8-33
	8.10.4 Project Cooperation Agreement .....	8-35
	8.10.5 Construction .....	8-35

**SECTION 9 - \*PUBLIC INVOLVEMENT AND COORDINATION**

9.1 PUBLIC INVOLVEMENT PROGRAM..... 9-1

9.2 ENVIRONMENTAL JUSTICE..... 9-3

    9.2.1 Initial Screening and Scoping ..... 9-3

    9.2.2 Public Participation ..... 9-3

9.3 COMPREHENSIVE REVIEW STUDY RECONNAISSANCE PUBLIC WORKSHOPS ..... 9-4

9.4 RESTUDY FOCUS GROUPS ..... 9-4

9.5 WATER PRESERVE AREAS STAKEHOLDER INVOLVEMENT AND OUTREACH ..... 9-5

    9.5.1 Stakeholder Involvement and Outreach..... 9-5

    9.5.2 Stakeholder Group Meetings..... 9-5

    9.5.3 Small Group Meetings ..... 9-5

    9.5.4 Local Government Briefings..... 9-5

    9.5.5 Staff Briefings ..... 9-6

9.6 PUBLIC MEETINGS ..... 9-6

9.7 REVIEW CONFERENCES ..... 9-6

9.8 OTHER REQUIRED COORDINATION ..... 9-7

    9.8.1 U.S. Fish and Wildlife Service ..... 9-7

    9.8.2 Florida Fish and Wildlife Conservation Commission ..... 9-8

    9.8.3 Florida State Historic Officer..... 9-8

9.9 SCOPING ..... 9-8

9.10 STUDY TEAM ..... 9-9

9.11 INTERNET WEB SITE..... 9-9

9.12 REVIEW OF DRAFT INTEGRATED FEASIBILITY REPORT AND SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT ..... 9-10

    9.12.1 Integrated Feasibility Report and Supplemental Environmental Impact Statement Recipients..... 9-10

    9.12.2 Comments and Responses ..... 9-12

**SECTION 10 - \*COMPLIANCE WITH ENVIRONMENTAL REQUIREMENTS**

10.1 NATIONAL ENVIRONMENTAL POLICY ACT OF 1969 ..... 10-1

10.2 FISH AND WILDLIFE COORDINATION ACT OF 1958..... 10-1

10.3 ENDANGERED SPECIES ACT OF 1973 ..... 10-1

10.4 NATIONAL HISTORIC PRESERVATION ACT OF 1966..... 10-2

10.5 CLEAN WATER ACT OF 1972..... 10-2

10.6 CLEAN AIR ACT OF 1972..... 10-2

10.7 COASTAL ZONE MANAGEMENT ACT OF 1972 ..... 10-2

10.8 FARMLAND PROTECTION POLICY ACT OF 1981..... 10-2

10.9 WILD AND SCENIC RIVER ACT OF 1968..... 10-3

10.10 MARINE MAMMAL PROTECTION ACT OF 1972 ..... 10-3

10.11 ESTUARY PROTECTION ACT OF 1968..... 10-3

10.12 FEDERAL WATER PROJECT RECREATION ACT OF 1965 ..... 10-3

10.13 RESOURCE CONSERVATION AND RECOVERY ACT OF 1976..... 10-3

10.14 TOXIC SUBSTANCES CONTROL ACT OF 1976..... 10-3

10.15 MARINE PROTECTION, RESEARCH, AND SANCTUARIES ACT OF

1972 .....	10-3
10.16 RIVERS AND HARBORS APPROPRIATION ACT OF 1899 .....	10-4
10.17 MAGNUSON-STEVENSON FISHERY CONSERVATION AND MANAGEMENT ACT .....	10-4
10.18 COASTAL BARRIER RESOURCES ACT .....	10-4
10.19 ANADROMOUS FISH CONSERVATION ACT .....	10-4
10.20 MIGRATORY BIRD TREATY ACT AND MIGRATORY BIRD CONSERVATION ACT .....	10-4
10.21 SECTION 904 OF THE 1986 WATER RESOURCES DEVELOPMENT ACT .....	10-5
10.22 SECTION 307 OF THE 1990 WATER RESOURCES DEVELOPMENT ACT .....	10-5
10.23 E.O. 11988, FLOODPLAIN MANAGEMENT .....	10-5
10.24 E.O. 11990, PROTECTION OF WETLANDS .....	10-5
10.25 E.O. 12114, ENVIRONMENTAL EFFECTS ABROAD OF MAJOR FEDERAL ACTIONS .....	10-5
10.26 E.O. 13089, CORAL REEF PROTECTION .....	10-5
10.27 E.O. 12898, ENVIRONMENTAL JUSTICE .....	10-6
10.28 FLORIDA STATUTES 373.1501 AND 373.026 (AMENDED) .....	10-6
10.28.1 Legislative Intent .....	10-6
10.28.2 Compliance Criteria .....	10-7
10.28.3 Purpose, Scope, and Organization .....	10-8

## **SECTION 11 - RECOMMENDATIONS**

## **SECTION 12 - \*LIST OF STUDY TEAM MEMBERS AND REPORT PREPARERS**

## **SECTION 13 - GLOSSARY OF TERMS, ACRONYMS AND ABBREVIATIONS, AND CONVERSION TABLES**

## **SECTION 14 - \*REFERENCES**

## **SECTION 15 - \*INDEX**

### **LIST OF ANNEXES**

- A – COORDINATION ACT REPORTS
- B – BIOLOGICAL ASSESSMENT
- C - SECTION 404(b)(1) EVALUATION
- D – COASTAL ZONE CONSISTENCY EVALUATION

### **LIST OF APPENDICES**

- A – Plan Formulation
- B- Engineering Design
- C- Geotechnical Appendix
- D- Draft Water Control Plans
- E – Cost Engineering
- F – Real Estate Plan
- G – Socio Economics

- H- Water Quality
- I- Florida Compliance Report

Note: \* Required for NEPA compliance

### LIST OF FIGURES

Figure 1.3-1 Study Regions 1-8	
Figure 1.3-2 C&SF Project Map .....	1-9
Figure 2.1-1 Pre-Drainage Florida .....	2-4
Figure 2.2-1 Map Showing Pre-drainage Florida .....	2-5
Figure 3.5-1 Water Preserve Areas Components in Palm Beach County. ....	3-4
Figure 3.5-2 Water Preserve Areas Components in Broward and Miami-Dade Counties ..	3-5
Figure 3.17-1 Miami-Dade County HTRW Database Review – Bird Drive Recharge Area .....	3-40
Figure 3.17-2 Palm Beach County HTRW Database Review – Hillsboro Impoundment..	3-41
Figure 3.17-3 Palm Beach County HTRW Database Review – Acme Basin B STA .....	3-42
Figure 3.17-4 Palm Beach County HTRW Database Review – Acme Basin B Impoundment .....	3-43
Figure 3.17-5 Palm Beach County HTRW Database Review – Strazzulla Wetlands	3-44
Figure 3.17-6 Broward County HTRW Database Review – North New River .....	3-45
Figure 3.17-7 Broward County HTRW Database Review – C-11 Impoundment.....	3-46
Figure 3.17-8 Broward County HTRW Database Review – C-9 Impoundment.....	3-47
Figure 4.2-1: Planning Horizon .....	4-2
Figure 4.12-1 Broward County HTRW Database Review – North New River Area .....	4-16
Figure 6.1-1 Alternative Plan Formulation & Evaluation Process .....	6-2
Figure 6.2-1 General Location of Water Preserve Areas Components .....	6-10
Figure 6.3-1 Alternative Design Process.....	6-12
Figure 6.3-2 Palm Beach Infrastructure Locations .....	6-20
Figure 6.3-3 Broward County Infrastructure Locations .....	6-25
Figure 6.3-4 Miami-Dade County Infrastructure Locations .....	6-29
Figure 6.8-1 Compensatory Mitigation .....	6-78
Figure 8.1-1 Strazzulla Wetlands.....	8-11
Figure 8.1-2 Hillsboro Impoundment.....	8-12
Figure 8.1-3 Broward County WPA (1 of 4) .....	8-13
Figure 8.1-4 Broward County WPA (2 of 4) .....	8-14
Figure 8.1-5 Broward County WPA (3 of 4) .....	8-15
Figure 8.1-6 Broward County WPA (4 of 4) .....	8-16
Figure 8.1-7 Dade-Broward Levee and Canal (1 of 3) .....	8-17
Figure 8.1-8 Dade-Broward Levee and Canal (2 of 3) .....	8-18

Figure 8.1-9 Dade-Broward Levee and Canal (3 of 3) ..... 8-19  
Figure 8.10-1 WPA Implementation ..... 8-32

**LIST OF TABLES**

Table 1.2-1 Steps in U.S. Army Corps of Engineers Project Development ..... 1-6  
Table 1.8.1-1 C&SF Project Authorities..... 1-21

Table 3.5-1 WRAP Existing Conditions ..... 3-6  
Table 3.7-1. Threatened, Endangered & Species of Special Concern ;plants and animals  
likely to be affected by the Water Preserve Areas ..... 3-15  
Table 3.10-1 WCA 1 Baseline Total Phosphorus Data ..... 3-20  
Table 3.10-2. Summary of Historic Phosphorus Data - NSID Basin ..... 3-22  
Table 3.10-3. Summary of Historic Phosphorus Data– C-11 West Basin. .... 3-24  
Table 3.10-4 Miami-Dade County Canal Monitoring ..... 3-28

Table 4.11-1 WRAP Future Without Project Condition ..... 4-14  
Table 4.11-1 WRAP Future Without Project Condition (Con't) ..... 4-15

Table 5-1 Goals and Objectives for the C&SF Comprehensive Review Study and Water  
Preserve Areas ..... 5-8

Table 6.1-1 Plan Formulation Steps ..... 6-2  
Table 6.2-1 Components of the Comprehensive Plan in Eastern Portions of Palm Beach,  
Broward and Miami-Dade Counties ..... 6-3  
Table 6.2-2 Alternative Component Names ..... 6-4  
Table 6.2-3 COMPONENTS DEPENDENT ON COMPLETION OF Pilot Projects within  
the Lower East Coast Region ..... 6-5  
Table 6.3-1 Natural Areas Hydrologic Evaluation Matrix..... 6-40  
Table 6.3-2 Water Quality Ranking for WPA Alternatives..... 6-48  
Table 6.3-3 Cumulative Water Quality Rating Scores for Each Alternative ..... 6-49  
Table 6.3-4 Plan Formulation Major Iterations..... 6-57  
Table 6.3-5 Separable Elements ..... 6-58  
Table 6.4-1 Separable Elements And Measures Used for the Cost Effectiveness and  
Incremental Cost Analysis ..... 6-59  
Table 6.4-2 Costs and Outputs Used in Cost Effectiveness and Incremental Cost Analyses  
of Alternative Plans 6-61  
Table 6.4-3 Cost Effective And Incremental Cost Information For Separable Elements.. 6-62  
Table 6.4-4 WPA Total (without Acme or Bird Drive)..... 6-65  
Table 6.4-5 Cost Effective And Incremental Cost Information For Water Preserve  
Areas ..... 6-65  
Table 6.8-1 Permitted 404 Mitigation Sites ..... 6-84  
Table 6.8-2 Proposed Mitigation Measures..... 6-86  
Table 6.10-1 Planning Criteria Evaluation..... 6-89  
Table 6.10-2 Evaluation Accounts Listed in the “Principles and Guidelines” ..... 6-91  
Table 6.10-3 Summary of Effects..... 6-92

Table 8.1-1 Strazzulla Wetlands Structures ..... 8-2

Table 8.1-2 Hillsboro Impoundment Structures .....	8-3
Table 8.1-3 Broward County Water Preserve Areas Structures.....	8-4
Table 8.1-4 Dade Broward Levee and Canal Structures.....	8-8
Table 8.2-1 Real Estate REQUIREMENTS .....	8-20
Table 8.5-1 Suggested Manatee Barrier Requirements and Locations .....	8-24
Table 8.7-1 Estimated Initial Cost for Construction Features .....	8-27
Table 8.7-2 Interest During Construction (IDC) for Water Preserve Areas Separable Elements .....	8-28
Table 8.7-3 Operations, Maintenance, Repair, Replacement and Rehabilitation Costs ...	8-28
Table 8.8-1 Cost Apportionment of Recommended Plan .....	8-29
Table 8.8-2 Cost Apportionment of Strazzulla Wetlands.....	8-29
Table 8.9-1 Projects Initially Authorized .....	8-30