Chapter 7A: Everglades Restoration Update

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SUMMARY

The South Florida Water Management District (SFWMD or District) and the U.S. Army Corps of Engineers (USACE) are partners in the largest ecosystem restoration program in the nation, the Comprehensive Everglades Restoration Plan (CERP). The District also collaborates with state and local governments on complementary water quality and ecosystem restoration projects. This chapter describes the progress that has occurred during Fiscal Year 2008 (FY2008) (October 1, 2007–September 30, 2008) in the planning, design, and construction of environmental restoration projects across the Northern and Southern Everglades regions (**Figure 7A-1**). This chapter also highlights some emerging restoration challenges and opportunities. To supplement this year's reporting, the chapter also includes the CERP Annual Report (470 Report), which is mandated by state statute, along with baseline and water quality reports required by the Florida Department of Environmental Protection permits for certain CERP projects (Appendix 7A-1); permit-related reports on CERP expedited projects (Appendices 7A-2 and 7A-3) and the L-8 Reservoir Project for Water Year 2008 (Appendix 7A-4); and the Annual Work Plan for Northern Everglades and Estuaries Protection Program (Appendix 7A-5). Importantly, it should be noted that this chapter is renamed *Everglades Restoration Update* to focus on the full scope of Everglades restoration and is now organized to report on related Everglades projects across the Northern and Southern Everglades regions.

Under CERP, a key milestone was achieved during the past year. In November 2007, three CERP Project Implementation Reports (PIRs) were authorized by the U.S. Congress. The authorized projects are the Indian River Lagoon – South, Picayune Strand Restoration, and the Fran Reich (Site 1) Impoundment. These projects were authorized in the Water Resources Development Act of 2007 (WRDA 2007), which was the first WRDA since 2000. Two additional PIRs, the Broward County Water Preserve Areas and the C-43 Storage Reservoir, also were completed in 2007 but were not included for authorization in the WRDA bill. Currently, the total estimated implementation cost for these five CERP PIRs is approximately $3 billion. The 2008–2009 federal budget includes the first request for the U.S. Congress to appropriate funds for a CERP project. The appropriation of funds in FY2009 will allow the USACE to initiate construction on the Picayune Strand Restoration Project. The bottom line is that the CERP planning process is beginning to achieve results in terms of lining up federal appropriations.

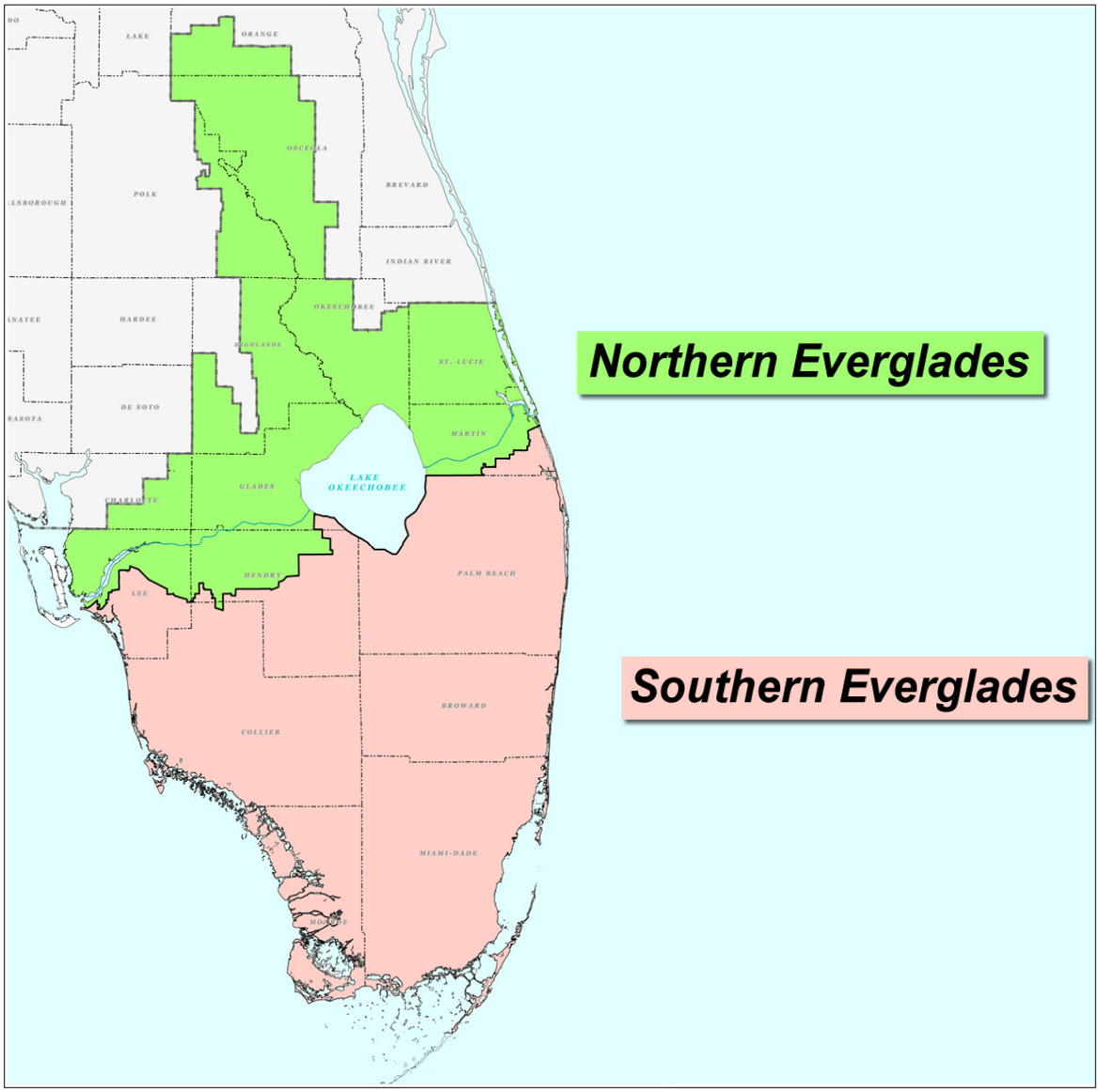

Figure 7A-1. The Northern and Southern Everglades regions.

Over the past year, the District completed final plans and specifications for several expedited projects[1], including the C-44 Reservoir and Stormwater Treatment Area (STA), the C-43 West Basin Storage Reservoir, and three components of the Biscayne Bay Coastal Wetlands projects. In addition, expedited design for two large STA expansions known as Compartments B and C, as part of the Long-Term Plan, was completed by late 2008. It is anticipated that construction will begin on the C-44 Reservoir and STA and the Compartments B and C STA expansions in FY2009. Another project that has gained tremendous momentum over the past year is the C-111 Spreader Canal Project, which is projected to have final design plans and specifications by May 2009. Progress was also made on implementation of the Northern Everglades and Estuaries Protection Program, as the Lake Okeechobee Phase II Technical Plan was completed in February 2008 (SFWMD et al., 2008).

Another expedited project described in previous South Florida Environmental Reports is the Everglades Agricultural Area (EAA) A-1 Reservoir. The EAA Reservoir was to be the first above-ground water storage facility to be built for CERP, and its construction was initiated in 2006. In May 2008, a lawsuit was filed in the U.S. District Court by the Natural Resources Defense Council, the National Wildlife Federation, and the Sierra Club claiming that the USACE 404 Dredge and Fill Permit to construct the reservoir was inconsistent with the intent of WRDA 2000. Due to the potential for a permit revocation resulting from this litigation, construction was halted in June 2008 to avoid significant financial risks associated with mobilizing a massive workforce and related heavy equipment.

In June 2008, Florida Governor Charlie Crist unveiled a bold strategy to revive America's *River of Grass* by acquiring vast tracts of agricultural land south of Lake Okeechobee. After five months of extensive deliberation, due diligence, and public input, the District's Governing Board voted in December 2008 to accept a contract with the United States Sugar Corporation to acquire, subject to financing, more than 180,000 acres of agricultural land for Everglades restoration. This potential transaction offers water managers the opportunity and flexibility to store and clean water on a scale never before contemplated.

[1] Since the launch of Acceler8, the District has recently expanded its list of fast-tracked construction projects to also support a number of other restoration and water quality initiatives now under way in both the Northern and Southern Everglades regions. Further information on the agency's expedited projects is available on the District's web site at www.sfwmd.gov, under the *Everglades* tab (see *Everglades Expedited Projects* e-link).

INTRODUCTION

The Greater Everglades ecosystem comprises both the Northern Everglades and South Everglades regions. The Northern Everglades includes the Kissimmee River south of Orlando, through Lake Okeechobee, and the Caloosahatchee and St. Lucie Estuaries, and the Southern Everglades includes the remnant Everglades areas as well as Florida and Biscayne bays. Over the past century, the region's habitats have undergone many changes that have caused degradation of the natural system. The consequence of development and drainage in South Florida is that, in dry times, sufficient water of the right quality is not always available for both the environment and the human population. Conversely, in wet times, the lack of natural storage capacity often causes damaging inundation to the coastal estuaries.

This chapter describes the progress that has occurred during Fiscal Year 2008 (FY2008) (October 1, 2007–September 30, 2008) in the planning, design, and construction of environmental restoration projects across the Northern and Southern Everglades regions (**Figure 7A-1**). The projects and programs described are designed to work together to benefit the Greater Everglades ecosystem, working toward the overall goals of increasing the total spatial extent of natural areas, enhancing habitat and functional quality, and improving native plant and animal species abundance and diversity. Most of these projects and programs are multi-purpose with many objectives, such as increasing water storage, reducing seepage, and improving the quality of water to be released into natural areas. While no single project will significantly improve the Everglades ecosystem by itself, the cumulative regional environmental benefits as projects are implemented will improve the quantity, quality, timing, and distribution of water. Many of these programs and projects involve partnerships among state, local, and federal agencies.

It is important to note that in previous SFERs, ecosystem restoration work in South Florida has been described as being accomplished through several local, state, and federal programs and initiatives including:

- Comprehensive Everglades Restoration Plan
- Critical Restoration Projects
- Acceler8
- Kissimmee River Restoration
- Everglades Forever Act and Long-Term Plan Projects
- Lake Okeechobee Protection Plan and Lake Okeechobee and Estuary Recovery Plan
- Northern Everglades and Estuaries Protection Program

One of the key changes that the Northern Everglades initiative has provided is to simplify the organization and communication of Everglades restoration progress. This simplification was to describe restoration in the context of the northern and southern regions of the Greater Everglades system. In the SFER, this chapter has been renamed *Everglades Restoration Update* to focus on the full scope of Everglades restoration and is now organized to report on:

- Northern Everglades Restoration
- Southern Everglades Restoration

It is essential that planning, design, and construction of restoration features are fully coordinated and integrated by well organized, multi-disciplinary teams, as well as interagency working groups and individuals who are responsible for implementing single projects or entire programs.

NORTHERN EVERGLADES

In April 2007, the Florida legislature substantially expanded the Lake Okeechobee Protection Act to include protection and restoration of the Lake Okeechobee Watershed and the Caloosahatchee and St. Lucie rivers watersheds and estuaries. The newly expanded program, known as the Northern Everglades and Estuaries Protection Program (NEEPP; Section 373.4595, Florida Statutes), requires that the SFWMD, in collaboration with coordinating agencies, develop a Technical Plan for Phase II of the Lake Okeechobee Watershed Construction Project (LOWCP) by February 1, 2008, and River Watershed Protection Plans for the Caloosahatchee and St. Lucie rivers and watersheds by January 1, 2009. This section contains updates on the NEEPP as well as the federal-state partnerships that are working in concert to restore the upstream waters of South Florida's ecosystem. Further information on the Northern Everglades, particularly Lake Okeechobee, the Kissimmee Basin, and the northern estuaries, is also presented in Chapters 4, 10, 11, and 12 of this volume, respectively. An overview of Everglades restoration projects in the Northern Everglades is depicted on **Figure 7A-2**.

The NEEPP will ensure that projects are holistically aligned and build upon the success of past and current initiatives. One key focus of the program is to achieve and maintain compliance with state water quality standards in the lake and its tributary waters through a phased, watershed-based comprehensive and innovative protection program. Another is to capture water to meet storage needs of the Northern Everglades. The goals and objectives of CERP and NEEPP overlap significantly, and so, the efforts complement and support one another. While Chapters 10, 11, and 12 focus on the science necessary to support the NEEPP, this chapter focuses on the planning efforts under way to develop the alternatives necessary to build a thorough, holistic plan for restoration of the Northern Everglades.

The Northern Everglades and Estuaries Protection Program requires that each River Watershed Protection Program include a watershed protection plan, a watershed construction project, a watershed pollutant control program, and a watershed research and water quality monitoring program. An intense planning effort similar to that used for the Lake Okeechobee Watershed Phase II Technical Plan was used for the development of the Caloosahatchee and St. Lucie Estuary River Watershed Protection Plans, which began in FY2008 in order to meet the legislative deadline of January 1, 2009. The objectives of these plans are to identify (1) required storage and water quality features, (2) areas for restoring natural wetlands, (3) urban and agricultural Best Management Practices (BMPs), and (4) options for muck removal from water bodies to achieve water clarity and quality goals. If achieved, these water storage and quality goals are expected to curtail habitat loss and allow the recovery of more desirable plant, fish, and wildlife communities in the Northern Estuaries.

Baseline information was assembled and alternatives were formulated during spring and summer 2008. The draft Caloosahatchee and St. Lucie Estuary River Watershed Protection Plans were released for public review in October 2008. Public meetings to receive comments on the plans were held the week of October 27, 2008. The final plans will be completed by the end of 2008 in order to meet the mandated deadline for submission to the legislature.

The Annual Work Plan for the Northern Everglades contains the next steps for the restoration of the Northern Everglades region (see Appendix 7A-5 of this volume). The work plan includes Lake Okeechobee as well as Caloosahatchee River and St. Lucie River restoration efforts.

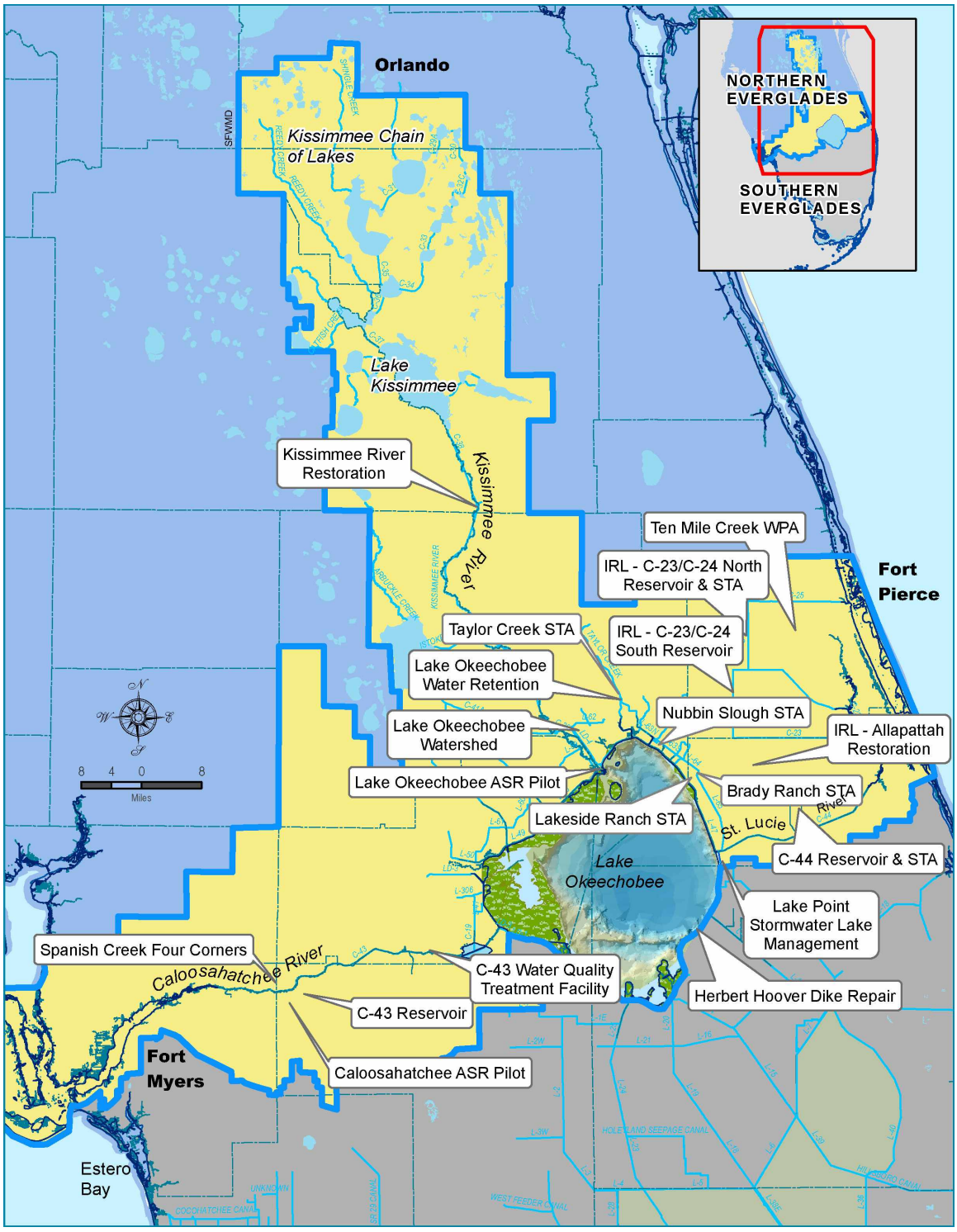

Figure 7A-2. Everglades restoration projects in the Northern Everglades. [Note: Some projects depicted on this map do not have any Fiscal Year 2009 updates and therefore are not discussed in this chapter; further details on these projects is available in previous SFERs.]

LAKE OKEECHOBEE AND ITS WATERSHED UPDATES

Kissimmee River Restoration Project

During FY2008, hydrologic restoration continued in the $634-million Kissimmee River Restoration Project, which is cost-shared equally by the U.S. Army Corps of Engineers (USACE) and the South Florida Water Management District (SFWMD or District). Since 1992, the District has invested approximately $300 million to acquire all 102,064 acres needed for this restoration effort. To date, 9.9 miles of canal have been backfilled and 18 miles of the former river channel have been restored. Two construction phases are complete and continuous water flow has been reestablished to 19 miles of the original Kissimmee River. Work is on schedule for completion in 2012.

One success indicator of the Kissimmee River Restoration is the number of bird species benefiting from the environmental recovery effort. The return to the river and its floodplain of dozens of waterfowl and shorebird species demonstrates that the river is recovering. Not only has the number of species improved so has the population of each species. While never absent from the area, wading birds have increased significantly in number – in recent years the counts have been more than double that expected as a result of restoration. In addition, promising results are being seen throughout the food chain – from small invertebrates to upper-level predators – as a result of the Kissimmee Restoration Project. Additional information on the Kissimmee Basin is presented in Chapter 11 of this volume.

In June 2008, the District's Governing Board directed rule development to reserve the water needed for environmental protection of the fish, wildlife, and plants critical to their habitats. Florida law allows the board to establish water reservation rules that set aside water for protection of fish and wildlife or public health or safety [Subsection 373.223(4), Florida Statutes]. As Central Florida and its demand for public water supply grows, the water reservation is a necessary tool for protecting the Kissimmee and other surface water systems. Based in sound science, water reservations will define a specific amount of water to set aside for the natural system and ensure that the environment receives the water it needs before water is allocated to other users. To assure that this and all reservations for specific water bodies are developed as accurately as possible, all scientific and technical data, methodologies, and models receive independent scientific peer review during the rulemaking process. Along with the public rule development process, water reservations will undergo additional Governing Board consideration before adoption. Additional information on water reservations is presented in Volume II, Chapter 3.

CERP Aquifer Storage and Recovery Regional Study

The Aquifer Storage and Recovery Interim Report 2008 (SFWMD and USACE, 2008), which details the first five years of the CERP Aquifer Storage and Recovery (ASR) efforts, was released in May 2008. The report summarizes the status of several technical studies conducted and outlines the importance of upcoming pilot studies. A summary of the ASR Interim Report findings is available on the CERP web site at www.evergladesplan.org/pm/projects/pdp_32_33_34_44_asr_combined.aspx#interim.

Favorable hydrogeologic conditions for ASR were found at four of the five ASR pilot project locations around Lake Okeechobee and along the Hillsboro Canal and the Caloosahatchee River. A vast hydrogeologic database has been compiled and developed into a comprehensive hydrogeologic framework of the Floridan aquifer system in South Florida. While building the

database, numerous areas of missing information were identified. Extensive geological and geophysical investigations were then performed to fill in the data gaps, including construction of seven new test wells and core borings throughout the region.

No fatal flaws have been uncovered that might hinder the implementation of CERP ASR. It is believed that ASR will work almost anywhere in South Florida on some scale and with some degree of efficiency. Cycle testing is about to begin and will continue over the next few years. A hydrogeologic, water quality, and ecological monitoring network has been constructed to observe the current state of the system and reveal any changes that might take place as a result of ASR.

Two groundwater models are being developed, which will be used to simulate potential local and regional effects of ASR on the groundwater system. They will be used to simulate the effects of density, pressure, flow, and transport on both local and regional scales. The results of the pilot projects and the various geological and geophysical investigations will continue to be integrated into the models, which will undergo refinement and calibration over the next few years.

Study planners continue to gain a deeper understanding of the complex geochemical and biological reactions that can take place within the Floridan aquifer system as a result of recharge, storage, and recovery of treated water. Teaming with the Florida Geological Survey, the U.S. Geological Survey, and others, a variety of geochemical studies and techniques have been developed to assess the effects of ASR on the quality of water recovered from the Floridan aquifer system. These studies will continue as the pilot projects become operational. Concerns with ASR, such as rock fracturing, ecological toxic effects, and water quality (e.g., arsenic and mercury) are also being addressed. Baseline environmental monitoring program and preliminary ecological tests have been performed to assess and predict the effects of ASR on the South Florida ecosystem. Studies on the effects of chemicals on organisms and ecosystems, as well as potential for mercury contamination have been completed. Results from these studies will be integrated into a conceptual ecological model with data obtained during pilot project cycle testing over the next few years. Results of future studies will be incorporated into the final ASR Program Technical Data Report, which is expected to be available by 2012. Further information on the CERP ASR Regional Study is available on the CERP web site at www.evergladesplan.org/pm/projects/proj_44_asr_regional.aspx.

CERP Aquifer Storage and Recovery Pilot Projects

A progress update on the CERP pilot projects that are contributing to the CERP ASR Regional Study is summarized below:

- Lake Okeechobee ASR Pilot
  - Construction completed at the Kissimmee River ASR Facility
  - Cycle testing began in FY2008 (Cycle 1)
  - Expect funding in FY2009 to initiate construction of Port Mayaca ASR Facility, with completion in late 2010 (design update to incorporate lessons learned)
- Hillsboro ASR Pilot
  - Reached substantial completion at Hillsboro ASR Facility
  - Cycle testing began in FY2008
- Caloosahatchee ASR Pilot
  - A sandy aquifer was found, which is not adequate for open-hole, high capacity ASR wells; the C-43 ASR well is being plugged

Lake Okeechobee Protection Plan

Recent years of water shortage have exposed many of Lake Okeechobee's littoral and near-shore areas that had been covered with mucky sediments. During FY2008, the District, in cooperation with the State of Florida, the Florida Fish and Wildlife Conservation Commission (FWC), and Glades County, began removing the muck and restoring six locations in the lake. Over two million cubic yards of muck have been removed from an estimated 2,000 acres of exposed shoreline, potentially restoring submerged aquatic vegetation (SAV) habitat. This project also removed an estimated 237 metric tons of total phosphorus (TP) at an approximate cost of $11 million.

Continued drought conditions have also provided other challenges and opportunities for habitat improvement in Lake Okeechobee. For instance, water supply was maintained with the installation of temporary forward pumps. Low lake levels also allowed large portions of the littoral region to be burned to remove torpedo grass (*Panicum repens*). Chemical treatment followed to control reemergence of this exotic invasive plant. Furthermore, lower lake levels improved the nearshore light penetration allowing SAV regrowth after two years of high and turbid waters.

Other Lake Okeechobee Watershed projects are in progress to reduce phosphorus transport from agricultural lands and capture runoff water during high rainfall periods. Modifications to the lake regulation schedule are under consideration. Ongoing research in the watershed is helping to optimize the design of TP reduction and flow attenuation measures. Research in the lake is providing guidance for adaptive management of water levels and exotic plants. Additional information on these and other projects to restore the lake is presented in Chapter 10 of this volume.

Lake Okeechobee Watershed Construction Project Phase II Technical Plan

Immediately upon enactment of the NEEPP legislation, the District launched an intensive planning effort for the Lake Okeechobee Watershed Construction Project Phase II Technical Plan in coordination with the Florida Department of Environmental Protection (FDEP) and Florida Department of Agriculture and Consumer Services (FDACS). As a result, the final Lake Okeechobee Watershed Construction Project Phase II Technical Plan (LOWCP P2TP) (SFWMD et al., 2008) was completed and submitted to the Florida legislature and governor by February 2008. Under this plan, the coordinating agencies evaluated various alternatives using the best available technology and scientific information. The development and comparisons of the alternatives, along with extensive input from the public, ultimately identified the best science-based and technologically feasible options for improving lake and northern estuary health.

The LOWCP P2TP identifies construction projects, along with agricultural and urban practices, needed to achieve water quality targets for the lake. In addition, it includes other projects for increasing water storage north of Lake Okeechobee to achieve healthier lake levels and reduce harmful discharges to the Caloosahatchee and St. Lucie estuaries. The plan also includes short-term measures for implementation during the first three years and longer-term measures that will be put into operation post-2010. The plan represents the best blueprint for achieving water quality standards while better managing lake levels.

Components of the multi-phase technical plan include the following:

- Implementing agricultural BMPs on more than 1.7 million acres of farmland
- Adopting new regulations that will reduce the impacts of development on water quality and flow
- Building treatment wetlands to clean water flowing into the lake
- Using other innovative "green" nutrient control technologies to reduce TP loads from the watershed
- Creating between 900,000 and 1.3 million acre-feet of water storage north of the lake through a combination of above-ground reservoirs, underground storage, and alternative water storage projects on public and private lands

The LOWCP P2TP builds upon and dovetails with ongoing restoration activities and successfully consolidates many previous Lake Okeechobee restoration efforts into a broader, Northern Everglades-focused approach. Additional information on the NEEPP and LOWCP P2TP is available in Chapter 10 of this volume. The Annual Work Plan for Northern Everglades and Estuaries Protection Program is presented in Appendix 7A-5.

Lakeside Ranch Stormwater Treatment Area

A phasing plan and expedited schedule have been developed to break ground for the Lakeside Ranch Stormwater Treatment Area (STA) Project by February 2009. Key features of the phasing plan are as follows:

- **Phase I – Northern STA.** A 300-cfs inflow pump station, canal improvements along the L-63 and L-64 levees, three STA cells totaling 1,000 acres, and acquisition of land for a drainage cell. Existing state appropriations will be used to implement Phase I.
- **Phase II – Southern STA.** 1,200 acres of STA cells, S-191A pump station and a discharge canal. Implementation of Phase II will be subject to future state appropriations.

Design refinement evaluations were completed in April 2008 and final preliminary design was completed in May 2008. The preliminary total cost estimate, excluding land, is $140 million. The pre-final design for the permit drawings were completed in October 2008.

CERP Lake Okeechobee Watershed Project

The Lake Okeechobee Watershed Project is intended to reduce the TP load by approximately 60 metric tons per year and to store approximately 273,000 acre-feet of water. This load reduction will help to meet the restoration and Total Maximum Daily Load (TMDL) goals for Lake Okeechobee. The off-site storage will help to reduce high lake stage and reduce flood control discharges to the estuaries. During FY2008, a Tentatively Selected Plan was presented at an Alternative Formulation Briefing (a USACE senior staff briefing for plan approval), and the compilation of the draft Project Implementation Report (PIR) sections began. The final PIR is scheduled to be completed by February 2009. Additional information on the CERP Lake Okeechobee Watershed Project is available on the CERP web site at www.evergladesplan.org/pm/projects/proj_01_lake_o_watershed.aspx.

Lake Okeechobee Critical Restoration Project

The Taylor Creek and Nubbin Slough STAs are operational and in the performance monitoring phase.

Lake Point Stormwater Lake Management Project

In August 2008, the District's Governing Board authorized an agreement for donation of land and construction services to the South Florida Water Management District for the creation of a Stormwater Treatment Area and stormwater management lake fronting on the C-44 canal with a permitted outfall easement to Lake Okeechobee and L-8 right-of-way extension. This will allow for a connection to the Loxahatchee River and the L-8 reservoir to potentially provide a range of environmental benefits through phosphorus load reduction and delivery of water to the Loxahatchee River.

Herbert Hoover Dike Rehabilitation

In April 2008, the USACE announced its intent to keep Lake Okeechobee water levels lower than normal in order to attain a water level of 12.5 to 15.5 feet above sea level and thereby reduce the threat of failure of the aging Herbert Hoover Dike. This will keep the lake on average approximately one foot lower than under previous normal operating conditions, increasing the potential for future water shortages. Lake management recommendations include beginning the flow of fresh water from the lake earlier in the year, thereby reducing the frequency and quantity of freshwater releases into coastal estuaries later in the wet season needed to keep lake levels low in advance of approaching storms.

Managing the lake at a lower level has the potential to improve safety performance by reducing structural risk to the Herbert Hoover Dike while rehabilitation efforts are under way. The USACE has commenced work on the shoring of the dike, with the District acquiring lands as needed so that the structure can be improved to current engineering standards. In May 2008, based upon its Environmental Impact Statement detailing 50 properties, the USACE advised the District that no new property acquisitions are needed in FY2009 for this project. Once design is complete, they cannot rule out the potential need for future acquisition. The District is currently working on five land acquisition requests in this area, including two homes, two farm lands, and a state-owned quarry. Funding of $3.8 million is in place for FY2008 to cover those acquisitions.

The WRDA 2007 bill authorized a $1.5 million study of the Herbert Hoover Dike. Further information and updates on the USACE Herbert Hoover Dike project are available on the USACE's web site at www.saj.usace.army.mil.

NORTHERN ESTUARIES UPDATES

Northern Estuaries plans and initiatives are focused on habitat and water storage and quality improvement projects, increasing the District's ability to make informed operational decisions from applied scientific research, administering state-funded initiatives with local governments, and managing tributary floodplains of coastal water bodies in the Northern Everglades. The coastal water bodies that comprise the Northern Estuaries are the Caloosahatchee River Estuary, the Indian River Lagoon, and St. Lucie River Estuary. Many CERP and federal projects are intended to contribute to water quality and water quantity improvements for the Northern Estuaries. Additional storage reservoirs and treatment areas may also be included as part of the Caloosahatchee and St. Lucie Estuary River Protection Plans. Updates on the Northern Estuaries restoration projects are highlighted in the sub-sections below.

CERP Indian River Lagoon – South Project Update

In November 2007, the U.S. Congress passed the Water Resources Development Act of 2007 (WRDA 2007), which contained authorization for the Indian River Lagoon – South Project. WRDA 2007 provides for federal authorization, but not appropriation of funds. The president's budget, released in February 2008, included funding for the initial phase of construction of the project, which will ultimately require $1.4 billion for full implementation.

In December 2007, the District's Governing Board approved a 1,772-acre land acquisition in St. Lucie County. The site will be used in conjunction with other acquired lands for two storage reservoirs that are included in the initial phase of USACE construction. The reservoirs are designed to improve the timing and quality of water flowing into the lagoon. The purchase of the parcel completes the land acquisition necessary for the north (C-24) reservoir and achieves 80 percent of the land needed for the south (C-23) reservoir. All lands needed for construction of the 2,568-acre STA are in public ownership. The District is investing $50.5 million over the next three years for the newest land parcel and expects to receive payments on the land while it remains in citrus production until construction of the reservoirs and STA begins.

In March 2008, the District's Governing Board approved the purchase of 112 acres in western Martin County to be incorporated into the Indian River Lagoon – South Allapattah Natural Lands Restoration Project. This project will provide natural water storage and water quality benefits across a vast 20,000-acre area. The property will be acquired through a joint partnership of the District, Martin County, and the U.S. Department of Agriculture Wetlands Reserve Program. Martin County will contribute 50 percent of the acquisition price, or $487,000, with the remaining 50 percent being funded by the District and the Wetlands Reserve Program. Further information on the Indian River Lagoon – South Project is available on the CERP web site at www.evergladesplan.org/pm/projects/proj_07_irl_south.aspx.

Ten Mile Creek Critical Restoration Project

Although initial construction has been completed on the Ten Mile Creek Critical Restoration Project, it has not been put into beneficial use. Analysis is being performed by the USACE to determine an appropriate course of action necessary to remedy design and construction issues for the project to meet its expected goals.

St. Lucie River and Caloosahatchee River Watershed Protection Plans

The Florida legislature, with the support of Governor Charlie Crist, authorized additional initiatives that include focused funding for the Caloosahatchee River Watershed and the St. Lucie River Watershed. The 2007 State of Florida Watershed Restoration Legislation, also known as the Northern Everglades and Estuaries Protection Program (NEEPP), includes requirements for the District to prepare the following:

- Caloosahatchee River Watershed Protection Plan
- Caloosahatchee River Watershed Research and Water Quality Monitoring Program
- St. Lucie River Watershed Protection Plan
- St. Lucie River Watershed Research and Water Quality Monitoring Program

The final Caloosahatchee River Watershed Protection Plan and St. Lucie River Watershed Protection Plan is scheduled to be submitted to the legislature by January 1, 2009, for ratification during the 2009 legislative session. This process includes (1) characterizing existing conditions, (2) identifying problems and opportunities, (3) determining planning objectives and constraints, (4) selecting performance measures and management measures, (5) formulating and evaluating alternatives, and (6) selecting and processing the recommended plan. Planning is being coordinated with the completed Lake Okeechobee Watershed Construction Project Phase II Technical Plan. The river watershed protection plans will address pollutant load reductions based upon adopted TMDLs, and each will include goals for salinity envelopes and freshwater inflow targets for the respective estuary. Each river watershed protection plan will include the following elements:

- **River Watershed Construction Project.** Planning, design, and construction of the initial phase to improve the hydrology, water quality, and aquatic habitats within the watershed.
- **River Watershed Pollutant Control Program.** A multi-faceted approach to reducing pollutant loads by improving management of pollutant sources within the watershed by implementing regulations and BMPs, developing and implementing improved BMPs, improving and restoring hydrologic function of natural and managed systems, and utilization of alternative technologies for pollutant reduction.

Chapter 12 of this volume provides detailed information regarding the St. Lucie and Caloosahatchee River Watershed Protection Plans that are under development.

Northern Everglades Water Quality Monitoring Programs

Research and monitoring in the St. Lucie and Caloosahatchee estuaries have been ongoing for more than 40 years. Recent efforts, including the state's Surface Water Improvement and Management (SWIM) Program, CERP, the District's regional water supply planning, and state and District rulemaking have added to this body of knowledge. The ability to find solutions to water quantity and water quality problems is hampered by significant gaps and uncertainties in the understanding of the two estuarine systems. For example, despite its importance it is not yet fully understood how various factors control the concentration of dissolved oxygen in either estuary. By reducing uncertainty and filling knowledge gaps, the Research and Water Quality Monitoring Plan will increase the ability to find robust, scientifically based solutions and more accurately predict the response of these estuaries to changes in water quality and quantity.

The NEEPP legislation requires the District, in cooperation with the FDEP, FDACS, and local governments, to establish a Watershed Research and Water Quality Monitoring Program for both the St. Lucie and the Caloosahatchee watersheds. Currently in progress, Research and Water Quality Monitoring Programs are building upon the District's existing research programs and are intended to carry out, comply with, and assess related plans, programs, and other responsibilities. These programs also will assess the water volumes and timing from the Lake Okeechobee and the Caloosahatchee and St. Lucie River watersheds and their relative contributions to the timing and volume of water delivered to the estuaries.

Chapters for the draft monitoring programs for each estuary are currently under review by the coordinating agencies. Each of the River Research and Water Quality Monitoring Plans has five chapters as follows:

- Chapter 1 has an introduction, describing the background, enabling legislation, document structure, and literature cited.
- Chapter 2 identifies the specific goals and objectives of the Research and Monitoring Plans based on the Northern Everglades legislation. It demonstrates how research, modeling, and monitoring contribute to the adaptive management of nutrient load reduction goals and the implementation and operation of projects designed to achieve them.
- Chapter 3 presents the state of knowledge regarding hydrology, water quality, and aquatic habitat. Of particular relevance to the plan are reviews of nutrient loading, salinity envelopes, and effects of Lake Okeechobee on delivery of water to the Caloosahatchee and St. Lucie estuaries.
- Chapter 4 provides a summary of existing monitoring programs for hydrology, water quality, and aquatic habitat. The programs have been evaluated based on their ability to meet program goals. Potential improvements are identified. A recommended monitoring plan along with associated costs of implementation is described.
- Chapter 5 summarizes ongoing research and modeling applicable to program goals. Plans for future research and modeling are described and prioritized. Integration of research, modeling, and monitoring will establish scientifically sound performance measures and support improvements to the estuary through the adaptive management process.

State and Local Cost-Share Projects

Four projects to improve water quality in the St. Lucie River are under way following the District's Governing Board approval of a funding partnership with Martin County. The projects are part of the NEEPP, and fulfill the "5-5-5" funding objective, which provides $5 million in state funds matched by $5 million from the District and $5 million from Martin County for implementation over the next year. Martin County considers water quality a top priority, and these projects will complement the environmental benefits expected from other restoration efforts. The four projects funded in this partnership are:

- Phase III of the Old Palm City Stormwater Quality Improvement Project, which will develop a neighborhood stormwater quality management system. The project includes land acquisition and construction of two STAs that will serve approximately 106 acres of residential land that was first platted in the 1920s.
- The final component of the Manatee Pocket Dredging project, which will improve the water quality in Manatee Pocket of the St. Lucie Estuary. The project calls for the removal of up to 253,000 cubic yards of material, with construction scheduled to begin in December 2008.
- The North River Shores Sewer System, which will provide sanitary sewer service to approximately 450 single-family and multi-family parcels of land in the North River Shores area. The project includes construction of an underground collection system throughout the area and a vacuum sewage collection and pumping facility. The project will enhance water quality in the North Fork of the St. Lucie River by eliminating nutrient loading from septic systems. In addition, it will route the wastewater to the North Wastewater Treatment Plant, where it will be converted to irrigation-quality water for reuse.
- The Manatee Creek water quality retrofit, which will provide additional water quality treatment for drainage from 833 acres of residential, commercial, and industrial development that discharges into the Manatee Pocket of the St. Lucie Estuary. The second and third phases of the Manatee Creek Water Quality Retrofit will provide additional wet detention and marsh filtration areas at the Dixie Park Wastewater Treatment Plant site prior to discharge.

Through the means described above, the health of the Northern Everglades will be enhanced by improving land management to reduce nutrient run-off and by constructing treatment wetlands and water storage projects.

CERP Caloosahatchee River (C-43) West Basin Storage Reservoir Project

Located on 10,000 acres of former farmland in Hendry County south of the river, the Caloosahatchee (C-43) West Reservoir will hold approximately 170,000 acre-feet of water, with a range in depth from 15 to 25 feet. It will provide a significant portion of the total water storage requirement for the Caloosahatchee Estuary. The reservoir will capture and store local basin runoff reducing harmful discharges to the coastal estuaries, improving the health of the ecosystem, and revitalizing fish and oyster habitats by maintaining salinity levels.

A salinity model indicates that this project will have primary benefits in the Caloosahatchee River, San Carlos Bay, and a portion of Pine Island Sound, while secondary benefits will also likely include portions of Estero Bay and the Gulf of Mexico. The reservoir will provide for water supply benefits and some flood attenuation and will provide environmental water supply deliveries to the Caloosahatchee Estuary. Water quality benefits will occur by the reduction of massive volumes of basin freshwater flows to the estuary, thereby reducing salinity imbalances. Reservoir operations are expected to incidentally improve water quality in the Caloosahatchee Estuary due to the settling of nutrients and other pollutants within the reservoir cells prior to delivery to the estuary. The Tentatively Selected Plan provides deep water habitat within the impoundment cells, including refugia, created by embankment excavation, for fish and other aquatic animas during extremely dry periods. The perimeter canal may include littoral areas for wading bird forage and nursery habitat. The configuration and extent of these areas will be determined during detailed design work.

The expedited design for the C-43 West Storage Reservoir was completed during FY2008. At the District's Governing Board meeting in July 2008, this project was identified to be turned over to the USACE for construction. The start of construction is presently on hold pending the availability of funding. Further information on the Caloosahatchee (C-43) West Storage Reservoir Project is available at www.evergladesplan.org/pm/projects/proj_04_c43_basin_1.aspx.

Caloosahatchee Water Quality Feature Project

In November 2007, the District's Governing Board approved a Memorandum of Agreement with Lee County to jointly finance a $37 million land acquisition, of which the county is contributing $10 million (the first two years of county commitment to the 5-5-5 funding), to purchase land for a project to improve water quality in the Caloosahatchee River. The State of Florida and District together will add $27 million to Lee County's funds to acquire 1,773 acres along the river, where a water quality treatment and testing facility will be built. Using treatment cells and technologies now under development, the project will provide water quality improvements in the Caloosahatchee River. At least 1,335 acres out of the 1,770 acres of land situated in Glades County, about eight miles east of the city of LaBelle, are targeted for this water quality project, which will remove nutrients and sediments from water flowing into the Caloosahatchee River.

Spanish Creek Four Corners Project

The Spanish Creek Four Corners Project has been identified as a potential management measure of the Caloosahatchee River Watershed Protection Plan. The proposed project will provide flow-way restoration, water quality improvement, and aquifer recharge. The final size and cost will be determined through ongoing analysis and design. Chapter 12 of this volume provides detailed information regarding the Caloosahatchee River Watershed Protection Plan that is under development.

SOUTHERN EVERGLADES

This section highlights key state programs and federal-state partnerships that are working in concert to restore the quantity, quality, timing, and distribution of the ecosystem's downstream waters. An overview of Everglades restoration projects in the Southern Everglades is depicted on **Figure 7A-3**.

SOUTHWEST FLORIDA RESTORATION UPDATE

CERP Picayune Strand Hydrologic Restoration Project

Under WRDA 2007, the U.S. Congress authorized the implementation of the Picayune Strand Hydrologic Restoration Project. As previously noted, the WRDA 2007 bill gives federal authorization, but not appropriation of funds. Adequate funds have been included in the federal FY2009 budget for the start of construction of one of the Picayune Strand Hydrologic Restoration Project pump stations. All pump station designs for Picayune Strand Hydrologic Restoration were completed during FY2008 and have now been transferred to the USACE for construction, which is expected to start in FY2009. Further information on the Picayune Strand Hydrologic Restoration Project is available at www.evergladesplan.org/pm/projects/proj_30_sgge.aspx.

Appendix 7A-3 of this volume provides the Annual 404 and 1502 permit reports to the FDEP for Prairie Canal Phase I, Everglades Agricultural Area Seepage Canal, C-44 Troup Indiantown Water Control District, and Picayune Strand Restoration Project Road Removal. The report discusses pre- and post-drainage conditions of hydrology, soil, fire, plant communities, estuarine resources, and fish and wildlife, including the endangered Florida panther (*Puma concolor*) and West Indian manatee (*Trichechus manatus*). The report contains detailed baseline information on small mammals, fish, aquatic macroinvertebrates, terrestrial invertebrates, amphibians, Pumpkin Bay benthic mapping, and incidental wildlife observations. It also contains partial baseline information on plant communities, including soil type and fire interval, and birds. A summary of hydrology and water quality is included, although most of this data is still under analysis. It is anticipated that baseline information will be updated in future SFERs.

Southern CREW / Imperial River Flow-Way Critical Restoration Project

The Southern Corkscrew Regional Ecosystem Watershed (CREW) / Imperial River Flow-Way Critical Restoration Project is intended to restore historical sheetflow, reduce freshwater discharges to Estero Bay during the rainy season, reduce nutrient loading to the Imperial River and Estero Bay, and reduce flooding west of the project area. Construction has proceeded as restoration lands were acquired. Land acquisition was placed on hold two years ago pending U.S. Department of the Interior (USDOI) review and approval of an application and grant cost-share agreement submitted by the District under which the USDOI will provide matching funds for acquisition of the lands needed for this project.

The cost estimates for this project in combination with the other Critical Restoration Projects exceeded the USACE's appropriation cap set by WRDA 1996. The District's land restoration activities, such as backfilling drainage ditches, demolishing existing structures, removing illegal dumping, and improving wildlife habitat, progressed with the FWC's assistance. Original plans

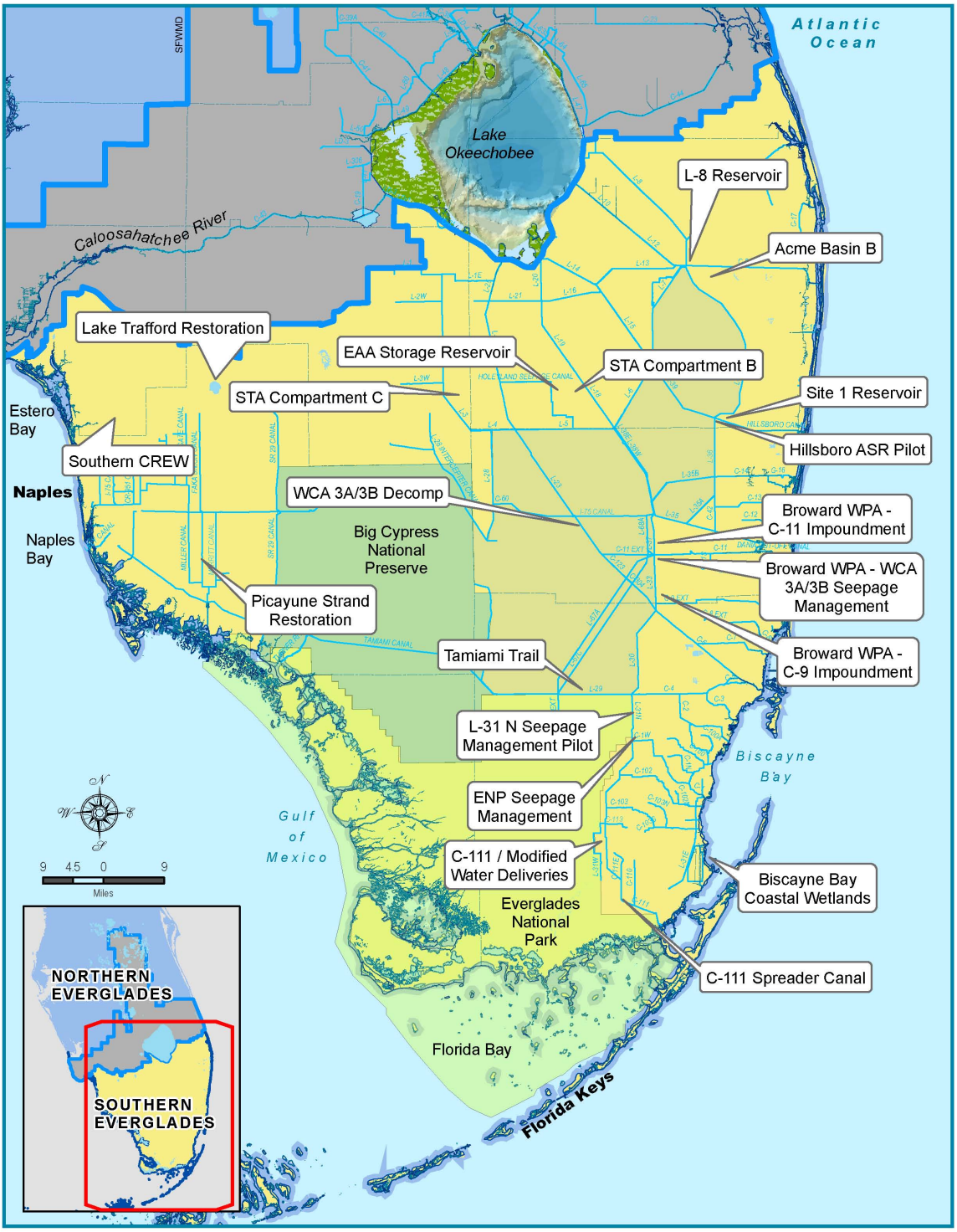

Figure 7A-3. Everglades restoration projects in the Southern Everglades. [Note: Some projects depicted on this map do not have any Fiscal Year 2009 updates and therefore are not discussed in this chapter; further details on these projects is available in previous SFERs.]

called for the District to purchase, by condemnation if necessary, up to 4,670 acres of east Bonita and return it to its natural state. The District has acquired 3,770 acres to date. The Project originally was expected to cost $14 million, but the land and restoration costs to date are $28 million. Acquiring the balance of the land is estimated to cost another $16 million, for a total cost of $44 million. Faced with a total project cost estimated at more than triple the original, rising land prices, declining tax revenues, and federal cost share funds capped, the District has requested Lee County to consider acquiring the remaining lands south of Kehl Canal through the Conservation 2020 Program. If the county can buy the fewer than 240 acres south of Kehl Canal, appraised at approximately $6.8 million, then the District can use the proceeds toward purchasing remaining project lands north of the canal. Acquisition and demolition activities are expected to allow sheetflow flooding on the land.

CERP Southwest Florida Feasibility Study

The Southwest Florida Feasibility Study (SWFFS) will evaluate features in all sub-basins of the study area at a conceptual design level. The study will provide rough order-of-magnitude construction and real estate costs, with land acquisition limited to approximately 25 percent of total project costs. The outcome will be an Interim Feasibility Study, which may allow for more flexibility in evaluation and comparison of alternatives. The study is not expected to require congressional action, as additional PIRs or more detailed feasibility studies will be required to develop design details for the recommend features.

The final array of alternatives that will be identified in the study are intended to provide a comprehensive regional framework to address water resources problems and opportunities. Alternatives modeling and evaluation progressed during FY2008, with the Alternative Formulation Briefing in December 2008. Based on the current schedule, the draft SWFFS will be issued in April 2009, and the final SWFFS will be completed in September 2009.

Lake Trafford Critical Restoration Project

The Lake Trafford Critical Restoration Project containment facility and base bid dredging have been completed. In Phase I, the District dredged 3.2 million cubic yards of muck from the central section of the lake. The District had begun Phase II dredging in the shallow littoral zone when, in 2007, severe drought conditions caused operations to be placed on hold. Phase II, which proposed to dredge approximately 800,000 yards of muck from the lake's sandy bottom, was about one-third completed when work was suspended. In 2008, the contract was cancelled because there was insufficient water to float the dredge barge. With abundant rains during summer 2008, the District's Big Cypress Basin implemented additional hydraulic dredging to restore the lake by stabilizing sediments and reducing nutrients – specifically, phosphorus and nitrogen – that contributed to algal blooms and fish kills.

A post-dredging monitoring program was implemented to complement ongoing monitoring of the fish, algae, SAV and other indigenous species that inhabit the lake. While early sampling reveals an absence of desirable, native SAV, this is expected given the major disturbances created by recent dredging activities. The FWC has been able to plant test plots of native aquatic vegetation, which are expected to help absorb nutrients that previously have caused massive algae blooms and fish kills.

GREATER EVERGLADES UPDATE

CERP EAA Storage Reservoirs - Phase 1 Project

Under the District's expedited design and construction initiative, design was completed and construction was started on the Everglades Agricultural Area (EAA) 1-A Reservoir. The master contract, executed in June 2006, called for construction of the reservoir in a triangular 25-square-mile footprint, 13 miles south of Lake Okeechobee where sugarcane once grew. Design specified a 21-mile-long perimeter embankment, meeting dam criteria, to rise 31 feet from the ground to the top of the parapet wall, to impound a pool of 190,000 acre-feet. The depth of the reservoir is designed to be 12.5 feet in order contain storm surges. The first three negotiated guaranteed-maximum-price phases – including the entire seepage canal that surrounds the perimeter of the reservoir footprint, a borrow area for fill, a rock-processing plant, and a stockpile of sorted embankment material — valued at $265 million, were completed during FY2008. Additionally, it should be noted that work to construct the $300-million dam, with a construction time of nearly three years, was suspended by the District's Governing Board in May 2008, due to a lawsuit challenging the federal construction permits. Further information on the CERP EAA Storage Reservoirs - Phase 1 Project is available on the CERP web site at www.evergladesplan.org/pm/projects/proj_08_eaa_phase_1.aspx.

CERP L-30 (L-31 North) Seepage Management Pilot Project

The purpose of the CERP L-30 (formerly L-31 North) Seepage Management Pilot Project is to determine the appropriate technology needed to control future levee seepage flow across the L-31N canal adjacent to Everglades National Park (ENP or Park), and to provide the appropriate amount of wet season groundwater flow that will minimize potential effects to the Miami-Dade County's West Wellfield and freshwater flows to Biscayne Bay. With identification of the Selected Plan during FY2008, this project was updated to include critical uncertainties associated with technologies that likely will be considered to control seepage from the ENP and Water Conservation Area 3B (WCA-3B). During FY2008, the USACE completed new design criteria for this seepage management pilot project. Further information on the L-30 Seepage Management Pilot Project is available at www.evergladesplan.org/pm/projects/proj_36_l31n_seepage.aspx.

CERP Everglades National Park Seepage Management Project

The purpose of the Everglades National Park Seepage Management Project is to improve water deliveries to Northeast Shark River Slough and restore wetland hydropatterns in the ENP by reducing levee and groundwater seepage and increasing sheetflow. There are three components to this project: (1) L-31 North levee improvements for seepage management, (2) S-356 structure relocation, and (3) Bird Drive recharge.

Application to this project of Incremental Adaptive Restoration principles was recommended in the biennial report, Progress Toward Restoring the Everglades, required by WRDA 2000. These principles include taking actions that promote learning, producing early benefits, addressing scientific uncertainties, and dividing projects into phases

In preliminary modeling, a seepage barrier was aligned parallel to the L-30/L-31N canal from S-335 to G-211. Several configurations were analyzed, including an additional barrier along the triangle area plus one to seven miles of barrier south of Tamiami Trail. Under existing conditions,

there were no significant changes in hydroperiods in the greater ENP for either dry or average years. Preliminary findings indicated that increases in hydroperiods were limited to the areas adjacent to the two-mile barrier south of Tamiami Trail.

PIR 1 will focus on the immediate environmental benefits to the natural system. It will feature the learning opportunity of a seepage barrier system along the L-30 triangle area to be constructed as the L-30 Seepage Management Pilot Project. PIR 1 will feature a seepage barrier system along the L-31N levee south of Tamiami Trail and other requirements to be determined prior to the Alternative Formulation Briefing. Future PIRs will focus on the remainder of the seepage barrier system south to G-211. PIR 1, the current schedule calls for the Alternative Formulation Briefing to be held in July 2009. The draft PIR is scheduled to be published in the Federal Register in June 2010 and the final PIR is scheduled to be published in the Federal Register in January 2011. Additional information on the Everglades National Park Seepage Management Project is available at www.evergladesplan.org/pm/projects/proj_27_enp_seepage.aspx.

CERP Fran Reich Preserve (Site 1 Impoundment) Project

The purpose of the CERP Fran Reich Preserve (Site 1 Impoundment) Project 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 the Arthur R. Marshall Loxahatchee National Wildlife Refuge (Refuge). The impoundment pool will 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.

During the first quarter of FY2008, this project, along with the Picayune Strand Hydrologic Restoration and the Indian River Lagoon – South projects, were authorized by the U.S. Congress under WRDA 2007. The District and the USACE are hopeful that appropriation of funding for this project will be forthcoming during FY2009. More information on this project is available at www.evergladesplan.org/pm/projects/docs_40_site_1_pir.aspx.

Everglades Construction Project Stormwater Treatment Areas

The long-term Everglades water quality goal is for all discharges to the Everglades Protection Area (EPA) to achieve and maintain water quality standards in the EPA, including compliance with the total phosphorus (TP) criterion established in Rule 62-302.540, Florida Administrative Code. Substantial progress toward reducing TP levels discharged into the EPA has been made by the State of Florida and other stakeholders. Pursuant to the Everglades Forever Act, (EFA), the District has been operating the Everglades Construction Project (ECP) STAs presently consisting of about 45,000 acres of man-made wetlands designed to reduce TP levels from stormwater runoff and other sources before it enters the EPA. To date, the combined performance of the regulatory program in the EAA and the STAs has exceeded expectations. In addition, source control measures have been implemented in urban and other tributary basins included in the non-ECP basins.

Additional measures are necessary to ensure that all discharges to the EPA meet water quality standards and the goals established in the EFA, including compliance with the TP criterion. The Long-Term Plan sets forth measures to achieve that goal. As part of the Long-Term Plan, 6,000 additional acres of land in the EAA were converted to treatment wetlands. Another 12,000

acres of STAs are currently in design as part of additional expansions to the existing ECP STAs. During FY2008, the civil design of the build-out for STA-2, STA-5, and STA-6 was completed. Also during FY2008, procurement of the pump equipment for the pump stations was initiated. The construction of the build-out of these STAs is scheduled to begin in FY2009 and be completed by December 2010. The construction of the pump stations is scheduled to be completed by December 2011. Additional information on the ECP STAs and the Long-Term Plan is presented in Chapters 5 and 8 of this volume, respectively.

CERP WCA-3A/3B Decomp and Sheetflow Enhancement Project

Flows into Florida Bay should be improved by the Water Conservation Area 3A/3B (WCA-3A/3B) Decompartmentalization (Decomp) Project, which will allow greater sheetflow through WCA-3B into the ENP. In 2007, the approach to Decomp planning and implementation was modified to include three separate PIRs, the first of which would only contain the Miami Canal backfill in WCA-3A. The rationale for this modification was that by sequencing the restoration efforts the construction of Decomp features would begin sooner than if the all of features were included, such as WCA-3B/Shark River Slough. The scope of the initial PIR will begin reversing the continuing degradation of the Everglades ecosystem and achieving measurable ecological restoration benefits while also gaining new knowledge to address decision critical uncertainties.

Recommendations from the 2008 Tamiami Trail Limited Reevaluation Report and from independent scientific review and policy guidance led to a rethinking of the planning approach and consideration of returning to the original CERP Yellow Book scope for the first of three planned PIRs to include both the Miami Canal and WCA-3/Northeast Shark River Slough features. As described in the Yellow Book, Phase 1 of Decomp will fill in the Miami Canal and also build upon the Modified Water Deliveries (MWD) Project to provide greater ecological and hydrological connectivity between the ENP and WCA-3. Phase 1 of Decomp was included in the initial authorization of CERP, and the original Project Management Plan, completed in 2002 for Phase 1, included all the initially authorized components. It is recognized that uncertainties regarding MWD features and implementation remain; however, with the Tamiami Trail recently completed in 2008, as discussed further under the *Federal C-111 and Modified Water Deliveries Projects* section of this chapter, District staff will start work on the conveyance and seepage features. This work, which began in July 2008, is expected to continue through January 2009.

It is proposed that in addition to the Miami Canal, Decomp PIR 1 also focus on WCA-3/Northeast Shark River Slough connectivity. Including in PIR 1 features from the original Phase 1 of Decomp is critical to CERP's overarching goal of ecosystem restoration as it will (1) build upon the ecological/hydrological improvements provided by the MWD project, (2) achieve measurable, regional restoration benefits earlier, (3) improve survival of federally and state-listed avian species in the Everglades, (4) stop the continued degradation of ridge and slough habitat in the ENP and WCA-3, (5) reduce damaging high water conditions on tree islands in WCA-3A, (6) reduce the severe dry-down events that have caused substantial loss of peat soils in northeast Shark River Slough, (7) potentially reduce cost by better integration of features and operations between MWD and DECOMP components, and (8) potentially reduce overall planning costs for all of DECOMP by developing two PIRs instead of three. Further information on the WCA-3A/3B Decompartmentalization and Sheetflow Enhancement – Part 1 Project is available on the CERP web site at www.evergladesplan.org/pm/projects/proj_12_wca3_1.aspx.

CERP Acme Basin B Discharge Project

In October 2007, the District and the Village of Wellington (VOW) celebrated the completion of the S-7 pump station in central Palm Beach County. The Acme Basin B Discharge Project also includes improvements to nearly three miles of the C-1 canal, which will offer increased conveyance capacity, and a new impoundment and second pump station to provide temporary offline water storage of 1,028 acre-feet of water. This will maintain flood protection in the basin and reduce nutrient loads flowing into the C-51 canal and subsequently to the EPA. Future components of the project will provide recreational opportunities, such as walking trails, overlooks, and equestrian trails. When fully implemented, this project will divert urban stormwater runoff from the local drainage basin, known as Acme Basin B, away from the Refuge, ending all Acme Basin direct discharges into the federally managed lands.

By diverting nutrient-laden stormwater away from the Refuge, the natural hydrology of the area's sensitive ecosystem can be restored, allowing the native flora and fauna to recover and flourish. The District's partnership with the VOW demonstrates how governments can successfully work together to achieve incremental restoration of the ecosystem. Operation of the S-7 pump station will move water from the C-1 canal into the C-51 West canal and subsequently to Stormwater Treatment Area 1 East (STA-1E) for treatment prior to being discharged to the Refuge, part of the EPA. STA-1E uses plants to naturally clean phosphorus from water flowing into the Everglades.

The District's Governing Board approved a $21.5 million contract amendment with the VOW for the second phase of the project. The project provides environmental restoration benefits by constructing a 368-acre stormwater impoundment area and pumping station. Together, they will store phosphorus-laden stormwater runoff that can be moved into treatment areas rather than left to flow into the Refuge. Land needed for the project was also transferred from the District to the VOW. Phase 2 of the Acme Basin B Discharge Project follows the successful completion of the S-7 pump station, which will work in concert with the planned impoundment area.

Once constructed, the impoundment will serve as a holding and settling area for stormwater runoff, providing immediate water quality improvements. From there, water can be moved through canals for coastal discharge or to STA-1E. It is anticipated that most of the water from the impoundment area will receive this additional treatment. More details on the Acme Basin B Discharge Project are available at www.evergladesplan.org/pm/projects/proj_38_acme.aspx.

CERP Broward County Water Preserve Areas Project

This project is currently in the design phase. The preliminary design for the C-11 Impoundment was completed in January 2008, and the final design is scheduled for March 2009. Design for the C-9 Impoundment is scheduled to begin after the finalization of the C-11 design and is expected in 2011. The WCA-3A/3B Seepage Management design will follow the C-9 design, which is scheduled to be completed in 2012. This project was one of the District's expedited projects and has been transferred to the USACE for completion of design and construction. Project construction is expected to commence within six months of authorization and funding.

SOUTHERN ESTUARIES UPDATE

Similar to the Northern Estuaries, Southern Estuaries plans and initiatives are focused on habitat and water quality improvement projects, increasing the District's ability to make informed operational decisions from applied scientific research, administering state-funded initiatives with local governments and managing tributary floodplains of coastal water bodies in the Southern Everglades. The coastal water bodies that comprise the Southern Estuaries are the Loxahatchee River and Estuary, Lake Worth Lagoon, Biscayne Bay, Florida Bay and the Florida Keys, and Naples Bay. Many CERP and federal projects are intended to contribute to water quality and quantity improvements for the Southern Estuaries. Additional storage reservoirs and treatment areas also will be constructed to improve water to the entire Everglades system including the Southern Estuaries. Updates on the key Everglades restoration projects by which these goals will be accomplished are highlighted in the sub-sections below.

CERP Biscayne Bay Coastal Wetlands – Phase I Project

The Biscayne Bay Coastal Wetlands – Phase I Project is planned to significantly reduce the harmful effect of existing point-source discharges to Biscayne Bay. Former wetland areas will be restored near the bay and water will be spread across a broad front near shore, enhancing the ecological health of Biscayne National Park. This is expected to restore a more natural salinity regime in coastal tidal wetlands.

Phase I consists of the planning-level design of two essential flow-ways located at Deering Estate and Cutler Ridge, a stormwater detention area adjacent to the C-103 canal, and the addition of culverts along L-31E to promote sheetflow as opposed to point source discharges. Currently, more than 90 percent of the land, or 5,782 acres, needed to complete the restoration project is in public ownership.

During FY2008, the Tentatively Selected Plan was identified for Biscayne Bay Coastal Wetlands - Phase I, and preparation of the draft PIR is under way. The state completed the expedited design for the Cutler Wetland C-1 Flow-Way, the Deering Estate, and the L-31E culverts during FY2008. The start of construction has been put on-hold pending the availability of funds. At the District's Governing Board workshop in July 2008, this project was identified to be turned over to the USACE for construction. More information on the Biscayne Bay Coastal Wetlands – Phase 1 Project is available at www.evergladesplan.org.

CERP C-111 Spreader Canal Project

The C-111 Spreader Canal Project is anticipated to increase the annual volume of water that sheet flows to northeast Florida Bay by increasing deliveries to Taylor Slough in the Park and by reducing seepage into the lower C-111 Canal. The District has made a clear commitment to bringing the stakeholders together to examine all options for the first phase of the project, which will increase freshwater flow through Taylor Slough toward Florida Bay. The resultant ecological benefits are a critical first step in restoring Florida Bay. Located in south Miami-Dade County, the first phase of the C-111 Spreader Canal Project will improve the health and water quality of Southern Everglades wetlands by improving the flow of water into Taylor Slough and northeast Florida Bay. This will establish a more natural pattern of water flow and reduce the damaging effects of high-volume freshwater releases through the C-111 canal and S-197 structure. The

multi-component restoration project consists of design and construction of new pump stations to redirect flood waters and prevent over drainage of Taylor Slough by the existing C-111 canal, plugs in local canals to reduce drainage of sensitive wetlands, and pilot studies to improve future operations and basin water quality.

To date, the District has invested $8.8 million to acquire all 1,080 acres of land needed to complete the first phase of the CERP C-111 Spreader Canal Project. With the project on an expedited schedule, a series of stakeholder technical workshops are in progress, and design is proceeding with a target completion in FY2009. The current schedule calls for construction to begin immediately following completion of the designs and, in order to resolve implementation uncertainties, project planning is progressing in two phases:

- **Western PIR.** An initial focus to reduce seepage losses from Taylor Slough and damaging pulse discharges from S-197.
- **Eastern PIR.** A second focus to construct the spreader canal to the Southern Glades and Model Lands, and optimize operations to support the elimination of the lower C-111 canal approach.

Uncertainties include the extent of possible backwater flooding effect of the Spreader Canal, drainage by C-111 possibly negating Spreader Canal benefits, and the effectiveness of source control and the infiltration basin in improving water quality for discharge into marsh. The plan will include adaptive management and monitoring activities that will assist in planning and designing the Phase II project.

Stakeholder workshops have provided strong support for the project features and the District's acceleration of the design and construction of the project. It is expected that the project will enhance Taylor Slough and northeast Florida Bay. More information on the CERP C-111 Spreader Canal Project is available at www.evergladesplan.org/pm/projects/proj_29_c111.aspx.

Federal C-111 and Modified Water Deliveries Projects

The District's land acquisition was substantially complete during FY2008 for the L-31N restoration portion of the Federal C-111 Project. Over 6,000 acres were needed and acquired, with approximately 12 acres in the process of complex settlement negotiations and or condemnation. The purpose of the Modified Water Deliveries (MWD) Project is to restore natural hydrologic conditions in Everglades National Park, which were altered by the construction of roads, levees, and canals. MWD is one of many projects that are the foundation for the CERP program. There are four major components of MWD: (1) 8.5 Square Mile Area (8.5 SMAP) flood mitigation, (2) Tamiami Trail modifications, (3) conveyance and seepage control features, and (4) system operational changes. All four components are necessary to provide substantial flow increases to the ENP.

Tamiami Trail Modifications

The Everglades National Park Protection and Expansion Act of 1989 directed the USACE to develop a plan for increasing water flows through Tamiami Trail and into the ENP. Since then, the USACE, the District, and other partners have worked to develop a plan that would provide significant benefits and at an acceptable cost. In April 2008, the Draft Limited Reevaluation Report (LRR) on Tamiami Trail was released for public review and comment. The LRR proposes a Tentatively Selected Plan for increasing flows under Tamiami Trail and into the northeastern

area of the ENP. The Tentatively Selected Plan is located in a 10.7-mile section of Tamiami Trail (U.S. Highway 41) between structures 334 and 333, and includes construction of a one-mile eastern bridge located about one-mile west of the intersection of Tamiami Trail and Krome Avenue. The plan allows water levels in the L-29 canal to reach 8.5 feet National Geodetic Vertical Datum, and includes reinforcing the remaining roadway to mitigate for possible effects of increased water levels. Primary hydrological objectives of the plan include restoring more natural timing of water flows, volume, and location. The main ecological objectives include preventing loss of and restoration of the naturally occurring ridge and slough landscape, water, and vegetation pattern of the Everglades. The sloughs are the lower areas where deeper water occurs and aquatic plants and animals are supported. The ridges are the higher land areas that support marshland plants and animals.

The project team made specific evaluations based on hydrological and ecological performance measures. The performance measures identified were total water flow volume, changes in the speed of water as it flows from the north side of the trail to the south, how long the water depth was enough to support slough vegetation, and the degree to which habitats south of the trail are connected to habitats to the north. By including water volume, which is affected by the level of water on the north side of the trail, as a performance measure, all alternatives that did not increase the water level in the L-29 canal from the current 7.5 feet to at least 8.0 feet were eliminated. Flow speeds different from those occurring naturally in marshes can result in modifications to the landscape within the Park and would impact the ridge and slough systems. If water flows too quickly, then it may erode material from the marsh near Tamiami Trail and fill in the marsh further south as the water's velocity decreases. Both of these effects are unnatural.

Moreover, flow patterns are very important. Sheetflow is the desired condition, rather than flow that originates from a discrete point. Alternatives with larger openings produce broader water paths for water that also travels at slower speeds. This creates the sheetflow condition needed to maintain the marsh. Alternatives that did not produce sheetflow condition were eliminated. Maintaining deep water for a long enough time during the wet season is important to restoring slough vegetation. Short durations of deep water are unlikely to cause the vegetation to change from shallower water plants such as sawgrass to deeper water slough plants. The longer the conditions last during the wet season, the better the conditions for the slough vegetation. Connectivity between the areas north and south of Tamiami Trail is especially important for wildlife migration and restoring more natural water flow. Analysis demonstrated alternatives that were eliminated for not producing acceptable flow speed also did not meet the connectivity performance measure.

These are a few of the factors considered during alternatives analysis for modifying the Tamiami Trail. These factors, when coupled with many others, including location, cost, and the need to protect the road from damage due to higher water levels in the L-29 canal, resulted in the selection of Alternative 3.2.2a as the Tentatively Selected Plan. The complete analysis is contained in Sections 4 and 5 of the Limited Reevaluation Report/Environmental Assessment, which is posted on the USACE's web site at www.saj.usace.army.mil.

CERP Florida Bay/Florida Keys Feasibility Study

The project authorization for the Central and South Florida Project Comprehensive Review Study (Restudy) directs the development of a hydrodynamic model for Florida Bay. Related tasks include developing data to support analysis of the effect of the Central and Southern Florida (C&SF) Flood Control Project on historical and current pathways and volumes of freshwater inflows into Florida Bay, developing data to support analysis of the effect of freshwater inflows

on salinity, and determining the biological responses to changes in salinity gradients and salinity fluctuations. Hydrodynamic model runs, consistent with the CERP Guidance Memoranda, neared completion during FY2006. Integration of the Water Quality Model and completion of Management Scenarios modeling is progressing toward completion in FY2008.

CERP North Palm Beach County – Part 1 Project

The L-8 reservoir will provide for effective and inexpensive water storage, which is essential to Everglades restoration success. Utilizing excavated mines, this reservoir will store water in a unique geological formation, connecting restoration projects throughout northern Palm Beach County. Additionally, it will supply the primary source of water for restoration of the North Fork of the Loxahatchee River.

Modeling analyses using the Lower East Coast Sub-Regional Model is under way for the North Palm Beach County – Part 1 Project. A test of Flow-way 1 was completed, which showed that water could be moved from the L-8 reservoir to the Loxahatchee River. The L-8 reservoir excavation is complete, and temporary pumps will be installed to assist with deliveries to Flow-way 1.

In March 2008, the District made a $37.2 million payment to Palm Beach Aggregates. This is the second-to-last installment in the land acquisition that led to the creation of the 15-billion-gallon L-8 reservoir. A total of $213.9 million, which includes almost $620,000 in interest, has been paid into a court-controlled account. Out of the FY2008 payment, $15 million was to remain in the account until the District verified that the pits can hold water. With the agreement of Palm Beach Aggregates, the District deducted $2.4 million to compensate for an undisclosed lobbying fee that had been paid to an engineering consultant. The District is expected to make one final payment of approximately $6 million during FY2008 for an extra 1.6 billion gallons of storage space that have been created on the site. The agreement gives the District immediate ownership of approximately 1,200 acres of mining land, and then requires Palm Beach Aggregates to deliver a series of 58-foot-deep, leak-proof pits according to a predetermined schedule. Water stored in the pits has provided relief to the City of West Palm Beach during the recent regional water shortage.

Further information on the North Palm Beach County – Part 1 Project is available on the CERP web site at www.evergladesplan.org/pm/projects/proj_17_npbc_1.aspx.

OTHER EVERGLADES RESTORATION UPDATES

EXOTIC SPECIES

In 2002, USACE authorized the Melaleuca Eradication and Other Exotic Plants Project, which was listed in the Restudy as an "other project element," but funding was not initially authorized for it under CERP in WRDA 1999. This project is a two-part plan to enhance efforts to control invasive exotic plant species in South Florida. The two parts include (1) mass rearing and controlled release of biological agents throughout South Florida, and (2) preparation of a report to further identify the overall problem with exotic invasive plants and provide a recommendation regarding further federal involvement. In 2004, a CERP Design Agreement amendment was approved by the District and USACE to proceed with development of this cost-share project, and the final, peer-reviewed Project Management Plan for this project was completed in February 2008. The first appropriation for this project is expected in FY2010, and implementation of the project is anticipated to span 17 years with a federal cost of about $5.5 million. Additional details on the project are available on the CERP web site at http://www.evergladesplan.org. Further details on exotic species across the Greater Everglades region are also presented in Chapter 9 of this volume.

RECOVER

RECOVER (Restoration Coordination and Verification) provides essential support to CERP in meeting its goals and purposes by applying a system-wide perspective to program planning and implementation. This multiagency team is charged with organizing and applying scientific and technical information to most effectively support the objectives of CERP and to conduct scientific and technical evaluations and assessments to improve CERP's ability to restore, preserve, and protect the South Florida ecosystem. In October 2007, RECOVER issued the CERP System-wide Performance Measure Report, which will enable prediction of system-wide performance of alternative plans and assessment of actual performance following project implementation. The 2007 System Status Report, completed in December 2007, is the first comprehensive technical assessment of monitoring data developed under the RECOVER Monitoring and Assessment Plan. Additional information on RECOVER is presented in Chapter 7B of this volume.

OUTREACH AND INTERAGENCY COORDINATION

Water Resources Advisory Commission

In a continued commitment to public involvement and open government, the District's Water Resources Advisory Commission (WRAC) meets regularly at the District's headquarters in West Palm Beach, and holds off-site meetings to ensure public access and encourage constituent and stakeholder participation. The WRAC is an advisory body to the District's Governing Board and to the South Florida Ecosystem Restoration Task Force, the multiagency group established by the U.S. Congress to support Everglades restoration. With more than 50 members, the WRAC serves as a forum for improving public participation and decision-making on water resource issues throughout South and Central Florida. Further information on the WRAC is available on the District's web site at www.sfwmd.gov, under the *Governing Board, WRAC – Water Resources Advisory Committee* section.

Everglades Coalition

Notably, more than 400 advocates for a healthy Everglades ecosystem gathered in Southwest Florida in January 2008 for the 23rd Everglades Coalition Conference. The conference highlighted the projects and public policy needed to restore the Everglades. Florida's Governor Charlie Crist, the District, and the USACE intend to ensure that the Everglades remains a healthy, viable ecosystem in the future. A message that resonated throughout this nationally recognized conference was the continued need for a strong federal-state partnership to protect the Everglades ecosystem. The importance of partnerships with stakeholder groups was also emphasized. Additional information on the Everglades Coalition is available at www.evergladescoalition.org.

Decision Makers Forum

The District and the USACE were among nearly a dozen federal, state, and local organizations that participated in the public Decision Makers Forum in January 2008 to discuss issues affecting Lake Okeechobee. The purpose of this meeting was to provide information to local governments, small businesses, and residents in the communities that surround the lake. Among the issues discussed were the need for more water storage outside of the lake, reducing nutrients in the lake, and the lake level regulation schedule. Also highlighted at the forum were the effects to the lake and regional water supply caused by the record drought conditions in Florida and the southeastern United States since late 2006. There are at least 60,000 people, spanning five counties, who live near Lake Okeechobee's shores, and involvement of area residents, governments and businesses is important. The forum provided an opportunity to bring all parties together to address the issues and work toward a common goal. Additional information on the Decision Makers Forum is available at www.ces.fau.edu/dmf/.

MASTER RECREATION PLAN

CERP projects will provide recreational opportunities for both visitors and residents of South Florida. The USACE and District hosted a series of nine public meetings across South Florida, from Fort Piece to Miami, in April and May 2008 to present and receive feedback on regionally based recreation plans. Planners presented regional recreation analyses and conceptual plans for review; short presentations were followed by open house sessions during which attendees met and talked with the planners. A formal comment period for the Master Recreation Plan was held during April and May 2008. Further information on this plan is available on the CERP web site at www.evergladesplan.org/pm/progr_master_rec_plan.aspx.

In April 2008, the District's Governing Board authorized the FWC to establish Stormwater Treatment Area 1 West (STA-1W) in Palm Beach County and Stormwater Treatment Area 5 (STA-5) in Hendry County as "Alligator Management Units" for the annual alligator hunting season. This will be the third season that the District authorized use of these lands for alligator hunts. The FWC, which monitors alligator hunting throughout the state, will let permitted hunters take a total of 300 alligators from the two STAs on specified weekends from August through October. An estimated one million alligators can be found statewide but only a small percentage can be hunted, and a permit is required. Alligator hunts in the STAs are unique in that hunting is only allowed on weekends, and motorized boats are prohibited. The motorized boating restriction is designed to prevent boats from stirring up plants and sediments in the constructed treatment wetlands. Alligators can be hunted on foot from the levee banks or from non-motorized boats that can be paddled or poled. The use of District-managed lands for permitted hunting is part of the District's continuing commitment to open lands for public access

and recreation. Alligator hunts do not affect the regular operation of the Stormwater Treatment Areas. Further information about alligator hunting and permit applications is available on the FWC's web site at www.myfwc.com/gators.

INTEGRATED DELIVERY SCHEDULE

To help streamline some Everglades restoration projects and achieve restoration benefits sooner, an Integrated Delivery Schedule is being developed in order to (1) integrate project schedules of CERP with schedules of non-CERP projects that also benefit the Everglades, such as the Foundation Projects; (2) take into account new recommendations from the National Academy of Sciences focusing on ensuring restoration benefits occur as early as possible, addressing uncertainties, and applying lessons learned to future components; and (3) take current funding issues into consideration. The Integrated Delivery Schedule is being developed with an emphasis on public involvement – gathering public input on prioritizing and sequencing projects. The proposed plan was discussed at the South Florida Ecosystem Restoration Task Force meeting in May 2008. Further information on the Integrated Delivery Schedule is available on the CERP web site at www.evergladesplan.org/pm/progr_int_schedule.aspx.

OUTLOOK

This chapter describes state and federal programs and projects that are under way to restore the Everglades ecosystem – but can these efforts save the Everglades in the long term? The entire South Florida region, including the Everglades, is vulnerable to many known and emerging threats and uncertainties, such as those related to climate change/sea level rise, financing of environmental restoration programs, and future legislative direction under WRDA, as highlighted below.

Climate Change / Sea Level Rise. Climate change and higher sea levels in recent years are affecting South Florida's coastline, and it is possible that these changes could accelerate in decades ahead. As a state virtually surrounded by salt water, the consequence of sea level rise is of utmost concern to regional water managers. A landmark report released in November 2007 by the United Nations Intergovernmental Panel on Climate Change (IPCC) has identified wide-ranging impacts of global warming that will occur during the twenty-first century. Recently, a Miami-Dade Task Force on Climate Change has suggested that the IPCC projections of global sea level rise have been underestimated and the real change, accounting for a more rapid melting of the Greenland ice sheet, could be as much as 3 to 5 feet by the end of this century. Although the impact of global warming on precipitation patterns (both averages and extremes), temperature, and consequently on evapotranspiration, regionally in Florida are not well understood, the potential implications of climate change and sea level rise on water management in general, and Everglades restoration in particular, could be very dramatic and far-reaching. Specifically, in South Florida, further inland movement of the seawater front could have significant impacts on underground water supply wellfields, the continued effectiveness of coastal structures to control water flow in canals, and planning assumptions for ecosystem restoration and other water resource projects.

During the last two decades, the District has conducted extensive research on natural climate variability due to phenomena such as El Niño/La Niña and Atlantic multidecadal oscillation. From this research, the implications of natural climatic cycles for South Florida are understood reasonably well. However, climatic impacts due to human-induced changes are not well understood on a regional scale. In summer 2008, the District began an effort to better understand the climate change vulnerabilities and adaptation strategies for regional water management and restoration. In FY2009, the District is planning to determine the future research necessary for identifying specific vulnerabilities and adaptation strategies to counter potential impacts of climate change. It is expected that this will be complemented by continuing agency efforts to understand projections of a General Circulation Model on a more regional level, conduct high-level scenario analysis of climate changes and their impacts on CERP plans using existing tools such as the South Florida Water Management Model, and research potential implications of climate change and sea level rise on the Everglades ecosystem. The District's efforts will be closely coordinated with those of the FDEP and the Florida Governor's Action Team on Energy and Climate Change (www.dep.state.fl.us/climatechange).

Financing Environmental Restoration. Environmental restoration on the scale undertaken for the Everglades requires long-term financial commitments by both federal and state partners. Stakeholders understand that full benefits of the restoration will not be realized before the costs are due. Local, state, and federal governments, agricultural/business interests, residents, and other key stakeholders all have an important interest in how the costs of ecosystem restoration should be fairly allocated. Intergovernmental cooperation is a significant precondition for the effective spending for the biological restoration of the estuaries, rivers, and watersheds of the Everglades

system. The enormous costs and continually rising costs of purchasing lands for the restoration of wetlands will be a persistent challenge in the future.

Project Authorizations and Appropriations. As previously noted, three CERP projects [Indian River Lagoon – South, Picayune Strand Restoration, and Fran Reich (Site 1) Impoundment] have been fully authorized by the U.S. Congress. These projects were authorized in WRDA 2007 (enacted in November 2007), which was the first WRDA since 2000. In addition to the WRDA authorization, the U.S. Congress must also appropriate funds for project construction before the USACE can sign an agreement with the SFWMD to initiate project implementation. The president's budget and the draft federal appropriations bills for FY2009 include funding for initiation of construction under CERP.

PIRs were also completed during 2007 for two additional projects, Broward County Water Preserve Areas and C-43 West Basin Storage Reservoir. Subject to completion of the final chief of engineers' reports, these projects are targeted for authorization in the next WRDA.

FUTURE OPPORTUNITIES FOR EVERGLADES RESTORATION

In June 2008, Florida Governor Charlie Crist unveiled a bold strategy to revive America's *River of Grass* by acquiring vast tracts of agricultural land south of Lake Okeechobee. After five months of extensive deliberation, due diligence, and public input, the District's Governing Board voted on December 16, 2008, to accept a contract with the United States Sugar Corporation to acquire, subject to financing, more than 180,000 acres of agricultural land for Everglades restoration. This historic transaction could provide water managers with the unprecedented opportunity to store and treat water on a scale never before envisioned for the benefit of the Everglades, Lake Okeechobee, and the St. Lucie and Caloosahatchee rivers and estuaries.

With full public involvement, the first phase of the *River of Grass* restoration project planning is expected to begin in early 2009. Through a series of Water Resources Advisory Commission Issues Workshops, the Phase 1 planning process will determine viable configurations for constructing a managed system of water storage and treatment to support ecosystem restoration efforts. Information generated during the process will be utilized by the District's Governing Board to support decision making related to the land acquisition and will provide the basis for more detailed future planning phases. Further details on the proposed acquisition are available on the District's web site at www.sfwmd.gov/riverofgrass.

LITERATURE CITED

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