



SOUTH FLORIDA ECOSYSTEM RESTORATION TASK FORCE

**JULY 2012 - JUNE 2014
STRATEGY AND BIENNIAL REPORT**

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THE SOUTH FLORIDA ECOSYSTEM RESTORATION TASK FORCE

The South Florida Ecosystem is a unique natural treasure. An 18,000-square-mile region of subtropical uplands, wetlands, and coral reefs, the ecosystem extends from the Kissimmee Chain of Lakes south of Orlando to Florida Bay and the reefs southwest of the Florida Keys.

Authorized by Congress, the South Florida Ecosystem Restoration Task Force (Task Force) brings together the federal, state, tribal, and local agencies involved in restoring and protecting the Everglades. The role of the intergovernmental Task Force is to facilitate the coordination of the myriad conservation and restoration efforts being planned and implemented. It provides a forum for the participating agencies to share information about their restoration projects, resolve conflicts, and report on progress.

Report Purpose

This document responds to congressional direction to outline how the restoration effort will occur and also satisfies the requirements of the Water Resources Development Act of 1996 to report biennially on Task Force activities and progress made toward restoration. The reporting period is July 2012 – June 2014.

This document is intended for four principal audiences:

- United States Congress
- Florida Legislature
- Seminole Tribe of Florida
- Miccosukee Tribe of Indians of Florida

This document synthesizes information from the following reports:

- Integrated Financial Plan
- System-wide Ecological Indicators for Everglades Restoration

To access these reports and for further details on information presented in this document, please visit:

www.evergladesrestoration.gov

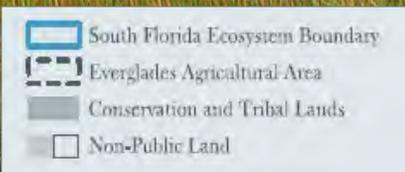
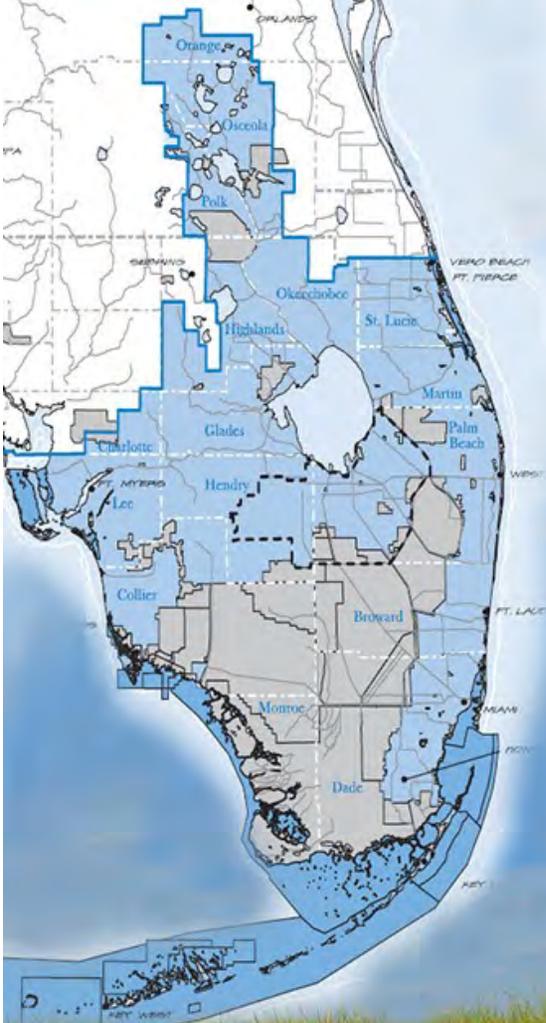


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EXECUTIVE SUMMARY

Restoring the Everglades and protecting south Florida's natural resources cannot be achieved by any single organization but depends upon a strategically coordinated set of federal, state, local, and tribal initiatives, funding, and partnerships. These restoration programs and projects require a long-term process for addressing key technical, management, and policy issues. The intergovernmental South Florida Ecosystem Restoration Task Force (Task Force) was created by Congress in 1996 to provide this long-term strategic coordination and to facilitate the incorporation of new information and opportunities over the multi-decade restoration initiative.

Restoration Framework

The Task Force uses a restoration framework that includes a shared vision, strategic goals, and system-wide ecological indicators to organize and assess this complex intergovernmental effort.

Vision

A healthy South Florida Ecosystem that supports diverse and sustainable communities of plants, animals, and people.

Strategic Goals & Project Implementation

Goal 1. Get the Water Right

Goal 2. Restore, Preserve, and Protect Natural Habitats and Species

Goal 3. Foster Compatibility of the Built and Natural Systems

The Task Force organizes and tracks over 200 programs and projects by the three strategic goals (pages 5–62).

System-wide Ecological Indicators & Ecosystem Response. The Task Force uses system-wide ecological indicators to assess the current status of the ecosystem and to track how it responds over time to the implementation of restoration projects and system-wide operational changes. The “stoplight” assessment of the system-wide ecological indicators communicates overall ecosystem health (pp. 63-84).

Restoration Highlights

Restoration has moved forward in important ways over the past two years. The following examples illustrate some of the most significant accomplishments achieved during the July 2012 to June 2014 reporting period.

Restoration Moving Forward. Comprehensive Everglades Restoration Plan (CERP) projects require Congressional authorization, through periodic water resources development acts. The Water Resources Reform and Development Act of 2014 (WRRDA 2014) authorizes four new projects: C-111 Spreader Canal Western Project; C-43 Basin Storage Reservoir; Biscayne Bay Coastal Wetlands Project; and the Broward County Water Preserve Areas Project and continues the progress toward restoration.

A Bold New Way to Plan Restoration Projects. In response to the needs of the natural system and the recommendations of the National Research Council (NRC) ([CISRERP 2010](#), pp. 147-148), planning for the 3rd generation of CERP projects focused on restoring increased natural flows into and through the Central and Southern Everglades. Under the CERP, the Central Everglades Planning Project (CEPP) was initiated in 2011 to restore the “Heart of the Everglades.” In October 2011, the Assistant Secretary of the Army (Civil Works), the Secretary of the Interior, the Governor of Florida, the Executive Director of the South Florida Water Management District (SFWMD), and other senior principals agreed to initiate CEPP as part of the U.S. Army Corps of Engineers’ (Corps) National Pilot Program for Feasibility Studies to expedite the planning process.

The regular agency planning process for CEPP was accompanied by an innovative public participation effort sponsored by the Task Force's Working Group (WG) and Science Coordination Group (SCG). The public was afforded more opportunities to provide meaningful input into the planning process than ever before and, as a result, CEPP earned unprecedented levels of public and stakeholder support. The NRC calls the CEPP public process “exemplary” and recommends that it “serve as a model for future planning processes” (see [CISRERP 2014](#) p. 65 for more on the enhanced CEPP public process).

Central Everglades Planning Project (Strategic Goal 1)

The Task Force kicked off the CEPP process at the end of 2011 and it quickly became the dominant element of restoration planning between 2012 and 2014. The goals of CEPP are to improve the quantity, timing, and

EXECUTIVE SUMMARY

distribution of water in the Northern Estuaries, Central Everglades, and Everglades National Park (ENP) in order to restore habitats and ecological function in the natural system. The CEPP combines six key CERP components into a comprehensive project that includes water storage, conveyance, and decartmentalization in the heart of the Everglades. The Final Project Implementation Report/Environmental Impact Statement and Draft Chief's Report were released for the required 30-day agency and public review on August 8, 2014. The Corps is considering a number of projects for authorization in a future WRRDA bill, including CEPP. For more information on CEPP, please visit www.evergladesrestoration.gov

Restoring Wetlands (Strategic Goal 2). The U.S. Department of Agriculture (USDA) supports the restoration of the Everglades by providing financial and technical assistance to private landowners and tribes. The Agricultural Conservation Easement Program (ACEP), implemented through USDA's Natural Resources Conservation Service (NRCS), provides agricultural and wetland easements to landowners. Agricultural easements prevent productive working lands from being converted to non-agricultural uses and protect land devoted to food production. Wetland easements restore and enhance wetlands and improve wildlife habitat.

Florida has the largest ACEP program in the nation. Since 2009, the USDA has invested over \$470 million in ACEP funds to protect almost 130,000 acres of land in Florida. Approximately 95% of this acreage is located within the Northern Everglades Watershed, an important component of Everglades restoration. In 2013 alone, NRCS committed \$60 million in ACEP funds to restore and protect wetlands in the Everglades watershed. NRCS wetlands easements in the Everglades provide habitat for a variety of listed species, including the endangered Florida Panther, a species on the edge of extinction.

Restoring Hydrology (Strategic Goal 1). Construction continues on three major hydrologic restoration projects in the Everglades. The first phase of the Site 1 Impoundment Project (Site 1) is expected to be completed by July 2015. Site 1 is designed to

capture and store local runoff during wet periods and then use that water to supplement water deliveries to the Hillsboro Canal basin during dry periods thus reducing the demands for releases from Lake Okeechobee and the Arthur R. Marshall Loxahatchee National Wildlife Refuge (LNWR). Reducing the need for water from the LNWR to meet local water demands will promote more ecologically desirable water levels within the LNWR.

The Picayune Strand Restoration project involves the restoration of natural water flow across 85 square miles in western Collier County that were drained in the early 1960s in anticipation of extensive residential development. Three major pump stations are currently under construction with the Miller Pump Station contract awarded in 2013 and the Merritt Pump Station expected to be completed in 2014.

The Indian River Lagoon South (IRLS) project will help restore the St. Lucie Estuary and southern portion of the Indian River Lagoon. The first major construction contract [which includes a 1,100 cubic feet per second (cfs) canal, a 300 cfs drainage canal, and all access roads for the C-44 component of the IRLS] was completed in July 2014. Three other major construction contracts are scheduled for award: Fall 2014 for construction of the stormwater treatment area; Spring 2015 for construction of the pump station; and Summer 2015 for construction of the reservoir. Construction will continue through 2018.

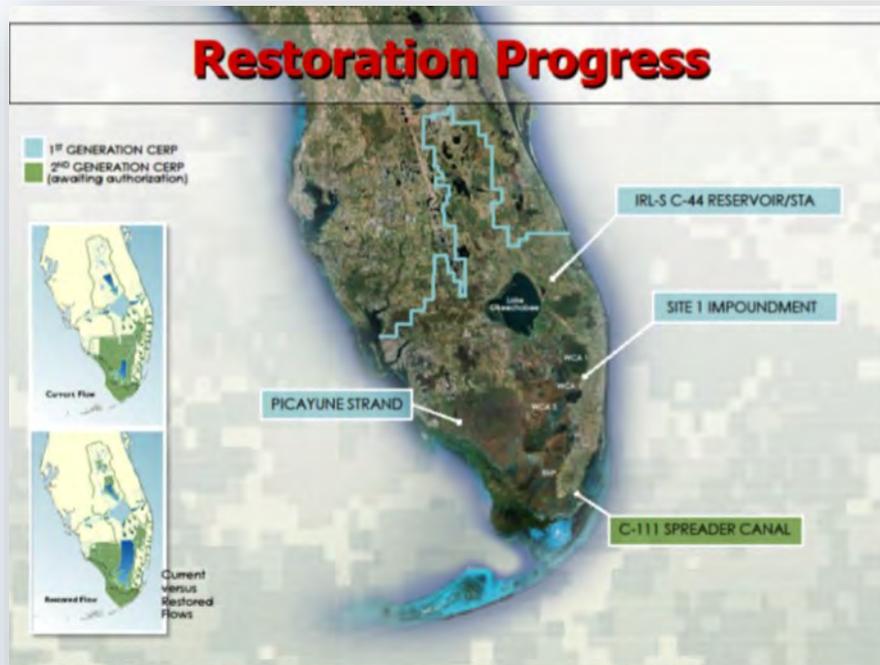


Photo by Scott Prinos

EXECUTIVE SUMMARY

A Partnership to Restore Flow through the River of Grass (Strategic Goal 1).

Built in the 1920s, U.S. Highway 41, known as “Tamiami Trail,” functions as a dam between the Central Everglades and Everglades National Park. Replacing sections of this roadway is one of the most important restoration features in the Everglades. The National Park Service and the Corps completed construction on the first mile of bridging on Tamiami Trail, which will increase flows to Northeast Shark River Slough in Everglades National Park 92% over current levels in 2013. The second 2.6 mile bridge will allow even more flow from north to south and will distribute that flow across a wider area to hydrate important deeper water habitats in ENP. Construction of the 2.6 mile bridge is also a pre-requisite to implementing CEPP. CEPP will capture and clean up water that is currently damaging estuaries to the north and will divert it south to flow through the River of Grass, under the Tamiami Trail bridges, to Everglades National Park and Florida Bay. The Tamiami Trail bridging will ultimately work in tandem with elements of CEPP to increase flow from Lake Okeechobee through the Central Everglades to Florida Bay.



In August 2013, Governor Rick Scott announced a \$90 million commitment to the second phase of bridging on US Highway 41. The total cost of the project, originally planned as 2.6 miles of bridging, was estimated to be \$180 million. Subsequent to the end of the reporting period for this biennial report, the National Park Service and State of Florida re-evaluated the project design and recalculated the original project cost estimate. The analysis resulted in modifications to the planned project and a decrease in the total estimated cost, currently \$143.9 million. The State of Florida's commitment, which is now part of the [Florida Department of Transportation](#) work plan, will match the federal commitment coming from the National Park Service. The [U.S. Department of Transportation](#) approved a \$20 million TIGER grant for the construction of the 2.6 mile bridge. This \$20 million grant will be combined with dollars from the National Park Service and the State of Florida.

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Reviving a River (Strategic Goal 1). The Kissimmee River Restoration Project continues to shine as the keystone Everglades restoration project and, after nearly 20 years of large scale construction, the project is nearing completion and interim ecological responses are being observed (see the Kissimmee River Case Study on pp. 81). During the reporting period alone a significant amount of construction was completed, including construction of public access facilities, canal improvements, spoil mound removal, and the recarving of historic river oxbows and creation of new oxbows.

The newly constructed elevated CSX Railroad Bridge allowed the restoration of the historic Kissimmee River riverbed at the boundary of Highlands and Okeechobee Counties. The historic riverbed was reestablished through the existing railroad embankment by dredging a channel to recreate the historic river. The completed feature was transferred to CSX Transportation in December 2013. In addition, a portion of the river (Canal 37) was enlarged from a 60 foot bottom width to a 90 foot bottom width to maintain the existing level of flood protection. Construction was completed as well for portions of the River Acres Flood Protection project which mitigates against the impact of raised Kissimmee River flood stages for the River Acres subdivision due to the implementation of the restoration project. Lastly, construction commenced on the S-65EX1 three-bay gated spillway which will provide for maintaining restoration water levels; construction is scheduled for completion in spring 2015.

Collaborating on Next Steps for Water Quality. In 2012, the State of Florida and the [U.S. Environmental Protection Agency \(USEPA\)](#) reached a consensus on new strategies for improving water quality in America's Everglades that resolves a long-standing and long-recognized environmental challenge. Based on months of scientific and technical discussions, the [Everglades Water Quality Restoration Strategies Plan](#) (Restoration Strategies Plan) builds upon the State's multi-billion dollar investment in water quality improvement projects to achieve the phosphorus water quality standard established for

the Everglades. The SFWMD is implementing the Restoration Strategies Plan which includes more than 6,500 acres of new stormwater treatment areas (STAs) and 116,000 acre-feet of additional water storage through construction of flow equalization basins (FEBs). FEBs provide a more steady flow of water to the STAs, helping to maintain desired water levels needed to achieve optimal water quality treatment performance. The [Florida Department of Environmental Protection](#) (FDEP) successfully issued permits and consent orders which include milestones for project completion, as well as enforcement mechanisms to ensure the milestones are met. Project components will be designed, constructed, and operated in accordance with the milestones developed. For more information, please visit: www.sfwmd.gov/restorationstrategies For copies of the permits, consent orders, and supporting information, please visit: www.dep.state.fl.us/everglades/ecp_sta.htm



Photo by Bill Perry

WHY RESTORATION

The South Florida Ecosystem supports some of the greatest biodiversity on earth. More than a century of changes to the environment have put the ecosystem in jeopardy. A healthy ecosystem depends upon reversing the unintended consequences of past changes to the region's waters and habitats. Historically, water flowed slowly from the Kissimmee River to Florida Bay across the ecosystem's extremely flat landscape forming what became known as the "River of Grass." This natural functioning system began to be altered over a century ago.

The quality of life in south Florida and the region's economy depend on the health and vitality of the natural system. South Florida's environment provides unique recreational opportunities that draw visitors from around the globe, from freshwater fishing in the north to coral reef snorkeling off of mainland southeast Florida and the Keys. Fertile soils support the region's agricultural industry. The Seminole Tribe of Florida and the Miccosukee Tribe of Indians of Florida live in the Everglades and their culture and way of life depends on the health of this ecosystem. Yet the waters, natural habitats, and native species of the South Florida Ecosystem are at risk.

Altering an Ecosystem

Motivated by the Swamp and Overflowed Lands Act of 1850, efforts began in the late 1800s to "reclaim" the Everglades for agricultural, residential, and commercial development. Wetlands were drained or filled, and canals, roads, and buildings began to displace native habitats and disrupt historical water flows.

In 1948, the ongoing efforts to drain the Everglades, protect the region from hurricanes, and make the region more habitable led to the Central and Southern Florida (C&SF) Flood Control Project. Authorized by Congress, the C&SF Project significantly altered the region's hydrology. It succeeded in draining half of the original Everglades and allowed for the expansion of coastal cities, particularly in the southeast, as well as interior farming areas such as the Everglades Agricultural Area (EAA) south of Lake Okeechobee.

Today, the C&SF project is comprised of over 1,800 miles of canals and levees and 200 water control structures and drains approximately 1.7 billion gallons of water per day into the Atlantic Ocean and Gulf of Mexico.

The C&SF Project was accompanied by other efforts to control water and develop the region. For example, the Kissimmee Flood Control Project channelized the Kissimmee River in the 1960s for flood protection and navigation. The project ultimately drained two-thirds of the historical floodplain and caused severe declines in wading bird and fish populations.

The cumulative adverse impacts of these water control projects upon water quality, habitats, and species were immense and the ecosystem declined. Extensive growth and development as a result of these projects further exacerbated the ecosystem's decline.

Research in the 1970s and 1980s detected declines in the populations of many native plant and animal species and discovered heightened

phosphorus pollution in the Everglades. Particularly alarming was evidence of the deterioration of Florida Bay, indicated by frequent algae blooms, dramatic losses in seagrass habitat, reductions in many shrimp and fish species, and a decline in water clarity.

Early Efforts toward Restoration

Public policy, in line with predominant public opinion, began to move in the direction of environmental protection and restoration in south Florida. During the 1970s and 1980s, several key pieces of environmental legislation were passed and conservation programs initiated.

Individual restoration projects were begun, aiming to correct specific environmental concerns in focused areas. However, the complexity and sheer size of the ecosystem limited the ability of these individual efforts to realize restoration at the ecosystem scale. It was soon recognized that a piecemeal approach to restoration was not enough; a comprehensive ecosystem-wide restoration effort was needed.

Establishing a Coordinated & System-wide Restoration Effort

The restoration challenges faced in south Florida must be solved collaboratively. Rather than dealing with issues independently, the challenge is to seek out the interrelationships and mutual dependencies that exist among all the components of the ecosystem. Acknowledging the need for an ecosystem-wide approach to better coordinate the individual efforts, a federal task force on Everglades restoration was established through an



WHY RESTORATION

interagency agreement in 1993. The following year, the Governor of Florida established the Governor's Commission for a Sustainable South Florida (GCSSF) "to develop recommendations and public support for regaining a healthy Everglades ecosystem with sustainable economies and quality communities." In recognition of the magnitude of the restoration effort and the critical importance of partnerships with state, tribal, and local governments, the current intergovernmental Task Force was established by the Water Resources Development Act (WRDA) of 1996. The Task Force and the GCSSF were instrumental in formulating a forum for consensus building in the early stages of ecosystem restoration. The Task Force advocates a system-wide

approach that addresses issues holistically, recognizing that the various levels of government have distinct jurisdictions and certain responsibilities that can be coordinated but not shared. The Task Force also recognizes the need to incorporate new information into the restoration process.

The WRDA 1996 also called for a comprehensive approach to restoring the hydrology of south Florida. The result was the CERP, a consensus plan approved by Congress and signed by the President as part of WRDA 2000. The CERP is designed to reverse unintended consequences resulting from the construction and operation of the C&SF Project.

While the CERP is the most significant component of the efforts to restore a more natural hydrology, there are other non-CERP "foundation" projects such as the Kissimmee River Restoration Project and the Modified Water Deliveries to Everglades National Park Project (Mod Waters). The overall South Florida Ecosystem restoration effort also includes projects to improve water quality, restore natural habitats, and protect native species.

Key Environmental Legislation & Programs 2012–2014

2012 Consolidated Appropriations Act ([Public Law 112-74](#)) authorized construction of the Tamiami Trail: Next Steps Project consisting of four bridges with a combined length of 5.5 miles.

2012 Miami-Dade Lake Belt Mitigation Plan: State amends that fees collected under the Lake Belt statute from "water treatment plant upgrades" be redirected to the SFWMD; amendment provides additional money into the Lake Belt Mitigation Trust Fund for seepage mitigation projects.

2012 State legislation encourages agricultural public-private partnerships to accomplish water storage and water quality improvements.

2012 Florida Legislature removes revenue caps and restores Governor independent line item veto authority for water management district budgets ([SB1986](#)).

2012 USFWS lists the Burmese python and several other large constrictor snakes as injurious species under the Lacey Act.

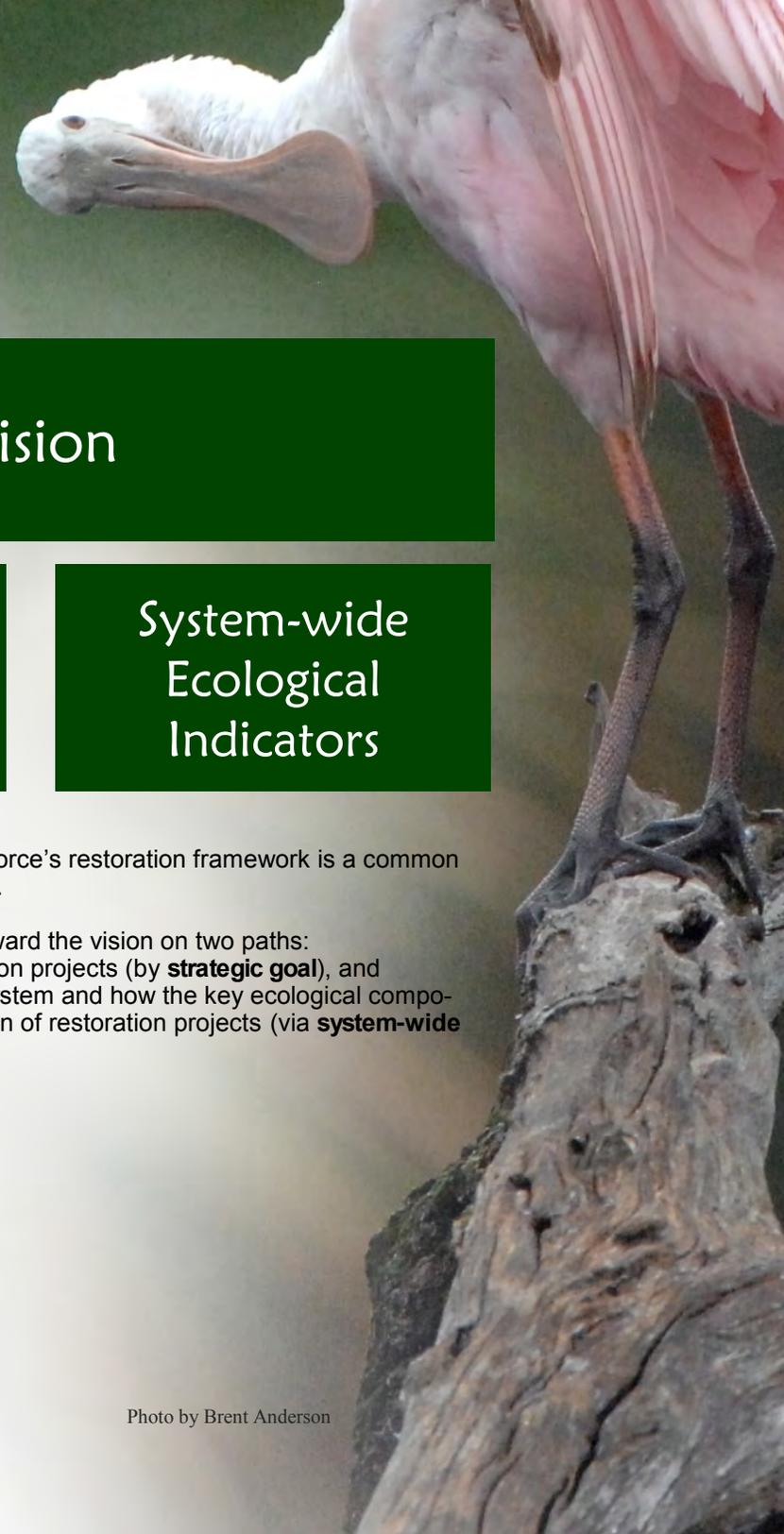
Chapter 2013-59, Laws of Florida ([HB 7065](#)) Everglades Improvement and Management which ratified the district's Restoration Strategies Plan and dedicated recurring funding through the Save Our Everglades Trust Fund.

2013 [SB 1808](#) Numeric Nutrient Criteria stated the Florida Department of Environmental Protection (FDEP) may implement its adopted nutrient standards for streams, springs, lakes, and estuaries in accordance with the document, "Implementation of Florida's Numeric Nutrient Standards."

2014 The [Water Resources Reform and Development Act of 2014](#) (WRRDA 2014) authorized the following CERP Projects: C-111 Spreader Canal Western Project, C-43 Basin Storage, Biscayne Bay Coastal Wetlands Project, and the Broward County Water Preserve Areas Project. WRRDA 2014 also provided procedures for authorization of certain water resources development or conservation projects outside the regular authorization cycle to expedite authorization.



RESTORATION FRAMEWORK



The Task Force has developed a restoration framework that includes a shared vision, strategic goals, and system-wide ecological indicators.

The overall premise of restoration is that the ecosystem must be managed from a system-wide perspective, which requires understanding the interrelationships that exist among all the components of the ecosystem. The same issues that are critical to the natural environment - getting the water right and restoring, preserving, and protecting diverse habitats and species - are equally critical to maintaining a quality environment for south Florida's residents and visitors.

The success of this comprehensive approach depends on the coordination and integration of over 200 individual restoration projects carried out by various agencies at all levels of government. Each agency brings its own authority, jurisdiction, capabilities, and expertise to this initiative and applies them through its individual programs, projects, and activities. The Task Force organizes, coordinates, and reports on the progress of the overall ecosystem restoration program.

Vision

Strategic Goals

System-wide Ecological Indicators

The overarching goal of the Task Force's restoration framework is a common **vision** of the restored ecosystem.

- The Task Force tracks progress toward the vision on two paths:
1. The implementation of restoration projects (by **strategic goal**), and
 2. The general status of the ecosystem and how the key ecological components respond to implementation of restoration projects (via **system-wide ecological indicators**).

RESTORATION FRAMEWORK

Vision

A healthy South Florida Ecosystem that supports diverse and sustainable communities of plants, animals, and people.

The Task Force has established a shared vision that recognizes the linkages between the region's natural and built environments and the need for ecosystem-wide restoration.

The region's rich and varied habitats will become healthy feeding, nesting, and breeding grounds for diverse and abundant fish and wildlife. Endangered species will recover. Commercial fishing, farming, recreation, and tourism dependent businesses and associated economies will benefit from a viable, productive, and aesthetically beautiful resource base. The quality of life enjoyed by residents and visitors will be enhanced by sustainable natural resources and by access to natural areas managed by federal, state, and local governments to provide a great variety of recreational and educational activities.

It is important to understand that the restored Everglades of the future will be different from any version of the Everglades that has existed in the past. The restored Everglades will be smaller and arranged somewhat differently than the historic ecosystem. However, it will have recovered those hydrological and biological characteristics that defined the original Everglades and made it unique among the world's wetland systems. It will evoke the wildness and richness of the former Everglades.

Strategic Goals

Goal 1. Get the Water Right

Goal 2. Restore, Preserve, and Protect Natural Habitats and Species

Goal 3. Foster Compatibility of the Built and Natural Systems

The three strategic goals recognize that water, habitats, species, and the built environment are inextricably linked in the ecosystem and must be addressed simultaneously if the ecosystem is to be restored and preserved over the long term.

Because of the complexity and the long timeframe of the restoration initiative, it is important to measure and track the hundreds of activities that must be performed to achieve the result of a restored ecosystem.

The strategic goals and related subgoals provide a framework in which to organize individual restoration projects. Measurable objectives have been established to track project implementation and restoration progress.

The strategic goals, subgoals, and measurable objectives are discussed in detail on pages 5–62. Some of the restoration projects are multipurpose in nature, and provide results for more than one measurable objective. In this report, multipurpose projects are listed once, under their primary measurable objective.

Additional information on individual projects is compiled by the Integrated Financial Plan (IFP), also published by the Task Force. Project information from the 2014 IFP has been incorporated into the web version of this document, allowing the reader to explore many layers of restoration information.

System-wide Ecological Indicators

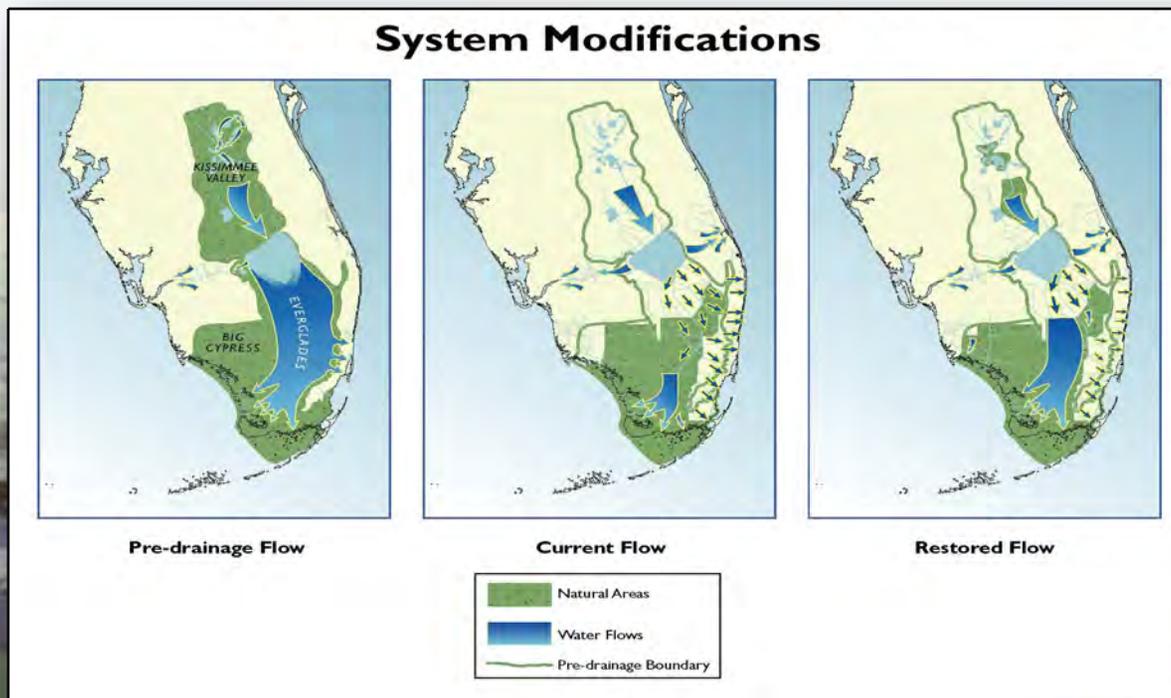
- Invasive Exotic Plants
- Lake Okeechobee Nearshore Zone Submersed Aquatic Vegetation
- Eastern Oysters
- Crocodilians (American Alligators & Crocodiles)
- Fish & Macroinvertebrates
- Periphyton & Epiphyton
- Wading Birds (White Ibis & Wood Stork)
- Southern Coastal Systems Phytoplankton Blooms
- Florida Bay Submersed Aquatic Vegetation
- Juvenile Pink Shrimp
- Wading Birds (Roseate Spoonbill)

Eleven system-wide ecological indicators have been carefully selected by the SCG and independently reviewed to assess the success of the Everglades restoration program from a system-wide perspective. These indicators cover the spatial and temporal scales and features of the ecosystem. The suite of ecological indicators is discussed beginning on page 63.

GOAL 1: GET THE WATER RIGHT

Water is the lifeblood of the South Florida Ecosystem, supporting many unique habitats. By the year 2000, historic water flows had been reduced to less than one-third of those that had once flowed through the Everglades. The quality of water that entered the ecosystem had been seriously degraded. Water did not flow at the same times or durations as it had historically, nor could water move freely through the system. The whole South Florida Ecosystem suffered. The health of Lake Okeechobee was seriously threatened. Excessive freshwater discharges in the wet season and inadequate flows in the dry season threatened the estuaries and bays that are critical nurseries and home to many fish and wildlife species.

Getting the water right depends upon restoration of the region's hydrology and water quality. The right quantity of water, of the right quality, needs to be delivered to the right places and at the right times.



The System Modifications diagram depicts the historic ecosystem (pre-drainage flow and areal extent), the current flow (resulting from the C&SF Project and construction of extensive canals and levees), and the restored flow (following implementation of the CERP). (Graphic courtesy of the SFWMD and USACE.)

Goal 1: Get the Water Right

Subgoal 1-A: Get the Hydrology Right

Objective 1-A.1: Provide 1.8 million ac-ft of surface water storage by 2036.

Objective 1-A.2: Develop alternative water storage systems capable of storing 1.7 billion gallons per day by 2030.

Objective 1-A.3: Modify 361 miles of impediments to flow by 2020.

Subgoal 1-B: Get the Water Quality Right

Objective 1-B.1: Construct 96,010 acres of stormwater treatment areas by 2035.

Objective 1-B.2: Prepare locally based plans to reduce pollutants as determined necessary by the total maximum daily loads by 2014.

SUBGOAL 1-A: GET THE HYDROLOGY RIGHT

The historic hydrology of the Everglades has been disrupted by flood control projects (e.g., canals and levees), agricultural use, and human development. Water that once slowly flowed across the River of Grass is now quickly diverted, impacting natural habitats including the region's sensitive estuaries. The CERP and other hydrology projects are being implemented to recapture most of this water and redirect it to sustain natural system functioning and to supplement urban and agricultural water supplies.

This subgoal consists of three measurable objectives: surface water storage, alternative water storage, and removing impediments to flow. Progress on the measurable objectives during the reporting period (July 2012–June 2014) is described below and further delineated in [Table 1](#). Additional hydrology efforts to help fulfill this subgoal are also described below.

Objective 1-A.1: Provide 1.8 million acre-feet of surface water storage by 2036.

Policy/Regulatory Framework

- [WRDA of 1996, Public Law 104-303](#)
- [WRDA of 1999, Public Law 106-53](#)
- [WRDA of 2000, Public Law 106-541](#)
- [WRDA of 2007, Public Law 110-114](#)
- [Water Resources Reform and Development Act \(WRRDA\) of 2014, Public Law 113-121](#)

Implementation Approach

Surface water storage impoundments provide the ability to retain water until it is needed downstream, avoiding adverse unnatural pulses of freshwater to the estuaries and better mimicking flows in the region's core.

Seepage Management Projects will be implemented to maintain flood protection and reduce the loss of groundwater through seepage toward the east coast where groundwater levels were lowered by the C&SF Project to allow for development and other uses.

Objective 1-A.1: Progress and Status at a Glance:

Since 2008:

- Construction began in July 2011 on the C-44 Reservoir in the Indian River Lagoon South project. This reservoir is expected to store 60,500 acre-feet of water, and is expected to be complete by September 2019.
- In 2012, the SFWMD completed construction of C-111 Spreader Canal Western Project features, which added approximately 1,800 acre feet of additional storage.
- The design and final specifications for the state-expedited C-43 West Basin Storage Reservoir were completed in 2008. When completed, this reservoir will provide 170,000 acre-feet of storage.
- Construction of the Site 1 Reservoir is underway which will provide 13,500 acre-feet of storage.
- Construction of the first of two Flow Equalization Basins (FEB) has been started by the SFWMD which will store 105,000 acre-feet of water.
- The Dispersed Water Management Program at SFWMD includes 45 projects across four different categories and accounts for 86,257 ac-ft of operational storage in the system.

2012 – 2014:

- The Caloosahatchee River (C-43) West Basin Storage Reservoir was authorized by WRRDA 2014.
- The Broward Water Preserve Area Project was authorized By WRRDA 2014.
- The Central Everglades Planning Project (CEPP) report has been completed which recommends construction of FEB 2 in the Everglades Agricultural Area which will store an additional 60,000 acre feet of water.

SUBGOAL 1-A: GET THE HYDROLOGY RIGHT

Objective 1-A.2: Develop alternative water storage systems capable of storing 1.7 billion gallons per day by 2030.

Policy/Regulatory Framework

- [WRDA of 1996, Public Law 104-303](#)
- [WRDA of 1999, Public Law 106-53](#)
- [WRDA of 2000, Public Law 106-541](#)
- [WRDA of 2007, Public Law 110-114](#)
- [Water Resources Reform and Development Act \(WRRDA\) of 2014, Public Law 113-121](#)

Implementation Approach

Alternative water storage is needed to supplement the region's surface reservoirs. The original proposal in the CERP was utilization of extensive aquifer storage and recovery (ASR). Because of technical uncertainties identified with the ASR technology at this scale, pilot projects and a regional evaluation are underway to determine the viability of [ASR](#) to the extent needed to fulfill this objective.

Objective 1-A.2: Progress and Status at a Glance:

Since 2009:

- Exploratory wells around Lake Okeechobee provided data for the Lake Okeechobee, Hillsboro, and C-43 ASR pilot projects.
- Installation of the Kissimmee River ASR facility was completed in 2009; testing was conducted between 2009 and 2013.
- The Hillsboro ASR facility was completed in 2009; testing was conducted between 2009 and 2012.
- A siting evaluation was completed and an exploratory well was constructed at the Seminole Tribe Brighton Reservation ASR well.

2012 – 2014:

- Modeling of the envisioned CERP ASR (333 wells) operations strategy was completed in 2013.
- The results of the pilot projects have been summarized in a Technical Data Report (TDR), which was finalized in 2013.

SUBGOAL 1-A: GET THE HYDROLOGY RIGHT

Discussion

Two pilot project facilities within this objective were constructed and tested. Although ASR has been used in local water storage for many years, there are technical uncertainties of using this technology at the regional scale envisioned in the CERP and it is being thoroughly researched through the ASR Regional Study and pilot projects. Modeling of the envisioned CERP ASR (333 wells) operations strategy was completed in 2013. The results of the pilot projects have been summarized in a Technical Data Report (TDR), which was finalized in 2013. The results of both pilot projects indicated that high capacity ASR is feasible in the area of Lake Okeechobee and along the Hillsboro Canal in central Palm Beach County. The results of the ASR Regional Study will be summarized in a TDR that will be finalized in late 2014. Contingency studies may be conducted after completion of the ASR Regional Study in 2015 to identify alternative storage and water supply options that ASR may not be able to address.

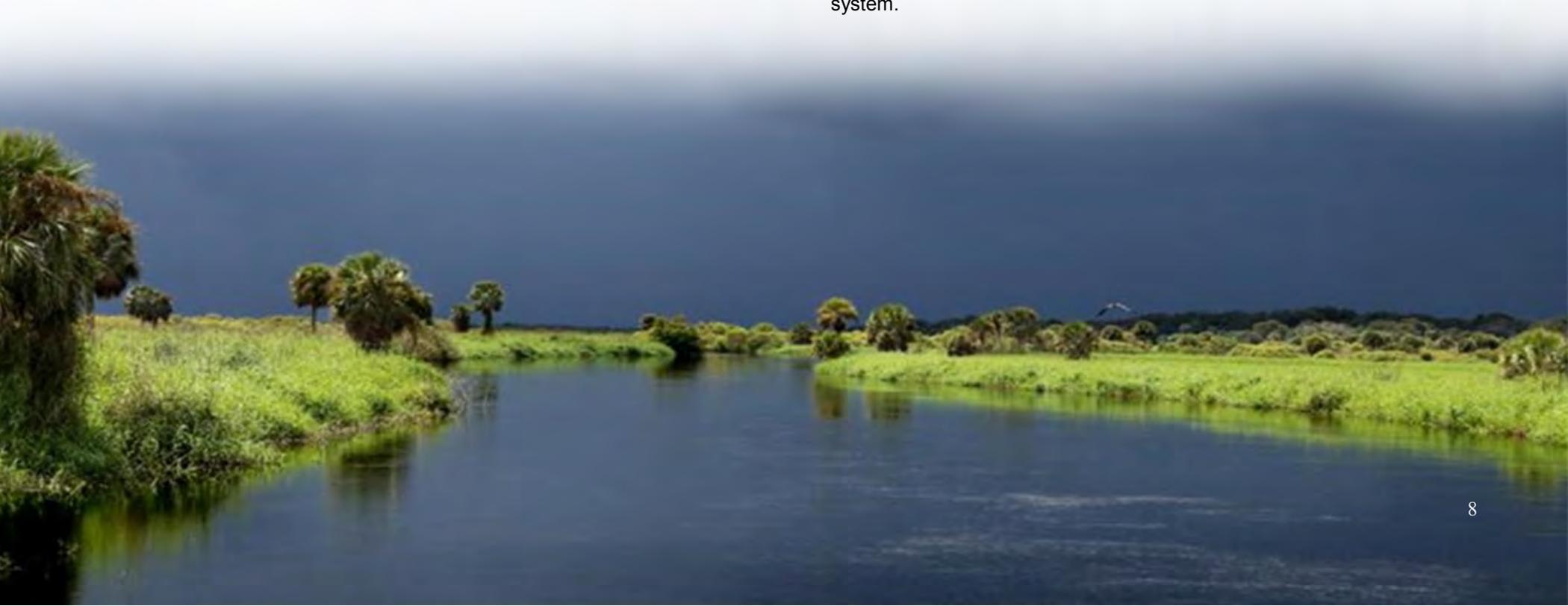
Objective 1-A.3: Modify 361 miles of impediments to flow by 2020.

Policy/Regulatory Framework

- [WRDA of 1996, Public Law 104-303](#)
- [WRDA of 1999, Public Law 106-53](#)
- [WRDA of 2000, Public Law 106-541](#)
- [WRDA of 2007, Public Law 110-114](#)
- [Water Resources Reform and Development Act \(WRRDA\) of 2014, Public Law 113-121](#)

Implementation Approach

Canals, internal levees, and other impediments will be removed or modified to reestablish the natural sheetflow of water through the system.



SUBGOAL 1-A: GET THE HYDROLOGY RIGHT

Objective 1-A.3: Progress and Status at a Glance:

Since 2000:

- Natural flow has been reestablished for 24 of 40 miles of the historic meandering Kissimmee River.
- A total of 15,041 acres of the Kissimmee River floodplain wetlands have been restored.
- Several species, including the ring-necked duck, American avocet, and black-necked stilt, have returned to the Kissimmee River after an absence of 40 years.
- The Taylor Slough Bridge has been replaced.
- The C-109 canal has been backfilled.
- C-110 Canal has been plugged.
- Portions of the C-111 spoil mound have been removed.
- A series of water detention areas in the C-111 Project footprint have been constructed.
- Construction of the major features of the Western C-111 Spreader Canal Project is completed.
- The Prairie Canal in Picayune Strand has been plugged and restored.
- Plugging of the Merritt and FakaUnion canals are underway as well as plugging of the Miller Canal. In all, over 55,000 acres will be restored with the completion of this project.
- The lower 4 miles of the L-67 Extension Canal and levee have been backfilled and removed.

2012 – 2014:

- In 2012, two Kissimmee River restoration construction efforts were completed, removing approximately 18,375 linear feet of fill from the historic channel.
- The first mile of bridging, road removal, and raising on US Hwy 41 (“Tamiami Trail”) were completed in March 2013.
- In 2013, Florida Governor Rick Scott committed \$90 million to cost share the construction of the next phase of bridging with the National Park Service.
- The Decomp Physical Model installation contract was awarded in May 2012. The first operational window was November 5, 2013.
- A 2-mile long, 35 foot deep cement-bentonite wall was installed by the Miami Dade Limestone Products Association along the L31N canal to test the efficacy of subterranean seepage management technology of preventing freshwater losses from Everglades National Park.
- Broward County Water Preserve Areas Project was authorized by the Water Resources Reform and Development Act 2014.
- CERP C-43 Basin Storage Reservoir, Part 1 (Caloosahatchee River (C-43) West Basin Storage Reservoir and Caloosahatchee Watershed) was authorized by the Water Resources Reform and Development Act 2014.

SUBGOAL 1-A: GET THE HYDROLOGY RIGHT

Discussion

Tamiami Trail. This feature of the Modified Water Deliveries Project was completed in March 2013 and considered a first step in the modifications to Tamiami Trail needed for restoration. Construction of the Mod Waters project, including the Tamiami Trail modifications, sets the stage for future CERP components and operating plans that have potential to improve the quantity, quality, timing, and distribution of water deliveries to ENP, thereby supporting the recovery of wading bird populations, restoration of naturally occurring ridge and slough formation, restoration of fish and wildlife resources, and overall improvement of 63,000 acres of wetlands.

The [2009 Omnibus Appropriations Act](#) (March 10, 2009) directed the NPS to evaluate bridging alternatives to the Tamiami Trail (US Highway 41) roadway (10.7-mile eastern section), beyond what was authorized by Mod Waters, in order to “restore more natural water flow to [Everglades National Park](#) (ENP) and Florida Bay and for the purpose of restoring habitat within the Park and the ecological connectivity between the Park and the Water Conservation Areas.” A Final Environmental Impact Statement (FEIS) was completed in 2010 by ENP for the Next Steps Project. The Notice of Availability for public comment was published in the Federal Register on December 20, 2010. The Record of Decision (ROD) was subsequently published in the Federal Register on April 26, 2011. The key finding in the FEIS/ROD was that an additional 5.5 miles of bridging and raising the balance of the 10.7-mile highway corridor (Alternative 6e in the FEIS) are necessary to achieve the 2009 Omnibus Appropriations Act’s restoration objectives.

On December 23, 2011, Congress passed the Consolidated Appropriations Act, 2012 ([Public Law 112-74](#)) which authorized construction of Alternative 6e of the Next Steps Project. In October 2012, NPS Director Jonathan Jarvis directed the staff of the Denver Service Center (DSC) and ENP to focus on the western 2.6 mile bridge as the first increment towards implementation of Alternative 6e.

In August 2013, Florida Governor Rick Scott committed the State of Florida to contribute one-half of the construction costs of the 2.6 mile bridge, amounting to approximately \$90 million, to be appropriated in \$30 million installments over the next three years. This decision allowed the NPS/DSC project team to partner formally with the FDOT and led to the identification of the design-build approach to project implementation. In addition, with the passage of the Consolidated Appropriations Act, 2012, Congress appropriated \$25 million for acquisition of commercial properties along Tamiami Trail authorized for acquisition by the 1989 Everglades National Park Protection and Expansion Act. The NPS is negotiating the acquisition of the needed real estate for the completion of the Mod Waters project and implementation of the first phase of the Next Steps project. Current estimates indicate that this will be completed by February 2016.

Kissimmee River In 2012, two Kissimmee River restoration construction efforts were completed in the lower pool of the Kissimmee River. The historic river channel in Reaches 2 and 3 were excavated in an effort to reestablish the pre-channelized flow and mosaic of habitats throughout the river and floodplain ecosystem. The total distance of historic channel excavated was approximately 18,375 linear feet of which 7,500 linear feet was excavated from Reach 2 oxbow north of US Highway 98, approximately 7,400 linear feet of Reach 3 oxbow south of US Highway 98, and approximately 3,475 linear feet of material was excavated south of the CSX railroad bridge to a point approximately 4,335 feet southward. The excavated material will ultimately be used for the backfilling of portions of the channelized Kissimmee River. Currently, the project is monitoring the success of 6 to 8 Caracara nests along reaches 2, 3, and 4 of the Kissimmee River Restoration project.

SUBGOAL 1-A: GET THE HYDROLOGY RIGHT

A project partnership agreement was signed in June 2010 to initiate the L-31 North (L-30) Seepage Management Pilot Project. This project provides for the testing of various technologies to prevent the loss of water from the natural system; however this project requires an updated authorized total project cost in order to move forward with solicitation and award of the construction contract. Until an updated project cost is obtained, the USACE and SFWMD have been monitoring similar efforts being implemented by a local rock mining corporation, as mitigation for their work. Upon reactivation of the project, any lessons learned from the rock miners efforts will be incorporated into the project.

The purpose of the L-31N (L-30) Seepage Management Pilot project was to evaluate the feasibility of installing a subsurface seepage barrier in the extremely porous aquifer that borders the everglades. The project development team established a preferred plan and a request for proposals was issued in November of 2009. Following the execution of the Project

Partnership Agreement in July 2010, the proposals were reviewed revealing that no responsible bidders were able to complete the project within the existing budget. A limited re-evaluation report (LRR) will be required to seek the necessary congressional authorization to provide the additional funding. At this date, there are no plans to initiate the LRR. In a separate effort, the Miami-Dade Limestone Products Association (MDLPA) has installed a 2-mile long, 35 foot deep cement-bentonite wall along the L31N canal. This project is part of required mitigation for the increase in groundwater flow resulting from limestone excavations adjacent to Everglades National Park. This 2-mile barrier, completed in June 2012, is a demonstration project. Monitoring data indicate the seepage barrier is performing as expected, and the inter-agency committee that manages the mitigation trust fund is expected to approve 3 additional miles of seepage barrier at an upcoming meeting in Fall 2014.

Operational Changes in water delivery management schedules will be made to alleviate extreme fluctuations and better match natural hydrological patterns while maintaining urban and agricultural water supply and flood control.

**Table 1: Subgoal 1-A: Get the Hydrology Right
Comprehensive Status July 2012–June 2014**

Objective	Projects	Status
<p>Surface Water Storage Reservoirs</p> <p>Objective 1-A.1: Provide 1.8 million acre-feet of surface water storage by 2036.</p>	<p>C&SF: CERP Indian River Lagoon–South (C-23/C-24/C-25/North Fork and South Fork Storage Reservoirs, and C-44 Basin Storage Reservoir) [Project ID 1101 and 1101A]</p>	<p>Planning: C44 reservoir design was completed in 2014; C23/24 and C-25 reservoir designs are on hold until 2020. Authorized for Construction: WRDA 2007 and 2010 Project Partnership Agreement. Construction: Began in 2011, scheduled completion for IRL C-44 Reservoir/STA is 2020.</p>
	<p>C&SF: CERP Everglades Agricultural Area Storage Reservoir [Project ID 1102]</p>	<p>Planning: Included as an FEB in the CEPP recommended plan in 2014.</p>
	<p>C&SF: CERP Central Everglades Planning Project [Project ID 1103]</p>	<p>Planning: Final revisions to the PIR/EIS are underway</p>
	<p>C&SF: CERP Lake Okeechobee Watershed [Project ID 1104]</p>	<p>Planning: Planning currently on hold.</p>
	<p>C&SF: CERP Site 1 Impoundment [Project ID 1107 and 1107A]</p>	<p>Planning: Phase 2 requires additional planning. Authorized for Construction: WRDA 2007. Construction: Phase 1 began in October 2010.</p>
	<p>C&SF: CERP C-43 Basin Storage Reservoir, Part 1 (Caloosahatchee River (C-43) West Basin Storage Reservoir and Caloosahatchee Watershed) [Project ID 1109 and 1109A]</p>	<p>Planning: Caloosahatchee River (C-43) West Basin Storage Reservoir PIR completed; Caloosahatchee Watershed PIR on hold. Reports: Chief’s Report for C-43 completed; authorized in WRRDA 2014.</p>

SUBGOAL 1-A: GET THE HYDROLOGY RIGHT

**Table 1: Subgoal 1-A: Get the Hydrology Right
Comprehensive Status July 2012–June 2014**

Objective	Projects	Status
<u>Surface Water Storage Reservoirs</u> Objective 1-A.1: Provide 1.8 million acre-feet of surface water storage by 2036.	Everglades and South Florida (E&SF): Critical Projects–Ten Mile Creek [Project ID 1111]	Planning: Completed Construction: Physically completed Implementation: Operational testing determined additional design corrections are needed for project to function as intended.
	C&SF: Loxahatchee River Watershed Restoration Project (formerly North Palm Beach County–Part 1) [ID 1115]	Planning: PIR Planning has been on hold and will be reinitiated in 2014. Construction: Completed on several features through the SFWMD expedited program.
	C&SF: CERP Broward County Water Preserve Areas [Project ID 1116]	Planning: Chief’s Report signed May 2012. The Record of Decision was executed in October 2012. Project is included in the WRRDA authorized by Congress in 2014.
<u>Alternative Water Storage</u> Objective 1-A.2: Develop alternative water storage systems capable of storing 1.7 billion gallons per day by 2030.	C&SF: CERP ASR Regional Study [Project ID 1203]	Planning: Pilot projects were completed in 2013. Results are being folded into the Regional Study Final Technical Data Report, expected to be completed in 2014.
	Seminole Tribe Brighton Reservation Aquifer Storage and Recovery (ASR) Pilot Project [Project ID 1206]	Planning: Test well has been completed, but the project is currently inactive until funding becomes available.
	Taylor Creek Aquifer Storage and Recovery (ASR) Project [Project ID 1207]	Planning: Design has been completed. Project is currently under review by the USEPA for acceptance of a petition for an aquifer exemption, to test the system without a disinfection process.
	Fisheating Creek Feasibility Study [Project ID 1208]	Planning: Completed Phase I.
<u>Modifying Impediments to Flow</u> Objective 1-A.3: Modify 361 miles of impediments to flow by 2020.	C&SF: C-111 (South Dade) [Project ID 1300]	Planning: Completed Construction: Completed on several features; Execution of Project Cooperation Agreement amendment between Corp and SFWMD for the construction of the North Detention Area (Contract # 8) is expected by end of 2014. L-31W Plugs (Contract #9) will be completed after Contract 8 is complete.
	C&SF: CERP WCA-3 Decompartmentalization and Sheet-flow Enhancement [Project ID 1301]	Planning: Included in the CEPP recommended plan completed in 2014. Construction: Physical Model contract awarded May 2012. The first season of operation was successfully completed November - December 2013.
	E&SF: Critical Projects - Southern CREW [Project ID 1303]	Land Acquisition: Completed. Planning: Planning and design completed. Construction: Partially completed by SFWMD. Remaining construction is on hold until funds are available.
	Kissimmee River Restoration [Project ID 1306]	Planning: Completed. Construction: Underway; completed for 13 of 22 miles of canal backfilling (24 of 40 miles of restored river channel). Construction now scheduled to resume in 2015 due to resolution of cost-share issues.
	Modified Water Deliveries to Everglades National Park [Project ID 1307]	Planning: Completed Construction: Underway. Tamiami Trail Modification completed in 2013 ; 8.5 Square Mile Area component structural modification is scheduled for completion FY 15; planning for operational field testing underway in FY 14. Real estate acquisition to be completed in 2016.
	Tamiami Trail Modifications: Next Steps [Project ID 1309]	Planning: Completed. ROD published April 2011. Construction: Design underway. Florida Department of Transportation has allocated \$90 million for the project; awarded Federal TIGER grant of \$20 million to initiate construction in 2015.
	C&SF: CERP C-111 Spreader Canal [Project ID 2310 and 2310A]	Planning: PIR and Chief’s Report completed; authorized in WRRDA 2014. Construction: SFWMD completed construction of the recommended plan, with the exception of structure 198, under its expedited construction program. The Operational Testing and Monitoring Period was completed in 2013.

SUBGOAL 1-B: GET THE WATER QUALITY RIGHT

Runoff from agriculture and stormwater from urban areas has impacted areas of the Everglades and Lake Okeechobee and impaired ecological functions in those critical ecosystems. Excess phosphorus is a major concern, but it is not the only problem. The Caloosahatchee and St. Lucie River and Estuaries, Biscayne Bay, Florida Bay, the Florida Keys, and near shore coastal waters periodically show signs of impacts from nutrients, too little or too much fresh water, and agricultural or industrial pollutants such as copper and pesticides. Although nitrogen is of particular concern for marine systems, increased total phosphorus concentrations continue to trigger algal bloom concerns in some estuaries, particularly Biscayne Bay and northeast Florida Bay. Mercury, resulting from atmospheric deposition, continues to be a concern in both freshwater and marine systems in south Florida. Potentially toxic contaminants, such as trace metals, pesticides, and other synthetic organic chemicals are found in certain soils, and sediments. This is of specific concern when former agricultural sites are used to construct water treatment and storage facilities.

The majority of the state and federal strategies in south Florida focus on water quality and quantity, with emphasis on nutrient reduction. Therefore it is generally recognized that achieving all of the water quality goals for ecosystem restoration in all use-impaired water bodies may depend on actions outside the scope of those described in this document.

The State's Everglades Protection Area Tributary Basins Long Term Plan (Long Term Plan) for Achieving Water Quality Goals focuses on strong science-based and adaptive implementation philosophy to allow continuous improvement until the long-term water quality goal for the Everglades Protection Area is achieved. Improvement of water quality is required elements of both federal and state legislation for restoring the Greater Everglades. There are also specific mandates in state law for water quality improvements in Lake Okeechobee and the Caloosahatchee and St. Lucie estuaries, in addition to the Everglades systems south of Lake Okeechobee.

The strategy for this subgoal consists of two measurable objectives:

1) STAs and 2) Water Management Plans. Progress on the measurable objectives during the reporting period (July 2012–June 2014) is described below and further delineated in [Table 2](#). Additional water quality efforts that will help fulfill this subgoal are also described below. Implementation of Total Maximum Daily Load (TMDLs) will involve a combination of regulatory, non-regulatory, and incentive-based actions to attain the necessary reduction in pollutant loading. One of the main mechanisms to implement the State of Florida's TMDLs is Basin Management Action Plans (BMAPs). In south Florida, water quality restoration and protection strategies have been incorporated into regional and comprehensive restoration programs

designed to address water quality, hydrology, and natural habitats. In many cases, these programs are designed to incorporate or complement BMAPs designed to address local and regional water quality issues. In some cases, regional restoration plans can serve in lieu of a BMAP, as Florida law allows FDEP to adopt Reasonable Assurance Plans for impaired waters that have control programs in place that will assure that water quality standards will be restored. A summary of progress under Goal 1B is provided in [Table 2](#).

Objective 1-B.1: Construct 96,010 acres of stormwater treatment areas by 2035.

Policy/Regulatory Framework

- In 1988, the federal government filed a complaint in federal court against the FDEP and SFWMD for alleged violations of state water quality. The lawsuit was settled in 1991, with a parties entering into a Consent Decree in 1992.
- The Florida Legislature passed the [Everglades Forever Act](#) (EFA) in 1994 which required the construction of Stormwater Treatment Areas (STAs) to meet the water quality standard for phosphorus described above. To date, 57,000 acres of STAs have been constructed.
- The CERP proposed the construction of 35,600 acres of manmade wetlands to treat urban and agricultural runoff before it is released into the Everglades.
- In 2005, USEPA approved the State of Florida's phosphorus rule for the Everglades Protection Area which established a stringent phosphorus water quality standard of 10 parts per billion (ppb).
- [Northern Everglades and Estuaries Protection Program \(NEEPP\)](#): In 2007, the Florida Legislature expanded the existing Lake Okeechobee Protection Act (LOPA) to include the Caloosahatchee and the St. Lucie Rivers and Estuaries. The primary goal of the legislation is to restore and to protect the state's surface-water resources by addressing water quality, quantity, timing, and distribution of water to the natural system.
- [Chapter 2013-59](#), Laws of Florida ([HBSBSB 7065](#)) Everglades Improvement and Management which ratified the SFWMD's Restoration Strategies Plan and dedicated recurring funding through the Save Our Everglades Trust Funds.

SUBGOAL 1-B: GET THE WATER QUALITY RIGHT

- SFWMD completed the acquisition of land needed to construct STA -1W Expansion No. 1 in April 2014. The STA-1W Expansion No. 1 is adjacent to and directly west of the existing STA-1W and will work in concert with STA-1W, STA-1E and the L-8 FEB to reduce total phosphorus concentrations in discharges to the Everglades.

Implementation Approach

STAs are man-made treatment wetlands designed primarily to remove nutrients from urban and agricultural areas before the runoff reaches the

natural system. Nutrient removal relies on uptake by vegetation and periphyton communities and other biogeochemical processes with permanent phosphorus removal occurring through the accumulation of partially decomposed organic sediments. The vegetation in the STAs consists of emergent aquatic vegetation in the upper reaches of the STAs and submerged aquatic vegetation (SAV) in the lower reaches.

Projects currently underway are detailed in [Table 2](#). Further information can be found here: www.sfwmd.gov/sta

Objective 1-B.1: Progress and Status at a Glance:

Since 1993:

- 68,000 acres of land south of Lake Okeechobee have been converted to STAs, yielding 57,000 acres of effective treatment wetlands.
- Approximately \$2 billion in Southern Everglades water quality improvements
- Everglades STAs prevented 1,727 metric tons of phosphorus from entering the Everglades since 1993
- Improved BMPs in the EAA have prevented 2,709 metric tons from entering the Everglades since 1996.
- North of Lake Okeechobee, three STAs have been constructed to reduce phosphorus loading from upstream basins. These STAs total approximately 1,810 acres currently Nubbin Slough, Taylor Creek and S-191 basins. Nubbin Slough STA is undergoing repairs which are anticipated to be complete in the fall of 2014. More details on all these projects can be found in the 2014 [South Florida Environmental Report](#).

2012 – 2014:

- More than 1.2 million acre-feet of runoff water was treated by Everglades STAs in Water Year 2013.
- The STAs achieved a total phosphorus load reduction of 84 percent, reducing inflow flow-weighted mean phosphorus concentrations from 138 to 21 parts per billion.
- In 2012, an additional 11,500 acres of STAs were completed through the expansion of STA-2 (Compartment B) and STA-5/6 (Compartment C). This has substantially increased the effective treatment of area of the existing STAs and brings the agencies 57,000 acres closer to the objective.
- In 2012, State of Florida developed the Restoration Strategies Regional Water Quality Plan (Restoration Strategies) which includes the construction of more than 6,500 acres of new STAs. The Restoration Strategies also includes 116,000 acre-feet of new water storage facilities known as Flow Equalization Basins (FEB) which will be shallow water reservoirs that work in tandem with the existing and new STAs to optimize treatment.
- The SFWMD initiated construction on a number of Restoration Strategies components, most notably the 15,000 acre A-1 FEB and the L-8 FEB, the two largest storage components of the plan.

SUBGOAL 1-B: GET THE WATER QUALITY RIGHT

Objective 1-B.2: Prepare locally based plans to reduce pollutants as determined necessary by the total maximum daily loads by 2014.

Efforts being led by the State of Florida

1. Basin Management Action Plans (BMAPs)

Policy/Regulatory Framework

- [Section 303\(d\) of the federal Clean Water Act](#) requires states to submit lists of surface waters that still do not meet applicable water quality standards (impaired waters) after implementation of technology-based effluent limitations, and to establish total maximum daily loads (TMDLs) for these waters on a prioritized schedule.
- The State of Florida has its own TMDL legislation; the Florida Watershed Restoration Act ([F.S. 403.067](#)) details the FDEP's role in implementing its [TMDL program](#). One of the main mechanisms to implement the State of Florida's TMDLs is BMAPs.

Implementation Approach

A [BMAP](#) is the "blueprint" for restoring impaired waters by reducing pollutant loadings to meet the allowable loadings established in a TMDL. It represents a comprehensive set of strategies - permit limits on wastewater facilities, urban and agricultural best management practices, conservation programs, financial assistance and revenue generating activities, etc. - designed to implement the pollutant reductions established by the TMDL. These broad-based plans are developed with local stakeholders as they rely on local input and local commitment and they are adopted by Secretarial Order to be enforceable.

In south Florida, water quality restoration and protection strategies have been incorporated into regional and comprehensive restoration programs designed to address water quality, hydrology, and natural habitats. In many cases, these programs are designed to incorporate or complement BMAPs designed to address local and regional water quality issues. In some cases, regional restoration plans can serve in lieu of a BMAP, as Florida law allows FDEP to adopt [Reasonable Assurance Plans](#) for impaired waters that have control programs in place that will assure that water quality standards will be restored.

Objective 1-B.2: Progress and Status at a Glance:

Since 2008:

- Almost 50 TMDLs have been initiated or adopted in south Florida, including four BMAPs, and watershed and locally based plans were initiated or adopted.
- Approximately 70% of the previously reported cesspits and septic tanks have been replaced with advanced wastewater treatment facilities from Key Largo to Key West.

2012-2014:

- BMAPs were completed for the Caloosahatchee, Everglades West Coast, and St. Lucie basins: St. Lucie River and Estuary (May 2013), Caloosahatchee Estuary Basin (December 2012), and the Everglades West Coast Basin (November 2012).
- In 2012, FDEP issued permits and consent orders for the Restoration Strategies Regional Water Quality Plan, including milestones and enforcement mechanisms to ensure the milestones are met.
- In early 2013, a BMAP for the Lake Okeechobee Watershed was initiated. BMAP completion is projected for end of calendar year 2014.
- In October 2013, the USEPA approved Florida's statewide TMDL for mercury.
- In 2013, the Florida Legislature unanimously voted to include Restoration Strategies in law and committed recurring funding for the duration of the program.
- The SFWMD initiated construction on a number of Restoration Strategies components, most notably the 56,000 acre A-1 FEB and the L-8 FEB, the two largest storage components of the plan.
- The District's regulatory BMP program in the Everglades Agricultural Area achieved a 63-percent reduction in phosphorus loads in 2014 compared to the pre-BMP historic period.
- The Lake Okeechobee Watershed Protection Plan and the SFWMD Regional Water Supply Plans were updated in 2014.

SUBGOAL 1-B: GET THE WATER QUALITY RIGHT

Discussion

In early 2013, the FDEP initiated a [BMAP](#) for the Lake Okeechobee Watershed that will identify projects and activities needed to restore water quality such that it meets the designated uses in these watersheds. The Lake Okeechobee BMAP, expected to be completed in late 2014, will build upon the decade plus work already done under the Lake Okeechobee Watershed Protection Program discussed further below. In addition, the following BMAPs were recently completed for the Caloosahatchee, Everglades West Coast, and St. Lucie basins: St. Lucie River and Estuary (May 2013), Caloosahatchee Estuary Basin (December 2012), and the Everglades West Coast Basin (November 2012).

Statewide Mercury TMDL: In October 2013, the USEPA approved Florida's statewide TMDL for mercury. The statewide [TMDL](#) for fresh and marine waters was the most comprehensive approach offering the most protection for the people of Florida. This approach addressed the following concerns: possible elevated levels of mercury in fish in Florida's fresh and marine waters that were not assessed, adjacency of waterbodies, mobility of marine species, and atmospheric deposition of mercury (the dominant source of mercury). The TMDL is now in effect and will be incorporated into new and renewal discharge permits for industrial and large domestic wastewater facilities.

Since 2008, the Department has completed and adopted by rule TMDLs identifying needed reductions for nutrients and/or to address low dissolved oxygen levels in the St Lucie–Loxahatchee Basin (including the Estuary, North Fork, South Fork, C-44, C-24, C-23 canals, Bessey Creek, and Southwest Fork Loxahatchee River), and for nutrients in the estuarine portion of the Caloosahatchee (below the Franklin Locks) and for fecal coliforms in Trout Creek (Caloosahatchee Basin) and Ten Mile Creek (St Lucie–Loxahatchee Basin). In addition, three TMDLs were adopted in the Charlotte Harbor Basin (dissolved oxygen TMDL for Coral Creek-East Branch, plus fecal coliform TMDLs for Gottfried Creek and the North Prong of Alligator Creek). One TMDL was adopted in the Everglades Basin (West Palm Beach Canal Fecal Coliform TMDL). Seven TMDLs were completed for nutrients, dissolved oxygen, unionized ammonia, or fecal coliforms in the Everglades West Coast Basin (1 for Cocohatchee River Estuary, 1 for the Gordon River, 3 for Hendry Creek, 1 for the Imperial River, and 1 for Lake Trafford). A fecal coliform TMDL was adopted for the E-1 Canal in the Lake Worth Lagoon Basin. In 2011, the FDEP proposed TMDLs to address high fecal coliforms concentrations in 20 water bodies located in the Southeast Coast region of the state, ranging from St Lucie County to Miami-Dade. These TMDLs have now been adopted into rule and became effective May 14, 2012.

The FDEP is awaiting EPA's approval of TMDLs to address nutrients and dissolved oxygen impairments for five lakes in the Kissimmee River Basin (Lake Cypress, Lake Holden, Lake Jackson, Lake Kissimmee, and Lake Marian). These TMDLs were proposed on September 12, 2013 (and re-proposed in response to public comments on October 23). They became effective on December 17, 2013.

The FDEP is currently developing TMDLs for nutrients and dissolved oxygen in the upper Caloosahatchee River and multiple tributaries located throughout the watershed. As part of this effort, the FDEP is revisiting and potentially revising the TMDLs for the lower Caloosahatchee River. (The Franklin Lock and Dam, S-79, divides the upper from the lower river.) The Division hosted three public meetings in June and August of 2013, and May of 2014. The FDEP is currently completing the modeling, selecting TMDL targets, and anticipates finalizing the TMDL in October 2014.

During state fiscal year 2014 - 2015, the FDEP intends to initiate rulemaking projects to develop nutrient TMDLs for the following water bodies in South Florida: Ten Mile Creek (St. Lucie-Loxahatchee Basin); Rookery Bay Coastal Segment (Everglades West Coast Basin); Chandler Hammock Slough, Popash Slough, and Lettuce Creek (Lake Okeechobee Basin); and Mud Lake and Lake Juliana (Withlacoochee Basin).

2. Restoration Strategies Regional Water Quality Plan

Policy/Regulatory Framework

In 2012, the State of Florida developed the [Restoration Strategies Regional Water Quality Plan](#), which is the next phase of the Long - Term Plan required by the Everglades Forever Act pursuant to [373.4592, F.S.](#)

Implementation Approach

The plan represents the culmination of consensus reached by the State of Florida and the U.S. EPA on new strategies for improving water quality in America's Everglades that resolves a long-standing and long-recognized environmental challenge. The SFWMD is implementing the Restoration Strategies Plan which includes more than 6,500 acres of new STAs and 116,000 acre-feet of additional water storage through construction of flow equalization basins (FEBs). FEBs provide a more steady flow of water to the STAs, helping to maintain desired water levels needed to achieve optimal water quality treatment performance.

SUBGOAL 1-B: GET THE WATER QUALITY RIGHT

Discussion

In 2012, the FDEP successfully issued [permits and consent orders](#) which include milestones for project completion, as well as enforcement mechanisms to ensure the milestones are met. The Restoration Strategies Program will cost \$880 million over a 13-year implementation period and project components will be designed, constructed and operational within six years. In 2013, the Florida Legislature unanimously voted to include the State's plan in law and committed an unprecedented recurring funding source for the duration of the program. At the end of the 13-year period in 2025, the [Water Quality Based Effluent Limit](#) (WQBE) will be in effect and the STA outflow phosphorus concentrations will initiate long-term compliance monitoring. Since the permits and consent orders were issued, the SFWMD has initiated construction on a number of project components, most notably the 15,000 acre A-1 FEB and the L-8 FEB, the two largest storage components of the plan. For updates and detailed implementation schedules please visit the website: www.sfwmd.gov/restorationstrategies

3. Best Management Practices

Policy/Regulatory Framework

Source control program requirements are established by legislation for the Southern and Northern Everglades areas. The Everglades Forever Act (EFA) [[Section 373.4592, Florida Statutes \(F.S.\)](#)] established source control requirements for the drainage basins in the Southern Everglades with primary responsibility assigned to the SFWMD. The Northern Everglades and Estuaries Protection Program (NEEPP) ([Section 373.4595, F.S.](#)) established coordinated source control requirements for the Lake Okeechobee, Caloosahatchee River and Estuary, and St. Lucie River and Estuary watersheds in the Northern Everglades, with varying responsibilities accorded to each of the coordinating agencies (SFWMD, FDACS, and FDEP) such that the state-wide BMP programs complement the existing SFWMD regulatory source control programs. The agencies implement their respective programs through specific rules promulgated by each agency based on statutory authorizations. SFWMD BMP rules adopted under [Chapters 40E-61 and 40E-63](#), Florida Administrative Code, F.A.C., for the northern and southern Everglades are ongoing programs addressing all land uses and take into account the unique characteristics of each region to establish specific water quality limitations to be achieved by permittees in their stormwater runoff after implementing Best Management Practices (BMPs).

Implementation Approach

BMPs are onsite source control activities that include structural and operational management practices targeting water quality in stormwater runoff on agricultural and non-agricultural lands with the goal to improve or maintain the health of downstream receiving water bodies and natural resources. Pollutant source control programs including BMPs are an integral component of Southern and Northern Everglades restoration and protection programs. The success of the source control strategies is dependent upon the comprehensive and consistent approach between watersheds, effective in-field verification, a robust water quality monitoring network for measuring progress and an adaptive management process for factoring in the lessons learned and the unique needs and characteristics of each region. The EAA regulatory program under [Chapter 40E-63](#), F.A.C., has played a major role in the overall success of the long term Everglades restoration efforts.

Discussion:

The SFWMD's regulatory BMP program in the Everglades Agricultural Area continues to exceed expectations with a 63-percent reduction in phosphorus loads in 2014 compared to the pre-BMP historic period. Results have been consistently above the 25% load reduction mandated by statute. Over nearly two decades, water quality treatment by the STAs combined with best management and improved farming practices together have prevented approximately 4,582 metric tons of phosphorus from entering the Everglades.

4. Northern Everglades Initiative

Policy/Regulatory Framework

Underscoring the state's commitment to Everglades ecosystem restoration, the Florida Legislature introduced the [Northern Everglades and Estuaries Protection Program](#) (373.4594, F.S.), and provided a simplified and organized approach to focus on the full scope of Everglades restoration in the context of the northern and southern regions of the Everglades system. A watershed source control program to control pollutants at the source before they enter water bodies related to the northern and southern Everglades is integral to the restoration efforts for the Greater Everglades ecosystem.



SUBGOAL 1-B: GET THE WATER QUALITY RIGHT

The Northern Everglades Initiative was brought about by substantial changes to the Surface Water Improvement and Management (SWIM) legislation associated with the Lake Okeechobee Watershed through the passage of the Lake Okeechobee Protection Act (LOPA) of 2000 and 2004 [[Section 373.4595, Florida Statutes \(F.S.\)](#)] and the 2007 amendments to the statute. With the 2007 amendment, the Florida Legislature substantially expanded LOPA to include protection and restoration of the Lake Okeechobee Watershed and the Caloosahatchee and St. Lucie River Watersheds and their estuaries. These plans are expected to augment restoration currently underway in the Everglades south of Lake Okeechobee and build on ongoing restoration efforts north of Lake Okeechobee and in the river watersheds by identifying and implementing programs and projects necessary to achieve water quality and quantity objectives for the watersheds.

Implementation Approach

The plans include source controls (e.g., BMPs) and several sub-regional and regional technologies, such as STAs and alternative treatment technologies, to improve the quality of water within each watershed and of that delivered to Lake Okeechobee. Several measures are also included in the plans to improve both water levels within the Lake and the quantity and timing of discharges from [Lake Okeechobee](#) to the [northern estuaries](#) to achieve more desirable salinity ranges. These measures include reservoirs, dispersed water management projects, aquifer storage and recovery and deep well injection. The measures will be considered and as relevant, will be incorporated into the BMAP currently under development for the Lake Okeechobee Watershed. The [St. Lucie](#) and the [Caloosahatchee River Watershed Protection Plans](#) identified major influences that negatively affect the [Estuary's](#) ecological health (primarily water quality, timing, distribution and quantity) and proposed strategies to minimize those stressors.

Discussion

The plans were developed in accordance with [NEEPP](#) mandated timelines and are updated every three years. The LOWPP was last updated in 2014, and the RWPPs were updated in 2014. The 2015 St. Lucie and Caloosahatchee River Watershed Protection Plan Updates are currently under development which will focus on the coordinating agencies' progress since 2012 toward meeting each plan's goals. The plans were developed in accordance with NEEPP mandated timelines and are updated every three years.

Other Cooperative, Tribal and Interagency Efforts

1. Tribal Water Quality Standards

In May 1999 the USEPA approved the 10 micrograms per liter (10 µg/L) total phosphorus water column quality standard adopted by the Miccosukee Tribe of Indians of Florida. The Tribe, which is treated as a state for purposes of the Clean Water Act, adopted water quality standards to protect the tribal Everglades under their jurisdiction on the Federal Reservation. The Seminole Tribe of Florida is working to develop numeric nutrient criteria by 2015, making Public Notice in 2016 and submitting to USEPA for approval in 2017. The Seminole Tribe of Florida, at the December 2012 South Florida Ecosystem Restoration Task Force (Task Force) meeting, raised concerns with the hydrology in the western basins and flagged the lack of monitoring, modeling, planning, and project implementation in this region for many years. The Task Force directed the [Office of Everglades Restoration Initiatives](#) (OERI) to convene a meeting of a subset of Task Force member agencies to discuss these concerns. The kick-off meeting for the Big Cypress Seminole Indian Reservation Natural Areas and adjacent portions of the Big Cypress was held in January 2013. To date this team has held seven meetings and has brought in technical experts as needed to discuss the complex issues. Team has identified immediate, short term and long term actions. The Seminole Tribe of Florida has been very encouraged by the folks who have been attending and their willingness to think outside the box. The Task Force has received regular updates and has agreed that this group should continue to meet.

The Western Everglades Basins Interagency Coordination Team was created under the convening authority of the Task Force at the May 7, 2014 meeting to address concerns raised by the Miccosukee Tribe regarding water quality problems with the L-28 canal system. The L-28 Interceptor canal ends on the Miccosukee Tribe Reservation as a free flowing discharge carrying waters with high levels of phosphorus into an area deemed by the Clean Water Act standards as outstanding Miccosukee waters. Prior to the introduction of the canal this entire area was a ridge and slough mosaic where the Tribe would have cultural and hunting activities and collect medicinal plants. The team held a conference call on May 14th, 2014 and held its first meeting on May 21st, 2014. The primary topic was for each agency to discuss what tools could be brought to the table (i.e., specific funding for project activities, restoration technologies, staff time for planning, resources, etc.) to address the water quality issue. The team concluded that a planning matrix was needed and the SFWMD volunteered to take the lead on

SUBGOAL 1-B: GET THE WATER QUALITY RIGHT

creating the matrix. Each participating agency has contributed to the matrix and it has been completed. A second meeting is scheduled for the end of September and the goal is for the team to review the matrix and agree on next steps.

2. Nutrient Criteria for Surface Waters

Since late 2011, the State of Florida has made significant progress toward establishing numeric nutrient criteria (NNC) for freshwater bodies and coastal waters. Today, the FDEP with the approval of the USEPA has promulgated NNC for most of Florida's freshwater streams, lakes, and springs, and narrative nutrient criteria for wetlands (except for the Everglades Protection Area) and south Florida canals, which includes non-perennial streams, canals/ditches used primarily as water conveyances for flood control, irrigation, and tidal creeks. In addition, FDEP has promulgated NNC for the majority of estuaries and coastal waters.

3. Ban of Harmful Pesticide

In 2010, the USEPA decided to ban all uses of Endosulfan, an organochlorine pesticide that bioaccumulates in the environment. Endosulfan is currently being phased out and all uses will be terminated by 2016. This insecticide/acaricide is acutely neurotoxic to insects and mammals—including humans. Endosulfan has been extensively used in California and Florida—the two largest users—to control insect pests and mites in agriculture, such as row crops, fruit trees, greenhouses plants, and vegetables. EPA concluded, after a lengthy scientific review, that Endosulfan poses a high risk to wildlife and humans exposed to this pesticide. One of the evidences cited by EPA is a study sponsored by Everglades National Park that documented the presence of Endosulfan in small, bottom feeding (demersal) fish that support higher level species, such as wading birds.

4. Florida Keys National Marine Sanctuary Water Quality Protection Program (FKNMS WQPP)

The USEPA, the National Oceanic and Atmospheric Administration (NOAA), the Florida Fish and Wildlife Conservation Commission (FWC), and the FDEP conduct a comprehensive water quality monitoring and research program that

monitors water quality, seagrasses and corals within the sanctuary. The program, which is called for in the act that designated the Florida Keys National Marine Sanctuary, facilitates implementation of corrective actions to address point and nonpoint sources of water pollution in sanctuary waters to help sustain healthy populations of animals and plants.

In 2012, The WQPP Steering Committee formed a working group focused on improving water flows and circulation in residential canals and marinas. The working group has identified and prioritized a list of canals that are in need of improvement. This will reduce the accumulation of seaweed wrack, which decomposes and affects the water quality in dead-end canals.

As mentioned previously, regional water quality plans can serve in lieu of a BMAP. On February 7, 2012, the FDEP adopted the Florida Keys [Reasonable Assurance Plans](#) (RAP) by Secretarial order. The RAP was developed by the FDEP in cooperation with local governments, state agencies, and federal agencies within the Florida Keys to set forth and accelerate the actions to reduce nutrient loadings to near shore waters throughout the Florida Keys so that water quality standards are met and beneficial uses are restored. In addition to the recent adoption of these Reasonable Assurance documents, the FDEP will be submitting these reports to USEPA for acceptance with the submittal of the Group 5-Cycle 2 assessment updates to Florida's 303(d) list.

SUBGOAL 1-B: GET THE WATER QUALITY RIGHT

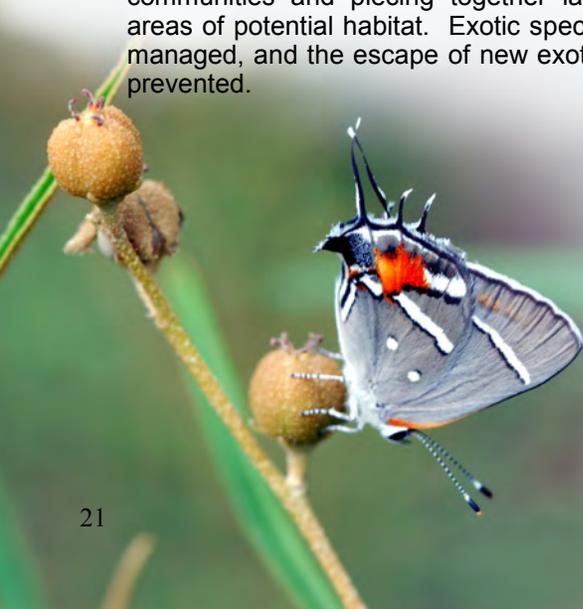
**Table 2: Subgoal 1-B: Get the Water Quality Right
Comprehensive Status July 2012–June 2014**

Objective	Projects	Status
<p>Stormwater Treatment Areas</p> <p><i>Objective 1-B.1: Construct 96,010 acres of stormwater treatment areas by 2035.</i></p>	E&SF: Critical Projects Lake Okeechobee Water Retention/Phosphorus Removal [Project ID 1506]	<p>Planning: Completed. Construction: The approximately 800-acre Nubbin Slough project is scheduled to be transferred to sponsor in Sept. 2012 for operations. The approximately 200-acre Taylor Creek project was transferred to sponsor for operations in 2011 and is currently in operation.</p>
	C&SF: West Palm Beach Canal STA-1E / C-51 West [Project ID 1513]	<p>Planning: Completed. Construction: Task Orders 1-4 are completed and Task Orders 5-7 are underway for culvert repairs. Task Order 8 will be awarded during FY 14. S-375 work is completed. Decommissioning of PSTA site initiated in May 2012 and completed in May 2014.</p>
	State Expedited Project: Everglades Agricultural Area (EAA) STAs Built-out Expansion [Project ID 1514A]	<p>Construction: Completed additional 11,500 acres in 2012 and these expansion areas are in operation.</p>
	State Expedited Project: Lakeside Ranch STA (part of the Northern Everglades Project) [Project ID 1515]	<p>Planning: Completed. Construction: Phase I construction completed and in operation; Phase II designed.</p>
	C-43 Water Quality Treatment Area and Test Facility [Project ID 1519]	<p>Planning: Conceptual design for the test facility was completed in late 2012.</p>
	Long-Term Plan for Achieving Everglades Water Quality Goals [Project ID 1520]	<p>Planning: In 2013, the Florida legislature amended the Everglades Forever Act and the Long-Term Plan by addition of the Restoration Strategies program. Restoration Strategies projects include additional STA treatment wetlands and construction of flow equalization basins upstream of STA.</p>
<p>Water Management Plans</p> <p><i>Objective 1-B.2: Prepare locally based plans to reduce pollutants as determined necessary by the total maximum daily loads by 2014.</i></p>	Total Maximum Daily Load for South Florida [Project ID 1600]	<p>Planning: Completed for St. Lucie Basin (nutrients, dissolved oxygen), Caloosahatchee Estuary (nutrients), Everglades West Coast Basin (nutrients, dissolved oxygen, fecal coliforms).</p>
	Hybrid Wetland Treatment [Project ID 1723]	<p>Planning: Completed. Construction: Completed for three sites (Lemkin Creek, Wolff Ditch, and Phase 1 of Grassy Island). Implementation: Completed for two sites (Lemkin Creek and Wolf Ditch).</p>
	Local Cost-Share Projects with Martin County [Project ID 1724]	<p>Planning: Completed. Construction: Construction is complete for four projects Old Palm City Stormwater Quality Improvement Project, Manatee Pocket Dredging, Manatee Creek Stormwater Improvement Project, and North River Shores Vacuum Sewer System Phase I.</p>

Photo by Bill Perry

GOAL 2: RESTORE, PRESERVE, & PROTECT NATURAL HABITATS & SPECIES

Historically, the natural habitats of south Florida covered an area of about 18,000 square miles. This enormous space encompassed a rich mosaic of ponds, sloughs, sawgrass marshes, hardwood hammocks, and forested uplands. In and around the estuaries, freshwater mingled with salt to create habitats supporting mangroves and nurseries for wading birds and fish. Beyond, nearshore islands and coral reefs provided shelter for an array of terrestrial and marine life. The vast expanses of habitat were large enough to support far-ranging animals, such as the Florida panther, and super colonies of wading birds, such as herons, egrets, roseate spoonbills, ibis, and wood storks. For thousands of years this resilient ecosystem withstood and repeatedly recovered from the effects of hurricanes, fires, severe droughts, and floods, retaining some of the greatest biodiversity found on earth. A combination of connectivity and spatial extent created the range of habitats and supported the levels of productivity needed for the historic diversity and abundance of native plants and animals. Restoring natural habitats and species will require reestablishing the hydrologic and other conditions conducive to native communities and piecing together large enough areas of potential habitat. Exotic species must be managed, and the escape of new exotics must be prevented.



Goal 2: Restore, Preserve, & Protect Natural Habitats & Species

Subgoal 2-A: Restore, Preserve, & Protect Natural Habitats

- Objective 2-A.1: Complete acquisition of 5.7 million acres of land identified for habitat protection by 2020.
- Objective 2-A.2: Protect 20 percent of the coral reefs by 2015.
- Objective 2-A.3: Improve habitat quality for 2.4 million acres of natural areas in south Florida.

Subgoal 2-B: Protect the South Florida Ecosystem from the harmful effects of invasive exotic species

- Subgoal 2-B: Protect the South Florida Ecosystem from the harmful effects of invasive exotic species
- Objective 2-B.1: Prevent the Introduction of Invasive Exotic Species
- Objective 2-B.2: Eradicate Invasive Exotic Species by Implementing Early Detection and Rapid Response (EDRR)
- Objective 2-B.3: Contain the spread of invasive exotic species
- Objective 2-B.4: Reduce the populations of widely established invasive exotic species and maintain at lowest feasible levels

SUBGOAL 2-A: RESTORE, PRESERVE, & PROTECT NATURAL HABITATS

Currently, the Florida panther and more than 70 other animal or plant species which inhabit south Florida are listed by the U.S. Fish and Wildlife Service (USFWS) as threatened or endangered. Many additional species are of special concern to the State of Florida. Super colonies of wading birds no longer nest in the Everglades. The wetland habitats that supported these species have been reduced by half, fragmented by roads, levees, and other structures, dewatered by canals, and degraded by urban and agricultural pollutants. The marine environments of the bays and coral reefs have suffered a similar decline. Restoration will require land acquisition to protect natural habitats and species, protection of the region's offshore habitats including coral reefs, and the improvement of the quality of these natural areas. Restoration will also depend upon the successful control of invasive exotic plants and animals.

The strategy for restoration, project highlights, and [Table 3](#) detailing progress toward the measurable objectives for Goal 2.

Subgoal 2-A: Restore, Preserve, & Protect Natural Habitats

Land will be acquired to preserve habitat for native plants and animals and to act as a buffer to existing natural areas. Land will also be acquired for water quality treatment areas, water storage reservoirs, and aquifer recharge areas that will help restore the natural hydrology. Fee-simple acquisition will be coupled with alternative tools to meet restoration land use needs while maximizing the benefits of limited fiscal resources.

The strategy for Subgoal 2-A consists of three measurable objectives: land acquisition, coral reef protection, and habitat improvement. Progress on the measurable objectives during the reporting period (July 2012–June 2014) is described in this section and further delineated in [Table 3](#). Additional efforts that will help fulfill this subgoal are also described below.

Objective 2-A.1: Complete acquisition of 5.7 million acres of land identified for habitat protection by 2020.

Policy/Regulatory Framework

- In 1963, the Florida Legislature began the first of a series of land acquisition programs for conservation and recreation purposes, all with dedicated funding sources. The [Land Acquisition Trust Fund](#) was created to fund a newly-created Outdoor Recreation and Conservation Program, designed primarily to purchase land for parks and recreation areas.
- In 1972, the Florida Legislature passed the Land Conservation Act, which created the [Environmentally Endangered Lands](#) (EEL) program. The EEL program was designed specifically to protect environmentally unique and irreplaceable lands in the state and was not designed to have outdoor resource-based recreation as its primary goal.
- The Florida Legislature replaced and expanded the EEL program in 1979 with the creation of the [Conservation and Recreation Lands](#) (CARL) Program. The CARL Program and its authorizing statute (originally Chapter 253, Florida Statutes, but now included in Chapter 259) called for a recurring revenue stream (instead of bond revenues) and significantly altered the administration and oversight of land acquisition activity.
- In 1981, the Florida Legislature created the [Water Management Lands Trust Fund](#), also funded from documentary stamp tax revenues from real estate transactions, for the acquisition and restoration of water resources.
- The [Florida Communities Trust](#) was actually established in 1989, but it did not receive funding until passage of the Preservation 2000 Act. The program was housed in the Department of Community Affairs and was designed to assist local governments in implementing the conservation, recreation and open space, and coastal elements of their comprehensive plans.
- [Florida Forever](#) is Florida's premier conservation and recreation lands acquisition program, a blueprint for conserving natural resources and renewing Florida's commitment to conserve the state's natural and cultural heritage. Florida Forever replaces Preservation 2000, the largest public land acquisition program of its kind in the United States.

GOAL 2-A: RESTORE, PRESERVE, & PROTECT NATURAL HABITATS

Implementation Approach

Mechanisms for Land Conservation: There are numerous federal, state, and local government programs, and cooperating non-governmental organization programs that could potentially be utilized in support of land acquisition and conservation. Many of these programs provide opportunities to match or leverage funding available through other sources for land acquisition, conservation, or restoration. Land conservation can be achieved through various methods, including:

- Fee purchase
- Easement purchase
- Easement donation
- Purchase of development rights
- Mitigation banks
- Outright land donation

Increasingly, land conservation will rely on collaborative efforts to protect vital wildlife habitats through community-based coalitions of private landowners, conservation groups, and state, local, and federal agencies. Conservation banks are like a biological bank account. Instead of money, a habitat owner has conservation credits to sell. Conservation easements involve purchasing a portion of the rights associated with the land to provide some degree of protection to natural resources on the land.

Objective 2-A.1: Progress and Status at a Glance:

Since 1980:

- 4.9 million acres of land have been acquired.
- 11 projects have been completed.
- 51 projects are underway.
- FDEP acquired 77 acres through donations.
- The 10 year, \$3 billion program was established in 2000 by the Florida Legislature to conserve environmentally sensitive land, restore waterways, and preserve important cultural and historical resources. Florida Forever is the successor to Preservation 2000. The 2008 Legislature authorized an additional \$3 billion through 2020.

Objective 2-A.2: Protect 20 percent of the coral reefs by 2015

Policy/Regulatory Framework

- [The Florida Keys National Marine Sanctuary and Protection Act and the National Marine Sanctuaries Act](#)
- [The Magnuson-Stevens Reauthorization Act of 2006](#)
- [Memorandum of Understanding for the Dry Tortugas National Park Research Natural Area \(RNA\) by the State of Florida and the National Park Service, 2013](#)
- [DRTO Final General Management Plan Amendment 2000](#)
- [National Park Service / State of Florida Submerged Lands Management Agreement 2005](#)
- [The National Park Service Organic Act \(16 U.S.C. 1 and 16 U.S.C.3\)](#)
- [National Park Service Management Policies \(2006\)](#)
- [NPS General Authorities Act of 1970](#)
- [Public Law 102-525 establishing Dry Tortugas National Park](#)
- [Executive Order 13089 of June 11, 1988, Coral Reef Protection](#)
- [Executive Order 13158 of May 26, 2000, Marine Protected Areas](#)
- [National Parks Omnibus Management Act of 1998](#)
- [National Parks and Recreation Act of 1978](#)
- [National Environmental Policy Act](#)

GOAL 2-A: RESTORE, PRESERVE, & PROTECT NATURAL HABITATS

Implementation Approach

Restoring and preserving off-shore habitat involves restoring more natural timing and delivery of freshwater flows to coastal estuaries, which are critical to the life-cycles on many reef fish, as well as the protection of critical coral reef communities in southeast Florida, the FKNMS, Dry Tortugas National Park and Biscayne National Park (BNP). Reef habitat protection involves a variety of management tools designed to increase biological and benthic integrity, which range from fisheries management practices that govern size, bag and gear restrictions on fished species to the establishment of areas such as marine zones which are closed to extractive activities and protect habitat.

Objective 2-A.2: Progress and Status at a Glance:

Since 2000:

- In 2001, the Florida Keys National Marine Sanctuary implemented the Tortugas Ecological Reserve, a large fully protected marine zone in the Tortugas region that includes deepwater coral reefs and other habitats.
- In 2007, Dry Tortugas National Park established the Research Natural Area, a 46 square-mile marine reserve that protects diverse habitats including shallow-water coral reefs.
- Cultivation of corals in underwater nurseries began in the Florida Keys in 2000. Since then, underwater coral nurseries have been established in Southeast Florida and the Florida Keys with support, in part, from NOAA American Reinvestment and Recovery Act funds, 2009.
- Over 6,200 staghorn corals grown in coral nurseries located in the Upper, Middle and Lower Keys and Broward County have been out-planted to reefs in the waters of the [Florida Keys and Southeast Florida](#).
- A report documenting five years of monitoring and study in the [Dry Tortugas National Park Research Natural Area](#) (RNA) was released in 2012 by FWC and the NPS.
- A coral nursery for staghorn (*Acropora cervicornis*) has been established at Dry Tortugas for over five years and over 800 coral fragments have been out-planted to date.

2012-2014:

- A new Memorandum of Understanding for the Dry Tortugas National Park Research Natural Area (RNA) was signed by the State of Florida and the National Park Service in 2013.
- In 2013, SEFCRI began the Our Florida Reefs community planning process which brings together the community of local residents, reef users, business owners, visitors, and the broader public in Southeast Florida to discuss the future of coral reefs in this region.
- Recommendations for modifications to existing and proposals for new marine zones in the Florida Keys National Marine Sanctuary are currently being made to enhance ecosystem protection and restoration of important habitats including shallow water and coral reef ecosystems. These recommendations are a part of the sanctuary's [marine zone and regulatory review](#), and will be evaluated in a Draft Environmental Impact Statement (late 2015 estimated release date).
- A new RNA Science Plan was written by NPS and FWC and will be released in late 2014.
- Community Working Groups, which will meet monthly from February 2014 through Fall 2015. They will then share their recommendations to balance use and protection of SE FL's coral reefs at a series of community meetings tentatively scheduled for spring 2015.
- Ecological monitoring continues throughout the sanctuary and Biscayne and Dry Tortugas National Parks.

GOAL 2-A: RESTORE, PRESERVE, & PROTECT NATURAL HABITATS

Discussion

[Southeast Florida Coral Reef Initiative \(SEFCRI\)](#) Started in 2004, the SEFCRI is a local action strategy for collaborative action among over 60 government and non-governmental partners to identify and implement priority actions needed to reduce key threats to coral reef resources off mainland southeast Florida in Miami-Dade, Broward, Palm Beach, and Martin counties. Led and primarily funded by the FDEP through its Coral Reef Conservation Program, SEFCRI's mission is "to develop and support implementation of an effective strategy to preserve and protect southeast Florida's coral reefs and associated reef resources, emphasizing the balance between resource use and protection, in cooperation with all interested parties."

[Our Florida Reefs](#) is designed to increase public involvement in the future management of southeast Florida's coral reefs by seeking input from community members on the development of recommendations that can become part of a comprehensive management strategy to ensure healthy coral reefs in the future. The *Our Florida Reefs* process began in June 2013 to introduce the process and SE FL coral reef information to the local community. Community representatives were selected to form Community Working Groups, these members represent a wide range of different interests, each who have a stake in the wellbeing of our coral reef communities. The earliest any community-recommended management actions would take effect would be 2016.

[Marine Zone and Regulatory Review in the Florida Keys](#) NOAA, in partnership with the State of Florida and US Fish and Wildlife Service, is engaged in a public process to review and update management plan and regulations for the Florida Keys National Marine Sanctuary regulations and update the Backcountry Management Plan for three national wildlife refuges in the Lower Keys. During this review, the sanctuary and its advisory council is evaluating whether existing management strategies, including regulations and marine zones, are sufficient to address threats to marine resources, and if new or expanded protection strategies are warranted to better address these threats as well as restore degraded habitats. The review process, which could result in additional protections for coral reef habitats, involves examining the sanctuary boundary, current sanctuary-wide regulations, the sanctuary's marine zones, and zone-specific regulations.

Marine Reserves/Protected Zones and Fisheries Benefits

The [Dry Tortugas National Park Research Natural Area](#) (RNA) monitoring report results suggest that the RNA has played a substantive role in enhancing exploited reef fish species populations in the Tortugas. Continued collaboration of the FWC and NPS, together with other partners, will facilitate long-term research and monitoring to fully understand the benefits of the RNA. Results from these monitoring studies and other research programs will be essential to guiding managers in the implementation of appropriate management tools. Fisheries studies in the sanctuary's fully protected zones, the Tortugas Ecological Reserve and Western Sambo Ecological Reserve, show that certain reef fish and spiny lobster populations have benefited from the protection offered by these two large reserves that protect diverse coral habitats. BNP is also developing updates to its fisheries management and general management plans.

Coral Reef Restoration and Coral Nurseries

Restoration of degraded or damaged coral reefs is also underway. Coral grown in underwater nurseries has been successfully out-planted to reefs in the Florida Keys, Southeast Florida and Dry Tortugas and continues with support from [NOAA's Community-based Restoration Program](#). The Nature Conservancy is coordinating this current out-planting effort with its partner nurseries at NOVA Southeastern University, University of Miami, Coral Restoration Foundation, Florida Fish and Wildlife Conservation Commission and Mote Marine Laboratory.

GOAL 2-A: RESTORE, PRESERVE, & PROTECT NATURAL HABITATS

Objective 2-A.3: Improve habitat quality for 2.4 million acres of natural areas in south Florida

Policy/Regulatory Framework

- Everglades Restoration Investment Act, [Chapter 373.470, F.S.](#)
- South Florida Water Management District as Local Sponsor, [Chapter 373.1501, F.S.](#)
- In order to restore and protect the greater everglades ecosystem, the Florida legislature established the State of Florida's responsibilities in a series of statutes under the Florida Water Resources Act ([Chapter 373, Florida Statutes](#)). In addition to authorizing the SFWMD to serve as local sponsor for the majority of restoration efforts, the statutes establish a funding mechanism for the State's share of the 50-50 federal-state partnership and establish a streamlined regulatory process for CERP.

Implementation Approach

The CERP calls for removing barriers to sheetflow, restoring more natural hydro-periods to wetlands, and providing natural system water flows to coastal waters. These projects will restore hydrological connections to large portions of the remnant Everglades marsh, improve water quality, and increase the extent of wetlands, thus enhancing fish and wildlife habitat. Wetlands enhancement will also be achieved through voluntary conservation efforts to restore, enhance, and protect degraded wetlands on agricultural lands.

Objective 2-A.3: Progress and Status at a Glance:

Since 2010:

- The Final PIR for the Biscayne Bay Coastal Wetlands Phase 1 Project was completed in December 2011 and the Chief's Report was signed in May 2012.
- Construction by Lee County began at Lakes Park in February 2012 and was completed in November 2012. The project ribbon cutting took place in February 2013.
- Phase II for Acme Basin was completed in July 2010, and on November 12, 2010, the dedication of the Acme Basin B Discharge project was held.

2012 - 2014:

- Picayune Strand Restoration. Construction continued on the Merritt Pump Station and Phase II Road Removal and will be completed in 2014. The Faka Union Pump Station and Phase III Road Removal continued and will be completed in March 2015. Work began on the Miller Pump Station in January 2014 with an anticipated completion date of 2017.
- Biscayne Bay Coastal Wetlands Phase 1 was authorized in WRRDA 2014. The SFWMD completed construction on hydrologic improvements on the Deering Estate wetland rehydration component of the project in January 2012 and installed four of the ten culverts planned for the L-31-East component to distribute water more naturally to coastal wetlands.
- CERP C-111 Spreader Canal was authorized in the Water Resources Reform and Development Act 2014. SFWMD completed construction of the recommended plan under its expedited construction program.

GOAL 2-A: RESTORE, PRESERVE, & PROTECT NATURAL HABITATS

Discussion

Picayune Strand Restoration. This project will restore 55,000 acres of natural hydrologic conditions and habitat in southwest Florida. Based on the USACE current fully funded project cost estimate, completion of all remaining project features would exceed the congressionally appropriated funding limit. The USACE plans to continue construction of features that can be accomplished within its current spending authority, and complete a Post-authorization Change-Limited Reevaluation Report to request authority for a project cost increase. The Faka Union and Miller canals cannot be filled until after the Manatee Mitigation Feature and Southwestern Protection Levee are constructed. These features will not be constructed until the updated project cost is authorized by Congress. The Southwestern Protection Feature, a 9-mile levee that will maintain pre-project levels of flood protection for adjacent lands, and the Manatee Mitigation Feature, an excavated manatee refugium, are scheduled to be initiated after Congressional approval of the cost increase.

Lakes Park Restoration. A 40-acre filter marsh and flow way was constructed to improve water quality treatment in Lakes Regional Park and enhance water quality in receiving waters of Hendry Creek and Estero Bay. The filter marsh is designed with a series of “peninsulas” to maximize the flow distance and contact time between the water and vegetation. Construction included converting spoil islands in the middle of Lakes Park to shallow, submerged, meandering littoral shelves to support wetland vegetation.

Acme Basin B. The SFWMD worked with local interests to expedite design and construction of the Acme Basin B Discharge Project outside of the CERP. This project helps to improve water quality in the Everglades by diverting urban stormwater runoff into the Section 24 Impoundment for peak flow attenuations, then into the C-51 canal for final delivery to STA-1E for final treatment. The project included construction of two new pump stations and improvements to the C-1 canal.



Photo by Brent Anderson

GOAL 2-A: RESTORE, PRESERVE, & PROTECT NATURAL HABITATS

**Table 3: Subgoal 2-A: Restore, Preserve, and Protect Natural Habitats
Comprehensive Status July 2012–June 2014**

Objective	Projects	Status
<p>Land Acquisition <i>Objective 2-A.1: Complete acquisition of 5.7 million acres of land identified for habitat protection by 2020.</i></p>	<p>Land Acquisition Projects [Project IDs 2100-2171]</p>	<p>Real Estate: 4,903,681 acres of the 5,672,226 acres (86%) have been acquired to date at a cost of \$3.7 billion.</p>
<p>Coral Reef Protection <i>Objective 2-A.2: Protect 20 percent of the coral reefs by 2015.</i></p>	<p>Florida Keys National Marine Sanctuary has initiated a marine zoning and regulatory review. Scoping meetings are scheduled for June 2012 and public comments are being accepted through June 29, 2012. BNP has been developing updates to its fisheries and general management plans.</p>	<p>Implementation: Ecological and water quality monitoring is underway at coral reefs and adjacent areas; a draft EIS with preferred alternatives regarding marine zones for ecosystem protection is scheduled for release in 2015. BNP has been developing updates to its fisheries and general management plans. SEFCRI's Our Florida Reefs is underway.</p>
<p>Habitat Improvement <i>Objective 2-A.3: Improve habitat quality for 2.4 million acres of natural areas in south Florida.*</i></p>	<p>C&SF: CERP Lakes Park Restoration [Project ID 2302]</p>	<p>Construction: Completed.</p>
	<p>Arthur R. Marshall Loxahatchee National Wildlife Refuge Prescribed Fire Program [Project ID 2304]</p>	<p>Implementation: Ongoing.</p>
	<p>C&SF: CERP Acme Basin B Discharge [Project ID 2306 and 2306A]</p>	<p>Construction: Completed construction of Pump Station #7 and C-1 canal conveyance improvements and Section 24 Impoundment.</p>
	<p>C&SF: CERP Picayune Strand Restoration [Project ID 2307]</p>	<p>Planning: PIR and Chief's Report completed, PAC LRR to be completed in early FY 2015. Construction: Prairie Canal Phase I & road removal completed, Merritt Pump Station & Phase II road removal to be completed 2014, Faka Union Pump Station & Phase III road removal to be completed 2015, Miller Pump Station was awarded in 2013 and anticipated to be completed in 2017.</p>
	<p>C&SF: CERP Biscayne Bay Coastal Wetlands [Project ID 2309 and 2309A]</p>	<p>Planning: PIR and Chief's Report completed; authorized in WRRDA 2014. Construction: SFWMD completed construction of Deering Estate Flow-way component and a portion of the L-31 East Flow-way component.</p>
	<p>C&SF: CERP C-111 Spreader Canal [Project ID 2310 and 2310A]</p>	<p>Planning: PIR and Chief's Report completed; authorized in WRRDA 2014. Construction: SFWMD completed construction of the recommended, with the exception of structure 198, plan under its expedited construction program.</p>

* The April 1999 USACE [C&SF Project Comprehensive Review Study Final Integrated Feasibility Report and Programmatic Environmental Impact Statement](#) included an extensive environmental evaluation of the likelihood of CERP in meeting planning objectives for both spatial extent and habitat quality improved through implementation of the CERP projects. Table 7-18 of that publication identifies in detail the anticipated effectiveness of various alternative plans in meeting the CERP planning objectives on a sub-regional basis. The projects included in this table are examples, not a comprehensive list, of how this objective will be achieved.

SUBGOAL 2-B: PROTECT THE SOUTH FLORIDA ECOSYSTEM FROM THE HARMFUL EFFECTS OF INVASIVE EXOTIC SPECIES

Florida is second only to Hawaii in the severity of the threats posed by invasive exotic species on native habitats and species. Florida is particularly vulnerable to the introduction, invasion, and establishment of non-native species because of its subtropical climate, the existence of major ports of entry, and the large scale pet, aquarium, and ornamental plant industries active in the region. Invasive exotic species are detrimental to the Everglades causing: 1) direct biological harm to native species through predation; 2) indirect harm by disruption of the food web and competition for resources; 3) the harm and irreparable loss of threatened and endangered species; and 4) physical changes to habitats and ecological processes and functions. The Task Force has been concerned about invasive exotic species and their impacts on South Florida's ecosystem for more than a decade and in 2013 launched a renewed effort to address the problem effectively.

Strategy

Recognizing the importance of preventing, eradicating, containing and protecting valuable resources by managing invasive exotic species, the Task Force initiated the development of an [Invasive Exotic Species Strategic Action Framework \(IES Framework\)](#) to leverage the large body of work and coordination already being accomplished through groups like the [Everglades Cooperative Invasive Species Management Area \(ECISMA\)](#). This Framework takes a comprehensive, system-wide approach and helps to increase coordination at leadership levels within and between agencies.

The Framework will enhance our collective ability to combat invasive exotic species by:

- Helping decision-makers understand the connections between goals, strategies and tactics;
- Maximizing the extent to which the current capacity for partnership is leveraged to meet common goals;
- Helping decision-makers make wise and timely investment decisions in the battle against invasive exotics; and
- Defining success and provide for accountability.

In addition to the Framework, the Task Force directed the OERI, WG, and SCG to develop a cross cut budget for invasive exotic species work. Both efforts are underway.

Updating the South Florida Ecosystem Restoration Strategy and Biennial Report

Although the IES Framework development process will not be complete until late 2014, in May 2014 the TF incorporated what had been learned through process to date into this 2012-2014 biennial report. Specifically, Subgoal 2-B has been updated and a new Subgoal, 3-D has been added in reporting cycle. This reporting period will be an interim attempt to incorporate as much of the information possible that support Subgoals 2-B and 3-D. Additional Framework development, including action steps, will help future reporting be even more comprehensive.

Objective 2-B.1: Prevent the Introduction of Invasive Exotic Species

Policy/Regulatory Framework

- [Plant Protection Act – Title 7-Agriculture](#)
- [Lacey Act \(1900; amended 1981\)](#)
- [The National Environmental Policy Act \(NEPA\) \(1969\)](#)
- [Convention on International Trade in Endangered Species of Wild Fauna and Flora \(CITES\) \(1975\)](#)
- [Non-indigenous Aquatic Nuisance Prevention and Control Act \(1990\)](#)
- [Executive Order 13112, Invasive Species \(1999\)](#)
- [Florida Department of Forestry Service- Exotic Control Practices](#)
- [Chapter 379.231, F.S](#)
- [Rule 68.5.001, F.A.C.](#)
- [The National Park Service Organic Act \(16 U.S.C. 1 and 16 U.S.C.3\)](#)
- [Title 36, Chapter I, Parts 1-199 of the Code of Federal Regulations: Park-specific or "special" regulations](#)
- [National Park Service Management Policies \(2006\)](#)

Photo of a lionfish

SUBGOAL 2-B: PROTECT THE SOUTH FLORIDA ECOSYSTEM FROM THE HARMFUL EFFECTS OF INVASIVE EXOTIC SPECIES

Objective 2-B.1: Progress and Status at a Glance:

2012 – 2014:

- NPS and USGS initiated the development of an Invasive Exotic Fish Risk Assessment, including research to identify and fill gaps in knowledge important to the development of the risk assessment tool.
- Four detector dog teams have been deployed by the Florida Department of Agriculture at mail/package distribution centers in Miami, Tampa, and Orlando - to detect plant pests accompanying plant material in mail packages destined for Florida. In addition to using this technology at parcel hubs, dedicated canines also inspect high risk areas for the presence of the giant African land snail in Miami.
- Additionally U.S. FWS law enforcement initiated a pilot program using detector dogs to increase the amount of cargo they are able to inspect.

Implementation Approach

Preventing the introduction of invasive exotic species protects the South Florida Ecosystem from the negative ecological and economic impacts of those species and the subsequent high costs associated with long-term control efforts. Prevention requires the ability to assess risks systematically but efficiently in order to stop the identified species from entering the South Florida Ecosystem. The ability to prioritize prevention efforts will rely on technical expertise and tool development, including the establishment of a system for conducting ecological risk assessment.

Objective 2-B.2: Eradicate Invasive Exotic Species by Implementing Early Detection and Rapid Response (EDRR)

Policy Regulatory Framework

- [ECISMA MOU](#)
- [Endangered Species Act \(1973\)](#)
- [Executive Order 13112, Invasive Species \(1999\)](#)
- [Refuge Planning Policy \(published and effective May 25, 2000\)](#)
- [Biological Integrity, Diversity, and Environmental Health Policy \(published January 16, 2001, effective April 16, 2001\)](#)

- [FWC-Chapter 379.231, F.S.](#), [Rule 68-5.002 F.A.C](#) and [Rule 68-5.004 F.A.C.](#)
- FWC must prepare land management plans pursuant to Chapters [253.034](#) and [259.032, F.S.](#)
- [DEP Resource Management Standard: Nuisance and Exotic Animal Removal](#)
- [The National Park Service Organic Act \(16 U.S.C. 1 and 16 U.S.C.3\)](#)
- [Title 36, Chapter I, Parts 1-199 of the Code of Federal Regulations; Park-specific or "special" regulations](#)
- [National Park Service Management Policies \(2006\)](#)
- [Miami-Dade County Comprehensive Development Master Plan, Conservation, Aquifer Recharge and Drainage Element and Coastal Management Element](#)
- [Miami-Dade County Code, Chapter 8CC Code Enforcement; Chapter 18A Landscape Ordinance; Chapter 18B, Right-of-Way Landscape Ordinance; Chapter 24, Environmental Protection; Chapter 26 Park and Recreation Department Rules and Regulations; and Chapter 33B Areas of Critical Environmental Concern](#)

SUBGOAL 2-B: PROTECT THE SOUTH FLORIDA ECOSYSTEM FROM THE HARMFUL EFFECTS OF INVASIVE EXOTIC SPECIES

Implementation Approach

It is imperative to respond quickly and deal with emerging threats while they remain localized. Eradication through EDRR is the second most cost-effective method to deal with invasive exotics, after prevention.

Preparation and monitoring are essential first steps to identify invasions as early as possible. According to ECISMA's EDRR

Plan, "in order to respond rapidly and effectively to an invasion, actions should be anticipated and consensus reached on as many response details as soon as possible, prior to discovery of an unwanted introduction. Then, when a response is needed, it will be rapid, streamlined, and more effective." Once a new invader is detected, rapid assessment should occur so that the response priority can be determined. All of the prior steps should enable a rapid response to identified threats.

Objective 2-B.2: Progress and Status at a Glance:

- ECISMA participants rapidly responded to control populations of mile-a-minute weed (*Mikania micrantha*).
- ECISMA participants continued monitoring and treatment of the invasive mangrove species *Lumnitzera racemosa*. Current efforts have removed all established *Lumnitzera racemosa* and are now focused on seedlings only. This effort will continue until the seed bank is depleted.
- Six exotic plants were identified at and removed from the boundary of ENP was monitored and 6 invasive exotic plants were detected and removed from the perimeter.
- Trapping and surveys have resulted in no additional exotic Psyllids insects or the associated bacteria species that may be present in their bodies, being observed during the reporting period. Psyllids are well known as vectors of citrus greening diseases and zebra chip disease in potatoes.
- During the reporting period containment efforts have been successful in keeping Mexican Red Bellied Squirrels from escaping from the islands of Biscayne National Park to the mainland. Additionally, eradication efforts have been progressing the squirrel population has been declining as observed through trapping efforts and reductions in the number of drays (nests) found.
- As part of a Everglades Invasive Reptile and Amphibian Monitoring Program rapid response activity, a Nile crocodile was observed and an interagency team, led by UF captured and removed the animal from the Chekika area of Everglades National Park.
- FWC conducted two trapping efforts for Gambian pouched rats, but no animals were trapped. However, sightings were reported from areas adjacent to the core neighborhood but these reports could not be verified. Trapping efforts will be increased with a contract with USDA in the next reporting period.

SUBGOAL 2-B: PROTECT THE SOUTH FLORIDA ECOSYSTEM FROM THE HARMFUL EFFECTS OF INVASIVE EXOTIC SPECIES

Objective 2-B.3: Contain the spread of invasive exotic species

Policy Regulatory Framework

- [Endangered Species Act \(1973\)](#)
- [Executive Order 13112, Invasive Species \(1999\)](#)
- [Refuge Planning Policy \(published and effective May 25, 2000\)](#)
- [Biological Integrity, Diversity, and Environmental Health Policy \(published January 16, 2001, effective April 16, 2001\)](#)
- FWC-[Chapter 379.231, F.S.](#), [Rule 68-5.002](#) and [Rule 68-5.004](#)
- FWC must prepare land management plans pursuant to Section [253.034](#) and [259.032, F.S.](#)
- [DEP Resource Management Standard: Nuisance and Exotic Animal Removal](#)
- [The National Park Service Organic Act \(16 U.S.C. 1 and 16 U.S.C.3\)](#)
- [Title 36, Chapter I, Parts 1-199 of the Code of Federal Regulations. Park-specific or "special" regulations : 36 C.F.R. Parts 7 and 13](#)
- [National Park Service Management Policies \(2006\)](#)
- Miami-Dade County [Comprehensive Development Master Plan, Conservation, Aquifer Recharge and Drainage Element](#) and [Coastal Management Element](#)
- [Miami-Dade County Code, Chapter 8CC Code Enforcement; Chapter 18A Landscape Ordinance; Chapter 18B, Right-of-Way Landscape Ordinance; Chapter 24, Environmental Protection; Chapter 26 Park and Recreation Department Rules and Regulations; and Chapter 33B Areas of Critical Environmental Concern](#)
- [Lacey Act \(1900; amended 1981\)](#)

Implementation Approach

Once it is determined that eradication is not possible, we enter the third phase of the Invasion Curve. Containment efforts focus on preventing the spread of an invasive exotic species to new areas in order to minimize the damage to the ecosystem and reduce long-term control costs. The containment phase focuses on utilization of control tools at containment boundaries and known pathways. Technical expertise, enforcement mechanisms, and adequate funding are needed to successfully contain expanding populations of priority species. Coordination at all levels should be enhanced and strengthened to enable better coordinated on-the-ground management activities directed at species, pathways, and high-value assets. Assessment and adaptation of current methodologies, investment in monitoring and science-based containment methods, and a supportive and engaged public will improve containment success.



SUBGOAL 2-B: PROTECT THE SOUTH FLORIDA ECOSYSTEM FROM THE HARMFUL EFFECTS OF INVASIVE EXOTIC SPECIES

Objective 2-B.3: Progress and Status at a Glance:

2012 – 2014:

- A multi-agency cooperative effort involving NPS, FWC, USGS, and the University of Florida was initiated to trap and remove Argentine Black and White tegus and attempt to prevent their spread into Everglades National Park and other sensitive lands. Even with limited funds this partnership successfully removed hundreds of tegus from in and around natural areas. The majority of tegus caught have been from the core urban areas. However, nearly 100 tegus have now been removed from traps between the core urban area and Everglades National Park.
- During this reporting period, 18 Nile Monitors have been removed from the Palm Beach County area, along the C-51 canal. FWC and UF responded to confirmed reports of Nile monitors in western Broward County but were unable to trap any animals. Trapping efforts will increase in Broward and Palm Beach Counties.
- As part of the EIRAMP containment, a total of eight surveys were led by UF with assistance from FWC for Oustalet's chameleons in the Homestead area. Thirty-five chameleons were removed, including one hatchling.
- As part of the EIRAMP activities, UF conducted six surveys for spectacled caimans in Miami-Dade and Broward Counties resulting in the removal of 26 animals; 10 more were observed. Singleton caimans were also removed from Broward County.

Objective 2-B.4: Reduce the populations of widely established invasive exotic species and maintain at lowest feasible levels

Policy /Regulatory Framework

- [369.22, Florida Statutes](#)
- [Lacey Act \(1900; amended 1981\)](#)
- [Endangered Species Act \(1973\)](#)
- [Executive Order 13112, Invasive Species \(1999\)](#)
- [Refuge Planning Policy \(published and effective May 25, 2000\)](#)
- [Biological Integrity, Diversity, and Environmental Health Policy \(published January 16, 2001, effective April 16, 2001\)](#)
- [FWC-Chapter 379.231, F.S., Rule 68-5.002](#) and [Rule 68-5.004](#)
- FWC must prepare land management plans pursuant to Section [253.034](#) and [259.032, F.S.](#)
- [DEP Resource Management Standard: Nuisance and Exotic Animal Removal](#)
- [The National Park Service Organic Act \(16 U.S.C. 1 and 16 U.S.C.3\)](#)
- [Title 36, Chapter I, Parts 1-199 of the Code of Federal Regulations. Park-specific or "special" regulations : 36 C.F.R. Parts 7 and 13](#)
- [National Historic Preservation Act](#)
- [National Park Service Management Policies \(2006\)](#)
- [Miami-Dade County Comprehensive Development Master Plan, Conservation, Aquifer Recharge and Drainage Element and Coastal Management Element](#)
- [Miami-Dade County Code, Chapter 8CC Code Enforcement; Chapter 18A Landscape Ordinance; Chapter 18B, Right-of-Way Landscape Ordinance; and Chapter 24, Environmental Protection; Chapter 26 Park and Recreation Department Rules and Regulations; and Chapter 33B Areas of Critical Environmental Concern](#)

SUBGOAL 2-B: PROTECT THE SOUTH FLORIDA ECOSYSTEM FROM THE HARMFUL EFFECTS OF INVASIVE EXOTIC SPECIES

Implementation Approach

The final stage of the [Invasion Curve](#) is resource protection and long-term management. This phase endeavors to reduce the ecological and financial impact of invasive exotic species so they no longer play a dominant role in the ecosystem. This can be accomplished by developing and using control tools to reduce the population densities of a species within a specific area and by strengthening the resilience of natural areas through restoration and recovery efforts. Restoration efforts aid recovery of habitat structure and function as invasive exotic species are brought to a minimum cost and impact (known as maintenance control).

Improvements in long-term management effectiveness will stem from investment in science, development of new tools, and enhanced coordination. Investment in research and monitoring may yield future tools that could dramatically reduce the population and extent of invasive exotic species that are well established today. Continual assessment and adaptation based on lessons learned will also reduce the extent and population of a currently established species.

Improving Restoration Success by Incorporating Invasive Exotic Species Management

Since the development of the 1999 CERP the link between invasive exotic species and project success has been considered. A vegetation management plan was developed late in the Picayune Strand Restoration Project (PSRP), allowing little flexibility in costs to address invasive exotic species. Although there was management of invasive exotic plants within the construction footprint, the funding deficit left surrounding areas infested with invasive plants, threatening the success of the PSRP.

Lessons learned from the PSRP project along with new legislation and CERP Guidance Memorandum (CGM 62) led to the incorporation of invasive species management into planning documents for CERP projects. The CEPP was the first project to utilize CGM62 to incorporate invasive species management in the planning document known as the Project Implementation Report.



Photo of Oustalet's chameleon

SUBGOAL 2-B: PROTECT THE SOUTH FLORIDA ECOSYSTEM FROM THE HARMFUL EFFECTS OF INVASIVE EXOTIC SPECIES

Objective 2-B.4: Progress and Status at a Glance:

- During this reporting period, 76 Burmese pythons have been removed under permits from state owned and managed lands.
- In 2014, there were more than 30 authorized agents working in the parks, generally resulting in 20 or more person hours each of searching for pythons and other invasive species.
- As of 2014, more than 4,800 acres have been restored through removal of invasive plants and associated seed banks in the Hole-in-the-Donut area of Everglades National Park.
- During this reporting time, 7,056 acres of Old World Climbing Fern and 8,506 acres of melaleuca were treated in Everglades National Park.
- A mass rearing Biocontrol facility was opened in 2014 and is currently supporting the production of four species of biological control agents that target three weeds.
- In 2014, the FWC promulgated rule development that prohibits the importation of live lionfish, including all species within the genus *Pterois*.
- The Environmentally Endangered Lands Program in Miami Dade County treated invasive exotic species on 3,869 acres throughout Miami-Dade County.
- In March 2014, a burn was prescribed across 73 acres on the Palmetto Bay/Cutler Bay Coastal Habitat Restoration site in Miami Dade County. Crews mowed the rest of the exotic grasses down. The next step is to plant native wetland grasses *Spartina spartinae* and *Muhlenbergia capillaris* and continue to monitor the land for exotic plant infestations.
- Picayune Strand Restoration and Site 1 Impoundment CERP projects have completed and approved Vegetation Management Plans. The former began treatment of cogongrass and torpedo grass in FY 2014.
- The USACE received guidance to incorporate invasive species control into the PIRs for CERP projects.
- The SFWMD is now implementing invasive plant management for the CERP C-111 Spreader Canal Project. This includes treatments of Old World climbing fern, Brazilian pepper, and Australian Pine in the C-111 watershed and intensive control and restoration efforts in area overtaken by shoebutton *Ardisia*.
- Digital Area Sketch Maps are now complete detailing information on major infestations throughout the entire 2.4 million-acre Everglades region.
- The SFWMD and the USACE implemented a partnership agreement to build a 2,700 square-foot annex to the existing USDA-ARS-IPRL to mass rear and release approved biological control agents targeting priority invasive plants. The facility is complete and was opened in 2014 and is currently supporting the production of four species of biological control agents that target three weeds.
- The most recent agents released have both established in Florida and are attacking water hyacinth and air potato throughout their ranges. Additional biological control agents that are currently undergoing quarantine host range testing include two species for Old world climbing fern, two species for downy rose myrtle, two species for Chinese tallow, two species for skunkvine, one species each for Brazilian pepper, air potato, water hyacinth, water lettuce, and melaleuca.
- USFWS invested more than \$3 million to treat and retreated over 10,000 acres of Melaleuca and Lygodium from June 2012 to June 2014 on the Arthur R. Marshall Loxahatchee NWR. Approximately 35% Initial treatment is complete for Category I invasive plants such as cogongrass and Brazilian Pepper on 19,000 acres of the Florida Panther NWR.
- Big Cypress Preserve: Australian pine is at maintenance level; Lygodium is the Preserve's highest priority exotic; Melaleuca is at or near maintenance level; about 20% of the Preserve acreage remains infested with invasive exotic plants.



SUBGOAL 2-B: PROTECT THE SOUTH FLORIDA ECOSYSTEM FROM THE HARMFUL EFFECTS OF INVASIVE EXOTIC SPECIES

Discussion: Invasive Exotic Plants

Regional, coordinated efforts have yielded the large portions of the Everglades free of melaleuca, though periodic management is still necessary to maintain low infestation levels. The remaining large populations of melaleuca occur in the Loxahatchee National Wildlife Refuge and north eastern ENP, though systematic control is diminishing these stands. Private lands adjacent to the Everglades continue to harbor large populations of melaleuca. Three established biological control agents are exerting some control on these infestations. Old World climbing fern, continues to proliferate in some areas of the EPA and recent monitoring activities indicate the plant is expanding its range to new areas. Newly detected infestations in the Southern Glades WMA, WCA 3A, and eastern ENP are priorities for control. Two biological control agents for Old World climbing fern are established in the Everglades, but their impact on the target weed is currently not yet known.

Non-native (exotic) plants are a significant threat to the native plant communities of ENP, most of which is a designated wilderness. Of the approximately 1,000 plant species recorded in the park, over 220 species are non-native. Due to funding constraints, systematic treatment is limited to five focal species: Brazilian pepper, Melaleuca (*Melaleuca quinquenervia*), Australian pine, Lather leaf (*Colubrina asiatica*), and Old World climbing fern. Exotic vegetation is estimated to affect approximately 200,000-250,000 acres of the park. Over the last 20 years, funds provided by federal, state, and county agencies have helped to treat exotic vegetation in ENP.

In the extreme southeastern portion of the Greater Everglades, the [Miami-Dade County Environmentally Endangered Lands \(EEL\) Program](#) and the SFWMD co-manage the South Dade Wetlands Preserve, a vast area of wetlands in the watersheds of Biscayne Bay, Florida Bay, Barnes Sound, and Card Sound which provides an

ecological linkage between Everglades and Biscayne National Parks. The EEL Program funds approximately \$3 million per year on invasive exotic species control within environmentally sensitive lands throughout Miami-Dade County including the South Dade Wetlands. Invasive exotic eradication efforts target species such as Old World climbing fern (*Lygodium microphyllum*), shoebutton ardisia, (*Ardisia elliptica*), Brazilian pepper (*Schinus terebinthifolius*) melaleuca (*Melaleuca quinquenervia*), and Australian Pine (*Casuarina equisetifolia*).

The NPS and the SFWMD continue the invasive species monitoring program for the Everglades. Using aerial and ground-based techniques, the SFWMD and the NPS are collecting useful spatial data for priority invasive plant species. There is now detailed information of major infestations throughout the entire 2.4 million-acre Everglades region (see Rodgers et al. 2014). Current estimates show that Brazilian pepper is the most abundant invasive plant in the Everglades, followed by melaleuca and Old World climbing fern. Biennial updated maps are produced, describing the location and intensity of the four most common exotic plant species and Laurel Wilt, a rapidly spreading tree disease within the ECISMA boundary. This project also produces detailed maps of work areas for participating regional managers each year.

Knowledge gained from both operational experience and recent herbicide trials allows the SFWMD and partner agencies to more effectively treat priority invasive plant species. Management evaluations for aquatic and terrestrial invasive plants have improved management outcomes. For example, SFWMD scientists and collaborators from the University of Florida are developing herbicide recommendations for control of priority aquatic weeds. Other work involving newly approved herbicides is increasing control efficacy for difficult to control weeds such as Brazilian pepper.

SUBGOAL 2-B: PROTECT THE SOUTH FLORIDA ECOSYSTEM FROM THE HARMFUL EFFECTS OF INVASIVE EXOTIC SPECIES

[The Arthur R. Marshall Loxahatchee National Wildlife Refuge \(LNWR\)](#) (License Agreement with the state dictates that four major invasive exotic species be under maintenance control by 2017. ARMLNWR spends between \$1 and \$5 million dollars per year controlling invasive exotic species. Treatment projections suggest a minimum of \$5 million per year for five years is required to bring all invasive exotic species within refuge boundaries under maintenance control. In FY 2014, the state of Florida (South Florida Water Management District and Florida Fish and Wildlife Conservation Commission) entered a partnership with LNWR and spent \$1.1 million treating exotics in addition to the funds invested by USFWS. A similar partnership and support is expected for FY 2015 but has not been finalized.

Invasive Exotic Animals

Invasive animal species are a rapidly increasing environmental and economic problem in the United States. According to USFWS records, legal wildlife shipments into the United States between 1999 and 2010 comprised over 2.8 billion individual exotic animals, representing at least 4,200 different species from over 150 countries. Florida now ranks as having the largest number of established non-indigenous amphibians and reptile species in the entire world. Fifty-six are established including three frogs, four turtles, one crocodilian, 43 lizards, and five snakes. Two species in particular, Burmese pythons and Lionfish are discussed further below.

Pythons: To date, over 2,000 documented Burmese pythons have been removed from south Florida. Burmese pythons (*Python molurus bivittatus*) are now a prominent component of the vertebrate biomass of the Everglades, and may be responsible for suppression of a number of native species. Everglades National Park, FWC, and others have enlisted the help of interested public in python removal. Permitted python removal agents routinely search public lands for pythons and other invasive species and report and remove those invasive species they encounter.

A population of the Northern African python (*Python sebae*) is known to be reproducing in the Bird Drive Recharge Area, an approximately 6-square mile area in western Miami-Dade County.

Photo of air potato beetle

Current data indicated that this population may have been in the area for more than 10 years. The FWC has been cooperating with the Miccosukee Tribe of Indians, SFWMD, Miami-Dade County, ENP, U.S. Geological Survey (USGS), and other local and federal agencies to survey for and remove Northern African pythons in the wild in South Florida since September 2009, after two were found.

To date, 27 pythons have been removed from this area. In 2012 and 2013 this species attacked dogs in the vicinity which has increased pressure to take more aggressive actions to eradicate this isolated population before the population expands. It is unclear if this species can still be eradicated.

Both the FWC and the USFWS have adopted regulations regarding these two species of pythons. The FWC listed the Burmese python, Northern African python and six other reptile species as a conditional species as of August 23, 2010, with the result that an individual can no longer acquire one of these animals in the state for personal use. In 2012, the USFWS placed the Burmese and Northern African pythons on the injurious species list, which prohibits the importation and interstate transportation without a federal permit.

Lionfish: Lionfish (*Pterois volitans*) were first reported off Florida's Atlantic Coast near Dania Beach in 1985. In the 2000s, the species began to be recorded off the Atlantic coasts of North Carolina, South Carolina and Georgia, while reports from Bermuda and Florida continued. Since the mid-2000s, lionfish reports have increased rapidly. As of 2010, they have begun showing up in areas where lionfish previously were not found, such as along the northern Gulf of Mexico off Pensacola and Apalachicola, and into estuarine systems such as the Indian River Lagoon. Lionfish are a predatory reef fish. They eat native fish, which can reduce native populations and have negative effects on the overall reef habitat and health as they can eliminate species that serve important ecological roles such as fish that keep algae in check on the reefs. Lionfish also compete for food with native predatory fish such as grouper and snapper. Current control efforts have focused on localized spearfishing and removal by recreational divers.

SUBGOAL 2-B: PROTECT THE SOUTH FLORIDA ECOSYSTEM FROM THE HARMFUL EFFECTS OF INVASIVE EXOTIC SPECIES

**Table 4: Subgoal 2-B: Control Invasive Exotic Plants and Animals
Comprehensive Status July 2012–June 2014**

Objective	Projects	Status
<p>Prevention <i>Objective 2-B.1: Prevent the introduction of invasive exotic species.</i></p>	Brown Marmorated Stink Bug (interception and research for potential biocontrols [Project ID 2500])	Implementation: Ongoing; (project up for annual renewal).
	FDACs Detector Dog Teams [Project ID 2501]	Implementation: Ongoing.
	Fruit Fly Survey and Detection [Project ID 2502]	Implementation: Ongoing, (project up for annual renewal).
	Python Responder/Patrol Training [Project ID 2503]	Implementation: Ongoing.
	Exotic Psyllids and Liberibacter species [Project ID 2504]	Implementation: Ongoing.
	High Risk Areas-target domestic inspection activities at vulnerable points in the safeguarding continuum [Project ID 2505]	Implementation: Ongoing.
	Interdiction Sites and Marina and Canals [Project ID 2506]	Implementation: 9/26/2013-2014 status complete.
	Effects of exotic fish on Everglades structure and function: risk assessment [Project ID 2507]	A literature review is currently being conducted FY14 funds will support studies to fill gaps in the known physiological tolerances of Spottin Spiny Eel and Banded Cichlid, two species key to the development of a quantitative risk assessment model funded under the USGS Natural Resources Preservation Program.
	Enhanced pest detection at high-risk domestic interdiction sites and marinas/canals systems [Project ID 2508]	Implementation: Ongoing, (project up for annual renewal).
Enhancement of Fruit Fly Immature Stage ID and Taxonomy [Project ID 2509]	Implementation: Ongoing, (project up for annual renewal).	
<p>Early Detection and Rapid Response <i>Objective 2-B.2: Eradicate Invasive Exotic Species through Early Detection and Rapid Response.</i></p>	Early detection of new exotic fish species in adjacent canals Vital Sign [Project ID 2601]	In 2013, SFCN conducted its second year of electrofishing in the canals along the periphery of Everglades National Park (EVER). Last year's initial pilot study determined that nighttime electrofishing yields higher fish abundance and higher species richness, and species composition of canals are stable over 3 year sample periods. The 2014 study is still in progress.
	Mexican Red Bellied Squirrel Eradication on the Islands in Biscayne National Park [Project ID 2602]	Since 2006, EPMT has found 1,814 dreys, 49 squirrels, over 1,760 hours.
	Development of comprehensive fish monitoring programs in Everglades National Park [Project ID 2603]	Implementation: Ongoing.
	Cooperative Agricultural Pest Survey [Project ID 2604]	Implementation: Ongoing, (project up for annual renewal).
	Everglades Invasive Reptile and Amphibian Motoring Program [Project ID 2605]	Implementation: Ongoing (funded through state FY 2015).

SUBGOAL 2-B: PROTECT THE SOUTH FLORIDA ECOSYSTEM FROM THE HARMFUL EFFECTS OF INVASIVE EXOTIC SPECIES

**Table 4: Subgoal 2-B: Control Invasive Exotic Plants and Animals
Comprehensive Status July 2012–June 2014**

Objective	Projects	Status
<p>Early Detection Rapid Response Continued</p> <p><i>Objective 2-B.2: Eradicate Invasive Exotic Species through Early Detection and Rapid Response.</i></p>	<p>Metagenomic (eDNA) survey in south Florida waters [Project ID 2606]</p>	<p>Implementation: Water samples were analyzed using the Titan supercomputer at Oak Ridge National Laboratory. Tentative identifications were made on thousands of taxa from viruses to mammals. These include many disease organisms and invasive species. Positive taxonomic identifications require specific genetic verifications which have yet to be performed, pending NPS input and recommendations.</p>
	<p>Development of eDNA for Nile Monitor detection and removal [Project ID 2607]</p>	<p>Implementation: Method development is underway.</p>
	<p>Burmese python eDNA development and application [Project ID 2608]</p>	<p>Implementation: Methodology developed and published in 2013/2014; field sample collections and analyses are ongoing.</p>
	<p>Miami Dade Fire Rescue Rapid Response and Invasive Species Removal (Venom Response) [Project ID 2609]</p>	<p>Implementation: Personnel from the unit are currently actively engaged in removal of exotic species during the course of their normal 24 hour workday, and respond to complaints of non-native species regularly.</p>
	<p>Develop and Implement a FWS Invasive Species Strike Team (ISST) [Project ID 2610]</p>	<p>Implementation: Ongoing.</p>
	<p>Giant African Land Snail Eradication Program [Project ID 2611]</p>	<p>Implementation: Ongoing.</p>
	<p>Northern African Python Removal [Project ID 2612]</p>	<p>Implementation: Ongoing.</p>
	<p>Corridors of Invasiveness Vital Sign [Project ID 2613]</p>	<p>Implementation: A complete sample of all selected survey sites in the three National Park Service units (BISC, EVER, BICY) occurs every five years. Sampling effort is balanced across years by using a rotating design, with year one starting in Biscayne National Park, year two dedicated to the eastern region of Everglades National Park, and year three dedicated to the south region of Big Cypress National Preserve. Because most of the area of Biscayne National Park is marine, survey sites are restricted to areas of the mainland and a few of the off-shore keys. Therefore, all of BISC can be surveyed within one annual cycle. Since all of BISC will be surveyed in a single year, year four will be dedicated to the western region of EVER, and year five will be dedicated to the north region of BICY, with year six starting the cycle over again, and dedicated to all of BISC. So far BISC, Eastern EVER, and South BICY have been completed. This summer, western EVER will be surveyed.</p>
<p>Fruit Fly Eradication Methods Development [Project ID 2614]</p>	<p>Implementation: Ongoing.</p>	

SUBGOAL 2-B: PROTECT THE SOUTH FLORIDA ECOSYSTEM FROM THE HARMFUL EFFECTS OF INVASIVE EXOTIC SPECIES

**Table 4: Subgoal 2-B: Control Invasive Exotic Plants and Animals
Comprehensive Status July 2012–June 2014**

Objective	Projects	Status
<p>Early Detection Rapid Response Continued</p> <p><i>Objective 2-B.2: Eradicate Invasive Exotic Species through Early Detection and Rapid Response.</i></p>	eDNA monitoring of five aquatic invasive species in South Florida [Project ID 2615]	Implementation: The USFWS's Region 4 Conservation Genetics lab has developed eDNA qPCR markers for five AIS taxa found in the Everglades: Mayan cichlid, African jewelfish, bullseye snakehead, Asian swamp eel, and lionfish. This technique has been used to sample waters of the A.R.M. Loxahatchee National Wildlife Refuge (Water Conservation Area WCA-1) to help monitor species such as African jewelfish and bullseye snakeheads, found in canals outside the refuge.
	ECISMA Early Detection Rapid Response [Project ID 2616]	Implementation: Ongoing management of ECISMA priority EDRR species through ECISMA workdays and contracts. Florida Fish and Wildlife Conservation Commission provides funding for rapid response for new invasive species documented on Florida CISMA EDRR plant lists. The National Park Service, Broward County, Miami-Dade County and others have provided personnel and supplies to respond to newly detected invasive species eradication efforts.
<p>Containment</p> <p><i>Objective 2-B.3: Contain the spread of invasive exotic species</i></p>	Eradication of Gambian Pouch Rat [Project ID 2700]	Implementation: Ongoing.
	Population suppression and biology of Black spiny-tailed Iguanas <i>Ctenosaura similis</i> [Project ID 2701]	Implementation: Ctenosaurs continue to be removed from Gasparilla Island (Charlotte County) by USDA Wildlife Services personnel. Necropsies are being performed to document additional aspects of the biology of the invasive population.
	Argentine black-and-white tegu (<i>Tupinambis merianae</i>) interdiction [Project ID 2702]	Implementation: Ongoing.
	Improve probability of detection and removal of pythons and other invasive reptiles [Project ID 2703]	Implementation: In initial development currently funded through fiscal year 2014/15.
	Feral Swine Assessment of control and impacts to help contain [Project ID 2704]	Implementation: Recently underway with FY2014 funds. Projects will include quantifying swine damage before and after control measures are implemented so that efficacy of control actions can be measured.
	BICY exotic reptile IES data sheet [Project ID 2705]	Implementation: Efforts to control invasive exotic reptiles currently depend upon chance observations from visitors (public and private), contractors, employees, volunteers, and landowners, who report those observations, or are in a position to capture or kill the animal. Often a lag exists between reported observations and staff response capability.

SUBGOAL 2-B: PROTECT THE SOUTH FLORIDA ECOSYSTEM FROM THE HARMFUL EFFECTS OF INVASIVE EXOTIC SPECIES

**Table 4: Subgoal 2-B: Control Invasive Exotic Plants and Animals
Comprehensive Status July 2012–June 2014**

Objective	Projects	Status
<p><u>Long-Term Maintenance Management</u> <i>Objective 2-B.4: Reduce the populations of widely established invasive exotic species and maintain at lowest feasible levels.</i></p>	<p>Schaus swallowtail butterfly (<i>Heraclides aristodemus ponceanus</i>) Habitat Enhancement [Project ID 2800]</p>	<p>Implementation: To date, we have planted 2,007 torchwood, 445 wild lime, and 96 nectar plants, for a grand total of 2,548 plants. Plantings took place at Elliott Key in the main breezeway restoration area, and Spite Highway restoration area. Additional plantings took place in Adam's Key in the main restoration area and the breezeway restoration area. Constant maintenance has been done in these areas including herbicide application, removal of noxious weeds, and watering of seedlings. This is necessary as plants are not yet mature enough to shade out understory and prevent weed growth. There is currently ongoing monitoring and removal of exotics species on the project site.</p>
	<p>Tegu Trap and lure [Project ID 2801]</p>	<p>Implementation: Testing is underway.</p>
	<p>Enhanced Mitigation Techniques for Control of Cactus Moth [Project ID 2802]</p>	<p>Implementation: Ongoing (project up for annual renewal).</p>
	<p>Biological Control of Imported Fire Ant [Project ID 2803]</p>	<p>Implementation: Ongoing (project up for annual renewal).</p>
	<p>Enhanced Mitigation Techniques for the Control of Several Whitefly Species [Project ID 2804]</p>	<p>Implementation: Ongoing (project up for annual renewal).</p>
	<p>Expansion of Asian Citrus Psyllid Biocontrol [Project ID 2805]</p>	<p>Implementation: Ongoing (project up for annual renewal).</p>
	<p>Python Removal Program - FWC [Project ID 2806]</p>	<p>Implementation: Ongoing.</p>
	<p>Everglades Complex of WMA's Exotic Plant Control [Project ID 2807]</p>	<p>Implementation: Ongoing annually or biennial (Lygodium surveys).</p>
	<p>Everglades Complex of WMA's Restoration Native Tree planting [Project ID 2808]</p>	<p>Implementation: Ongoing.</p>
	<p>Miami-Dade County Environmentally Endangered Lands Program-Conservation Land Acquisition and Management [Project ID 2809]</p>	<p>Implementation: Since its inception, the EEL Program has acquired and manages more than 20,800 acres of land within the Greater Everglades Ecosystem, including pine rockland, tropical hardwood hammock, salt marsh, mangrove and freshwater wetlands. The EEL Program manages an additional 2,800 acres of environmentally sensitive lands owned by the county Parks Department. Over 20,000 acres of land within the EEL Program's inventory are within the CERP C-111 and BBCW project footprints. The primary effort of management activities is eradication of invasive exotic plant species and restoration of native habitats at a cost in excess of \$3,000,000 per year.</p>
<p>Arthur R. Marshall Loxahatchee National Wildlife Refuge -Invasive Exotic Control Program [Project ID 2810]</p>	<p>Implementation: Ongoing.</p>	
<p>Python removal authorized agent program for South Florida National Parks [Project ID 2811]</p>	<p>Implementation: Start 2009 and Ongoing.</p>	

SUBGOAL 2-B: PROTECT THE SOUTH FLORIDA ECOSYSTEM FROM THE HARMFUL EFFECTS OF INVASIVE EXOTIC SPECIES

**Table 4: Subgoal 2-B: Control Invasive Exotic Plants and Animals
Comprehensive Status July 2012–June 2014**

Objective	Projects	Status
<p><u>Long-Term Maintenance Management Continued</u> <i>Objective 2-B.4: Reduce the populations of widely established invasive exotic species and maintain at lowest feasible levels.</i></p>	Lionfish assessment and control in South Florida National Parks [Project ID 2812]	Implementation: Ongoing.
	Palmetto Bay/Cutler Bay Coastal Habitat Restoration (Project ID 2813)	Implementation: 2013 start and ongoing.
	Digital Aerial Sketch Mapping (DASM) of 4 priority Invasive plants and Laurel Wilt [Project ID 2814]	Implementation: 2013 start and ongoing.
	Python Chemical Communication [Project ID 2815]	Implementation: Data collection for the project begins in 2014 to identify and isolate python sex pheromones to improve trapping success.
	Genetic Analyses of invasive reptiles in Florida [Project ID 2816]	Implementation: Genetic sequencing of Agama (15 specimens), Ctenosaura (22 specimens) and Python sebae (21 specimens) are ongoing.
	Thermal infra-red detection of Burmese pythons [Project ID 2817]	Implementation: Readings were collected and the data are being analyzed, with follow up trials to be determined.
	C&SF:CERP Melaleuca Eradication and Other Exotic Plants (OPE) (CERP Project WBS # 95) [Project ID 2818]	Construction: Rearing facility under construction. Completion expected October 2012.
	Everglades National Park Exotic Control Program (Project ID 2819)	Implementation: Ongoing.
	Hole-in-the-Donut [Project ID 2820]	Implementation: Ongoing.
	Aquatic and Upland Invasive Plant Management [Project ID 2821]	Implementation: Ongoing.
	Invasive Exotic Plant Control in Terrestrial and Aquatic Natural Systems [Project ID 2822]	Implementation: Maintenance control of Melaleuca achieved in most regions of the Everglades Protection Area.
	Invasive Species Research and Information Exchange [Project ID 2823]	Implementation: Ongoing.
	Enhancement of the Aquatic Resources at the Miccosukee Tribe [Project ID 2824]	Implementation: Ongoing.
	Big Cypress National Preserve Long-term Maintenance and Control of Invasive Exotic Plants [Project ID 2825]	Implementation: Currently, Australian pine is at maintenance level; Lygodium is the Preserve's highest priority exotic; melaleuca is at or near maintenance level; and Brazilian pepper while being addressed in all existing exotic plant treatment contracts, is far from a maintenance level. About 20% of the Preserve acreage remains infested with invasive exotic plants. New threats from exotic plant invasion are eminent.
Mitigating ecological and cultural effects of Laurel wilt disease [Project ID 2826]	Implementation: Ongoing.	

GOAL 3: FOSTER COMPATIBILITY OF THE BUILT & NATURAL SYSTEMS



Balmy weather, vibrant communities, beautiful scenery, and abundant natural habitats at the land/sea interface offer south Florida residents a unique choice of lifestyles and visitors a variety of destinations. The diversity of landscapes, including some of the most intensively developed and densely populated areas in the state, has contributed to the economic success and high quality of life enjoyed by Floridians and experienced by visitors from around the world.

This lifestyle has not come without a price. Tremendous population growth, accompanying urban sprawl, and the subsequent need for related infrastructure and public services have resulted in adverse impacts on natural ecological systems. Development patterns have resulted in the loss of natural habitats and connectivity. The region's intensive growth and development have also heightened concerns regarding flood protection and water supply.

To maintain a high quality of life for south Florida's residents, the built environment must be planned and managed in a manner that both supports the social and economic needs of communities and is compatible with the restoration, preservation, and protection of natural habitats and species. This requires development patterns, policies, and practices that serve both the built and natural systems.

Goal 3: Foster Compatibility of the Built & Natural Systems

Subgoal 3-A: Use & Manage Land in a Manner Compatible with Ecosystem Restoration

- Objective 3-A.1:** Designate or acquire an additional 10,000 acres of lands needed for parks, recreation, and open space to complement South Florida Ecosystem restoration through local, state, and federal programs by 2015.
- Objective 3-A.2:** Increase participation by 350,000 acres in the Grassland Reserve Program, Wetland Reserve Program, Farm and Ranch Land Protection Program, and the Environmental Quality Incentive Program to promote compatibility between agricultural production and South Florida Ecosystem restoration by 2014.
- Objective 3-A.3:** Increase the use of educational programs and initiatives to further public and local government understanding of the benefits of South Florida Ecosystem restoration.

Subgoal 3-B: Maintain or Improve Flood Protection in a Manner Compatible with Ecosystem Restoration

- Objective 3-B.1:** Objective 3-B.1: Maintain or improve existing levels of flood protection for the urban, agricultural, and natural environments.
- Objective 3-B.2:** Objective 3-B.2: Rehabilitate the Herbert Hoover Dike to provide adequate levels of flood protection to the communities and lands surrounding Lake Okeechobee.

Subgoal 3-C: Provide Sufficient Water Resources for the Built & Natural Systems

- Objective 3-C.1:** Plan for regional water supply needs.
- Objective 3-C.2:** Increase volumes of reuse on a regional basis.
- Objective 3-C.3:** Increase water made available through the state's Water Protection and Sustainability Program and the SFWMD Alternative Water Supply Development Program.

Subgoal 3-D: Reduce invasive exotic species pathways originating from the built environment

- Objective 3-D.1:** Increase awareness of the impacts of invasive exotic species on south Florida's environment, economy, culture, and human health.
- Objective 3-D.2:** Continue existing and develop new partnerships that focus on reducing pathways.

SUBGOAL 3-A: USE AND MANAGE LAND IN A MANNER COMPATIBLE WITH ECOSYSTEM RESTORATION

The strategy for Subgoal 3-A consists of three measurable objectives that focus on the compatibility of land use with restoration efforts. Progress during the reporting period (July 2012–June 2014) is described below and further delineated in [Table 5](#). Additional efforts that will help fulfill this subgoal are also described below.

Objective 3-A.1: Designate or acquire an additional 10,000 acres of lands needed for parks, recreation, and open space to complement South Florida Ecosystem restoration through local, state, and federal programs by 2015

Policy/Regulatory Framework

- For Conservation Lands: [373.1391, Fla. Stat.](#) (“... lands titled to the water management districts shall be managed and maintained to the extent practicable to ensure a balance between public access, general public recreational purposes, and restoration and protection of their natural state and condition.”)
- All Everglades Construction Projects (STAs): [373.4592\(4\)\(a\)](#) (“district shall allow these areas to be used by the public for recreational purposes”)

- The legislative intent expressed in [373.016\(3\)\(i\)](#), (“...To promote recreational development, protect public lands, and assist in maintaining the navigability of rivers and harbors...”)
- [373.1395](#) Limitation on liability of water management district with respect to areas made available to the public for recreational purposes without charge. (1) The purpose of this section is to encourage water management districts to make available land, water areas, and park areas to the public for outdoor recreational purposes by limiting their liability to persons going thereon and to third persons who may be damaged by the acts or omissions of persons going thereon.
- Supporting the state’s no-net-loss of hunting statute [§379.3001\(5\)](#) Any state agency or water management district that owns or manages lands shall assist and coordinate and cooperate with the commission to allow hunting on such lands if such lands are determined by the commission to be suitable for hunting.

Implementation Approach

Park, recreation, and other open space lands will protect natural systems and/or serve as buffers between natural and built environments. Greenways, blueways, and trails will multiply the benefits of open spaces by linking them and enhancing public access.

Objective 3-A.1: Progress and Status at a Glance:

Since 2005:

- The goal of 10,000 additional acres being acquired has been well exceeded. Allapattah Flats in Martin County, and Picayune Strand in Collier County, are two of the larger properties acquired for restoration, and are together over 70,000 acres. Additionally, many other properties were opened for public use along the Kissimmee River, the Kissimmee Chain of Lakes, the Stormwater Treatment Areas, and other areas.

2012 – 2014:

- During this reporting period, the SFWMD opened four new properties in the Kissimmee River and Kissimmee Chain of Lakes areas to expand hunting and other [recreational uses](#). Also STA 5 was opened for regularly scheduled day use which includes trails for hiking, biking, and wildlife viewing.
- One public boat ramp was on the Kissimmee River in Highlands County, was completed and opened for public use. The S-65D Boat Ramp includes a concrete boat ramp with associated dock, a shell rock parking lot, three paved ADA car spaces, a single lane road entrance/exit loop, waterless restroom facility, and solar safety lighting.

SUBGOAL 3-A: USE AND MANAGE LAND IN A MANNER COMPATIBLE WITH ECOSYSTEM RESTORATION

Objective 3-A.2: Increase participation by 350,000 acres in the Agricultural Land Easement Program and the Environmental Quality Incentive Program to promote compatibility between agricultural production and South Florida Ecosystem restoration by 2014.

Policy/Regulatory Framework

- ACEP - Subtitle H of Title XII of the [Food Security Act of 1985](#), as amended by Section 2301 of the [Agricultural Act of 2014](#) (Public Law 113-79).

Implementation Approach

Agriculture is Florida's second leading industry and a large portion of agricultural land can be viewed as open space that benefits the natural

system through buffering, revitalization of natural habitats, water storage and filtration, and aquifer recharge. In addition to regulatory programs and BMPs, several voluntary conservation programs are successfully assisting landowners in protecting and preserving natural resources on agricultural lands. These successes not only aid Everglades restoration but are instrumental in improving estuaries and lessening the impact of non-point source pollution on coral reefs, a total package for ecosystem restoration. [The 2008 Farm Bill](#) responded to a broad range of emerging natural resource challenges faced by farmers and ranchers, including soil erosion, wetlands, wildlife habitat, and farmland protection. Private landowners will benefit from a portfolio of voluntary assistance, including cost-share, land rental, incentive payments, and technical assistance. The 2008 Farm Bill places a strong emphasis on the conservation of working lands, ensuring that land remains both healthy and productive. The assistance includes the design, layout, and consultation services associated with the conservation practice application or management guidance provided. Technical assistance is targeted towards nutrient management, water quality, and water conservation concerns associated with animal feeding, livestock grazing operations, and fruit and crop production within the Everglades ecosystem.

Objective 3-A.2: Progress and Status at a Glance:

Since 2009:

- [U.S. Department of Agriculture](#) (USDA) has invested over \$470 million in Conservation Easement Program funds to protect almost 180,000 acres of land in Florida.
- Approximately 95% of this acreage is located within the Northern Everglades Watershed, an important agency priority.

2012 – 2014:

- In 2013 alone, NRCS committed \$60 million in [Easement Program funds](#) to restore and protect wetlands in the Everglades Watershed. NRCS wetlands easements in the Everglades provide habitat for a variety of listed species, including the endangered Florida Panther, a species on the edge of extinction.
- During the reporting period, a total of 394,589 acres in the 16-county south Florida region were enrolled in Farm Bill conservation programs at an obligated cost of \$330,738,014.

SUBGOAL 3-A: USE AND MANAGE LAND IN A MANNER COMPATIBLE WITH ECOSYSTEM RESTORATION

Objective 3-A.3: Increase the use of educational programs and initiatives to further public and local government understanding of the benefits of South Florida Ecosystem restoration.

Policy/Regulatory Framework

- The [National Park Service Organic Act](#) (16 U.S.C. 1 and 16 U.S.C.3)
- [Everglades National Park Protection and Expansion Act of 1989](#) (16 U.S.C. 410r-5)
- [Modified Water Deliveries to Everglades National Park Project](#) (16 U.S.C. 410r-S)

- The [Water Resources Development Act of 2000](#) (Public Law No. 106-541). Title VI, Section 601, of the Act, describes authorizations specific to the Comprehensive Everglades Restoration Plan
- [AR-360-1, The Army Public Affairs Program](#)

Implementation Approach

Public outreach and communication form an important cornerstone for support of ecosystem restoration efforts. Public outreach strategies aim to instill a broad sense of stewardship, and responsibility for all stakeholders involved, including private citizens. Efforts include environmental education, small business outreach, community outreach, and project-specific local outreach.

Objective 3-A.3: Progress and Status at a Glance:

2012 – 2014:

- OERI conducted seven Working Group and Science Coordination Group sponsored public workshops during the reporting period, with an average of 40 attendees at each workshop.
- Public participation is a major component of CERP. The planning process requires robust public participation to ensure stakeholder involvement, understanding, and support. For the Central Everglades Planning Project (CEPP) alone, 171 public engagements were conducted within 29 months. These forums are open to the public and advertised through CERP e-notice distribution lists, web page updates and social media. Meeting materials are also provided online for public access. In addition to standard notification through e-notice distribution lists, web page updates and social media, public meetings and public comment periods are also announced through news release and published in the Federal Register. Meeting materials, along with meeting transcripts are provided online for public access.
- The USACE and the SFWMD continued their efforts to raise awareness about the CERP and overall restoration of the South Florida Ecosystem.
- USACE and SFWMD continue to utilize web-based communication, to help ensure that CERP and the greater Everglades ecosystem is better understood and that the public has opportunities to participate in decision-making. Recently, RECOVER has conducted grass roots level public meetings in coordination with universities to include the public in the system-wide monitoring findings reported in the 2014 System Status Report.
- A new partnership between the DOI and USACE was initiated 2013 to combine [www.sfrestore.org](#) and [www.evergladesplan.org](#) by overhauling our web presence for everglades restoration in a new webpage, [www.evergladesrestoration.gov](#). The launch of [www.evergladesrestoration.gov](#) is expected in Fall 2014.

SUBGOAL 3-A: USE AND MANAGE LAND IN A MANNER COMPATIBLE WITH ECOSYSTEM RESTORATION

Discussion

Enhance [Public Participation Process for Central Everglades Planning Process \(CEPP\)](#). At their October 2011 meeting, the Task Force directed the Working Group to develop an enhanced public and stakeholder dialogue for the CEPP. These workshops were conducted in addition to regular USACE meetings and processes (e.g. NEPA, PDT). The workshops were designed to add value for the public and agencies involved in the CEPP, provide CEPP planning and technical information to the public, facilitate two-way dialogue between the public and CEPP staff, occur at timely intervals in the CEPP planning process, and be responsive/flexible to the needs of the public. The workshops utilized interactive tools to help facilitate understanding and discussion, including Google Earth. The workshop model has been very successful and has received widespread praise from the public, agency staff, and decision makers.

The [Agricultural Conservation Easement Program \(ACEP\)](#) is implemented through USDA's Natural Resources Conservation Service (NRCS). ACEP is a voluntary program that consolidates the former Wetlands Reserve Program, Grassland Reserve Program, and Farm and Ranchlands Protection Program. ACEP is comprised of agricultural and wetlands easements. Agricultural easements prevent productive working lands from being converted to non-agricultural uses and protect land devoted to food production. Wetland easements offer landowners the opportunity to protect, restore, and enhance wetlands and wildlife habitat on their property. The NRCS provides technical and financial support to help landowners with their wetland restoration efforts. The NRCS goal is to achieve the greatest wetland functions and values, along with optimum wildlife habitat, on every acre enrolled in the program. This program offers landowners an opportunity to establish long-term conservation and wildlife practices and protection.

Fisheating Creek Wetland Program. Under the Wetlands Reserve Program, NRCS acquired permanent conservation easements in the Fisheating Creek Wetland Restoration Project area. The planned restoration activities will reduce the amount of surface storm water leaving the land, slowing water runoff and the concentration of nutrients entering Lake Okeechobee and the Everglades. The purchase and restoration of easements in Fisheating Creek will contribute to the connection of public and private lands and help form a conservation corridor from the Kissimmee River to the ENP. The easements will provide large open spaces, food resources, and connectivity needed to sustain wide ranging animals like the federally endangered Florida panther, and other wildlife including crested caracara, Florida black bear, red-cockaded woodpecker, and the whooping crane.

Wetland Reserve Projects in the Northern Everglades. Throughout the 20th Century, agricultural producers in what is now referred to as the Northern Everglades were encouraged to construct surface water drainage systems to facilitate the establishment and production of "improved" pasture forages and crops. As a result, thousands of miles of surface water drainage systems and other water control infrastructures were installed, resulting in accelerated drainage of both water and nutrients from local ranches and farms into downstream water bodies. The USDA-NRCS delivers the Agricultural Conservation Easement Program (ACEP) to agricultural landowners located within the NEEPP region and partners with SFWMD for various technical support. This program consists of a comprehensive wetland restoration and conservation easement effort designed to restore and protect wetlands that will improve water quality and provide habitat for rare, endangered and threatened species in the Northern Everglades. As a result of this program, the amount of surface waters leaving lands from participating landowners will be reduced through infiltration and evapotranspiration and will occur over a more natural period of time compared to drained agricultural land. Consequently, the concentrations of nutrients entering the public water management system and ultimately Lake Okeechobee will be reduced.

SUBGOAL 3-A: USE AND MANAGE LAND IN A MANNER COMPATIBLE WITH ECOSYSTEM RESTORATION

**Table 5: Subgoal 3-A: Use and Manage Land in a Manner Compatible with Ecosystem Restoration
Comprehensive Status July 2012—June 2014**

Objective	Projects	Status
<p><u>Parks, Recreation, and Open Space</u> <i>Objective 3-A.1: Designate or acquire an additional 10,000 acres of lands needed for parks, recreation, and open space to complement South Florida Ecosystem restoration through local, state, and federal programs by 2015.</i></p>	Florida Communities Trust Grant Program	Land Acquisition: A total of \$567.5 million has been spent on acquiring all 26,300 acres of the State's Florida Communities Trust Lands.
	Florida Keys Overseas Heritage Trail [Project ID 3200]	Planning: Completed for three new segments; underway for six others Construction: Completed for 4.7 miles; underway for 14 miles
	Florida Greenways and Trails Program [Project ID 3202]	Planning: 2 Blueway systems (Lee County and Charlotte County), Shingle Creek paddling trail, and Shingle Creek Regional Park designated Land Acquisition: 5.22 acres in Orange County
<p><u>Compatible Agriculture</u> <i>Objective 3-A.2: Increase participation by 350,000 acres in the Grassland Reserve Program, Wetland Reserve Program, Farm and Ranch Land Protection Program, and the Environmental Quality Incentive Program to promote compatibility between agricultural production and South Florida Ecosystem restoration by 2014.</i></p>	Technical Assistance to Indian Reservations [Project ID 3300]	Implementation: Ongoing
<p><u>Community Understanding</u> <i>Objective 3-A.3: Increase the use of educational programs and initiatives to further public and local government understanding of the benefits of South Florida Ecosystem restoration.</i></p>	2002 Farm Bill Conservation Programs [Project ID 3301]	Implementation: Enrolled 394,589 acres at an obligated cost of \$ 330,738,014.
	USACE CERP Public Outreach and Assistance [Project ID 3502]	Implementation: Ongoing; detailed information is available on the project sheet in the Integrated Financial Plan.
	SFWMD Outreach Program [Project ID 3503]	Implementation: Ongoing; detailed information is available on the project sheet in the Integrated Financial Plan.

SUBGOAL 3-B: MAINTAIN OR IMPROVE FLOOD PROTECTION IN A MANNER COMPATIBLE WITH ECOSYSTEM RESTORATION

Land suitable for development and human habitation will continue to require considerable flood protection, since without such protection most of south Florida would be unsuitable for existing urban and agricultural uses. Given the population growth projections for south Florida, there will be an ongoing need for monitoring and balancing the flood protection needs of urban, natural, and agricultural lands as part of restoration.

WRDA 2000 clearly states that implementation of the CERP shall not reduce levels of service for flood protection that were in existence on the date that the law was enacted and in accordance with applicable law. The Savings Clause states that CERP projects, including increased canal and groundwater levels, need to be accomplished in a way that does not harm flood protection.

Strategy & Restoration Progress

The strategy for Subgoal 3-B consists of two measurable objectives and additional efforts that focus on flood protection. Progress on the two measurable objectives during the reporting period (July 2012–June 2014) is delineated in [Table 6](#).

Objective 3-B.1: Maintain or improve existing levels of flood protection for the urban, agricultural, and natural environments.

Policy/Regulatory Framework

- [The Flood Control Act of June 30, 1948](#)
- [The Flood Control Act of September 3, 1954](#)
- [The Flood Control Act of July 3, 1958](#)
- [The Flood Control Act of July 14, 1960](#)
- [The Flood Control Act of October 23, 1962](#)
- [The Flood Control Act of October 27, 1965](#)
- [The Flood Control Act of 1968](#)
- [Everglades National Park Protection and Expansion Act of 1989, Public Law 101-229](#)
- [WRDA of 1992](#)
- [WRDA of 1996, Public Law 104-303](#)
- [WRDA of 1999, Public Law 106-53](#)
- [WRDA of 2000, Public Law 106-541](#)
- [WRDA of 2007, Public Law 110-114](#)
- [Water Resources Reform and Development Act of 2014, Public Law 113-121](#)

Implementation Approach

Capital improvements, modifications, and repairs to water control and conveyance facilities will help maintain and improve flood protection. The CERP consists of numerous projects that may provide incidental improvements to flood protection while decreasing the loss of freshwater supplies. Other projects, including some partially funded by the Federal Emergency Management Agency (FEMA), also seek to improve or maintain flood protection in the region.

Objective 3-B.1: Progress and Status at a Glance:

- The C-4 Flood Mitigation Projects include multiple individual projects to provide flood mitigation in the C-4 Basin. These include impoundments, pump stations, flood walls, and berms as well as conveyance improvements. Eight projects have been constructed.

2012 – 2014:

- Three projects are currently under design.

SUBGOAL 3-B: MAINTAIN OR IMPROVE FLOOD PROTECTION IN A MANNER COMPATIBLE WITH ECOSYSTEM RESTORATION

Objective 3-B.2: Rehabilitate the Herbert Hoover Dike to provide adequate levels of flood protection to the communities and lands surrounding Lake Okeechobee. Maintain or improve existing levels of flood protection for the urban, agricultural, and natural environments.

Policy/Regulatory Framework

- [The Rivers and Harbors Act of 1930](#)
- [The Rivers and Harbors Act of 1935](#)
- [The Flood Control Act of June 30, 1948](#)
- [The Flood Control Act of July 3, 1958](#)
- [The Flood Control Act of 1968](#)

The Herbert Hoover Dike Major Rehabilitation Evaluation Report from 2000 was the beginning of the rehabilitation efforts at Herbert Hoover Dike. The ongoing Dam Safety Modification Study is being developed in accordance with USACE Engineering Regulation 1110-2-1156: [SAFETY OF DAMS – POLICY AND PROCEDURES](#).

Implementation Approach

The Herbert Hoover Dike (HHD) system consists of approximately 143 miles of embankment surrounding Lake Okeechobee. Rehabilitation will address seepage, embankment stability and problematic foundation conditions and will provide authorized levels of flood risk management to adjacent communities. The ongoing Dam Safety Modification Study report is to include an implementation plan for actionable areas for the entire HHD system beyond the current ongoing and planned projects. The report is currently scheduled to be completed in 2015.

SUBGOAL 3-B: MAINTAIN OR IMPROVE FLOOD PROTECTION IN A MANNER COMPATIBLE WITH ECOSYSTEM RESTORATION

Objective 3-B.2 Progress and Status at a Glance:

Projects listed provide risk reduction for adjacent lands and communities around Herbert Hoover Dike.

Since 2005:

- Partial Seepage Berm in Reach 1A (2008)
- Culverts IPPC-1 and IPPC-2 Removals (2010)
- Culverts FC-1 and HP-7 Replacements (2010)
- Quarry Backfill in Reach 1D (2011)
- Culvert 14 Removal (2012)
- Reach 1 Cutoff Wall (2012)
- Structures S-269 (C-11) and S-270 (C-16) Replacements (ongoing)
- Structures S-270 (C-1A) and S-280 (C-1) Replacements (ongoing)
- Structures S-276 (C-4A) and S-277 (C-3) Replacements (ongoing)
- Structures S-281 (C-5A) and S-282 (C-5) Replacements (ongoing)
- Structures S-273 (C-10) and S-275 (C-12) Replacements (ongoing)
- Structures S-268 (C-8) and S-272 (C-13) Replacements (ongoing)

2012 - 2014:

- The Major Rehabilitation Report (MRR) from 2000 divided the 143 mile embankment into eight reaches with the initial focus on Reach 1. This Reach by Reach rehabilitation approach has been replaced with a system-wide risk reduction approach as required for safety modifications to USACE dams. The supplemental MRR being produced for Reaches 2 and 3 has become a system wide Dam Safety Modification Study (DSMS) Report. (The MRR approach and approval for Reach 1 occurred prior to procedural changes implemented post-Hurricane Katrina.) The DSMS report will address the entire dike as a system and will include a risk reduction approach to implementing features based on priority and reducing risk as quickly as possible. All features planned and under construction support the goal of this report. Construction of 21.4 miles of cutoff wall was completed in 2013.
- In 2011, the USACE approved a plan to replace, abandon or remove the 32 water control structures (culverts) operated by the USACE within the HHD system. This project is being implemented as part of the risk reduction approach to the entire system. The USACE has completed removal of one culvert while twelve culvert replacements are underway. Planning and design for replacement of the next five culverts is underway.
- As part of the DSMS report effort, a seepage management pilot test is currently being constructed to demonstrate the constructability of an alternate risk reduction feature to address the embankment and foundation seepage issues. The results of this demonstration will be utilized in the DSMS for future consideration.

SUBGOAL 3-B: MAINTAIN OR IMPROVE FLOOD PROTECTION IN A MANNER COMPATIBLE WITH ECOSYSTEM RESTORATION

Discussion

Non-structural Flood Protection. Numerous non-structural options for flood protection exist for the built environment. These include

ensuring that new construction meets FEMA guidelines, land use planning to guide development away from flood-prone areas, and acquiring undeveloped lands from willing sellers.

**Table 6: Subgoal 3-B: Maintain or Improve Flood Protection in a Manner
Compatible with Ecosystem Restoration
Comprehensive Status July 2012–June 2014**

Objective	Projects	Status
<p><u>Public Works Construction</u></p> <p><i>Objective 3-B.1: Maintain or improve existing levels of flood protection for the urban, agricultural, and natural environments.</i></p>	<p>C-4 Flood Mitigation Projects [Project ID 3600]</p>	<p>Planning: Completed Construction: Eight projects completed; three projects under design</p>
<p><u>Herbert Hoover Dike Rehabilitation</u></p> <p><i>Objective 3-B.2: Rehabilitate the Herbert Hoover Dike to provide adequate levels of flood protection to the communities and lands surrounding Lake Okeechobee.</i></p>	<p>Herbert Hoover Dike Rehabilitation [Project ID 3700]</p>	<p>Planning: Planning and design underway for replacement of Culverts HP-2, HP-3, 12A, 2, 10A, 6, and HP-6. Dam Safety Modification Study is ongoing with expected approval in 2015. Construction: Reach 1 cutoff wall construction completed. Removal of Culvert 14 completed. Replacement of Culverts 1, 1A, 11, 16, 3, 4A, 5, 5A, 8, 13, 10, and 12 are ongoing. Seepage Management Pilot Test under construction.</p>



SUBGOAL 3-C: PROVIDE SUFFICIENT WATER RESOURCES FOR THE BUILT AND NATURAL SYSTEMS

The State of Florida independently and both the federal and state partners under the CERP have specific responsibilities regarding existing and future water supply for both the built and natural systems. The State of Florida has statutory goals and responsibilities to ensure an adequate supply of water for protection of the natural system along with existing and future “reasonable-beneficial” potable, industrial, and agricultural uses. The CERP authorization in the WRDA 2000 specifically provides that the CERP serves as a framework for restoring, preserving, and protecting the South Florida Ecosystem while providing for other water related needs of the region, including water supply.

Strategy & Restoration Progress

The strategy for Subgoal 3-C consists of three measurable objectives and additional efforts that focus on water supply. Progress on the three measurable objectives during the reporting period (July 2012–June 2014) is delineated in [Table 7](#).

Objective 3-C.1: Plan for regional water supply needs

Policy/Regulatory Framework

- Chapters [373](#), [403](#), and [187](#), Florida Statutes (F.S.).
- Additionally, the water supply planning regions shall be considered Water Resource Caution Areas for the purposes of [Section 403.064](#), F.S., and affected parties may challenge the designation pursuant to [Section 120.569, F.S.](#)

Implementation Approach

Regional [water supply plans](#) for each of the five SFWMD planning areas will be updated every five years to reassess water resource conditions and water resource and water supply projects. The goal of each plan is to meet the water supply needs of the region during a one-in-ten year drought and the needs of the environment while not causing harm to the water resources.

Objective 3-C.1: Progress and Status at a Glance:

Since 2000:

- In 2000, SFWMD published the Kissimmee Basin, Lower East Coast, Lower West Coast, and Upper East Coast Water Supply Plans. These four plans were updated in 2005-2007. The next Upper East Coast Update was completed in 2011.

2012 – 2014:

- The Lower West Coast (LWC) Update was completed in 2012, and the Lower East Coast (LEC) Update was completed in 2013.
- The Kissimmee Basin has been divided into the Upper Kissimmee Basin (UKB) and Lower Kissimmee Basin (LKB) planning areas. The draft LKB Plan was distributed to stakeholders, comments received, and approval is anticipated in September 2014.
- The UKB is in the Central Florida Water Initiative (CFWI) Regional Water Supply Planning (RWSP) area, which is a joint effort between South Florida, Southwest Florida, and St. Johns River water management districts. The draft CFWI RWSP was acknowledged by the Governing Board in May 2014. Work on the Solution Document is underway and is expected to be completed in the summer of 2015. The planning horizon for these updates is 2030 except for the CFWI and LKB which are 2035. The plan updates include development of goals and objectives, population and demands projections, issue identification, water source options, water supply and water resource projects, and future direction. The plans are completed in a public process under the auspices of the SFWMD’s Water Resources Advisory Commission (WRAC).

SUBGOAL 3-C: PROVIDE SUFFICIENT WATER RESOURCES FOR THE BUILT AND NATURAL SYSTEMS

Objective 3-C.2: Increase volumes of reuse on a regional basis

Policy/Regulatory Framework

- [Chapter 62-40, F.A.C.](#)
- [Chapter 62-610, F.A.C.](#)
- [Section 403.064, F.S.](#)
- [Section 403.086, F.S.](#)
- [Section 373.250, F.S.](#)

Implementation Approach

The SFWMD regional water supply plans outline the planning and permitting efforts that encourage water conservation and lower consumptive use rates over time among others. Reuse involves the treatment to appropriate standards and subsequent beneficial reuse of domestic wastewater for a variety of beneficial uses, including ground water recharge, environmental enhancement, and irrigation. The CERP contemplates the use of reclaimed water to help meet the freshwater requirements of the southern end of the Everglades system, including Biscayne Bay.

Objective 3-C.2: Progress and Status at a Glance:

- In 2013, a total of 112 treatment facilities provided reuse within the SFWMD. These facilities reused a total of 271 million gallons per day of treated wastewater. Most of the reclaimed water (155 mgd) was used for landscape irrigation at over 127,000 residences, 203 golf courses, 238 parks, and 73 schools.

2012 – 2014:

- **Conservation:** The SFWMD continues to implement its [2008 Comprehensive Water Conservation program](#) and development of a year-round conservation ethic. Utility per capita water use utilized in water supply plans continues to trend downward.
- **Reuse:** Due to uncertainties concerning ecological effects of application of reclaimed water to sensitive water bodies, such as tidal waters and coastal wetlands of the BNP, several assessments and demonstration scale projects have been conducted. The Miami-Dade Water and Sewer Department conducted the first phase of a pilot project from November 2010 to April 2011 to assess the use of highly treated reclaimed water for recharge of the Biscayne aquifer upstream of the water supply wellfield. The county also conducted pilot testing of technologies for water quality objectives related to rehydration of coastal wetlands. Miami-Dade County submitted a final report to the SFWMD, FDEP, and BNP in October 2011. The report included information on effectiveness and costs of best available technologies in achieving treatment objectives. Design and implementation of a full scale project has been deleted from Miami-Dade's long-term water facilities plan as a result of reduced water demands cost-effectiveness and the economic downturn. These efforts could be used to evaluate the role of large scale reuse in augmenting system-wide water budgets, either by providing additional water or by offsetting existing consumptive uses.
- In 2008, the Florida Legislature passed a law requiring wastewater effluent discharges through ocean outfalls to cease by December 31, 2025, except as "backup discharge" to a functioning reuse system. In addition, the law requires that those utilities implement 60 percent reuse of the effluent being discharged to the ocean or about 180 million of gallons per day (mgd) by the 2025 deadline. Utilities were required to submit their implementation plan to the FDEP prior to the by July 1, 2013 deadline. To comply with the law, South Central Regional (Delray/Boynton) and Boca Raton plan to expand existing public access irrigation, Broward County North District is working on a joint project with Palm Beach County to use reclaimed water to serve existing golf courses in southern Palm Beach County and northern Broward County, the City of Hollywood plans to recharge the Floridan Aquifer and Miami-Dade Water and Sewer District plans to reuse a majority of their reclaimed water for cooling water for a Florida Power and Light Turkey Point power plant expansion as well as Floridan Aquifer recharge. A 2013 amendment to the ocean outfall law requires FDEP, the SFWMD, and the ocean outfall utilities to re-evaluate the reuse of wastewater to meet water supply needs.



SUBGOAL 3-C: PROVIDE SUFFICIENT WATER RESOURCES FOR THE BUILT AND NATURAL SYSTEMS

Objective 3-C.3: Increase water made available through the state's Water Protection and Sustainability Program and the SFWMD Alternative Water Supply Development Program

Policy/Regulatory Framework

- [Section 373.707](#)
- [Section 403.086](#)

Implementation Approach

Alternative technologies for water supply development are more expensive than historically used freshwater water sources. The Alternative Water Supply Development Program in coordination with the state's Water Protection and Sustainability Program provides grants and cost-sharing for alternative water supply development such as saltwater, brackish water, and aquifer storage and recovery and reclaimed water projects.

Objective 3-C.3: Progress and Status at a Glance:

Since 1997:

- District Funding was \$125,930,907
- From 2006-2009, Total Approved State Funding was \$67,580,700
- Total Approved Funding was \$193,511,607
- Total Water Made Available is 434.08 MGD

2012 – 2014:

- Currently, over 270 mgd of reclaimed water is being reused for beneficial purposes in the SFWMD. In addition, there are 38 operational desalination facilities with a total capacity of approximately 269 mgd (all but two utilize brackish ground water as source water). [The Alternative Water Supply \(AWS\) Program](#) recommended that 21 projects receive funding for Fiscal Year (FY) 2012, 2013 and 2014 with a total of \$8.07 million. No state funding was available in these years.

Discussion

Water Reservations and Allocations. WRDA 2000 requires that the State of Florida reserve or allocate water for the natural systems associated with implementation of the CERP. Water necessary to achieve the natural system benefits of each CERP project will be identified within each PIR. Water reservations have been adopted for the Picayune Strand and Fakakatchee Estuary in association with the Picayune Strand Restoration Project, for the North Fork of the St. Lucie River in association with the Indian River Lagoon-South Project, and for all surface water flowing to Biscayne Bay in association with the Biscayne Bay Coastal Wetlands Phase I Project. The water reservation rule for the Caloosahatchee River

(C-43) West Basin Storage Reservoir Project is in the final stages of rulemaking. The District is just beginning the rule development process to establish a water reservation for the Kissimmee River Basin, which includes the upper chain of lakes (19 lakes total), the Kissimmee River and its floodplain. Restricted Allocation Area rules have been adopted that protect natural system water for the North Palm Beach/Loxahatchee River Watershed Water Bodies & Lower East Coast Everglades Water Bodies, which protect water for the Loxahatchee River and the Everglades, including the Site I impoundment project. The RAA rules ensure that water will be available for future projects like the Central Everglades Planning Project. www.sfwmd.gov/reservations (http://www.sfwmd.gov/portal/page/portal/xrepository/sfwmd_repository_pdf/bor_wu.pdf)

SUBGOAL 3-C: PROVIDE SUFFICIENT WATER RESOURCES FOR THE BUILT AND NATURAL SYSTEMS

2008 Comprehensive Water Conservation Program. In September 2008, the SFWMD Governing Board approved the [Comprehensive Water Conservation Program](#), the compilation of a 2-year collaborative process with over 20 stakeholders representing 14 interest groups. The program is organized into three initiatives: regulatory, voluntary and incentive-based, and education and marketing. The overall program is built on a set of core values identified by the SFWMD's stakeholder group and is designed to be sustainable, science-based, measurable, goal-based, environmentally protective, equitable wherever possible, and practicable. The SFWMD is currently implementing the program recommendations in an effort to achieve efficient levels of water use and ensure, in conjunction with other initiatives, an adequate and reliable supply of water to both protect the health of the ecosystem and satisfy current and future water demands.

Minimum Flows and Levels. Florida law directs the SFWMD to set [minimum flows and levels \(MFLs\)](#) to prevent significant harm to water resources. The SFWMD will continue to establish MFLs for the ecosystem's priority water bodies. The Priority Water Body List and Schedule is prepared annually approved by the Governing Board and then submitted to FDEP for review and approval. Once MFLs, water reservation or restricted allocation areas rules are adopted, they are implemented through the SFWMD's consumptive use permitting and water supply planning program.

**Table 7: Subgoal 3-C: Provide Sufficient Water Resources for the Built and Natural Systems
Comprehensive Status July 2012–June 2014**

Objective	Projects	Status
<p><u>Water Supply Plans</u> Objective 3-C.1: Plan for regional water supply needs.</p>	<p>Regional Water Supply Plans [Project ID 3800]</p>	<p>Reports: The LWC Update was completed in 2012; LEC Update was completed in 2013 and the LKB is anticipated to be approved in September 2014. The draft CFWI RWSP was acknowledged by the Governing Board in May 2014. Work on the Solution Document is underway and is expected to be completed in the summer of 2015.</p>
<p><u>Water Conservation and Reuse</u> Objective 3-C.2: Increase volumes of reuse on a regional basis.</p>	<p>C&SF: CERP South Miami-Dade County Reuse [Project ID 3900]</p>	<p>Planning: Local governments have conducted advanced treatment pilot studies to assess feasibility of using reclaimed water for restoration. As a result of reduced water demands, cost effectiveness and the economic downturn, no additional work related to use of reclaimed water for wetland restoration is underway. Alternative reuse strategies involving the Floridan aquifer appear more cost effective.</p>
<p><u>Alternative Water Supply Development</u> Objective 3-C.3: Increase water made available through the state's Water Protection and Sustainability Program and the SFWMD Alternative Water Supply Development Program.</p>	<p>Alternative Water Supply Grant Program [Project ID 4000]</p>	<p>Implementation: 21 projects funded in FY2012, 2013 and 2014.</p>

SUBGOAL 3-D: REDUCE INVASIVE EXOTIC SPECIES PATHWAYS ORIGINATING FROM THE BUILT ENVIRONMENT

The control of invasive exotic species is integral to the restoration of the South Florida Ecosystem, including America's Everglades and the recovery of threatened, endangered, and other imperiled species. At the same time, the continuing degradation of the natural environment may enhance the spread or the rate of spread of exotic species, making timely restoration all the more critical.

The Task Force has been engaged in invasive exotic species impacts for more than a decade. During this 2012-2014 reporting period, the Task Force asked that a Strategic Action Framework be developed to better address the impacts of invasive exotics in South Florida. This Subgoal 3-D has been added, for the first time, to this reporting cycle of the Biennial Report and Strategic Plan to incorporate information from the Framework process (see page 29 Subgoal 2-B for more details).

A significant number of pathways for the introduction of invasive exotic species originate from the built environment. In some cases it is a well-intentioned pet owner releasing an unwanted pet, unaware of the damage that can be done when populations of exotic species become established in south Florida. Others plant prolific exotics that are low maintenance from a landscaping perspective, not realizing that the very thing that makes these plants easy to grow also makes them potentially invasive. Some species find their way in through our ports or even through interstate mail. Increasing awareness of the impacts such decisions and practices have on the South Florida Ecosystem will help to reduce pathways into our natural areas.

A better understanding of pathways can lead to more robust and effective measures that prevent introductions before they produce significant economic and ecological damages, while simultaneously protecting safe commerce. Securing current and potential pathways will require enhanced import screening, a component of Subgoal 2-B.1 (see page 29). In addition to screening, public outreach and education, best management practices, and partnerships are important to reducing introductions of invasive exotic species from the built system pathways.

A Significant Number of Species Are Introduced Through the Built Environment. Preventing Species Entering through these Pathways is Critical to Future Success.

Improved Reporting and Coordination

Development of the Framework began in September 2013 and was approved in November 2014. What has been learned thus far has been incorporated into this 2012-2014 biennial report. Improvements to the organization of Subgoal 2-B and this new Subgoal 3-D have been incorporated into this reporting cycle. This reporting period will be an interim attempt to incorporate as much of the information possible that supports Subgoals 2-B and 3-D. Additional Framework development, including action steps, will help future reporting be more comprehensive and strategic.

Objective 3-D.1: Increase awareness of the impacts of invasive exotic species on south Florida's environment, economy, culture, and human health.

Policy/Regulatory Framework

- [The Miami-Dade County Comprehensive Development Master Plan](#)

Implementation Approach

Several initiatives have been developed to increase awareness of the impacts of invasive exotic species including Pet Amnesty Day events, the Everglades Non-Native Fish Roundup, a reporting hotline and data base, outreach to ENP visitors, educational curriculum such as, the Don't let it Loose Guide, and participation in conferences and workshops by ECISMA and associated agencies, and outreach activities associated with individual species.

SUBGOAL 3-D: REDUCE INVASIVE EXOTIC SPECIES PATHWAYS ORIGINATING FROM THE BUILT ENVIRONMENT

Objective 3-D.1: Progress and Status at a Glance:

2012 – 2014:

- **Pet Amnesty days and the Hotline (1-800-I'veGot1)**- A total of 711 pets were surrendered through both programs, keeping them from being introduced and potentially establishing a population or adding to an existing population into the natural system.
- **Hotline Reports** During this reporting period, over 7,000 reports have been received including those from the hotline and EDDMapS, the online data reporting site.
Everglades Non-native Fish Roundup In May 2014, the fifth Annual Non-Native Fish Round Up was held. There were 55 people registered across the three counties. 580 pounds of invasive fish were caught including a new exotic fish called the Marbled-Pin Catfish (*Leiarus marmoratus*).
- **EEL Volunteer Workdays** The Miami-Dade County Environmentally Endangered Lands Program hosts at least 15 volunteer workday events annually, attracting 1,000's of volunteers who remove invasive exotic species, plant trees, maintain trails, remove refuse and debris, and conduct other restoration tasks. Volunteers learn to identify native species, and remove invasive exotic species. The EEL Program hosted 2,227 citizen volunteers from July 2012 to March 2014 at 29 Volunteer Workday Events.
- **Southwest CISMA** planned 13 Outreach Events and approximately, 3000 people reached and approximately 300 professionals trained to identify and in some cases remove invasive exotic reptiles. They also held an Exotic Pet Amnesty Day, approximately 15-20 exotic animals surrendered and adopted out.



Giant African land snail



Ambrosia Beetle



Oxyops vitiosa

SUBGOAL 3-D: REDUCE INVASIVE EXOTIC SPECIES PATHWAYS ORIGINATING FROM THE BUILT ENVIRONMENT

Objective 3-D.2: Continue existing and develop new partnerships that focus on reducing pathways.

Policy/Regulatory Framework

- [Everglades Cooperative Invasive Species Management Area \(ECISMA\) MOU](#)
- SWCISMA MOU

Implementation Approach

Pathways can be from ports, pet owners, accidentally carried on equipment or tools, or other accidental releases. In many cases we can help reduce pathways by partnering with other agencies and private organizations. Partnerships with the Pet Industry help spread the word about being a responsible pet owner. Outreach to boating groups help reduce the spread of aquatic hitchhikers. Initiatives to inform travelers at airports also increase awareness about bringing in items that could cause harm to both natural and built environments, including the economy. Inter-agency partnerships such as ECISMA and the Task Force, help define and coordinate the message so it can be incorporated into all the partner agencies outreach efforts.

Objective 3-D.2: Progress and Status at a Glance:

2012 – 2014:

- The Don't Pack-a-Pest program recognition increased by 23% according to repeated surveys.

SUBGOAL 3-D: REDUCE INVASIVE EXOTIC SPECIES PATHWAYS ORIGINATING FROM THE BUILT ENVIRONMENT

Discussion

The Everglades Cooperative Invasive Species Management Area (ECISMA), a cooperative interagency effort to manage and control exotic species has continued its focus on early detection and rapid response of emerging threats. Since its inception, the group has achieved much progress toward improved coordination and cooperation among those engaged in invasive species management in the Everglades. These accomplishments include development of regional monitoring programs, standardization of data management, completion of numerous rapid response initiatives, and enhanced coordination of management and research activities, in addition to continued coordination and collaboration on long-term management efforts for melaleuca, Old World climbing fern, and other widely established species.

Don't Pack-a-Pest Partnership (DPAP), Working in collaboration with airlines and airports, notable accomplishments include the production of a 60-second video, signage and promotional materials for multiple uses and broad distribution. The video is displayed on monitors in the passport control areas at 20 U.S. international airports through Custom and Border Patrol's Model Ports Program with the potential to reach 85% of international travelers into the U.S. The video was also aired for over a year on American Airlines flights as part of the NBC Universal American programming. Over 350 signs are displayed at Miami International Airport, Fort Lauderdale/Hollywood International Airport, Port of Miami, Port Everglades, Orlando International Airport, two international airports and a cruise port in Jamaica, two airports and a cruise port in the Dominican Republic, and ports of entry in San Juan, Puerto Rico and the U.S. Virgin Islands. Plans to launch the program in the Cayman Islands are set for July 2014. A survey of 480 international travelers at Miami International Airport was conducted to gauge travelers' awareness of the DPAP program. Results indicated that 39% of the travelers surveyed had seen the signs, and of those, 85% understood why it was important to declare agricultural items. The survey was repeated in September of 2013 and the program recognition had increased by 23%.

Habitattitude. Habitattitude is a national campaign developed by the Aquatic Nuisance Species Task Force and its partner organizations designed to unify government and interested parties to speak with one voice and to empower target audiences to become part of the solution by promoting their prevention behaviors. The U.S.FWS serves as the lead federal agency, and the partnership has the significant support and involvement of two different, but related sectors; the pet and aquarium trade, represented by the Pet Industry Joint Advisory Council, and the nursery and landscape industry. Two key players are NOAA's National Sea Grant College Program and state fish and wildlife agencies.

Habitattitude is a proactive campaign addressing:

- Habits: Ensure that pets are thoughtfully chosen and well-cared for;
- Habitats: Protect the natural environment from the impacts of unwanted pets; and
- Attitudes: Help pet owners find alternatives to the release of their pets.

Habits + Habitats + Attitudes = Habitattitude

Habitattitude inspires and educates people to be both responsible pet owners and environmental stewards, minimizing the impact of invasive species concerns on the environment, economy, and human health.

SUBGOAL 3-D:REDUCE INVASIVE EXOTIC SPECIES PATHWAYS ORIGINATING FROM THE BUILT ENVIRONMENT

**Table 8: Subgoal 3-D: Reduce invasive exotic species pathways originating from the built environment
Comprehensive Status July 2012–June 2014**

Objective	Projects	Status
<p>Outreach and Education</p> <p><i>Objective 3-D.1: Increase awareness of the impacts of invasive exotic species on south Florida’s environment, economy, culture, and human health.</i></p>	<p>Miami-Dade County Environmentally Endangered Lands Program-Volunteer Workdays [Project ID 4200]</p>	<p>Implementation: The EEL Program’s Volunteer Workdays and other volunteer events run from September through June of each year, with occasional summer projects, within EEL Preserves. The EEL Program hosts at least 15 events annually, attracting over 1,000 volunteers per year who plant trees, maintain trails, remove refuse and debris, eradicate invasive exotic species, and conduct other restoration tasks. In exchange for their service, volunteers are provided an opportunity to visit natural areas that are typically not accessible to the public, to learn to identify native species, to learn how to identify and eradicate invasive exotic species and to receive guided tours by naturalists and land managers.</p>
	<p>Everglades Non-Native Fish Round Up [Project ID 4201]</p>	<p>Implementation: In May 2014, the fifth Annual Non-Native Fish Round Up was held. There were 55 people registered across the three counties. 580 pounds of invasive fish were caught including a new Exotic fish called the Marbled-Pin Catfish (<i>Leiarium marmoratus</i>).</p>
	<p>Zoo Miami/Miami-Dade County Invasive Species Outreach and Educational Programs [Project ID 4202]</p>	<p>Implementation: These multiple outreach and educational programs concerning invasive species will continue in perpetuity as part of our mission. As the Conservation and Research Department expands its programs for invasive species control, more outreach opportunities will be developed and expanded.</p>
	<p>Public Outreach to Support Containment Efforts [Project ID 4203]</p>	<p>Implementation: University of Florida has been coordinating invasive species outreach efforts since 2011 but has not yet received any external funding directed toward this purpose.</p>
	<p>Public Outreach to Support EDRR Efforts [Project ID 4204]</p>	<p>Implementation: University of Florida has been coordinating invasive species outreach efforts since 2011 but has not yet received any external funding directed toward this purpose.</p>
	<p>Public Outreach to Support Prevention Efforts [Project ID 4205]</p>	<p>Implementation: University of Florida has been coordinating invasive species outreach efforts since 2011 but has not yet received any external funding directed toward this purpose (with the exception of a small subaward for website redesign – see below).</p>
	<p>Exotic Pet Amnesty [Project ID 4206]</p>	<p>Implementation: Plans for 6 events a year are underway. Citizens can also call the 888-Ive-Got-1 hotline year round to surrender unwanted nonnative pets. Funding provided through a grant from Everglades National Park is supporting the program through 2015. Following the end of grant funding, FWC will be searching for additional partnerships to help support this program and staff.</p>
	<p>Exotic Species Reporting Hotline and Database Maintenance [Project ID 4207]</p>	<p>Implementation: This program continues and will be funded particularly by a grant from the DOI Everglades National Park up to 2015. After the grant expires, the FWC will be looking at current budget and staffing to assume the full costs of the hotline.</p>

SUBGOAL 3-D: REDUCE INVASIVE EXOTIC SPECIES PATHWAYS ORIGINATING FROM THE BUILT ENVIRONMENT

**Table 8: Subgoal 3-D: Reduce invasive exotic species pathways originating from the built environment
Comprehensive Status July 2012–June 2014**

Objective	Projects	Status
<p>Outreach and Education <u>Continued</u></p> <p>Objective 3-D.1: Increase awareness of the impacts of invasive exotic species on south Florida's environment, economy, culture, and human health.</p>	SW Florida CISMA outreach [Project ID 4208]	Implementation: 13 Outreach Events planned, approximately, 3000 people reached. Three Professional Trainings/Workshops, approximately 300 professionals trained.
	ECISMA Outreach [Project ID 4209]	Implementation: ECISMA informs partners, colleagues and environmental professionals about invasive species issues through the annual Everglades Invasive Species Summit. Invasive species education efforts for the general public are realized through the ECISMA website and attendance at a limited number of outreach events .
<p>Partnerships</p> <p>Objective 3-D.2: Continue existing and develop new partnerships that focus on reducing pathways</p>	Travelers "Don't Pack a Pest" Partnership with Airlines [Project ID 4300]	Implementation: Ongoing and expanding into Cayman Island Airport.
	ECISMA [Project ID 4301]	Implementation: Ongoing.
	HABITATTITUDE [Project ID 4302]	Implementation: Ongoing.
	SW CISMA Partnership [Project ID 4303]	Implementation: Active Partners: USFWS, Collier County, Lee County, Florida Forestry Service, Florida DEP State Parks, City of Sanibel, UF IFAS, Charlotte County, FFWCC. (www.FloridalInvasives.org/Southwest) Educational materials: CISMA brochure, Kids activity guide, "Don't Let it Loose" stickers and magnets, Kids interactive game: native and non-native species identification.

SYSTEM-WIDE ECOLOGICAL INDICATORS

The Task Force has established a suite of 11 system-wide ecological indicators to assess current ecosystem health and provide a means to track ecosystem response to restoration. This suite of system-wide ecological indicators and the green-yellow-red “stoplight” graphics were developed specifically as a communication tool to provide a big picture view of the ecosystem’s health and response to restoration in a non-technical format. The system-wide ecological indicators and stoplight illustrations provided herein represent just a summary of broader and more detailed science assessments available in companion reports including the 2014 System-wide Ecological Indicators for Everglades Restoration, RECOVER’s 2014 Systems Status Report, and SFWMD’s 2014 South Florida Environmental Report.

Details of the process for developing each indicator were published in a special issue of the scientific journal [Ecological Indicators \(Volume 9, Supplement 6, November 2009\)](#). The process for selecting the indicators and an explanation of how the indicators relate to other factors being monitored was described in previous biennial reports. The suite of system-wide ecological indicators was chosen for its collective ability to comprehensively reflect ecosystem response to restoration in terms of space and time (Table 1). For example, periphyton responds to change very rapidly at both small and large spatial scales while crocodylians respond more slowly to change at intermediate and large spatial scales. As indicators, they cover different aspects of the ecosystem.

This report differs somewhat from the 2012 report. The indicator sections have been shortened to show only composite results for the previous reporting period (WY2012) and the current reporting period (WY2014). Readers looking for more detailed information on regional status and changes will find it within the full report ([See 2014 System-Wide Ecological Indicator Report](#)). Newly included are four case studies that show how ecological indicators are responding to smaller scale operations and restoration actions. These case studies help to show us where ecological responses are consistent with what we think we know and with our plans for restoration.

Table 1 System-wide Ecological Indicators

- Invasive Exotic Plants
- Lake Okeechobee Nearshore Zone Submerged Aquatic Vegetation
- Eastern Oysters
- Crocodylians (American Alligators and Crocodiles)
- Fish & Macroinvertebrates
- Periphyton
- Wading Birds (White Ibis & Wood Stork)
- Southern Coastal Systems Phytoplankton Blooms
- Florida Bay Submersed Aquatic Vegetation
- Juvenile Pink Shrimp
- Wading Birds (Roseate Spoonbill)

Hydrologic Context for Water Years 2013 and 2014

The following discussion provides a basic introduction to the south Florida water cycle and a basic description of conditions during the reporting period: Water Years 2013 (May 1, 2012 to April 30, 2013) and 2014 (May 1, 2013 to April 30, 2014; Fig. 1). A more detailed discussion of south Florida hydrology is available in the 2014 System-wide Ecological Indicators for Everglades Restoration report.

The Everglades has a hydrologic cycle, also called a water cycle, uniquely its own. Throughout most of the continental United States to the north, water levels generally rise and fall in tune with the four seasons. There, water levels typically peak during the spring as snow melts and front-driven storms move through, and ebb in the fall at the end of the hot summer stretch. The water cycle of subtropical south Florida and the Everglades, however, is fueled by only two seasons, wet and dry, leading to a reversal of its seasonal high and low water marks. In contrast with conditions to the north, water levels in the Everglades peak in the fall, coinciding with the end of the wet season, and ebb in the spring, coinciding with the end of the dry season when large expanses of wetlands dry out.

SYSTEM-WIDE ECOLOGICAL INDICATORS

Summer Wet Season

The wet season begins in late spring, usually around Memorial Day. It is characterized by consistently hot and humid weather, the daily buildup of spectacular cumulonimbus cloud formations, and resultant heavy thunderstorms that are often local and short term in nature. Other larger systems—including early season storms enhanced by lingering spring-time instability in the upper atmosphere, mid-latitude cyclones, and tropical storms—periodically spike the Everglades with regionally expansive rains.

In response to these meteorologic inputs, the Everglades become flooded with an ankle- to waist-deep, slow-moving pool of water through summer and fall, leaving only the highground tree islands and hardwood hammocks above water. The term sheet flow is used to describe this shallow and spatially expansive wetland plain that, unlike a lake or bog, flows like a stream, only much more slowly, almost imperceptibly slow to the human eye. Spanning from horizon to horizon, this sheet of water flows south through a maze of tree-island-dotted ridges and sinuous low-lying sloughs, giving rise to the name River of Grass coined by Marjory Stoneman Douglas in 1947.

Winter Dry Season

The weather turns mild during the winter half of the year, marking an end to the regular buildup of afternoon thundershowers and tropical storms and thus initiating the dry season, an approximate 6- to 7-month period dominated by a slow shallowing of standing water. As the dry season ensues, more and more land emerges. Water first recedes from the highest perched pine and other tree islands. Drainage of the marl prairies follows next, leading to an eventual retreat of water into the lowest-lying sloughs and marshes. The rate of recession may be slowed or even temporarily reversed by sporadic winter rains that are

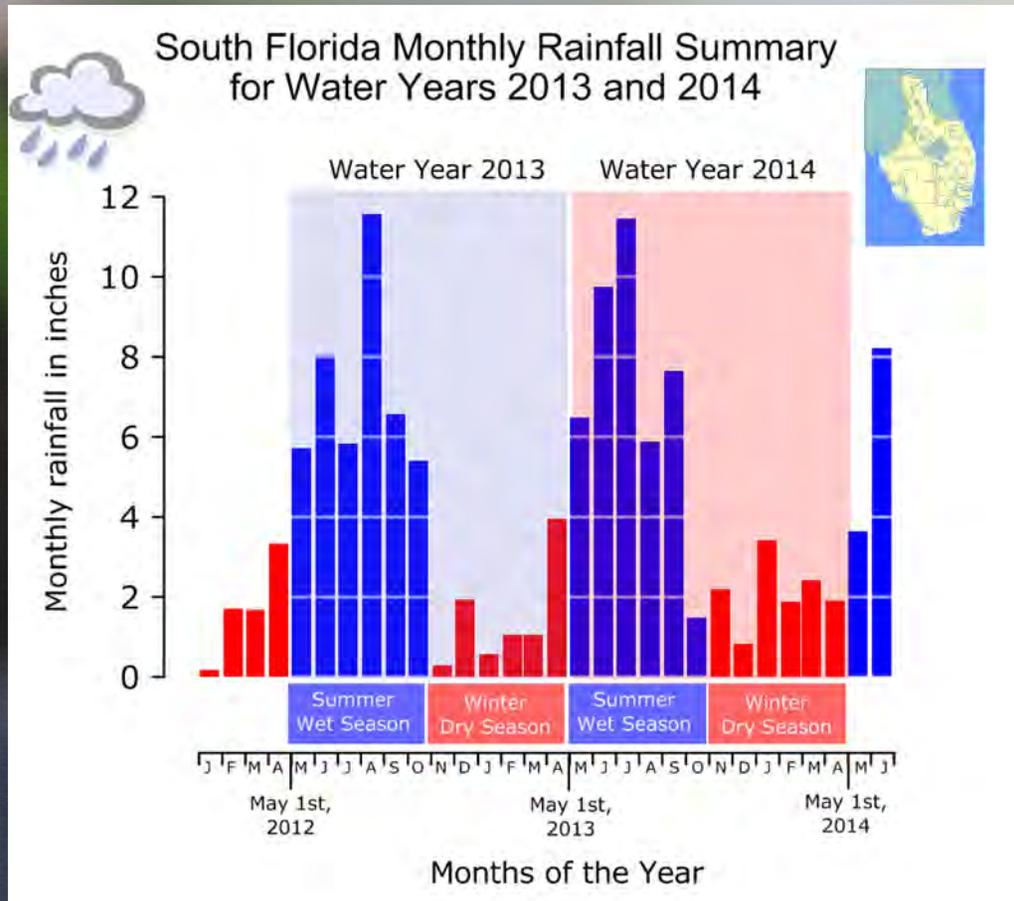
typically brought on by the descent of cold continental air masses from the north. Lower winter evaporation rates also hinder the rate of recession, though it rapidly picks up again in spring as daylight hours and air temperatures increase.

Although south Florida is generally considered a wet area by merit of its abundant average annual rain total of 52 inches (with a 70/30 percent wet/dry season split) and its often flooded wetland views, drought and wildfire play vital roles in maintaining the region's unique assemblage of flora and fauna. The ecological health of the Everglades is intimately tied to seasonal and inter-annual fluctuations of the water cycle and is impacted by a combination of:

- Natural processes
 - Rainfall
 - Evaporation
 - Overland flow
 - Groundwater infiltration
- Climatic oscillations
 - El Niño/La Niña
 - Climate change
- Water management manipulation purposes associated with operation of the Central and Southern Florida (C&SF) project and other drainage works for:
 - Flood protection
 - Urban and agricultural water supply
 - Environmental protection

Each water year is different in the Everglades, and the hydrologic cycle is characterized by large interannual variation – in other words, seldom do we experience average years. The previous two years are summarized next.

SYSTEM-WIDE ECOLOGICAL INDICATORS



Water Year Summaries

Water Year 2013 (May 1, 2012 to April 30, 2013)

In contrast to dry-season soaked Water Year 2010 and wet-season parched Water Year 2011 (61 and 40 inches annual rain, respectively), Water Year 2013 fell squarely in the normal range with 52 inches of rain, much like Water Year 2012. However, the beginning and end of the wet season were wetter than normal, which increased water levels early in the season and maintained them well into the fall (Fig. 1).

Rain from Hurricane Isaac's feeder bands drenched the east coast of Florida in August 2012 and caused urban flooding, and also saturated the Kissimmee River, Lake Okeechobee, and Water Conservation Areas 1 and 2. Rains from Isaac elevated the stage (water level) of Lake Okeechobee 4 feet in the 5 weeks that followed (Fig. 2), nearly matching the rate and height of a similar water-level rise in the aftermath of Tropical Storm Fay in Water Year 2009.

Because water levels were so low prior to August, Hurricane Isaac did not trigger appreciable flood-control releases to Florida's east or west coast. Many areas of the Everglades sustained their highest summer water levels since Water Year 2009. Benefiting from ample summer storage, the dry season saw water levels recede at a fairly steady rate—a condition initially conducive to wading bird foraging and nesting—before ending in April/May on a bit of a wet note {See wading bird section page 75}.

Figure 1. Summary of monthly rainfall in water years 2013 and 2014 throughout the South Florida Water Management District. The graph was produced using daily rainfall data provided by the SFWMD. SFWMD meteorologists compute a daily rainfall value for the fourteen major basins and district wide from rain gage measurements. See <http://www.gohydrology.org/p/about.html> for more information.

SYSTEM-WIDE ECOLOGICAL INDICATORS

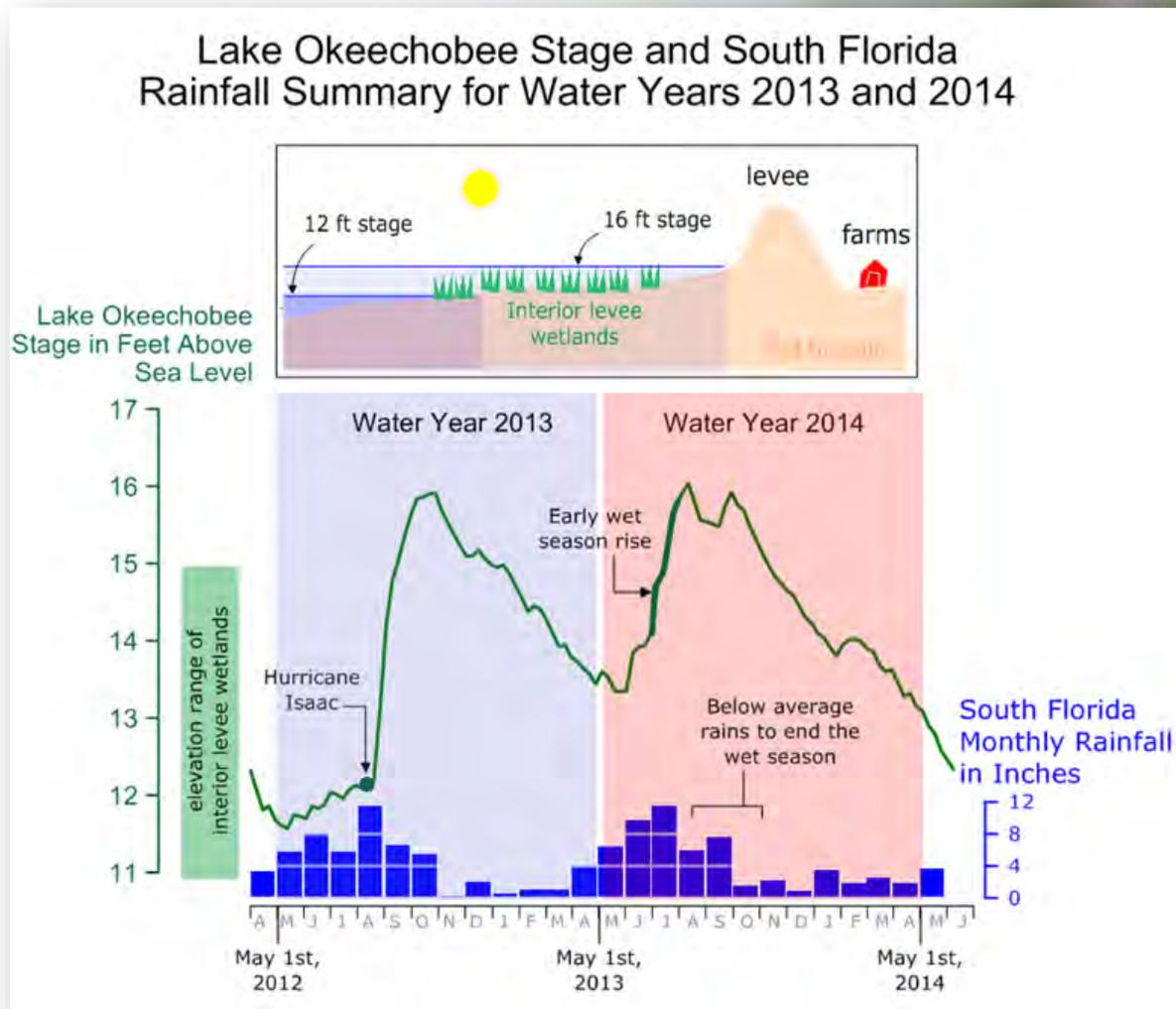


Figure 2. Lake Okeechobee stage and summary of monthly rainfall in the South Florida Water Management District in water years 2013 and 2014. Daily rainfall data provided by the South Florida Water Management District. District meteorologists compute a daily rainfall value for the fourteen major basins and district wide from rain gage measurements. See <http://www.gohydrology.org/p/about.html> for more information.



SYSTEM-WIDE ECOLOGICAL INDICATORS



Water Year 2014 (May 1, 2013 to April 30, 2014)

Rainfall in WY2014 was above average (56 inches compared to a 52 inch average) and an unusually wet spring (rains in April and May were double the average) followed by above-average rains in June and July set the stage for the quickest and highest water level start of the summer wet season south Florida had seen in years (Fig. 2). Lake Okeechobee grabbed headlines by rising to just a few inches shy of its record high for August, a condition that prompted water managers to open the lake's flood gates for relief in anticipation of hurricane season.

Flows gushed down the Caloosahatchee and St. Lucie rivers at their highest rate since Hurricane Wilma in Water Year 2006. Totalling 2.5 and 0.7 million acre-feet in the Caloosahatchee and St. Lucie rivers, respectively, as measured at their downstream control points, these high flows, coupled with significant discharge from the local drainage basins, disrupted the delicate estuarine salinity balances and contributed to damaging algal blooms and mortality of oysters {See oyster indicator page 71}. It should be noted that the release volume was not commensurate with similar lake stages from a decade ago, but instead was partially reflective of recent changes in the regulatory release rules to offer added protection to the ailing perimeter levee around Lake Okeechobee, which is currently undergoing repairs.

Early concerns of tree-island and wildlife-threatening flooding in Water Conservation Area 3A abated as the second half of the wet season fizzled with subpar rains and no tropical storms. Enough water remained in the sloughs, however, to hold winter water levels in check through most of the dry season, other than in the adjacent Big Cypress Swamp to the west - a slightly higher-elevation, cypress-dominated wetland mosaic—where drought- and drainage-exacerbated wildfires ignited and spread.

Photo by Richard Fike

SYSTEM-WIDE ECOLOGICAL INDICATORS

System-wide Ecological Indicators

Helpful Hints for Reading the Indicators

Within the system-wide indicator tables, the “Current Status” column contains the most recent indicator information, which for most indicators is the end of the 2014 water year (May 1, 2013 to April 30, 2014). The “Previous Status” column contains information for water year 2012 (May 1, 2011 to April 30, 2012). Status is shown using green, yellow, and red stoplight colors as explained below.

Stoplight Color Legend

- Red Substantial deviations from restoration targets creating severe negative condition that merits action.
- Yellow Current situation does not meet restoration targets and may require additional restoration action.
- Green Situation is within the range expected for a healthy ecosystem within the natural variability of rainfall. Continuation of management and monitoring effort is essential to maintain and be able to assess “green” status.
- Clear Data have been collected but not processed yet.
- Black No data or inadequate amount of data were collected due to reductions in funding.

INDICATORS AT A GLANCE	Previous Status	Current Status
	WY2012	WY2014
Invasive Exotic Plants	Yellow	Yellow
Lake Okeechobee Nearshore Zone Submerged Aquatic Vegetation	Red	Yellow
Eastern Oysters- Modified (Northern Estuaries only)	Yellow	Yellow
Crocodylians (American Alligators and Crocodiles)- Modified (DOI Lands Only)	Yellow	Red
Fish & Macroinvertebrates (WCA3 and ENP only)	Red	Red
Periphyton - Modified (no species composition)	Yellow	Yellow
Wading Birds (White Ibis and Wood Stork)	Red	Red
Southern Coastal Systems Phytoplankton Blooms- Modified (no southwest shelf)	Yellow	Yellow
Florida Bay Submerged Aquatic Vegetation	Yellow	Yellow
Juvenile Pink Shrimp- Modified (no sampling)	Yellow	Black
Wading Birds (Roseate Spoonbill)	Red	Red

INVASIVE EXOTIC PLANT INDICATOR

STATUS	PREVIOUS (WATER YEAR 2012)	CURRENT (WATER YEAR 2014)
SYSTEM-WIDE	Y	Y

The stoplight color for the invasive exotic plant indicator (Doren et al. 2009) remains yellow for WY2014 due to a combination of positive and negative results among numerous invasive plant species.

Although management success continues for several species, other species are invading and spreading faster than they can be controlled (Rodgers et al. 2014). For example, areas within the Greater Everglades Module containing high densities of melaleuca (*Melaleuca quinquenervia*) declined 73% from 2003 to 2013, but areas with abundant Old World climbing fern (*Lygodium microphyllum*) increased 46% over the same time period (see 2014 System Status Report).

Following hydrologic restoration of the Kissimmee River flood plain, documented invasions of exotic grass species (e.g., West Indian marsh grass (*Hymenachne amplexicaulis*) and limpgrass (*Hemarthria altissima*)) also demonstrate that the spread of invasive species can, in some cases, be directly linked to changes in hydrology (Toth and van der Valk 2012).

Continued progress with biological control efforts, including initiation of the Comprehensive Everglades Restoration Plan (CERP) biological control implementation project, is expected to improve management capabilities for several species in the future. However, limited invasive plant management

funding and the continued establishment of new invasive species are the greatest threats to invasive plant management success.

Literature Cited:

Doren, R. F., J. C. Volin, J. H. Richards. 2009. Invasive exotic plant indicators for ecosystem restoration: An example from the Everglades restoration program. [Ecological Indicators 9S:S29-36](#)

Rodgers, L., D. Black, M. Bodle, and F. Laroche. 2014. [Status of non-indigenous species](#). South Florida Environmental Report.

[2014 System Status Report](#)

Toth, L.A., and A. van der Valk. 2012. Predictability of flood pulse driven assembly rules for restoration of a floodplain plant community. *Wetlands Ecology and Management* 20.1: 59–75.

LAKE OKEECHOBEE NEARSHORE ZONE SUBMERSED AQUATIC VEGETATION INDICATOR

STATUS	PREVIOUS (WATER YEAR 2012)	CURRENT (WATER YEAR 2014)
SYSTEM-WIDE	R	Y

The stoplight color for the Lake Okeechobee Nearshore SAV indicator changed from red in WY2012 to yellow in WY2014 primarily because SAV coverage met the 50% or greater vascular taxa composition performance measure during WY2013 and WY2014. The other part of the measure, total SAV acreage, did not show a consistent increasing trend from WY 2012 to WY2014. Also, some sites in the nearshore region were too deep to sample during WY2014, as the lake stage was at 16 feet NGVD during the annual August SAV survey. Because lake stages during the winter and spring of WY2014 were within the ecologically beneficial zone for SAV, continued increases in SAV coverage are anticipated, barring any impacts from tropical systems or the occurrence of drought conditions.

Annual SAV coverage surveys continue. The long-term data suggest that restoration activities that provide bidirectional water storage in the Lake Okeechobee watershed, thereby allowing the lake to more closely follow the depth and temporal components of the ecological beneficial stage envelope, should enhance SAV coverage and density in the nearshore region.

On the basis of annual SAV coverage data collected since 2000, maintaining lake stage within the ecologically beneficial stage envelope, both in terms of depth and temporal ascension and recession rates, provides the best conditions to maximize nearshore SAV coverage (see Lake Okeechobee Case Study page 82). When lake stages have been too high or low, SAV coverage has declined. However, even with better control of lake stage, periodic events such as tropical storms and droughts will continue to influence nearshore SAV coverage.

Photo by SFWMD

EASTERN OYSTERS (*CRASSOSTREA VIRGINICA*) INDICATOR

STATUS	PREVIOUS (WATER YEAR 2012)	CURRENT (WATER YEAR 2014)
SYSTEM-WIDE (Modified Northern Estuaries only)	Y	Y



Photo by Aswani Bolety

The stoplight color for the eastern oyster (*Crassostrea virginica*) remains yellow for WY2014. This summary reports only on the status of the eastern oyster in the Caloosahatchee Estuary (Northern Estuaries) and not on the oysters in the Lostmans River (Southern Estuaries). While monitoring continued in the Caloosahatchee Estuary, albeit at a reduced scope, oyster monitoring in Lostman's River was discontinued from WY 2012 due to funding limitations.

The oysters in the Caloosahatchee Estuary are still being impacted by excessive amounts of freshwater in summer and insufficient amounts of freshwater in the winter. Although flow down the Caloosahatchee River in WY 2013 was relatively stable, WY 2014 witnessed large releases of freshwater into the Caloosahatchee Estuary from both Lake Okeechobee and the local watershed (See hydrology context on page 63). While oysters at downstream locations survived, oyster populations at the upstream locations (e.g., Iona Cove) suffered total mortality. Excessive amounts of freshwater decrease reproduction, larval recruitment, survival, and growth, while insufficient amounts of freshwater increase disease prevalence and intensity of the oyster pathogen *Perkinsus marinus*, and predation, thereby decreasing the survival of oysters. Disease levels were moderate and density levels of living oysters good in WY 2013, while disease levels and density levels of living oysters were both low due to low salinities prevailing in the Caloosahatchee Estuary during the early summer and fall months.

Intended to minimize extreme fluctuations in salinity, creation of storage areas in the Caloosahatchee Estuary for excess freshwater discharges from Lake Okeechobee may enable survival of oyster populations and result in increased population densities in the Caloosahatchee Estuary. Current conditions do not meet restoration criteria, signifying that this area needs further attention.

CROCODILIANS (AMERICAN ALLIGATORS & CROCODILES) INDICATOR

STATUS	PREVIOUS (WATER YEAR 2012)	CURRENT (WATER YEAR 2014)
SYSTEM-WIDE (Modified DOI lands only)	Y	R

A full system-wide status for crocodilians for WY 2012–WY 2014 cannot be provided because some routes were eliminated when funding was suspended in WY 2012. However, surveys have continued on Department of Interior lands (Arthur R. Marshall Loxahatchee National Wildlife Refuge, Big Cypress National Preserve, Crocodile Lake National Wildlife Refuge, Biscayne National Park, and ENP).

The stoplight color for the crocodilian indicator in the areas listed above has changed to red for WY2014, although positive responses of crocodiles to restoration actions by ENP have occurred around Cape Sable [{See Cape Sable Case study}](#) and the interagency efforts in the C-111 Basin [\(See C111 case study\)](#). In addition, encounter rates of alligators in areas with longer hydroperiods (periods of seasonal flooding) are generally increasing or remaining constant [{See 2014 System-wide Indicator Report}](#) and [2014 System Status Report](#). The change from yellow to red from WY2012 to WY2014 is a reflection of two factors: lower survival rates of juvenile crocodiles in Biscayne Bay and an overall index that has consistently hovered near the threshold between yellow and red.

Data collected during 2004–2014 were used to refine what is known about the relationship between alligators and hydrology, and this information was used to plan for the CEPP. Alligator relative abundance is stable or increasing in areas with longer hydroperiods such as the southwest portion of Water Conservation Area 3, but declining in areas that dry out more frequently such as Water Conservation Area 3A north and northeastern Shark Slough in Everglades National Park downstream of the Tamiami Trail bridge project. Alligators south of the Tamiami Trail bridge project currently have low body condition (are skinnier than target levels) and low relative abundance, but increasing trends in these measures are expected as hydrologic regimes are restored.

Data relating salinity to growth and survival of juvenile crocodiles were used as an ecological planning tool for CEPP, which helped to evaluate alternatives and understand the benefits of the various plans. Analysis of data collected during 1978–2013 within Everglades National Park supports the hypothesis that juvenile survival and growth rates increase with lower salinity levels.



FISH & MACROINVERTEBRATES INDICATOR

STATUS	PREVIOUS (WATER YEAR 2012)	CURRENT (WATER YEAR 2014)
SYSTEM-WIDE	R	R

The stoplight color for the fish and macroinvertebrates assessed in ENP (Shark and Taylor Sloughs) and WCA 3A and WCA 3B remains red for WY2014. This summary is based on the density of all small fish and crayfish collected in monitoring programs using a 1-m² throw trap in these areas. This method effectively captures aquatic animals between 0.5 and 3.5 inches in length, which is representative of key food species for apex predators in the region. Production of these animals is affected by hydrology, nutrient status, and abundance of their predators, but they are particularly impacted by marsh drying events (hydrology). They are assessed by comparison of observed densities to densities predicted based on rainfall for that year. Stoplights are assigned based on how many times densities are above or below rainfall-based values after accounting for key aspects of model uncertainty {See 2014 System-wide Ecological Indicator Report}. This stoplight also incorporates assessment of non-native fish species.



The WY2014 red assessment was based on fewer fish than expected at multiple sites in Shark River and Taylor Sloughs, as well as WCA 3B and WCA 3A north of I-75. Three out of six sites in Shark River Slough had markedly fewer fish than expected based on rainfall, and three of five sites in Taylor Slough. Northeast Shark River Slough and the southern reaches of Taylor Slough (Craighead Pond, for example) dried more than expected based on rainfall, leading to fewer fish than expected. Everglades crayfish were frequently more abundant than expected based on rainfall at the sites where there were too few fish. Thus crayfish increased in frequency in dry conditions.

Non-native fishes have increased in numbers since their decline immediately following the January 2010 cold temperature event. We have observed an increase of non-native fish in Shark and Taylor Sloughs and the ENP Panhandle region, though they have not passed the arbitrary cut-off of 2% that yields a red value for that component of the stoplight. Mayan cichlids remain the most commonly collected non-native fish, though jewelfish are increasing in frequency of capture at some sites. Swamp eels and spotfin spiny eels were also common at times in Taylor Slough.

Persistent patterns of drying in Shark River Slough and Taylor Slough may explain a general trend in declining fish and crayfish biomass in these areas. This long-term trend is observed after accounting for annual drying events and may be the result of a loss of recovery capacity in communities experiencing recurrent disturbances. This is discussed in more detail in the [RECOVER System Status Report](#).

STATUS	PREVIOUS (WATER YEAR 2012)	CURRENT (WATER YEAR 2014)
SYSTEM-WIDE (Modified—no species composition)	Y	Y

The spotlight color for the modified periphyton indicator remains yellow for WY2014. The periphyton indicator could not be calculated as originally developed because of funding limitations beginning in WY 2012 (see system-wide indicator report). The modified indicator includes periphyton quality (a reflection of total phosphorus (TP) and biomass only). The yellow status was assigned again because some sites still show altered or cautionary conditions. However, in WY2014 periphyton quality and biomass values showed improvements relative to previous years. The sampling sites with lower periphyton quality (sites with higher TP concentrations, or enriched sites) were clustered near the L-67 canal, the central Water Conservation Area 3A flowpath, and near canal boundaries of Water Conservation Areas 1 and 2A. Several sites in coastal areas had lower periphyton quality, possibly driven by marine sources of phosphorus. An early onset of the 2014 wet season may have caused an earlier flushing of nutrients accumulated in the prior dry season relative to prior years. An improved indication of water quality problems provided by species composition data was not possible again in WY2014.

The thresholds used for quality and biomass metrics were refined from data that have been collected for nearly a decade for the periphyton mapping program. In addition, the utility of the quality, biomass, and composition metrics were compared and relationships to phosphorus loading from boundary canals were determined (Gaiser et al. in press). The species compositional metric, discontinued in WY2012, improves detection of water quality improvement or

impairment by more than 20% because the ratio of weedy to native diatoms is the most sensitive of the three metrics to changes in TP concentration exposure. Wet season compositional values for the 6 years of record are highly correlated with flow-weighted mean TP concentrations at inflow structures. The high correlation between inflow concentration and condition status across each wetland is surprising, since it includes locations well to the interior. The full interpretation of the periphyton metric for marsh impairment must consider inflow and legacy TP, local biogeochemical processes and other factors (hydroperiod, soil compaction and subsidence) influencing periphyton ecology. Analysis at the PSU level may resolve interpretation of sources for impairment. The compositional metric was also the key meaningful metric in an analysis of edibility for key aquatic prey species (Trexler et al. in press). These data and findings were also reported in the [2014 System Status Report](#) (Section 3 B) and are being used to support models for synthesis efforts.

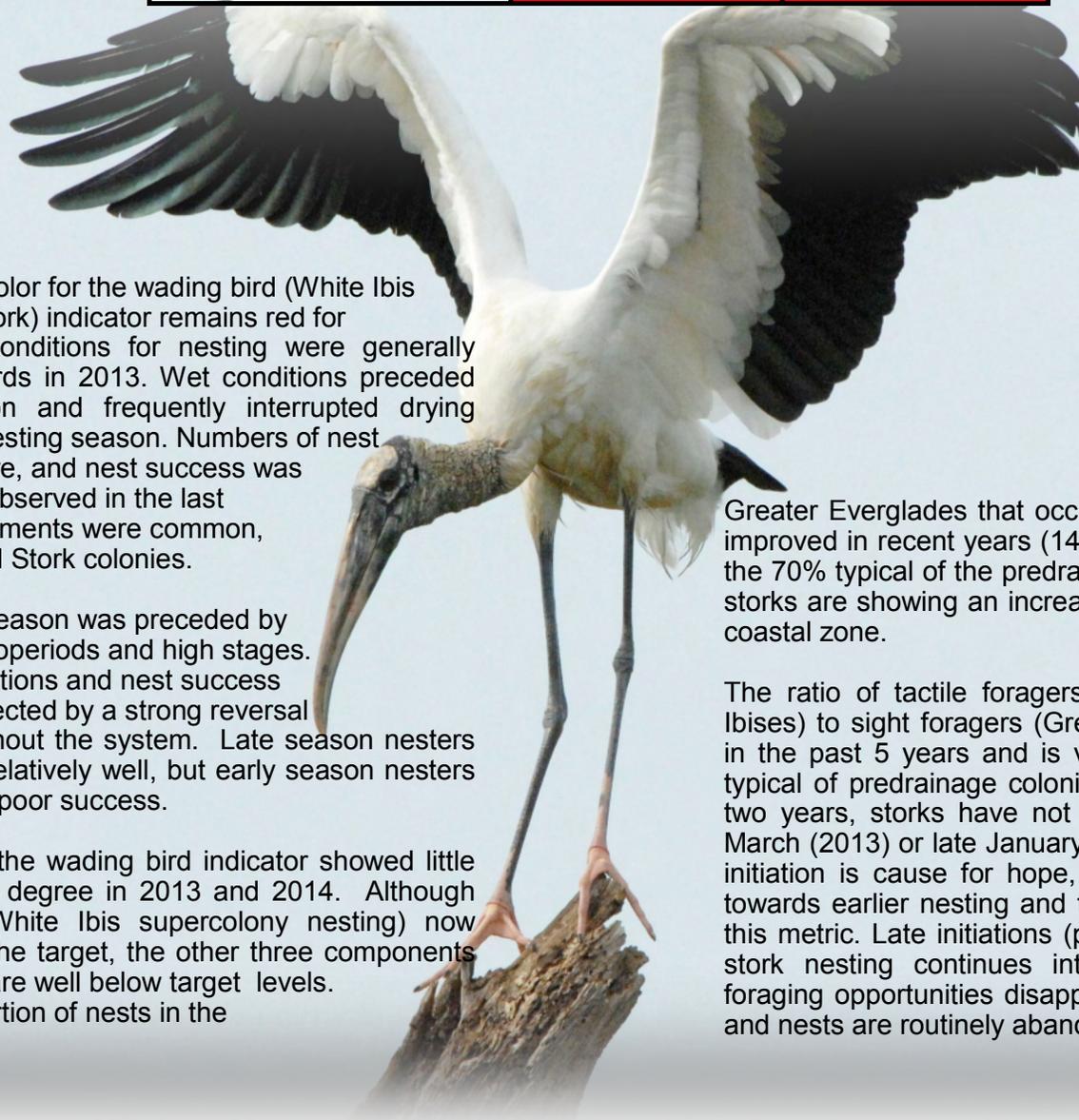
Literature Cited:

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WADING BIRDS (WOOD STORK & WHITE IBIS) INDICATOR

STATUS	PREVIOUS (WATER YEAR 2012)	CURRENT (WATER YEAR 2014)
SYSTEM-WIDE	R	R



The stoplight color for the wading bird (White Ibis and Wood Stork) indicator remains red for WY2014. Conditions for nesting were generally poor for wading birds in 2013. Wet conditions preceded the nesting season and frequently interrupted drying trends during the nesting season. Numbers of nest starts were mediocre, and nest success was among the lowest observed in the last 10 years. Abandonments were common, particularly at Wood Stork colonies.

The 2014 nesting season was preceded by favorably long-hydroperiods and high stages. However, nest initiations and nest success were negatively affected by a strong reversal in February throughout the system. Late season nesters (White Ibis) fared relatively well, but early season nesters (Wood Storks) had poor success.

All components of the wading bird indicator showed little change in trend or degree in 2013 and 2014. Although one component (White Ibis supercolony nesting) now routinely exceeds the target, the other three components remain stable and are well below target levels. Although the proportion of nests in the

Greater Everglades that occurs in the coastal zone has improved in recent years (14 – 21%), it remains far from the 70% typical of the predrainage period. Nonetheless, storks are showing an increased tendency to nest in the coastal zone.

The ratio of tactile foragers (Wood Storks and White Ibises) to sight foragers (Great Egrets) has shifted little in the past 5 years and is very far from the 30:1 ratio typical of predrainage colonies. Finally, during the last two years, storks have not initiated nesting until early March (2013) or late January (2014). While the January initiation is cause for hope, there is little trend overall towards earlier nesting and therefore, progress towards this metric. Late initiations (post-December) means that stork nesting continues into the wet season, when foraging opportunities disappear with rising water levels and nests are routinely abandoned.

SOUTHERN COASTAL SYSTEMS PHYTOPLANKTON BLOOMS INDICATOR

STATUS	PREVIOUS (WATER YEAR 2012)	CURRENT (WATER YEAR 2014)
SYSTEM-WIDE (Modified—no southwest shelf, reduced sampling frequency)	Y	Y

The stoplight color for the Southern Coastal Systems (SCS) phytoplankton blooms indicator remains yellow for WY2014. The status of phytoplankton blooms in the SCS (an indicator of water quality) remained consistently above the desired baseline from WY2012 through WY2014. These increases warrant attention, particularly in Biscayne Bay where a widespread and unprecedented phytoplankton bloom was observed in the summer of 2013. This bloom resulted in all sub-regions of Biscayne Bay being assigned an undesirable red status for WY2014.

As of WY2012, water quality was not sampled in the offshore regions of the southwest Florida shelf. This sub-region is directly upstream from the Florida Keys National Marine Sanctuary. Furthermore, sampling frequency elsewhere (except Biscayne Bay) decreased from monthly to bimonthly since late 2011, decreasing our capability to detect blooms.

The slightly elevated yellow status of phytoplankton blooms in the areas of the SCS outside of Biscayne Bay (Florida Bay and the southwest Florida coastal zone) is likely a result of increased rainfall and runoff in these regions and is not a cause for concern. There was no evidence of increases of chlorophyll a or phytoplankton blooms in the C-111 project area before or after project completion, a positive sign.

In Florida Bay, phytoplankton bloom status was in the yellow range from WY2012 through WY2014. One area of concern was in northeastern Florida Bay, where the phytoplankton bloom indicator increased steadily from WY2009 through WY2013, with the value in WY2013 being the highest since 1994 and just below the boundary of a red condition. Because this region is downstream of the C-111 Spreader Canal Western Project area and this project became operational early in WY2013 ([see C111 Case study](#)), these bloom conditions raised a question of whether these operations caused a downstream water quality problem. However, based on the increasing bloom indicator trend pre-dating these operations and the occurrence of increased rainfall and runoff in the project area in WY2013, a negative project effect cannot be strongly inferred. It is also notable that the indicator value improved in 2014, although it still was in the yellow range.

Investigation of the underlying causes of the increased phytoplankton blooms in Biscayne Bay should be a top priority. In addition to an unprecedented phytoplankton bloom in Biscayne Bay in WY2014, there has been a significant linear increase in chlorophyll a concentrations throughout Biscayne Bay over the past 20 years. Moreover, benthic macroalgae in Biscayne Bay are increasing and replacing seagrass (Collado-Vides et al. 2013). Without understanding the cause(s) of this water quality degradation, efficient mitigation actions that are likely necessary to improve water quality and return phytoplankton blooms in this area to their baseline conditions cannot be proposed.

Literature Cited:

Collado-Vides, L., C. Avila, S. Blair, F. Leliaert, D. Rodriguez, T. Thyberg, S. Schneider, J. Rojas, P. Sweeney, C. Drury, and D. Lirman. 2013. A persistent bloom of *Anadyomene* J.V. Lamouroux (*Anadyomenaceae*, *Chlorophyta*) in Biscayne Bay, Florida. *Aquatic Botany* 111:95–103.

FLORIDA BAY SUBMERSED AQUATIC VEGETATION INDICATOR

STATUS	PREVIOUS (WATER YEAR 2012)	CURRENT (WATER YEAR 2014)
SYSTEM-WIDE	Y	Y

The stoplight color for this indicator remained yellow from WY2012 to WY2014 across Florida Bay. However, improvements have occurred in the Transition Zone and Northeast Zones, reflecting continued improvement since the mid-2000's when hurricanes and a prolonged micro-algal bloom negatively impacted the SAV community.

Despite some incidents of high salinity in recent years, large-scale SAV die-off has not been observed. Some basins reflect one or more of the components of the indicator (abundance or target species) in the fair or poor range and these are being closely monitored. Although the Western Zone remains in good overall condition, there are declines

in some component scores that bear watching. Improvement is required in the Southern Zone which has remained yellow for the last 5 years. It is expected that with continued improvements to hydrology via restoration, increases in these scores may occur in the near-term.



JUVENILE PINK SHRIMP INDICATOR

STATUS	PREVIOUS (WATER YEAR 2012)	CURRENT (WATER YEAR 2014)
SYSTEM-WIDE	Y	B

Funding was suspended in WY 2012. No data available for the WY2014 condition.



WADING BIRDS (ROSEATE SPOONBILL) INDICATOR

STATUS	PREVIOUS (WATER YEAR 2012)	CURRENT (WATER YEAR 2014)
SYSTEM-WIDE	R	R

Overall, the stoplight color for the wading bird (Roseate Spoonbills) indicator remains red for WY2014, though conditions in northeastern Florida Bay (NEFB) appear to be improving while those in northwestern Florida Bay (NWFB) are declining.

Nesting success in NEFB has improved greatly in recent years, probably due to favorable climatic conditions and to communication of researchers with operations managers at the SFWMD during nesting season. This communication results in fewer unnecessary disruptions in flow patterns to the foraging grounds in NEFB, leading to greater success. Projects such as the C-111 Spreader Canal Western project are expected to have additional positive effects on NEFB spoonbills and also on their prey.

The cause for the decline in NWFB is not known, but two highly speculative reasons can be put forth. One is that we have observed much more nest predation from crows over the last few years. The second possibility is that intrusion of salt water through the Homestead and East Cape canals has degraded the interior freshwater wetlands of Cape Sable (the primary foraging grounds of NWFB birds) to the point that they are no longer as productive of prey fish species. These canals have since been plugged, but a third canal (Raulerson) has become an uncontrolled tidal canal continuing the degradation started by the Homestead and East Cape canals.

Spoonbill prey data collected from 1990 to 2013 indicates that prey productivity has increased with longer hydroperiods and lower salinity in the mangrove wetlands. The C-111 spreader canal project is expected to lengthen wet-season hydroperiods and lower salinity. Prey availability is dependent on low water levels in the wetlands where spoonbills feed during the dry season. It is not fully understood what effect the C-111 spreader project will have on this metric but increasing sea level may lead to adverse responses to prey availability, resulting in spoonbill nesting failure. Monitoring of spoonbill prey will continue in order to evaluate this uncertainty.

Prey studies in the Cape Sable interior wetlands performed since 2005 also indicate that the plugging of the Homestead and East Cape Canals had a positive effect on both spoonbills and their prey. This response was short-lived (about two years) because of the breaching of Raulerson canal during the 2005 hurricane season and the subsequent size and tidal flow increases from this canal into the interior wetlands that are on-going today. As the size and tidal exchange through this canal gradually increased over the last several years, it has largely masked the beneficial results of the plugging of the other two canals.

A fundamental premise of Everglades restoration is that the ecosystem must be managed from a system-wide perspective. The suite of system-wide ecological indicators was chosen based on their collective ability to reflect the ecosystem in terms of response to restoration over space and time. Their purpose is to report on the general status of the ecosystem as a whole and show how the key ecological components respond to implementation of restoration projects.

The stoplight colors shown in this report for each indicator integrate across all of the areas where that indicator is monitored. This integration includes both areas where restoration actions have occurred and where they have not occurred, thus representing a system-wide view. Because many restoration actions to date have been fairly small-scale, or focused on just one component of the ecosystem, we have not yet seen collective positive trends in the suite of indicators (see indicators at a glance on page 68). There are, however, examples where local restoration actions have resulted in the type of positive ecological responses that we expect to one day see system-wide. We have selected four case studies that illustrate how some ecological indicators are responding to smaller-scale operations or early stages of larger restoration actions. Arranged geographically from the north to south (see project map), they are as follows:

- [Kissimmee River Restoration Project](#)
- [Lake Okeechobee Restoration](#)
- [C-111 Spreader Canal Western Project](#)
- [Cape Sable Canals Restoration](#)



THE KISSIMMEE RIVER RESTORATION PROJECT: A LONG - TERM PROJECT SHOWS PROMISING INTERIM RESULTS

The Kissimmee River Restoration Project (KRRP) is one of the largest and most ambitious river restoration projects in the world (see map). The project, to be completed in 2019, will restore a full suite of ecosystem values to more than 40 square miles of river channel and floodplain habitats at a cost of approximately \$800 million. The restoration will backfill more than 22 miles of the flood conveyance canal that replaced the once naturally meandering, complex river channel, effectively reconnecting approximately 40 miles of historical river channel into one continuous stretch of river. In the restored system, river inflows will be allowed to mimic natural conditions, inundating floodplain habitats in response to season and rainfall.

An intermediate inflow regime has allowed for monitoring of the environmental response of important ecological indicators during the two of four planned phases of backfilling that have been completed so far. Perhaps surprisingly, even though hydrologic conditions do not yet match those of the historical system, dramatic responses are being seen in important ecosystem components.

Monitoring of environmental response is a crucial aspect any restoration project, and the KRRP monitoring plan investigates a suite of 25 performance measures covering physical, chemical, and biological aspects of the ecosystem. Interim monitoring results indicate that restoration targets for some performance measures already have been met. For example, the density of winter wading birds is showing tremendous response to

interim restoration. A target value of 30.6 birds/km² has been achieved in most monitoring periods. In contrast, while a large-scale target for restoration of wetland plants has been met, a finer-scale wetland plant target of re-establishing the broadleaf marsh community across 50% or more of the flood plain has not and will likely require the more complete implementation of historical hydrologic conditions that will accompany project completion.

Demonstrating the interim success of a project of this physical scale and time-frame is vital to maintaining forward momentum both within the technical team and at management and policy level. The interim progress simultaneously illustrates the effectiveness of the investment of resources and makes clear that achievement of the full suite of anticipated benefits is dependent on a continued commitment to project completion and performance measure monitoring.

For a more detailed version of this case study, see the [2014 System-Wide Ecological Indicator Report](#).

LAKE OKEECHOBEE: LOWERED LAKE REVEALS IMPORTANT ECOLOGICAL LESSONS

Lake Okeechobee and its surrounding wetlands lie at the center of the Greater Everglades watershed that stretches from the Kissimmee River through the Everglades and finally into Florida Bay (see map). Lake Okeechobee provides natural habitat for fish, wading birds, and other wildlife, and is also a key component of south Florida's water supply and flood control systems. The lake's health has been threatened in recent decades by excessive inflow of nutrients from agricultural and urban activities and also by harmful high and low water levels. Restoration of the lake is a priority within Everglades restoration efforts.

Since 1994 we have had the opportunity to see how ecological conditions in Lake Okeechobee respond to a variety of managed lake stages, hurricanes, and drought. In April 2008, a new and lower lake regulation schedule was implemented for Lake Okeechobee, designed to keep the water level of the lake approximately one foot lower compared to the previous schedule, and even lower than earlier regulations required. As a result, for most of the past 6 years, the Lake level has remained within or below an ecologically preferred range of 12.5 to 15.5 feet above sea level.

The best indicators of habitat quality in a hydrologically restored lake are considered to be emergent aquatic plants in the marsh and submerged aquatic vegetation in the nearshore zone. Generally speaking, the total extent of vegetated acres is a good proxy for environmental conditions of Lake Okeechobee.

Analysis of marsh plant data, collected along transects since 2003, reveals that under lower lake-level conditions, the area of the southern and western shoreline zone colonized by emergent aquatic plants

expanded, as did the nearshore area colonized by submerged aquatic vegetation, resulting in an increase in total vegetated acres in the shoreline and nearshore zones, suggesting an improvement in available habitat. Other taxonomic groups, including periphyton, sport fish, and wading birds are also showing increased abundance under the generally lower lake levels.

Of course, achieving ecologically beneficial lake levels by simply draining large volumes of water from Lake Okeechobee when needed, as currently takes place, entails serious negative consequences for both water supply and for east and west coast estuaries that consequently receive environmentally damaging high flows from the lake. A regional restoration solution is required that will both permanently improve lake levels and protect the estuaries. Bi-directional northern watershed storage to better control lake levels, coupled with additional water projects that improve water quality and allow excess water to once again flow southward through the Everglades ecosystem, are important goals of both the CERP and the CEPP.

For a more detailed version of this case study, see the [2014 System-Wide Ecological Indicator Report](#).





THE C-111 SPREADER CANAL WESTERN PROJECT: SINGLE PROJECT PROMISES BENEFITS TO MANY SPECIES

The C-111 Spreader Canal Western Features Project (Project), which is a component of CERP, was developed to protect and restore the hydrology and ecology of southeastern Everglades National Park (ENP), including Florida Bay. This Project, combined with the earlier C-111 South Dade Project, constructed a nine-mile hydraulic ridge oriented north-south along the ENP eastern boundary to minimize seepage into the C-111 Canal and retain rainfall and natural water flows within Taylor Slough, benefitting up to 252,000 acres of wetlands and coastal habitat. The South Florida Water Management District completed construction of the Project in February 2012 and it became operational in late June 2012.

The Project is anticipated to increase flow in Taylor Slough and decrease discharge out of the C-111 canal through the S-197 structure. The increase in flow through Taylor Slough is expected to result in higher water levels in the Taylor Slough watershed, lower salinities in northern Florida Bay, an expansion of brackish and freshwater submersed aquatic vegetation, greater growth and abundance of the emergent aquatic vegetation community, increased abundance of the freshwater prey-based fish communities, increased nesting success rate for spoonbills, increased growth and survival of juvenile crocodiles, and increased adult crocodile abundance and nesting. Decreased discharge through the S-197 structure will reduce large point-source discharges into Biscayne Bay, which can devastate sessile marine organisms by rapidly lowering salinity.

Water Years 2013 and 2014 (see Hydrology Overview for definition of Water Year) provided the

first opportunities to assess the effect of the Project by examining flows, water levels, and downstream salinity. Flows at Taylor Slough Bridge in 2013 were almost 60 percent greater than the historical average, wet season flows were the highest recorded in the last 20 years, and the ratio of C-111 discharge to Taylor Slough flow was the lowest it has been in 20 years. Salinity levels measured downstream of Taylor Slough in Little Madeira Bay were found to be significantly lower after Project completion. However, because both the regional rainfall and rainfall over the local Project footprint were above average in WY2013, downstream effects cannot yet be conclusively linked to the Project.

With only 1-2 years of post-project data, it is only possible at this point to describe correlations between changes in hydrology, ecological responses, and project implementation. However, with the positive post-project hydrologic conditions cited above, measures of submersed aquatic vegetation, number of prey fish species, spoonbill nesting success rate, and crocodile abundance have all shown signs of improvement. These positive initial results are in keeping with our conceptual models and predictions made in advance of project implementation. Additional years of monitoring will be required to determine the Project's contribution to changing ecological indicators, verify cause-effect relationships, and allow us to more effectively use this information as feedback to Project operations.

For a more detailed version of this case study, see [the 2014 System-Wide Ecological Indicator Report](#).

CAPE SABLE CANALS RESTORATION: CROCODILES AND SPOONBILLS SUGGEST ECOLOGICAL RESPONSE

Restoring more natural patterns of freshwater flow and salinity in coastal estuaries is an important goal of Everglades restoration (refer back to Sub-Goal 1-A, Get the Hydrology Right page 6). As restoration projects are completed, freshwater from upstream areas will be delivered southward through the system. In the meantime, in the Cape Sable and Flamingo area of Everglades National Park, a canal restoration effort has been plugging canals that were built in the early twentieth century. These canals have allowed tidal energy and saltwater to intrude into interior areas where it did not historically occur, causing erosion, marsh degradation, and filling the region's largest lake with sediment. This project gives us a glimpse into a future where ecological improvements will result from restoration actions. Two important species of the area that has been impacted by saltwater intrusion via canals are the American crocodile (*Crocodylus acutus*), which as juveniles are very sensitive to salinity levels, and Roseate Spoonbills (*Ajaia ajaja*), which depend on prey fish sensitive to salinity levels and tidal fluctuations.

Park managers, recognizing the need to address the changes created by the canals, plugged the East Cape, Homestead, and other interior canals in 1956 with earthen dams along the marl ridge to prevent further salt water intrusion and loss of freshwater to tide. Many of these dams eventually failed and a series of restoration efforts using stronger materials has followed over the decades and continues to the present time. The Buttonwood canal in the Flamingo area was plugged with a concrete structure in the mid-1980s and has remained in good condition. Now, many years after the canals were first dug, we have studied crocodiles and spoonbills at Cape Sable and Flamingo, where canal restoration actions were implemented, and compared the results to northeastern Florida Bay, an area which once provided the core habitat of the American crocodile in Florida but which now suffers

from high salinity levels due to the shortage of freshwater flow through the altered system. Monitoring data collected in Florida Bay over recent decades on various aspects of crocodile life-history (occurrence, hatchling survival, growth, and nesting) show a repeating pattern. The animals have fared best in the Buttonwood canal area (where the successfully dammed canal has led to relatively stable lower salinity), next best in the area of other restored canals (including East Cape and Homestead canals where dams have failed and had to be restored over time), and worst in northeastern Florida Bay (where salinity levels have yet to benefit from restoration of freshwater flow). These results lend preliminary support to the hypothesis that restoring the hydrology of an area can result in ecological improvements.

Further, Audubon Florida scientists found that when the East Cape and Homestead canals were repaired in 2011, greatly reducing tidal influence at inland sites, prey availability increased and low salinity species became more prevalent. The number of Roseate Spoonbills that nest and feed near these sites had plummeted following the damaging 2005 hurricane season but began to increase again after the canals were dammed, restoring more natural conditions.

The canal plugging project in Everglades National Park serves to illustrate that even relatively small restoration efforts may produce meaningful ecological results and can serve to inform larger restoration projects. Because crocodiles and spoonbills in Everglades National Park have been monitored for many years, data needed to analyze response to canal restoration were available. Long-term monitoring of salinity, crocodiles, spoonbills, and their prey in these areas is vital to the assessment and fine-tuning of the restoration process. For a more detailed version of this case study, see the [2014 System-Wide Ecological Indicator Report](#).



ADDITIONAL ECOSYSTEM-WIDE EFFORTS

In addition to the programs and projects previously discussed, there are additional restoration efforts underway, some of which are highlighted below.

Comprehensive Everglades Restoration Plan Activities

The single largest component of the Everglades restoration initiative is the CERP. Authorized by Congress in 2000, this plan is vital to getting the water right in the natural system. Implementation of the CERP will provide benefits to the ecosystem's habitats, improve urban and agricultural water supply, and maintain existing levels of flood protection.

As outlined in this report, to date four CERP projects are under construction – (1) Picayune Strand Restoration Project, (2) Indian River Lagoon – South, (3) Site 1 Impoundment, and (4) Melaleuca Eradication and other Exotic Controls. Additionally, four projects have been authorized in WRDDA 2014 – (1) C-43 West Basin Storage Reservoir, (2) C-111 Spreader Canal – Western, (3) Biscayne Bay Coastal Wetlands, and (4) Broward County WPA. The Central Everglades Planning Project (CEPP) was initiated in November 2011 and represents the next phase of CERP planning. CEPP focuses on restoring the flow of clean water through the Central Everglades, with the goal of restoring the “Heart of the Everglades”. The CEPP Chief's Report is scheduled for completion in FY14. For further details on the CERP, please refer to the CERP 2012 Report to Congress.

Independent Scientific Review

In accordance with WRDA 2000, the National Research Council (NRC) [Committee on Independent Scientific Review of Everglades Restoration Progress](#) (CISRERP) was convened to conduct biennial reviews of the CERP. CISRERP is composed of a diverse team of internationally recognized experts in ecosystem restoration science. Although the biennial reviews have recognized the development of good science for the restoration effort, the

committee has recommended the utilization of Incremental Adaptive Restoration (IAR) (2006) and the expeditious implementation of projects that have the most potential for contributing to natural system restoration (2008). The findings from the Committee's fourth biennial review were released in June 2012 and the fifth biennial review was released in June 2014. Their reports have reaffirmed the significant restoration progress has been made, but also that much more needs to be done, including renewing the focus on restoring the flow of water to the central Everglades, better integrating water quality and water quantity components, and increasing the overall pace of restoration. The CEPP addresses the Committee's recommendations. <http://www.nationalacademies.org/nrc/>

Climate Change Coordination

Historic climate variability is a complex interaction of historic daily, monthly, annual, and longer period variations in global weather patterns and ocean currents. Understanding the implications of historic climate variability combined with the potential impacts of ongoing global warming is critical to implementing meaningful restoration and long term sustainability of the Everglades ecosystem. Projected impacts of increases in greenhouse gases include acceleration of the historic rate of sea level rise and related saltwater intrusion, plus changes in temperatures and rainfall, (SFWMD) historic hydrologic patterns, and other related concerns. South Florida, including the Everglades ecosystem, is sensitive to these projected changes because of the exceptionally flat terrain, extremely porous geology, broad areas of peat soils, and the susceptibility of native plants and animals to changes in temperature, humidity, evapotranspiration, and precipitation (all aspects of the hydrologic cycle). A workshop at the 2008 Greater Everglades Ecosystem Restoration conference concluded that it is likely that Everglades restoration will be an important aspect of our adaptation response to climate change. Addressing these challenges and opportunities requires a coordinated intergovernmental approach for development of regional climate change projections and advanced tools to evaluate water resources adaptation strategies for both natural and developed area concerns.

ADDITIONAL ECOSYSTEM-WIDE EFFORTS

Since 2008, there have been many workshops conferences, symposiums, and summits have been organized by local, state and federal agencies together with academic institutions and foundations. Most of these meetings have been focused on sea level rise in coastal developed communities.

Research, Partnerships, and Initiatives

A newly created organization called Florida Climate Institutes have been expanded to include several other universities.

Researchers at the [South Florida Natural Resources Center](#) of ENP, often in collaboration with university and other agency investigators, have published regularly on climate change issues relevant to south Florida's ecology and physical environment. Publications include synthesis reports on ecological implications, computational modeling of species responses, impacts of sea level rise and storm disturbance on coastal plant communities, mangrove response to increasing CO₂, sea level rise, and salt water intrusion and climate variability implications for coastal resources. Through the DOI Critical Ecosystems Studies Initiative, Everglades National Park funds research on climate change that includes topics such as climate modeling of wildlife distributional shifts, soil biogeochemistry responses, mangrove and other vegetation community response, and changes to coastal environments.

The SFWMD has published [two reports](#) on the state of science applicable to south Florida. This work identified several weaknesses of regional climate models and suggested improvements that may be needed before they can be used to evaluate regional restoration projects. The SFWMD is continuing to conduct research and publish on anticipated responses and uncertainties of temperature, precipitation, and south Florida hydrology with climate change.

Florida Atlantic University's Center for Environmental Studies (CES), with active participation from the U.S.GS, Florida Sea Grant, and other local, state, and federal agencies have organized

several workshops/summits to review the state of science and coordinate response activities among agencies. These include:

- (1) [Sea Level Rise Summit](#) and
- (2) Hydrology of the Everglades in the context of climate change (March, 2012). CES is continuing to engage ecologists and will have a follow-up meeting among scientists and restoration managers has been planned for April 2014.
- (3) Predicting Ecological Changes in a Future Climate Scenario (February 2013)
- (4) Recommendations for Everglades Restoration under a Future Climate Scenario (April 2014)

The Rosenstiel School of Marine and Atmospheric Science held a climate change conference in January 2010, with an emphasis on the state of the knowledge on climate change climatology, oceanography, and climate modeling.

The USFWS and the USGS collaborated with urban planners from Massachusetts Institute of Technology (now GeoAdaptive, Inc.) in spatial scenario planning for the case of climate change wildlife adaptation planning. Scenarios varied across four dimensions: climate change, human population change, land & water planning policies, and availability of public resources. Each alternative future simulated climate and land cover change 50 years into the future at three time steps (2010, 2040 & 2060). The work has since (2012 to present) been expanded to all of Florida as a Peninsula Florida Landscape Conservation Cooperative (PFLCC) project.

The PFLCC got underway with steering committee meetings in 2012 and a mission to foster landscape scale conservation to sustain natural and cultural resources for future generations. Since that time, it has developed active programs to integrate existing statewide science with scenario planning and decision support tools. Another major focus of the PFLCC has been in engaging large landowners and identifying paths for encouraging landscape conservation.

ADDITIONAL ECOSYSTEM-WIDE EFFORTS

Florida International University has received a grant from NSF and USDA entitled “[South Florida Water, Sustainability, and Climate](#)” through which implications of both climate change and sea level rise are being addressed through a large collaborative effort involving multiple universities and state/federal agencies. Another entity that is active in climate change and sea level rise research is the Florida [Water and Climate Alliance](#) which is a stakeholder-scientist partnership committed to support decision making in water resources management. In February 2014, the SFWMD signed a Memorandum of Agreement with the Netherlands to exchange and collaborate on several areas of water resources management including climate change and sea level rise.

United States Global Research Program has released a draft of the [Third National Climate Assessment](#) and its Southeast Chapter highlights South Florida as a uniquely vulnerable region in the country to sea level rise. <http://ncadac.globalchange.gov/>

Gulf Coast Vulnerability Assessment

The Gulf of Mexico Alliance, NOAA, Gulf Landscape Conservation Cooperatives, and USGS Climate Science Centers lead the Gulf Coast Vulnerability Assessment to better understand the effect of climate change, sea level rise, and land use change on coastal ecosystems and species.

[Southeast Florida Climate Compact](#): The Monroe, Miami-Dade, Broward, and Palm Beach counties which cover the area from Key West to Palm Beach have formed the Southeast Florida Climate Compact to coordinate planning and actions related to adaptation for sea level rise and other climate change impacts. This area has roughly six million residents, approximately one-third of the population of Florida. The Climate Compact has been very active in the region and has published several technical reports and an action plan. Further participation and technical assistance from the state and federal agencies in the compact effort is needed.

The recent emphasis of the Compact has been to implement the Regional Climate Action Plan which includes over 100 recommendations to be implemented by local and regional agencies.

In view of the evolving science on the topics of climate change and sea level rise, it is extremely important to continue collaboration and monitoring of the latest developments regarding future outlook. In addition, the local, state, and federal agencies need to collaborate on the development tools that will be needed to determine exact vulnerabilities, and adaptation strategies. The issue of aging infrastructure and the retrofitting or replacement in view of past sea level rise on the coastal regions require immediate attention. The science of ecological impacts and their implications for such important projects as CEPP need to be prioritized and pursued. Establishment of an inter-agency climate change and sea level rise task force may be warranted.

[NOAA Coastal and Ocean Climate Applications \(COCA\)](#)

Integrated MODEls for Evaluating Climate Change, Population Growth, and Water Management effects on south Florida coastal marine and estuarine ecosystems (iMODEC). The University of Miami Rosenstiel School of Marine and Atmospheric Studies received a \$300,000 award of funding from the 2012 NOAA COCA program for a collaborative effort with the Miami NOAA Laboratories Atlantic Oceanographic and Meteorological Lab and Southeast Fisheries Science Center to predict and compare the state of south Florida coastal ecosystems under alternative joint climate change – CERP scenarios. The predictions will be produced by existing hydrodynamic, biophysical, and trophic models of Florida Bay and the lower southwest Florida coast. The models will be further developed and refined for this effort..

THE TASK FORCE

The intergovernmental [Task Force](#) is the only forum that provides strategic coordination and a system-wide perspective to guide the separate restoration efforts being planned and implemented in south Florida.

The duties of the Task Force are to:

- Coordinate the development of consistent policies, strategies, plans, programs, projects, activities, and priorities addressing the restoration, preservation, and protection of the South Florida Ecosystem;
- Exchange information regarding programs, projects, and activities of the agencies and entities represented on the Task Force to promote ecosystem restoration and maintenance;
- Facilitate the resolution of interagency and intergovernmental conflicts associated with the restoration of the South Florida Ecosystem among the agencies and entities represented on the Task Force;
- Coordinate scientific and other research associated with the restoration of the South Florida Ecosystem; and
- Provide assistance and support to agencies and entities represented on the Task Force in their restoration activities.

Organization

Four sovereign entities (federal, state, and two tribes) are represented on the Task Force. Fourteen members sit on the Task Force itself, representing seven federal departments, three state agencies/offices, two American Indian tribes, and two local governments.

The Florida-based [Working Group](#) and the [Science Coordination Group](#) have been established to assist the Task Force with its responsibilities. Their members include additional federal, state, and local agencies. The Task Force and Working Group establish regional and issue-based teams as needed to address pressing or area-based restoration concerns.

Currently, the SFWMD's [WRAC](#) serves as an advisory body to the Task Force.

Intergovernmental Coordination

The Task Force and its subgroups conduct meetings for the purpose of intergovernmental coordination. The Task Force meets regularly to report on progress, facilitate consensus, and identify opportunities for improvement. The Task Force includes public participation in all its coordination activities. In addition to its regular meetings, the Task Force developed and conducted a workshop process to enhance public engagement in the [CEPP](#).

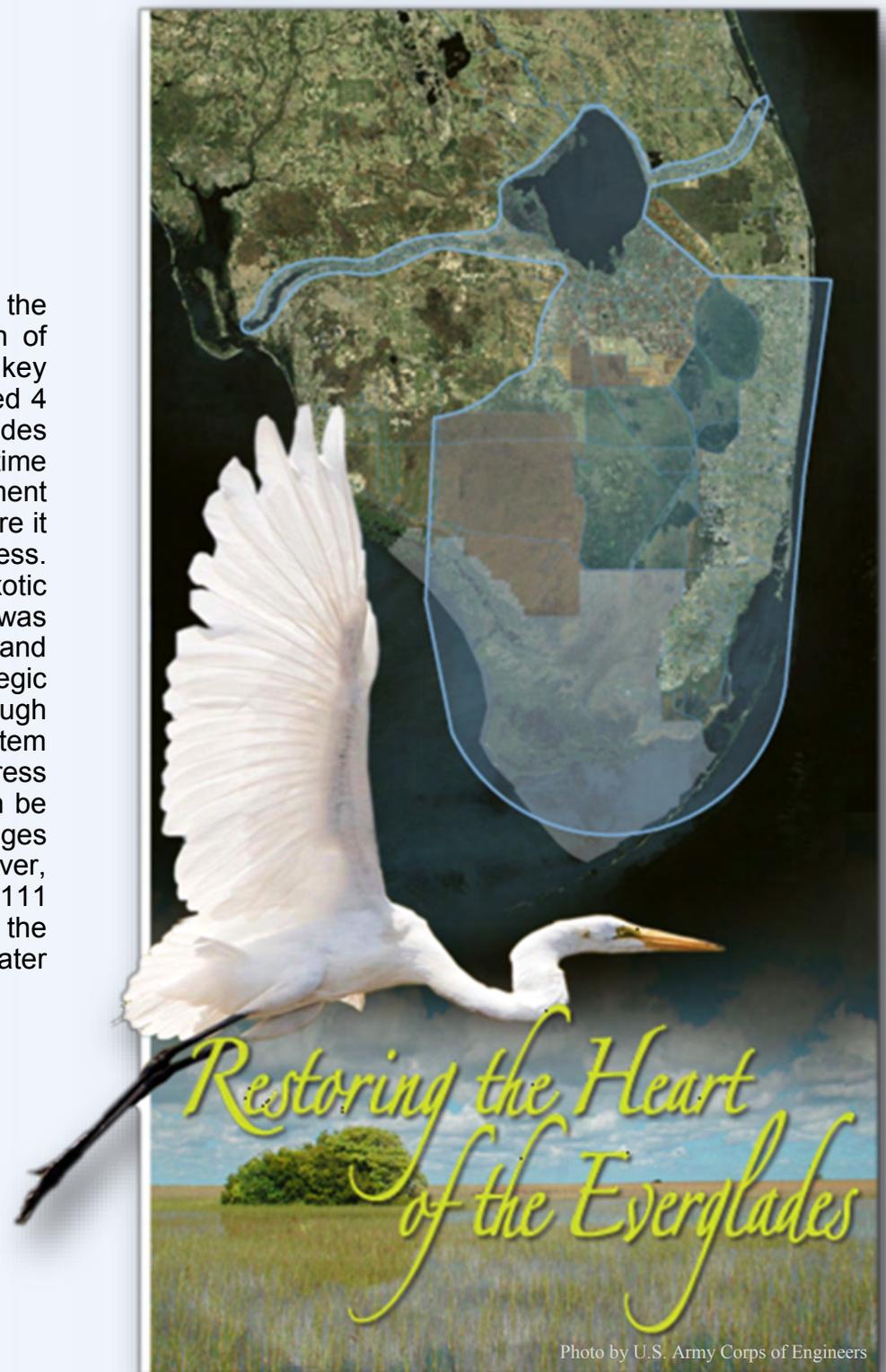
Invasive Exotic Species (IES)

At the December 2012 Task Force meeting, the Task Force directed the [Office of Everglades Restoration Initiatives \(OERI\)](#), WG, and SCG to develop a comprehensive review of current efforts to combat [invasive exotic species](#) (IES). This review indicated that an integrated approach with sustained resources was needed to be effective. The Task Force then directed at its July 9, 2013 meeting that a Strategic [Action Framework \(Framework\)](#) be developed to address the serious threats to the Everglades posed by invasive exotic plant and animal species. The Task Force also directed OERI to continue providing coordination support for federal invasive species efforts.

During the reporting period, seven meetings were conducted by OERI that brought together a diverse array of IES experts. The work effort has focused on development of a printable Framework document, an enhanced web-based Framework, a prioritized list of strategies, and a cross-cut budget tool. The Framework document will be presented to the Task Force at their November 2014 meeting.

Conclusions

Restoration efforts for the Everglades continued during the reporting period on a number of fronts. Construction of needed infrastructure facilities continued for several key projects and a new [WRRDA](#) was passed that authorized 4 additional projects for restoration. The Central Everglades Planning Project was completed using an expedited time frame as well as a greatly expanded public involvement process. The report was forwarded to Washington where it is undergoing final review prior to transmittal to Congress. Due to the growing concern over the impact of exotic species on restoration efforts, a new coordinated effort was launched to better define the problems, issues, and ongoing efforts, as well as develop an overall strategic approach to dealing with the growing problem. Although the System Status Report continues to show ecosystem problems and challenges, solid restoration progress continues to be made and visible, positive impacts can be seen in those areas where water management changes have been implemented, such as the Kissimmee River, portions of the Picayune Strand, Biscayne Bay, and C-111 Spreader Canal West. These positive effects confirm the original premise for the CERP that by getting the water right, the ecosystem will recover.



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ABBREVIATIONS AND ACRONYMS

µg/L	Micrograms per liter	FDEP	Florida Department of Environmental Protection	RAP	Reasonable Assurance Plans
AD	Amended Determination	FEIS	Final Environmental Impact Statement	RECOVER	Restoration Coordination and Verification Team
ARM	Arthur R. Marshall	FEMA	Federal Emergency Management Agency	RNA	Research Natural Area
ARRA	American Recovery and Reinvestment Act	FKNMS	Florida Keys National Marine Sanctuary	ROC	Reptile of Concern
ARS	Agricultural Research Service	FIAN	Fish and Invertebrate Assessment Network	RWPP	River Watershed Protection Plan
ASR	Aquifer Storage and Recovery	FWC	Florida Fish and Wildlife Conservation Commission	RWSP	Regional Water Supply Plan
AWS	Alternative Water Supply	FWS	U.S. Fish and Wildlife Service	SAV	Submersed Aquatic Vegetation
BMAP	Basin Management Action Plan	FY	Fiscal Year	SBB	South Biscayne Bay
BMB	Barnes, Manatee, and Blackwater Sounds	GCSSF	Governor's Commission for a Sustainable South Florida	SCG	Science Coordination Group
BMP	Best Management Practice	HHI	Herbert Hoover Dike	SCS	Southern Coastal System
BNP	Biscayne National Park	IAR	Incremental Adaptive Restoration	SDCS	South Dade Conveyance System
C/N	Chicks per nest	iMODEC	Integrated MODels for Evaluating Climate Change	SEIS	Supplemental Environmental Impact Statement
C&SF	Central and Southern Florida	ICEM	Integrated Conceptual Ecological Model	SFB	South Florida Bay
C-#	Canal	KB	Kissimmee Basin	SFER	South Florida Environmental Report
c/n	Chicks per nest	L-#	Levee	SFWMD	South Florida Water Management District
CBB	Central Biscayne Bay	LCS	Land Conservation Strategy	SSR	System Status Report
CEM	Conceptual Ecological Model	LEC	Lower East Coast	STA	Stormwater Treatment Area
CES	Center for Environmental Studies	LNWR	Loxahatchee National Wildlife Refuge	SWIM	Surface Water Improvement and Management
CEPP	Central Everglades Planning Project	LOPA	Lake Okeechobee Protection Act	SWFS	Southwest Florida Shelf
CERP	Comprehensive Everglades Restoration Plan	LOST	Lake Okeechobee Scenic Trail	Task Force	Florida Ecosystem Restoration Task Force
CFWI	Central Florida Water Initiative	LWC	Lower West Coast	TDR	Technical Data Report
CISMA	Cooperative Invasive Species Management Area	MAP	Monitoring and Assessment Plan	TMDL	Total Maximum Daily Load
CISRERP	Committee on Independent Scientific Review of Everglades Restoration Progress	MARES	Marine and Estuarine Goal Setting for South Florida	TNC	The Nature Conservancy
COCA	Coastal and Ocean Climate Applications	MFL	Minimum Flows and Levels	TP	Total Phosphorus
CREW	Corkscrew Regional Ecosystem Watershed	mgd	Millions of gallons per day	UF/IFAS	University of Florida/Institute of Food and Agricultural Sciences
CSCOR	Center for Sponsored Coastal Ocean Research	Mod Waters	Modified Water Deliveries to Everglades National Park	UEC	Upper East Coast
DEIS	Draft Environmental Impact Statement	MRP	Master Recreation Plan	USACE	U.S. Army Corps of Engineers
DOI	U.S. Department of the Interior	MRR	Major Rehabilitation Report	USDA	U.S. Department of Agriculture
DOT	Florida Department of Transportation	MSRP	South Florida Multi-Species Recovery Plan	USEPA	U.S. Environmental Protection Agency
DSM	Dam Safety Modification	MTZ	Mangrove Transition Zone	WCA	Water Conservation Area
E&SF	Everglades and South Florida	NBB	North Biscayne Bay	WFB	West Florida Bay
EA	Environmental Assessment	NCFB	North-central Florida Bay	WHIP	Wildlife Habitat Incentives Program
EAA	Everglades Agricultural Area	NEFB	Northeast Florida Bay	WOD	Works of the District
EDRR	Early Detection/Rapid Response	NEEPP	Northern Everglades and Estuaries Protection Program	WQPP	Water Quality Protection Program
EIRAMP	Everglades Invasive Reptile and Amphibian Monitoring Project	NFWF	National Fish and Wildlife Foundation	WRAC	Water Resources Advisory Commission
EMC	Event mean concentration	NGO	Non-governmental Organization	WRDA	Water Resources Development Act
ENP	Everglades National Park	NRC	National Research Council	WRP	Wetland Reserve Program
ENSO	El Niño-Southern Oscillation	NRCS	Natural Resources Conservation Service		
EPA	Everglades Protection Area	NPS	National Park Service		
EPOC	Emerging Pollutant of Concern	NWFB	Northwest Florida Bay		
EQIP	Environmental Quality Incentive Program	OMB	Office of Management and Budget		
FDACS	Florida Department of Agriculture and Consumer Services	OGT	Office of Greenways and Trails		
		P	Phosphorus		
		ppb	Parts per billion		
		PIR	Project Implementation Report		
		QEI	Quantitative Ecosystem Indicators		

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