



SOUTH FLORIDA ECOSYSTEM RESTORATION TASK FORCE

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2018 BIENNIAL REPORT

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Restoring America's Everglades

South Florida Ecosystem Restoration Task Force: 2018 Biennial Report

Report Purpose

The Biennial Report satisfies the requirements of the Water Resources Development Act of 1996 to report biennially on South Florida Ecosystem Restoration Task Force activities and progress made toward restoration. The reporting period for this edition is July 1, 2016 – June 30, 2018.

The Biennial Report is intended for four principal audiences:

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

The information included in this report will also be broadly shared with state and federal agencies, local governments, and stakeholders interested in the restoration of the South Florida Ecosystem.

The Biennial Report is part of a suite of Everglades restoration documents prepared by the Office of Everglades Restoration Initiatives on behalf of the Task Force, all of which can be found at:

EvergladesRestoration.gov

EXECUTIVE SUMMARY

Everglades Restoration and 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. A century of changes to the ecosystem, including an extensive network of canals and levees to drain land for agricultural and residential development, are being re-examined and reworked in order to restore this water-based system. Everglades restoration is key to both a healthy ecosystem and a vibrant economy. The environment and the economy are inextricably linked in south Florida where unique habitats and species, agricultural and tourism economies, and 8.1 million residents all depend upon plentiful, clean, fresh water.

Authorized by Congress in the Water Resources Development Act (WRDA) of 1996, the **South Florida Ecosystem Restoration Task Force** (Task Force) brings together the federal, state, tribal, and local agencies involved in restoring and protecting America's Everglades. The role of the intergovernmental Task Force is to facilitate the coordination of the myriad of conservation and restoration efforts being planned and implemented. It also provides a forum for the participating agencies to share information about their restoration projects, resolve conflicts, and report on progress. The Task Force's coordination and conflict resolution role is an essential key to our future successes in accomplishing our goals and in restoring and protecting America's Everglades.

The U.S. Department of the Interior's Office of Everglades Restoration Initiatives (OERI) on behalf of the Task Force has developed a suite of documents to report on restoration goals and progress. This **Biennial Report** satisfies the requirements of the WRDA 1996 to report biennially on Task Force activities and progress made toward restoration. Details on individual restoration projects can be found within the **Integrated Financial Plan**. The **Strategy** organizes the complex restoration effort by three strategic goals relating to water, habitats and species, and the built environment. Ecosystem health and response to restoration is described by the **System-wide Ecological Indicators** (a summary of which is found within Appendix A of this report). All these documents can be found at EvergladesRestoration.gov.

Restoration Highlights

Efforts over the reporting period focused on getting the water right by addressing the quantity, quality, timing, and distribution of water throughout the ecosystem, including specific projects of the federal/state partnership known as the Comprehensive Everglades Restoration Plan (CERP). These efforts will benefit the natural and built systems dependent upon the region's water resources.

- Significant successes in restoring natural flow have been seen in the northern reaches of the ecosystem (Kissimmee River Restoration) and southern areas as well (Picayune Strand Restoration and Modified Water Deliveries to Everglades National Park).
- Intensive planning efforts continued on all sides of Lake Okeechobee [the Lake Okeechobee Watershed Restoration Project to the north, the Western Everglades Restoration Project to the west, the Loxahatchee River Watershed Restoration Plan to the east, and the Central Everglades Planning Project (CEPP) Validation Report and the South Florida Water Management District (SFWMD) / Everglades Agricultural Area (EAA) Reservoir Study to the south].
- In the heart of the Everglades, design is underway on two crucial CEPP-South components (removal of Old Tamiami Trail and implementation of the S-333N water control structure).
- Additional water storage is also moving forward. In southwest Florida, construction of the C-43 Reservoir has continued and is scheduled to be completed on time in 2022 while on the east coast, the C-44 Reservoir is under construction and is expected to be completed in 2020.
- Significant progress with the State of Florida's Restoration Strategies water quality program continues with 110,000 acre-feet of additional water storage (flow equalization basins) completed during the reporting period.

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- More water has been provided to Florida Bay by rehydrating Taylor Slough in Everglades National Park through the C-111 South Dade Project, the C-111 Spreader Canal Western project, and the SFWMD's Florida Bay Initiative.
- Habitat restoration efforts have included restoring wetlands (Northern Everglades and Biscayne Bay) and working to prevent further invasions of invasive exotic species.

Restoration has moved forward in important ways over the past two years, and the following examples illustrate some of the most significant accomplishments achieved. Although the body of this report reflects the July 1, 2016 to June 30, 2018 reporting period, the information in the Executive Summary includes some of the most significant accomplishments achieved from July 1, 2018 to September 30, 2018. Starting with the 2020 edition of the Biennial Report, the Task Force will begin reporting on its efforts currently underway to re-examine the established system-wide ecological indicators in Appendix B. One of the many Task Force goals of this re-examination of the system-wide ecological indicators will be to improve our ability to periodically report progress and identify system-wide ecological responses that have been observed as a result of completed restoration projects.

Support for Restoration Remains Strong (CERP and Water Management)

Since 1993, the State of Florida and the federal government have made significant investment of resources on restoration programs and projects for America's Everglades. The following are some examples of funding spent to date. The federal government has obligated \$1.2 billion in CERP funding, \$54 million in Critical Projects funding, \$376 million in Kissimmee River Restoration funding, over \$870 million to rehabilitate Herbert Hoover Dike (HHD), and \$1.5 billion in Central and Southern Florida projects through August 2018. The State of Florida has obligated \$2.3 billion in CERP funding, \$53 million in Critical Projects funding, \$202 million in Kissimmee River Restoration funding, and \$1.8 billion in Central and Southern Florida projects through August 2018. Since July 2016, the State also spent \$64 million to support the State's Restoration Strategies projects, \$102 million for Northern Everglades projects, \$90 million for construction of the Tamiami Trail Bridge, and \$50 million to support the U.S. Army Corps of Engineers (USACE) effort to rehabilitate the HHD. The State of Florida has signed into law \$293 million for the Fiscal Year (FY) 2018/19, including an additional \$50 million for the HHD and \$64 million for the EAA Reservoir. Further information on funding is provided in the Cross-Cut Budget and Integrated Financial Plan which can be found at EvergladesRestoration.gov.

The **CERP** authorized by WRDA 2000 requires Congressional authorization and funding through periodic water resources development acts. The progress toward restoration has continued with Congressional authorization of the **Central Everglades Planning Project** under WRDA 2016.

In 2014, the citizens of Florida passed the Florida Water and Land Conservation amendment to the Florida Constitution that requires the Legislature to appropriate funds annually for land conservation and improvement. A portion of these funds is intended to go towards Everglades restoration efforts.

In 2016, the Florida Legislature passed the Legacy Florida Bill that provides a dedicated funding source for 10 years to 2026 for Everglades restoration. As written, it will deliver approximately \$200 million in 2017 and 2018 to restoration projects for the Everglades.

Planning for Future Restoration Projects (CERP)

During the reporting period, the USACE and the SFWMD continued their process to update the **Integrated Delivery Schedule (IDS)**. The IDS provides an overall strategy for project planning, design, and construction based upon ecosystem needs, benefits, costs, and available funding. The schedule helps restoration planners, stakeholders, and the public focus on priorities, opportunities, and challenges and provides a path forward to complete construction on previously authorized projects while outlining the next projects to undergo planning and design. The 2018 update to the 2016 IDS reflects changes to the scheduling of the projects based on actual budgets received versus the notional budgets used as the framework for establishing the restoration schedules. However, the IDS does not represent a commitment by the federal government to include amounts reflected on the IDS in the federal budget.

The planning for the **Loxahatchee River Watershed Restoration Project** was re-initiated in 2016 to: (1) restore wet and dry season flows to the Northwest Fork of the Loxahatchee River; (2) restore or maintain estuarine communities (oysters, fish, seagrass); (3) increase natural area extent of wetlands; (4) restore connections between natural areas; (5) restore native plant and animal species abundance and diversity; and (6) reduce water quality degradation risk. This project also seeks to restore, sustain, and reconnect the area's wetlands and watersheds that form the historic headwaters for the river.

Planning efforts continued for the Western Everglades Restoration Project and the Lake Okeechobee Watershed Restoration Project. The overall purpose of the **Western Everglades Restoration Project** is to improve the quantity, quality, timing, and distribution of water needed to restore and reconnect the western Everglades ecosystem while complying with applicable water quality standards. The preliminary project objectives are to: (1) improve the quantity, quality, timing, and distribution of flows in the western Everglades; (2) re-establish sheet flow south of the West Feeder Canal on the Big Cypress Seminole Indian Reservation into Big Cypress National Preserve; (3) restore water levels to reduce wildfires associated with altered hydrology; and (4) re-establish ecological connectivity. The **Lake Okeechobee Watershed Restoration Project** focuses on the major tributary systems that deliver water to Lake Okeechobee. The project goals and objectives are to: (1) improve the Lake Okeechobee water levels; (2) improve the quantity and timing of discharges to the St. Lucie and Caloosahatchee estuaries; (3) increase the extent and functionality of aquatic and wildlife habitat within Lake Okeechobee and the surrounding watershed; and (4) increase the availability of water supply to existing legal water users of Lake Okeechobee.

On March 26, 2018, the SFWMD submitted its plan for the EAA Storage Reservoir to the Assistant Secretary of the Army for Civil Works (ASA-CW) for federal review and submittal to Congress. This plan seeks to increase the storage, treatment, and conveyance of the new water component in the congressionally authorized CEPP, providing further reduction in damaging discharges to the Northern Estuaries and delivering additional water to the Everglades consistent with the CERP goals.

Restoring the Heart of the Everglades (CERP)

In December 2016, the **Central Everglades Planning Project (CEPP)** was authorized by Congress and signed into law by the President. The goals of CEPP are to improve the quantity, timing, and distribution of water in the Northern Estuaries, central Everglades, and Everglades National Park 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 decompartmentalization in the heart of the Everglades. The CEPP Validation Report for the southern features was initiated in 2017. The validation report will focus on removing water flow barriers in the southern portion of the project's footprint, which will set conditions to flow more water south. The design for both the removal of Old Tamiami Trail and the S-333N structure are underway.

Restoring Wetlands (Habitat Protection and Restoration)

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 the USDA's Natural Resources Conservation Service (NRCS), provides agricultural and wetland easements to landowners. Agricultural easements on productive working lands prevent them from being converted to non-agricultural uses and protect lands devoted to food production. Wetland easements restore and enhance wetlands and improve wildlife habitat.

During the reporting period, the USDA invested over \$38 million in ACEP funds to protect 10,833 acres of land in Florida. Over 75% of this investment was within the Northern Everglades Initiative area. In 2017, for the ninth consecutive year, Florida received the largest NRCS easements program funding allocation in the nation.

Restoring Natural Hydrology (CERP)

The goal of the **Biscayne Bay Coastal Wetlands Project** is improve the ecology of Biscayne National Park and Biscayne Bay, including the nearshore waters of Biscayne Bay, by rehydrating coastal wetlands and reducing freshwater point source discharges with a redistribution of surface water flows through a

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spreader canal system. In advance of Congressional authorization, the SFWMD completed construction of the L-31E Flow-way and the Deering Estate features.

During the reporting period, a Project Partnership Agreement between the SFWMD and the USACE was executed paving the way for project completion. The USACE completed construction of two L-31E Flow-way culverts in April 2018 and the SFWMD is currently constructing the remaining four culverts. Plans and specifications are under development by the USACE for the remaining features with design of the Cutler Wetlands scheduled for initiation in 2019.

The Picayune Strand Restoration Project involves restoring flow across an area larger than the District of Columbia in western Collier County that was drained in the early 1960s in anticipation of an extensive residential development that never materialized. Construction was completed on the Merritt Pump Station and Phase II Road Removal in 2014. The Faka Union Pump Station was completed in April 2017 and its 12-month operational testing phase was completed April 2018. Work began on the Miller Pump Station in January 2014, construction was completed in May 2018, and the 12-month operational testing phase has begun. Analysis of the effects on the water levels of adjacent private lands is currently underway. The Manatee Mitigation Feature designed to mitigate for impacts to an existing warm water habitat is complete and fully operational.

The Indian River Lagoon-South (IRL-S) Project will help restore the St. Lucie Estuary and the southern portion of the Indian River Lagoon. Several components have been completed for the C-44 Reservoir and Stormwater Treatment Area (STA) by the USACE and for the C-44 Communication Tower and System Discharge by the SFMWD. The 6,300-acre C-44 STA and the reservoir pump station are under construction by the SFWMD and both are expected to be completed in 2018. The C-44 Reservoir, which will store up to 50,600 acre-feet of water, is under construction by the USACE and is expected to be completed in 2020. The USACE initiated pre-design work for the C-23/24 North Reservoir of the IRL-S Project in 2018.

A Partnership to Restore Flow through the River of Grass (Foundation Projects & CERP)

The Modified Water Deliveries to Everglades National Park (Mod Waters) project, including a one-mile bridge and associated Tamiami Trail modifications completed in 2013, sets the stage for future CERP components and operating plans that have the potential to improve the quantity, quality, timing, and distribution of water deliveries to Everglades National Park (ENP). This would support the recovery of wading bird populations, restoration of naturally occurring ridge and slough formations, restoration of fish and wildlife resources, and overall improvement of 63,000 acres of wetlands. The 8.5 Square Mile Area Project will provide mitigation for the increased water flow to Northeast Shark River Slough and ENP associated with the Mod Waters project. All features of this project are constructed and the Combined Operational Plan (COP) for the Mod Waters project is under development and scheduled to be completed in 2020.

The CEPP South components currently moving forward are the removal of approximately 6 miles of Old Tamiami Trail between the ENP Tram Road and the L-67 Extension Levee. This will provide a net gain of wetland acreage, facilitate additional deliveries of water from Water Conservation Area (WCA) 3A directly to ENP, and aid in alleviating the high-water conditions currently being experienced in WCA-3A. In addition, design to increase the conveyance capacity at the S-333 structure is complete.

The Return of a River (Foundation Projects)

The **Kissimmee River Restoration Project** continues to shine as the keystone Everglades restoration project. After 20-plus years of large-scale construction, the project is nearing completion with positive interim ecological responses being observed. During the reporting period, a significant amount of construction was completed, including backfilling of the MacArthur Ditch in the Pool C floodplain and local levee breaching in the Upper Basin to provide water storage and environmental enhancement functions. Currently, two major contracts are under construction, including canal backfill and installation of erosion protection measures. These efforts will backfill 6.5 additional miles of the C-38 canal restoring the remnant river channel which is being reconnected as well. This is the last backfill effort that will complete the

rehydration of 25,000 acres of river floodplain. In 2017, the final two construction contracts were awarded. The Corps is scheduled to have all construction completed in 2020, resulting in the completion of this Foundation Project.

Continuing to Invest in Water Quality Restoration (Water Quality)

During the reporting period, the State of Florida made significant progress implementing the Restoration Strategies water quality plan, building on its existing multi-billion dollar investment in water quality improvements in the Everglades. The Restoration Strategies plan includes more than 6,500 acres of new STAs and 210,000 acre-feet of additional water storage through construction of Flow Equalization Basins (FEBs). To date, 7 projects are complete, 6 others are ongoing, and 39 of 74 consent order milestones have been achieved, 37 of them ahead of their deadlines.

Combatting Invasive Exotic Species (Invasive Exotic Species)

The South Florida Ecosystem is one of the most highly vulnerable regions to the threat of invasive exotic species in the entire United States. The Task Force has developed an **Invasive Exotic Species Strategic Action Framework** that is organized along the four phases of invasion/response: Prevention, Early Detection and Rapid Response, Containment, and Resource Protection and Long-term Management.

Prevention: The U.S. Fish and Wildlife Service (USFWS) announced a final rule on September 30, 2016 to add 11 nonnative freshwater species to the list of injurious wildlife under the Lacey Act. The rule went into effect on October 31, 2016, prohibiting the importation or shipment of these species. These 11 species are not in U.S. trade or are negligible in trade, so the listing results in only a minor, if any, effect on the U.S. economy. However, if introduced into the wild, the 11 species would have the potential to become highly invasive and cause harm to freshwater habitats, native species, and the local economies these natural resources support.

Early Detection and Rapid Response: The need for a decision support tool was identified in the Task Force's Invasive Exotic Species Strategic Action Framework in 2014. The decision support tool, subsequently developed through the U.S. Geological Survey's Priority Ecosystem Studies program, provides a standardized and transparent process for ranking those nonnative species that warrant a rapid response after their detection within the ecosystem. This tool is currently being adapted by the Florida Fish and Wildlife Conservation Commission (FWC) for statewide use.

Containment: The FWC has ramped up efforts to engage the public in invasive species removal by developing trap loan programs for Argentine black and white tegus in infested areas. The FWC issues loaner traps to homeowners to maintain and check throughout the active season. If a tegu is captured, the homeowner contacts the FWC for removal.

Resource Protection and Long-term Maintenance: The FWC has developed two programs to engage local experts and the public in Burmese python removal in south Florida. In April 2017, the FWC launched the Python Removal Contractor Program and the public incentive program called Python Pickup. Additionally, ENP expanded its Python Removal Authorized Agent Program in 2018 from 40 to 120 authorized agents. Big Cypress National Preserve is also allowing FWC contractors to remove pythons from their lands in an attempt to expand the removal program.

Studying Impacts of Hurricane Irma

Hurricane Irma made landfall on Cudjoe Key on September 10, 2017 as a Category 2 hurricane and traveled up the west side of the Florida peninsula. Scientists mobilized quickly to track hurricane impacts on the Everglades and the Task Force's Science Coordination Group sponsored a coordination meeting in September 2017 in which ~100 scientists shared early scientific results and plans for future studies. The major impacts to the Everglades were from storm surge and hurricane-force winds. The southwest Gulf coast of ENP experienced storm surge up to about 3 meters, with the largest impacts occurring from Cape Sable north to Marco Island. Eerie images prior to the storm's passage showed no standing water in Florida Bay between the Key Largo Interagency Science Center and Pelican Key as the approaching storm pushed

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water from eastern Florida Bay to the east. The mangrove zone of the Everglades received sediment deposition from the Gulf up to 10 cm, and up to 10 km inland in some places. This magnitude of deposition is estimated to be equivalent to 100 years of deposition at normal rates. Coastal mangrove forests were subjected to defoliation and other damage from the winds. Florida Bay and Biscayne Bay experienced significant disturbance in seagrass beds. Lake Okeechobee experienced a 3-m storm seiche from the east to the west, leading to a large amount of re-suspended sediments, increasing total phosphorus levels, and decreasing light penetration. The Everglades STAs south of the Lake Okeechobee area performed very well, despite greatly increased flows and depths from the hurricane. In summary, Hurricane Irma caused significant ecological impacts which is not unexpected from a storm of this magnitude. While hurricanes are a natural feature of south Florida and a normal part of ecological succession, human impacts on the ecosystem may be affecting the way the Everglades responds to such natural disturbances. Monitoring and research on Hurricane Irma impacts will continue for several years into the future.

2017 and 2018 High Water Conditions (Water Management)

Extreme rainfall in the Everglades WCAs in 2017 and 2018 prompted the Florida Department of Environmental Protection to issue an emergency final order authorizing the SFWMD and the USACE to take immediate action to deviate from permitted water management practices to move significant volumes of floodwater out of the WCAs. Rainfall from three named tropical cyclones made the 2017 wet season (June – October 2017) the wettest on record. The USACE initiated additional deviations during the wet season and both the SFWMD and the USACE implemented several emergency operations to limit further inflows of water into the Everglades and move as much water as possible out of the WCAs, which exceeded their regulation schedules.

Emergency actions for the 2018 high water event were still ongoing as of the time of this report. In 2017, water levels in all three WCAs were lowered below their respective regulation zones by early January 2018 due to emergency operations with assistance from favorable below average rainfall in November and December 2017. More than 3.8 million acre-feet of water was discharged from the WCAs from June 1, 2017 through January 2018. Discharges from WCA-3A through the S-12 structures (500,000 acre-feet) were the largest on record since 1978. Inflows to Shark River Slough in ENP totaled 1.5 million acre-feet, also the largest volume since 1978. Emergency actions for the 2018 high water event were still ongoing as of the time of this report.

Conclusion

Restoration efforts for the Everglades continued during the reporting period on a number of fronts. The final construction contracts for the Kissimmee River Restoration Project and the C-111 South Dade Project were awarded with the completion of the C-111 South Dade contracts scheduled for 2018 and the Kissimmee contracts by 2020. Construction continues on two major reservoir projects, the C-43 and the C-44 reservoirs. Both of these, when complete in the next 2-3 years, will provide much needed relief to the Caloosahatchee and St. Lucie estuaries, respectively. In addition, all construction contracts were also completed for the Mod Waters Project. This, coupled with the completion of the C-111 South Dade Project, allows the implementation of a new operational plan for bringing more water into the eastern portion of ENP. Planning for that new operational plan began during this reporting period with incremental implementation already underway. This was key in dealing with excessive rainfall events during this period.

Construction also continued on the Biscayne Bay Coastal Wetlands Phase 1 project to expand the rehydration of coastal wetlands bordering Biscayne Bay. The State of Florida continued its progress on the construction of the Restoration Strategies Program to improve the quality of water entering the Everglades.

Meanwhile, major planning efforts were also initiated with the Lake Okeechobee Watershed Project to develop a plan to provide more storage north of the Lake; the Western Everglades Project to improve regional water management and restore degraded portions of Big Cypress National Preserve; and the Loxahatchee Watershed Restoration Project to restore more natural flows to that wild and scenic river while also increasing available water supply in that area. In addition, the State through the SFWMD launched a

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Post Authorization Change Report effort on the recently authorized CEPP to increase the storage by 240,000 acre-feet, increase flows to the Everglades by over 100,000 acre-feet per year, and reduce harmful discharges to both the St. Lucie and Caloosahatchee estuaries.

Efforts also continued during this period in the battle against the invasion and expansion of exotic species in south Florida. New programs were launched and/or expanded to deal with python and tegu control that increased the capture and removal of these species, while educational programs and public outreach continued to assist in the fight against all invasive exotic species.

The **System-wide Ecological Indicators** and the **System Status Report** continue to show ecosystem problems and challenges in key areas, many of which were compounded by the weather extremes experienced. However, 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 of the Comprehensive Everglades Restoration Plan that by getting the water right, the ecosystem will recover.

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INTRODUCTION

The South Florida Ecosystem, an area twice the size of New Jersey, is a multifaceted mixture of dense forests and open prairies, sunny croplands and shady swamps, rural expanses and dynamic cities. It is also the source of water for 8.1 million residents. 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 in attempts to make the ecosystem more hospitable to agriculture and development.

The quality of life in south Florida and the region's economy depend on the health and vitality of the natural environment. 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 in the Florida 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 depend on the health of this ecosystem.

A healthy ecosystem depends on reversing the unintended consequences of past changes to the region's waters and habitats. 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. In 1996, the intergovernmental South Florida Ecosystem Restoration Task Force (Task Force) was created by Congress to provide this long-term strategic coordination and to facilitate the incorporation of new information and opportunities over the multi-decadal restoration initiative.

The Water Resources Development Act (WRDA) of 1996 requires the Task Force to provide a biennial update on restoration progress. This document reports on the major hydrological restoration projects, water quality improvement projects, land acquisition efforts, habitat conservation programs, invasive exotic species efforts, water supply planning, and flood protection projects taking place within the South Florida Ecosystem. These projects are working in concert to reverse the damage the current water management system has inadvertently caused the Everglades, while continuing to serve the millions of people who reside within and visit the region. The Biennial Report also provides updates on the activities of the South Florida Ecosystem Restoration Task Force, Working Group, and Science Coordination Group.

This Biennial Report includes a summary of South Florida Ecosystem restoration activities for the current two-year reporting period (July 1, 2016 – June 30, 2018). Previous editions of the Biennial Report were organized by the Task Force's three strategic goals: (1) Get the water right; (2) Restore, preserve, and protect natural habitats and species; and (3) Foster compatibility of the built and natural systems. The 2018 edition reports progress by restoration program or subject area to improve the document's utility and readability. It follows and expands upon the format utilized by the Integrated Delivery Schedule (see the Looking Ahead section). More information on the strategic goals is available in the Task Force's **Strategy** document. The Task Force's **2018 Integrated Financial Plan** contains detailed information on each project described within the Biennial Report. In addition, the Task Force issues a biennial **System-wide Ecological Indicators Report**. The indicator report tracks ecosystem health and response to restoration through a suite of 11 system-wide ecological indicators. A summary of the indicator report is provided in Appendix A. All these documents can be found at EvergladesRestoration.gov.

COMPREHENSIVE EVERGLADES RESTORATION PLAN

The Comprehensive Everglades Restoration Plan (CERP) is the single largest restoration program underway in the South Florida Ecosystem. The CERP is implemented by a federal-state partnership to restore, protect, and preserve the region's water resources by addressing the quantity, quality, timing, and distribution of water. Implementing projects that capture, store, clean, and redistribute water will restore natural water flow, enhance and protect habitats, and improve our ability to retain and utilize much needed fresh water within the ecosystem, instead of having to drain this precious resource to the Atlantic Ocean and Gulf of Mexico.

The WRDA 2000 approved the CERP as a framework for modifications and operational changes to the Central and Southern Florida Project that are needed to restore, preserve, and protect the South Florida Ecosystem while providing for other water related needs of the region, including water supply and flood protection. Subsequent water resource development acts authorized specific projects within CERP. These subsequent authorizations are often referred to as "Generations" with Generation 1 projects having been authorized in WRDA 2007 and Generation 2 projects in the Water Resources Reform and Development Act (WRRDA) of 2014. The WRDA 2016 authorized the Central Everglades Planning Project (CEPP). The US Army Corps of Engineers (Corps or USACE), the South Florida Water Management District (SFWMD), and other partners are working together to implement the CERP.

GENERATION 1 PROJECTS

Picayune Strand Restoration Project: This CERP project will restore over 55,000 acres by removing barriers, plugging 42 miles of canals, and degrading 285 miles of roadways and 62 miles of logging trams. Three pump stations and spreader basins will be added to aid in rehydration of the wetlands and restoration of the natural flow of water in the region while maintaining flood protection for neighboring communities. Construction of the project is approximately 75% complete. The remaining features are under design and construction is scheduled to be completed in the near future.

Site 1 Impoundment Project: Phase 1 of this CERP project is complete and will reduce seepage loss from the Arthur R. Marshall Loxahatchee National Wildlife Refuge (LNWR). The project includes rehabilitation and improvements to the levee bordering the refuge. Phase 1 construction was completed and transferred to the SFWMD for operation and maintenance in 2016.

Indian River Lagoon-South Project (IRL-S) Project: In July 2011, construction began on the C-44 Reservoir and Stormwater Treatment Area (RSTA) component. When complete, the 3,400-acre reservoir will store up to 50,600 acre-feet of water while the 6,500-acre stormwater treatment area (STA) will hold another 9,900 acre-feet of water. The SFWMD awarded the construction contracts for the STA and the pump station with completion scheduled for 2018. The USACE awarded the construction contract for the C-44 Reservoir and construction is scheduled to be completed in 2021. This will be followed by up to two years of operational testing and monitoring for all the completed features of the C-44 RSTA. The USACE initiated pre-design work for the C-23/24 North Reservoir of the IRL-S Project in 2018, including hydrographic, topographic, LiDAR, cultural resources, and geotechnical surveys in the lands that the SFWMD acquired for the C-23/24 North Reservoir. The C-23/24 North Reservoir design will continue through 2021 and is scheduled for construction in 2022.

GENERATION 2 PROJECTS

Broward County Water Preserve Areas Project: This project will provide 11,650 acre-feet of surface water storage that will reduce seepage losses from Water Conservation Area (WCA) 3 and capture stormwater that would be lost to tide, allowing it to be redistributed for urban and natural system water deliveries. An initial construction contract (Mitigation Area A Berm) was awarded in September 2017 and is under construction. Design of the C-11 Impoundment resumed in June 2018.

Biscayne Bay Coastal Wetlands Project (BBCW): The WRRDA 2014 authorized the BBCW to protect the coastal ecosystem. The goal of this CERP project is to improve the ecology of Biscayne National Park (BNP) and Biscayne Bay by rehydrating coastal wetlands and reducing freshwater point source discharges with a redistribution of surface water flows through a spreader canal system. Phase 1 includes construction of three components (Deering Estate, L-31E Culverts, and Cutler Wetlands) to redistribute the flow of surface water into Biscayne Bay. In advance of Congressional authorization, the SFWMD completed construction of the L-31E Flow-way and the Deering Estate features. A Project Partnership Agreement between the SFWMD and the USACE was executed on August 25, 2016 and amended on March 9, 2018, paving the way for project completion. The USACE awarded a construction contract in late 2016 for the construction of two L-31E Flow-way culverts and construction was completed in April 2018; the SFWMD is constructing the remaining four culverts in 2018. Plans and specifications are currently under development by the USACE for the remaining features. Construction of the Cutler Wetlands is scheduled for initiation in 2019.

C-111 Spreader Canal Western Project: In 2012, the State of Florida expedited construction and began operation of this project. This CERP project consists of a 590-acre detention area supplied by a 225 cubic feet per second (cfs) pump station (S-200), extension of the Aerojet Canal to a 225 cfs pump station, and 11 plugs in the C-110 and L-31W canals. This project will reduce seepage losses from Everglades National Park (ENP) and provide increased flows to Florida Bay through Taylor Slough. As part of the SFWMD's Florida Bay Initiative the project is being modified to increase capacity to 300 cfs at each pump station with operation set to begin in September 2018. A new structure downstream of the S-200 pump station began operation in June 2017 to convey surface water flows directly to Taylor Slough headwaters.

Caloosahatchee River (C-43) West Basin Storage Reservoir: In November 2015, construction of this 10,700-acre reservoir was initiated and is scheduled to be completed in 2022. When completed, this reservoir will provide 170,000 acre-feet of storage. Capturing excess flows in the river during the wet season and then releasing the stored water to the estuary during low flows will improve the timing and quantity of water delivered to the Caloosahatchee Estuary, aiding in meeting the minimum dry season flows. The SFWMD has the lead on construction and awarded three contracts for a total combined cost of \$80 million, which includes preloading and demolition, construction of two pump stations, and inflow structures. The remaining contract is for construction of the reservoir and remaining associated features and is scheduled for award in 2019.

CENTRAL EVERGLADES PLANNING PROJECT

Authorized in the WRDA 2016, the CEPP combines several CERP components extending from Lake Okeechobee down to ENP into a comprehensive project that includes water storage, water quality treatment, conveyance, and decompartmentalization (the removal of levees and canals) in the heart of the Everglades. The project is designed to send an annual average of approximately 210,000 acre-feet of water south from Lake Okeechobee. Primary features include construction of the A-2 Flow Equalization Basin (FEB) in the Everglades Agricultural Area (EAA) to provide additional water storage, canal and pump station modifications at northern end of WCA-3A to improve distribution of water entering WCA-3A, backfilling of the 13.5 miles of the Miami Canal in northern WCA-3A to rehydrate northern WCA-3A, construction of new tree islands along the reach of the backfilled canal, removal of portions of the L-67C, L-67 Extension, and L-29 levees to create a new flow-way into Northeast Shark River Slough from WCA-3A, enlargement of the S-333 structure and S-356 pump, removal of 6 miles of old Tamiami Trail south of the S-12 structures, construction of a new water control structure in the L-29 canal and the L-67A levee, and construction of a 4.2-mile long 35-foot deep seepage cutoff wall along the L-31N canal. These features will deliver an

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average annual 210,000 acre-feet of new water to the central Everglades that would otherwise be discharged to tide via the northern estuaries.

OTHER CERP PROJECTS

Decomp Physical Model (DPM): This CERP project will help determine how best to design and formulate plans for future decompartmentalization of WCA-3. The DPM is designed to address scientific, hydrologic, and water management uncertainties prior to planning and construction of future Everglades restoration projects. Installation of the DPM was completed in October 2013 with year-round testing planned through 2021. It also serves as a mechanism to aid in moving water from WCA-3A to WCA-3B during times of high water in WCA-3A.

Southern Corkscrew Regional Ecosystem Watershed (CREW): Construction of the Southern CREW project was initiated in February 2016 and completed in April 2018. The SFWMD has led this restoration effort with its partners, including the U.S. Department of the Interior (USDOI). This project will restore historic sheetflow within the watershed. The restoration efforts included land acquisition (~4,000 acres), road removal, plugging of agricultural ditches, and invasive exotic vegetation removal.

Loxahatchee River Watershed Restoration Project: In 2016, the planning for the Loxahatchee River Watershed Restoration Project was re-initiated. Four alternative plans were evaluated to identify a recommended plan. The proposed tentatively selected plan is currently under review and would provide additional water storage, improve the distribution of water, deliver 91% of dry-season flows to the Loxahatchee River, and provide over 8,000 watershed and 400 estuary annual habitat units over the future without project.

Biological Control Implementation Project: The CERP Biological Control Implementation Project (Melaleuca Eradication and Other Exotic Plants – Implement Biological Controls) is dedicated to the implementation of biological control agents to address the spread of invasive exotic plants throughout the CERP footprint. The initial phase of the project included construction of a mass rearing annex to the existing US Department of Agriculture-Agricultural Research Service (USDA-ARS) biological control facility in Davie, Florida. Completed in 2013, the facility is being used to mass rear approved biological control agents for melaleuca and other invasive exotic plants. The project also includes release and monitoring of agents in impacted areas in the CERP area. The USDA-ARS, in close coordination with the SFWMD and the USACE, has begun the operational phase of the project and is releasing insects and mites on three weed species. Extensive field monitoring and evaluation of the biological control agents continues.

Bay Monitoring: The National Oceanic and Atmospheric Administration (NOAA) conducts monitoring in Biscayne Bay and Florida Bay as part of the CERP Monitoring and Assessment Plan. The NOAA Southeast Fisheries Science Center (SEFSC) collaborates with the National Park Service (NPS) and the University of Miami Rosenstiel School of Marine and Atmospheric Science to monitor biological assets and basic physical forcing functions in Biscayne Bay. The project, called Integrated Biscayne Bay Ecological Assessment and Monitoring (IBBEAM), has four components: epifauna, which consists of small fish and macroinvertebrates; mangrove fish, consisting mainly of sport fish that also live on the offshore coral reef; submerged aquatic vegetation (SAV); and salinity, temperature, and water depth. The project takes place in shallow nearshore waters along the western shoreline of south-central Biscayne Bay. In Florida Bay, SEFSC collaborates with NOAA's Atlantic and Oceanographic Meteorological Laboratory (AOML) to monitor juvenile spotted seatrout and other sport fish in four northern regions of Florida Bay. Both projects identify, develop, and follow over time ecological indicators for use in determining the effects of CERP as it is implemented. Funding comes from the Restoration Coordination and Verification (RECOVER) Monitoring and Assessment Plan through the USACE.

FOUNDATION PROJECTS

The planning process for CERP assumed that a set of previously authorized projects would be completed and thus serve as a foundation for CERP implementation. Foundation Projects seek to provide improvements to the quantity, quality, timing, and distribution of water through the construction of water storage and management features and the removal of impediments to surface water flow.

C-111 South Dade Project: In 1962, the C-111 South Dade project was originally authorized as a part of the Central and Southern Florida Flood Control Project. In 1996, the Congress authorized additional modifications to the original project to provide additional enhancements for environmental purposes while maintaining the original flood control purposes of the project with construction commencing in the same year. In 2014, the amendment of the cost-share project cooperation agreement enabled the SFWMD to garner credit for work-in-kind and certain real estate interests that were acquired for the project. In 2015 and 2016, subsequent to the execution of the amended agreement, the Corps proceeded with the award of Contracts 8 and 8a while the SFWMD began construction of Contract 9 features. Construction completion of all the project features is scheduled for 2018. Recently, during heavy rainfall periods, this Foundation Project aided with providing additional flows to Northeast Shark River Slough. As construction of key components were completed in June 2018, it enabled L-29 stages to increase to 8.5 feet NGVD the following month and more water to flow under Tamiami Trail. In the future, additional flows to both Northeast Shark River Slough and Taylor Slough are anticipated when the Combined Operational Plan (COP) is implemented.

Florida Bay Initiative: In September 2015, the SFWMD initiated a six-month South Dade Study to examine water resource management in southern Miami-Dade County. This area was subjected to a detailed study since water management affects Taylor Slough and the eastern panhandle of ENP and wetlands in southeastern Miami-Dade County. The study consisted of a series of public workshops and resulted in a common understanding of the area's water management challenges. It identified projects proven to reduce flood risks in urban and agricultural areas of Miami-Dade County while providing much needed water to natural areas. Based on the SFWMD Governing Board's direction, the recommended operational and structural projects were incorporated into ongoing and upcoming efforts including modifications to the CERP C-111 Spreader Canal Western Project and expediting construction of portions of the C-111 South Dade Project's Contract 9 by the SFWMD. In July 2016, the SFWMD expedited implementation of operational and structural projects, which have sent approximately 68,000 acre-feet of additional water to eastern Florida Bay and Taylor Slough.

Kissimmee River Restoration: This restoration project seeks to return the river to a more natural flow after having been channelized in the 1960s. The project involves restoring the Kissimmee River and floodplain through backfilling 22 miles of canal, recontouring 12 miles of remnant river channel, rehydrating 25,000 acres of river floodplain, modifying the operational schedules for the upper Kissimmee Chain of Lakes, and implementing a comprehensive ecological evaluation program. In 2017, the final two construction contracts were awarded and construction is underway. Upon construction completion the approved Headwaters Revitalization Schedule will be implemented for the Upper Basin Lakes and project monitoring will continue to track the restoration progress in the basin.

Modified Water Deliveries to Everglades National Park (Mod Waters): The ENP Protection and Expansion Act of 1989 added 109,000 acres to ENP. This act also authorized a project funded by the USDOJ and designed and constructed by the Corps to redirect flows to rehydrate this new area. The goal was to help restore ecological function to the area, while providing flood protection to residential areas in the 8.5 Square Mile Area and agricultural interests along the L-31N canal. In addition to protecting the 8.5 Square Mile residential area, a major component of the project included modifying the Tamiami Trail. In 1928, U.S. Highway 41, known locally as "Tamiami Trail," was completed. The 25-mile portion of Tamiami Trail that crosses the central Everglades obstructs natural sheetflow and limits water deliveries to ENP. Bridging and raising the eastern portion of this 90-year-old roadway is one of the most fundamental Everglades restoration actions to help restore flow in the southern end of the ecosystem. In 2013, with NPS

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funding, the USACE completed construction of a 1-mile bridge and partially raised the remaining 10.7 miles of the eastern Tamiami Trail roadway. This allows water levels in the adjacent L-29 canal to be raised and thus allows the passage of larger flows into eastern ENP. Additional road improvements are being pursued within the Tamiami Trail Next Steps (TT:NS) project (see below).

The Mod Waters project also includes other features for conveyance and seepage management (S-355 spillways/S-356 pump station) to return flows to the Everglades. All Mod Waters features were completed by June 2018 and development of the new COP is underway, with expected completion by May 2020. Once this operational plan is finalized, average annual flows into the Northeast Shark River Slough portion of ENP will more than double. This will allow the rehydration of the downstream ENP wetlands and relieve some of the adverse high water impacts upstream in WCA-3A.

Tamiami Trail Next Steps: In 2012, Congress approved the TT:NS project, which included up to 5.5-miles of additional bridging and reconstruction of the remaining eastern roadway to support the higher water levels and flows envisioned in the CERP. Phase 1 of this project is currently constructing two bridges totaling approximately 2.6 miles, as well as limited roadway reconstruction, via a federal/state partnership with expected completion by December 2018. A Phase 2 plan is currently in development between the federal/state partners. Preliminary findings indicate that the 3.2- miles of total bridging will accommodate all future anticipated CERP flows. The Phase 2 focus will therefore be on reconstructing the remaining 6.7 miles of roadway and adding smaller water conveyance features to improve flow distributions by targeting historic slough crossings. If approved, the Phase 2 plan will allow for unconstrained flows into Northeast Shark River Slough. This final plan would fully support future federal and state restoration initiatives to redirect water flows from Lake Okeechobee back into the central/southern Everglades and Florida Bay.

Seminole Tribe Big Cypress Reservation Water Conservation Plan: This project was authorized in WRDA 1996. The project will rehydrate wetlands, improve water quality, and provide storage on the Seminole Tribe's Big Cypress Reservation, the Big Cypress National Preserve, and the Everglades Protection Area. The project accommodates the Seminole Tribe of Florida's water entitlement, supports sustainable agriculture, and contributes to the restoration of the western Everglades ecosystem basin. The project consists of constructing features within three basins on tribal lands. Basins 1, 2, and 4 are complete and were transferred to the Seminole Tribe of Florida in 2010, 2017, and 2013, respectively. At the request of the Seminole Tribe of Florida, an amendment to the Project Cooperation Agreement was executed in 2018, removing Basin 3 from the authorized project.

WATER QUALITY

Water quality within the ecosystem has been compromised by a variety of nutrients and pollutants. Excess phosphorus is a major concern for the central Everglades as well as for the ecosystem's lakes and estuaries, often evidenced by excessive cattail growth or widespread algal blooms, but it is not the only problem. Other nutrients, too little or too much fresh water, mercury, and potentially toxic contaminants such as trace metals, pesticides, and other synthetic organic chemicals, are also of concern. However, the majority of the state and federal water quality programs described here focus on nutrient reduction. 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.

Projects are being implemented to achieve applicable water quality goals and standards. These projects include constructed wetlands that use plants to retain nutrients as water moves through the system, establishment of best management practices to improve the quality of stormwater runoff from agricultural and urban areas, and watershed-wide planning efforts that utilize a suite of tools to improve water quality,

STORMWATER TREATMENT AREAS

Stormwater treatment areas (STAs) are constructed treatment wetlands that remove and store nutrients through plant growth and the conversion of dead plant material into soil. Approximately 68,000 acres of land south of Lake Okeechobee have been converted to STAs, yielding 57,000 acres of effective treatment wetlands. In Water Year (WY) 2017 (May 2017 - April 2018), the Everglades STAs treated 1.85 million acre-feet of water and retained 275 metric tons of phosphorus (P), which equates to a 77 percent P load reduction, and produced an outflow P concentration of 36 micrograms per liter.

STAs located north of Lake Okeechobee include the Lakeside Ranch STA, which will help improve water quality flowing into the lake, and the Lake Okeechobee Water Retention and Phosphorus Removal Project/Taylor Creek and Nubbin Slough STAs, which capture and treat inflows and subsequently discharge cleaner water back into Taylor Creek, Nubbin Slough, and Lake Okeechobee.

RESTORATION STRATEGIES

One of the State of Florida's largest water quality programs underway is Restoration Strategies, a consensus plan developed collaboratively by the State of Florida and the U.S. Environmental Protection Agency (USEPA) with an estimated cost of \$880 million. Under this program, the SFWMD is designing, constructing, and operating a suite of regional water storage, treatment, and conveyance improvement projects that is envisioned to further improve water quality in America's Everglades. The program also includes a robust STA Science Plan consisting of research activities focused on investigating the critical factors that influence P reduction and better understanding the sustainability of P removal performance at low P concentrations. The strategies also feature implementation of additional sub-regional source controls – where pollution is reduced at the source – in areas where P levels in stormwater runoff have been historically higher. Through April 2018, total program expenditures by the SFWMD were approximately \$290 million and all projects are scheduled to be completed by December 2025.

REGULATORY BEST MANAGEMENT PRACTICES PROGRAM

Best Management Practices (BMPs) are source control efforts to reduce the amount of pollutants (pesticides, fertilizers, animal waste, etc.) in agricultural or urban runoff. The SFWMD's regulatory BMP program in the EAA Basin under Chapter 40E-63, F.A.C. is an example of how source controls can play a major role in restoration. For over 20 years, the SFWMD's regulatory program has exceeded expectations, most recently with a 66 percent reduction in phosphorus loads in WY 2018 compared to the pre-BMP historic period. Results have been consistently above the 25 percent load reduction mandated by Florida

statute, averaging 57 percent over the long-term. The cumulative results of the SFWMD BMP program have prevented approximately 3,779 metric tons of P from entering the Everglades through WY 2018.

NORTHERN EVERGLADES AND ESTUARIES PROTECTION PROGRAM

In 2007, the Florida Legislature amended the Lake Okeechobee Protection Act to include the St. Lucie River and Estuary and the Caloosahatchee River and Estuary, and their watersheds, in an effort to promote a comprehensive, interconnected watershed approach to protect the Northern Everglades and Estuaries ecosystems. The amended legislation (Section 373.4595, Florida Statutes), renamed the Northern Everglades and Estuaries Protection Program (NEEPP), recognizes that the Lake Okeechobee, Caloosahatchee River, and St. Lucie River watersheds are critical water resources of the State of Florida. This program builds upon and consolidates numerous restoration activities into a comprehensive, regional approach. Watershed Protection Plans (WPP), developed pursuant to the NEEPP for each of the three watersheds, identify actions to help achieve water quality and quantity objectives for the watersheds and to restore habitat, and are the basis for the Florida Department of Environmental Protection's (FDEP) basin management action plans (BMAPs) in the respective areas. These efforts are detailed in the following section. In 2016, the Florida Legislature amended the NEEPP to strengthen the provisions for implementing the BMAPs and further clarify the roles and responsibilities, coordination, implementation, and reporting among the three coordinating agencies: FDEP, Florida Department of Agriculture and Consumer Service (FDACS), and SFWMD. Implementation of the NEEPP by the coordinating agencies is underway. Updates on NEEPP annual progress are covered in the South Florida Environmental Report (SFER) – Volume I, Chapter 8 (www.sfwmd.gov/sfer).

BASIN MANAGEMENT ACTION PLANS/WATERSHED PROTECTION PLANS

A variety of basin-specific planning efforts identify water quality standards and detail mechanisms to achieve and maintain those standards. BMAPs and WPPs promote a comprehensive, interconnected watershed approach to identify upstream measures to improve hydrology to, and water quality in, downstream water bodies. Total Maximum Daily Loads (TMDLs) are scientifically determined maximum amounts of a pollutant that a surface water body can absorb and still meet water quality standards that protect human health and aquatic life. BMAPs are the "blueprint" for restoring impaired waters by reducing pollutant loadings to meet the allowable loadings established in a TMDL. Reasonable Assurance Plans (RAPs) are a possible alternative to BMAPs for certain surface waters that already have control programs in place that will ensure water quality standards will be restored. An update on key planning efforts is highlighted below.

Caloosahatchee River/St. Lucie River/Lake Okeechobee Watershed Protection Plans: WPPs for the Northern Everglades and estuaries were adopted for both the Caloosahatchee and St. Lucie estuaries in 2009 and Lake Okeechobee in 2004. The purpose of these plans is to improve the hydrology and aquatic habitats of Lake Okeechobee and downstream receiving waters, including the Caloosahatchee and St. Lucie rivers and estuaries, for the restoration and protection of these Northern Everglades ecosystems. The WPPs were developed in accordance with NEEPP-mandated timelines and were last updated in 2014 (Lake Okeechobee) and 2015 (Caloosahatchee and St. Lucie rivers). Future updates to the WPPs will be done in accordance with the 2016-amended NEEPP to ensure that they are consistent with the adopted BMAPs for Lake Okeechobee and the St. Lucie and Caloosahatchee river watersheds. Per NEEPP requirements, the next update of the Lake Okeechobee WPP will be completed by March 1, 2020 and every five years thereafter.

The BMAPs for the Caloosahatchee Estuary Basin, St. Lucie River and Estuary Basin, and Lake Okeechobee were adopted in 2012, 2013, and 2014, respectively. Per NEEPP requirements, the first 5-year review for the Caloosahatchee Estuary BMAP was completed by FDEP in December 2017 and the first 5-year review for the St. Lucie River and Estuary BMAP was completed in June 2018. The first 5-year

review for the Lake Okeechobee BMAP is scheduled to be completed by FDEP in December 2019, in coordination with the next update of the Lake Okeechobee WPP. The state's annual progress reporting on the BMAPs also continued during the reporting period. The first Florida Statewide Annual Report was published on July 1, 2018 per statutory requirements (www.floridadep.gov/dear/water-quality-restoration/content/basin-management-action-plans-bmaps).

Florida Keys National Marine Sanctuary (FKNMS) Water Quality Protection Program (WQPP): The legislation that created the FKNMS in 1990 directed the USEPA and the State of Florida, in consultation with NOAA, to develop the WQPP (http://ocean.floridamarine.org/FKNMS_WQPP/). This program has been instrumental in supporting upgrades to wastewater management infrastructure in the Keys, helping to restore degraded residential canals, and coordinating other water quality improvements. Ongoing long-term monitoring of water quality, seagrass communities, and coral reefs and special research projects funded through the WQPP have provided valuable information to marine resource managers. In 2008, the Florida Keys Reasonable Assurance Plan (FKRAP) was developed by the FDEP in cooperation with local governments and state and federal agencies within the Florida Keys to set forth and accelerate the actions to reduce nutrient loadings to nearshore waters throughout the Florida Keys, including making significant progress implementing advanced wastewater treatment. As part of this plan, Monroe County and its municipalities have been implementing advanced wastewater treatment throughout the Florida Keys. In December 2011, the Florida Keys Reasonable Assurance Documentation (FKRAD) was updated to provide the status of management activities defined in the original RAP and to address dissolved oxygen impairments for some segments or water body identification numbers. Most recently, the Florida Keys were assessed and the FKRAD was updated in 2017–2018. Most of the planned restoration projects have been implemented; however, more monitoring is needed to assess the success of the plan.

The FDEP and Monroe County are working together to put a monitoring program in place that will focus on the water quality in the nearshore waters. It is anticipated that this program will continue for two years and results will be reported in the next FKRAD update, which is due in 2020. Progress has also been made on identifying best technologies for restoring degraded residential canals. As part of this long-term program, the USEPA has supported regular monitoring to assess the status of water quality, seagrass meadows, and coral reefs. The waters of the Keys are assessed by FDEP and the FKRAP was updated in 2017-2018. The majority of the restoration projects in the initial plan have been implemented; however, more monitoring is needed to assess the results of the restoration activities.

OTHER WATER QUALITY INITIATIVES

Dispersed Water Management Program: As part of an ongoing effort to maximize water storage in the greater Everglades system, the SFWMD is continuing to partner with agencies and private landowners to bolster the Dispersed Water Management (DWM) Program. The goals and objectives of the DWM Program are to provide shallow water storage, detention, and retention on public and private lands to help reduce the amount of water flowing into Lake Okeechobee and/or being discharged to the Caloosahatchee and St. Lucie estuaries when excess water conditions occur in the Northern Everglades watersheds. This year, the SFWMD has led efforts to plan, implement, or operate: the Florida Ranchlands Environmental Services Project, 14 Northern Everglades Payment for Environmental Services projects, 2 Water Farming Pilot Projects on fallow citrus lands, and 6 large public/private projects under the NEEPP. Since its inception in 2005, the DWM Program's estimated average annual retention volume has grown to more than 146,000 acre-feet per year in operation and maintenance with an additional estimated average annual retention volume of over 220,000 acre-feet per year in the planning, design/permitting, or construction phase.

C-43 Water Quality Treatment and Testing Facility: The SFWMD, in partnership with Lee County, is conducting the C-43 Water Quality Treatment and Testing Facility Project to help demonstrate and implement cost-effective, wetland-based strategies for reducing nutrient loadings, particularly nitrogen, to the Caloosahatchee River and its downstream estuarine ecosystems. In 2007, approximately 2,000 acres of land were acquired with funds from Lee County as well as from the SFWMD and State of Florida. In WY 2015, the SFWMD proceeded with the first phase of the project, which includes mesocosms and bioassays. Phase I mesocosm construction was completed in June 2016 and the mesocosm study is planned for completion in December 2018. Phase II of the demonstration (test and field-scale cells) and full treatment

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facility are both contingent on future legislative funding. Currently, the property has mixed uses, with a portion leased for citrus production while other site activities continue. In addition, water storage is also being done on an interim basis, with approximately 5,250 acre-feet per year of operational storage capacity. Pumps can pull water directly from the Caloosahatchee River before it reaches the estuary.

Hybrid Wetland Treatment Technology (HWTT): HWTT systems combine attributes of STA treatment wetlands with chemical treatment systems. There are currently 8 operational HWTT systems within the SFWMD boundaries: 5 in the Lake Okeechobee Watershed (Nubbin Slough, Mosquito Creek, Lemkin Creek, Grassy Island, and Wolff Ditch) and 3 in the St. Lucie River Watershed (Ideal 2 Grove, Bessey Creek, and Danforth Creek). These systems remove between 74% and 93% of total phosphorus (TP) and 63% of the total nitrogen in the water flowing through the treatment systems.

Floating Aquatic Vegetation Tilling (FAVT): FAVT systems utilize floating plants to absorb nutrients that are then composted to provide new soil for the FAVT system. The 540-acre East Caloosahatchee site is designed to treat local agricultural runoff from the Hendry Hilliard Water Control District, the East Caloosahatchee River, and Lake Okeechobee. The East Caloosahatchee FAVT facility removes approximately 90% of the inflow TP load on an annual basis. The Fisheating Creek facility, located in the Lake Okeechobee watershed, is comprised of 250 acres of floating aquatic vegetation and submerged aquatic vegetation communities. In 2016, this facility became operational and is currently in an optimization phase. Load reductions will be determined after optimization is completed.

Tribal Water Quality Standards: The Seminole Tribe of Florida is working to develop numeric nutrient criteria and plans on submitting it to the USEPA for approval upon completion.

L-28 Canal System: Range of Options for Improving Water Quality: In December 2015, in response to the Miccosukee Tribe of Indians of Florida's (Miccosukee Tribe) concerns about P impacts to their Reservation, the Interior, Environment, and Related Agencies House Appropriations Sub-Committee directed the NPS (in the Consolidated Appropriations Act of 2016) to work with the Miccosukee Tribe and relevant federal agencies to develop a range of options to address the water quality issues of the L-28 canal system. In March 2017, the NPS completed their report and in October 2017, the approved final report was submitted to the Congress. This work was integrated into the ongoing Western Everglades Restoration Project (WERP).

HABITAT PROTECTION AND RESTORATION

Historically, the natural habitats of south Florida covered an area of about 18,000 square miles. 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. Restoration will require land acquisition and conservation to protect natural habitats and species and protection of the region's offshore habitats including coral reefs.

LAND ACQUISITION

The 10-year, \$3 billion Florida Forever program was established in 2000 by the Florida Legislature to conserve environmentally sensitive land, restore waterways, and preserve important cultural and historical resources. The 2008 Florida Legislature authorized an additional \$3 billion through 2020.

The Florida Water and Land Conservation Initiative, Amendment 1, was on the November 4, 2014 ballot in the state of Florida as an initiated constitutional amendment, where it was approved. The measure was designed to dedicate 33 percent of net revenue from the existing excise tax on documents to the Land Acquisition Trust Fund.

The Land Acquisition Trust Fund was developed to acquire and improve conservation easements, wildlife management areas, wetlands, forests, fish and wildlife habitats, beaches and shores, recreational trails and parks, urban open space, rural landscapes, working farms and ranches, historical and geological sites, lands protecting water and drinking water resources, and lands in the EAA and the Everglades Protection Area. The fund was designed to manage and restore natural systems and to enhance public access and recreational use of conservation lands.

State Land Acquisition since 1980:

- 4.9 million acres of land have been acquired.
- 12 projects have been completed.
- 66 projects are underway.

LAND CONSERVATION

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. The USDA – Natural Resources Conservation Service (NRCS) provides technical and financial support to help landowners with their wetland restoration efforts. The NRCS's goal is to achieve the greatest wetland functions and values, along with optimum wildlife habitat, on every acre enrolled in the program.

Agricultural Conservation Easement Programs (ACEP) in Florida: During the reporting period, the USDA invested over \$38 million in ACEP funds to protect 10,833 acres of land in Florida. Over 75% of this investment was within the Northern Everglades Initiative area.

Fisheating Creek Wetland Restoration Project: The NRCS has acquired permanent conservation easements in the Fisheating Creek Wetland Restoration Project area. The planned restoration activities will reduce the amount of surface stormwater leaving the land, slowing water runoff and reducing the concentration of nutrients entering Lake Okeechobee and the Everglades. Restoration activities are scheduled to begin in early 2019.

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Northern Everglades: As a result of the ACEP program, the amount of surface water 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.

ESTUARY AND CORAL REEF PROTECTION

Biscayne National Park Coastal Restoration Efforts: In 2017-18, the USACE and SFWMD continued to move forward with construction and operation of the BBCW Phase 1 project (see Generation 2 Projects, in this document) and have begun to document improvements in water quality, coastal vegetation, and estuarine conditions downstream of the completed portions of the project. While the quantity of freshwater delivered through this project at this stage has shown direct benefits in only the nearshore regions, the coral reef zone is also anticipated to be an indirect beneficiary of improved water quality. Coral reefs within BNP are experiencing impacts from coral disease with possible ties to poor water quality and increased water temperature. At this time, it is estimated that only 8% of the historic reef cover remains viable. Incremental improvements in flow, as have been achieved through the addition of culverts and a temporary 25 cfs pump station on canal L-31E in the BBCW project, are expected to continue to contribute to improved conditions in the local area.

Fisheries Management Efforts: Between 2016 and 2018, the Florida Fish and Wildlife Conservation Commission (FWC) enacted conservation measures for several species important to the estuaries and nearshore coral reefs of the South Florida Ecosystem to either recover or maintain at sustainable populations. Species include hogfish, mutton snapper, and great barracuda.

Coral Reef Conservation Program (CRCP)/Southeast Florida Coral Reef Initiative (SEFCRI): The FDEP's CRCP coordinates coral reef research, monitoring, and mapping, conducts education and outreach, develops management strategies, and encourages partnerships and stakeholder participation to advance protection of Florida's reefs. The CRCP leads the implementation of SEFCRI, a local action strategy for collaborative action among over 60 government and non-governmental partners to reduce key threats to coral reef resources off Miami-Dade, Broward, Palm Beach, and Martin counties. During 2017/2018, the SEFCRI Team created new Local Action Strategies with a five-year action plan. In August 2017, the State of Florida hosted the U.S. Coral Reef Task Force meeting with topics that included stressors to the offshore coral reefs as well as restoration initiatives. New legislation was passed that establishes the Southeast Florida Coral Reef Ecosystem Conservation Area in state waters from the northern boundary of BNP to the St. Lucie Inlet starting July 1, 2018.

Coral Restoration Efforts: With funding from a NOAA Community-Based Restoration Grant, the Coral Restoration Foundation continued to out-plant two federally threatened listed species of coral in the FKNMS during this reporting period. Research is ongoing regarding culture techniques for three additional Endangered Species Act listed coral species and refining out-planting techniques.

Coral Disease Outbreak Multi-Agency Response: Since it first emerged in 2014, a severe coral disease outbreak has continued to progress throughout the Florida Reef Tract, spreading over 175 miles, and has since spread to the northern extent of the Florida Reef Tract and south through BNP into the FKNMS (see FKNMS below). This is a widespread and lethal coral disease outbreak extending over a large geographic range that has continued to spread for over three years without interruption, affects nearly half of Florida's reef-building coral species, and has high rates of transmission and mortality. NOAA, FDEP, and other federal, state, and local government entities, universities, non-governmental organizations (NGOs), and the community at large have been working on a comprehensive multi-faceted response effort that includes: (1) field data collection; (2) sampling, analysis, and experimentation to better understand the disease dynamics and identify the primary and secondary causes; (3) investigating potentially contributory environmental conditions; and (4) identifying of management actions to slow or stop the spread of disease. While these disease-specific response efforts are ongoing, parallel efforts to ensure the presence of environmental conditions required for coral survival, such as improvement to nearshore water quality through the CERP, will be necessary to ensure the long-term survival and recovery of these resources. Partner agencies have continued to characterize the distribution, prevalence, and severity of the disease and are working to identify

causative agents and linkages with environmental factors. Testing of different treatments to mitigate impacts and reduce disease spread is underway. Following successful laboratory attempts by BNP to salvage pieces of infected colonies of the threatened pillar coral, *Dendrogyra cylindrus*, scientists have begun a “genetic rescue” project to ensure that as many unique genotypes are preserved as possible and are testing the use of antibiotics to treat infected corals.

FKNMS Reef Assessment and Triage following Hurricane Irma: Within days of Hurricane Irma’s September 2017 crossing in the Lower Keys, NOAA scientists, partner agencies, and local organizations conducted a rapid assessment of selected coral reefs to document storm impacts and stabilize overturned corals. Although storms are natural events, the strength of the storm and overall condition of the reef prompted a triage response.

Marine Debris/Vessel Removal Efforts in FKNMS: The FKNMS and the National Marine Sanctuary Foundation launched *Goal: Clean Seas Florida Keys* in response to the significant amount of debris left in the wake of Hurricane Irma. This community-based program engages local tour operators and other businesses in removing derelict lobster traps, fishing gear, construction materials, and other items that pose significant pollution and navigation threats. FKNMS science staff also served as Natural Resource Advisors in the submerged vessel salvage operations conducted by the US Coast Guard in response to Irma.

FKNMS Resource Planning Efforts: The FKNMS Advisory Council continued to hold regular public meetings during the reporting period. These meetings are designed to inform members about ecological and sociological issues related to sanctuary resource management.

Our Florida Reefs: This program 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.

Biscayne Bay Habitat Focus Area: Biscayne Bay and its nearshore reef, including the state Biscayne Bay Aquatic Preserves (BBAP), BNP, and the upper part of the FKNMS (Manatee Bay, Barnes Sound, and Card Sound), were designated a NOAA Habitat Focus Area in the NOAA Habitat Blueprint Initiative. The implementation plan completed in 2016 contains four goals that address the quality of bay and reef habitat for protected and fishery species and the people of the region and the nation. The first three goals are to: (1) improve and protect water quality; (2) increase and protect freshwater inflows; and (3) reduce physical damage to seagrass, coral, mangrove shoreline, and other bay habitats. Applied studies are being used to develop scientific information to shape the most effective approaches to addressing these goals. For example, considerable progress has been made on determining the most effective ways to prevent stimulation of algal blooms by nutrients. Progress also is being made to learn more about the historic and current presence and habitat of the smalltooth sawfish in Biscayne Bay. The fourth goal is to acquire information on socio-economics and ecosystem services to help citizens, managers, and policy makers better understand the bay’s economic, social, and ecological benefits to human systems and the importance of gaining and maintaining the long-term good health of Biscayne Bay and its reef tract now and into the future.

Biscayne Bay Aquatic Preserves: In 2016, a basin-wide loss of seagrass habitat led to dedicated research efforts initiated by FDEP BBAP staff, facilitated through the Task Force’s Biscayne Bay Regional Restoration Coordination Team and other partners, to investigate causes of declining water quality and seagrass habitat health in an historically productive section of the bay. Initial indicators suggest high loads of nutrients and other pollutants enter the basin from failing sewage and surface water infrastructure, further emphasizing the importance of a comprehensive restoration plan for all waters connecting the Everglades and all south Florida estuaries.

Florida Keys Aquatic Preserves (FKAPs): Two FDEP-managed aquatic preserves (AP) fall within the FKNMS: Lignumvitae Key AP and Coupon Bight AP. During this reporting period, a dedicated staff position was created to oversee the management of these valuable resources. The focus of activities within the

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preserves includes establishing water quality monitoring sites, increasing community awareness and appreciation of the preserves' resources, and post-Hurricane Irma response.

FKNMS Water Quality Protection Program (WQPP): The FKNMS WQPP is a congressionally authorized program established in 1990 that is dedicated to protecting and improving water quality, coral reefs, seagrasses, fisheries, and recreational opportunities within the FKNMS and adjacent boundary waters. Co-chaired by the USEPA and FDEP, the WQPP is a collaborative program driven by a Steering Committee comprised of federal and state resource managers, local governments, elected officials, NGOs, academia, and local citizens that meet biannually to identify and address pollution sources impacting marine resources of the FKNMS. The condition of FKNMS waters, corals, and seagrass is evaluated through a long-term status and trends monitoring network established in 1996. Most recently, the USEPA provided funding to support the WQPP including a full-time disease response specialist position at FDEP; projects investigating the ecology, transmission, and progression of coral disease; an impact study on corals and spiny lobster from endocrine disrupting compounds (mosquito spraying); and support for the Fish and Wildlife Research Institute's (FWRI) Coral Reef Evaluation and Monitoring Program that is in its 22nd year. USEPA-funded projects for various water quality and coral disease projects were awarded to universities and state and local governments totaling over \$1.4 million during this reporting period.

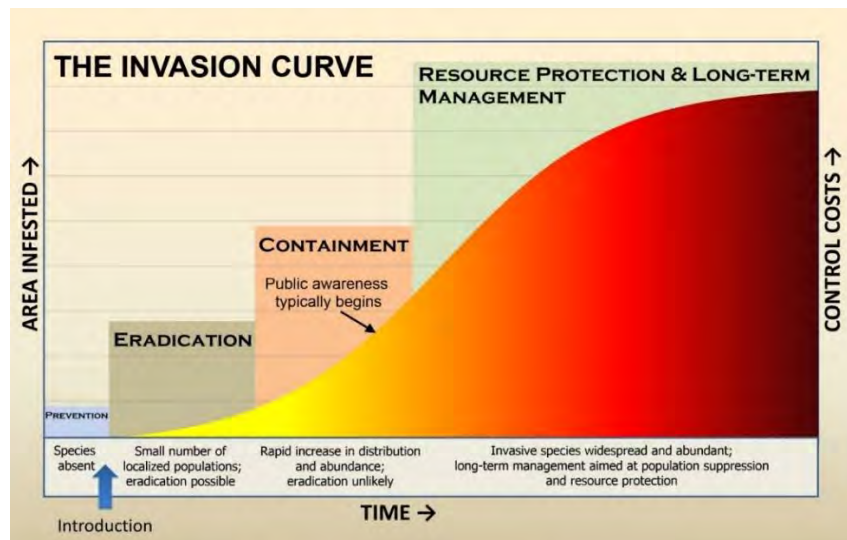
INVASIVE EXOTIC SPECIES

Florida has the highest severity of threats posed to native habitats and species by invasive exotic species in the continental United States. Florida’s subtropical climate, major ports of entry, large-scale pet and aquarium commerce, and agricultural and ornamental plant industries contribute to the state’s vulnerability to biological invasions. Invasive exotic species are detrimental to America’s Everglades, causing harm to native species including threatened and endangered species through predation, food web disruption, resource competition, physical changes to habitats, and disruptions to unique ecological processes and functions.

According to the U.S. Fish and Wildlife Service (USFWS), Florida now ranks as having the largest number of established non-indigenous amphibians and reptile species in the entire world. Fifty-six non-native amphibians and reptiles have established themselves in Florida, including three frogs, four turtles, one crocodylian, forty-three lizards, and five snakes. Two invasive exotic species that raise significant concerns in south Florida are the Burmese python and the Argentine black and white tegu lizard. Burmese pythons are a threat to native wildlife and ecosystems of south Florida, and their presence has led to severe declines in Everglades mammal populations. Pythons are particularly worrisome in vulnerable habitats such as Key Largo, the only place in the world where the federally endangered Key Largo woodrat and Key Largo cotton mouse are found. They have also preyed on imperiled species such as wood storks and limpkins, as well as large animals such as alligators, white-tailed deer, and bobcats. They also compete with native predators for food, habitat, and space. Other species of nonnative constrictors would likely have similar impacts as Burmese pythons if they were to grow in number in south Florida. Due to the rapid response of wildlife managers, Northern African pythons have not invaded south Florida beyond a small area west of Miami.

The Argentine black and white tegu is also of particular concern as an invasive reptile. As of 2017, this species was established in multiple counties in Florida including Hillsborough, Polk, and Miami-Dade, and more than 1,000 tegus have been captured and removed. Tegus eat fruits, vegetables, eggs, insects, dog or cat food, and small animals like lizards and rodents. In Florida, tegus have dug into alligator and turtle nests and eaten the eggs. A growing and spreading tegu population is a threat to native wildlife such as crocodiles, sea turtles, ground-nesting birds, and small mammals.

Recognizing the importance of protecting valuable resources by managing the growing threats of these and other invasive exotic species, the Task Force developed an Invasive Exotic Species Strategic Action Framework (Framework) in 2014. The Framework is organized along the four phases of the Invasion Curve: Prevention, Early Detection and Rapid Response (EDRR), Containment, and Resource Protection and Long-term Management.



PREVENTION

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 identify pathways to stop harmful exotic species from entering the South Florida Ecosystem.

Prevention at Ports: The USFWS Office of Law Enforcement's Wildlife Detector Dog program was established to serve as an additional mechanism for combating the illegal wildlife trade. These K-9s, joined by Wildlife Inspector K-9 handlers, are trained to detect wildlife product scents (e.g. elephant ivory, rhino horn, sea turtle, sea horse, and snakeskin) and exposed to work environments such as air cargo warehouses, ocean containers, international mail facilities, and U.S./Mexico border crossings. These dogs are individually trained for the most common wildlife trafficked items that are seized at their duty station. Wildlife detector dog teams have been deployed to sniff out illegal wildlife products at the Miami port of entry. In Florida, USFWS K-9 teams, in conjunction with U.S. Customs and Border Protection (USCBP) and the USDA, run special operations to deter imports of injurious or invasive species at Tampa, Orlando, Fort Lauderdale, Jacksonville, West Palm Beach, and Miami ports of entry. Additionally, USFWS law enforcement officers are using detector dogs in a pilot program and have had success in increasing the amount of cargo they are able to inspect.

"Don't Let It Loose" Outreach and Public Engagement Tools: The FWC and partner agencies continue to utilize the "Don't Let It Loose" campaign at all education and outreach events to encourage responsible pet ownership and prevent release of nonnative wildlife into Florida. Promotional and education items are distributed to the public and interested stakeholders at outreach events that include the "Don't Let it Loose" logo.

Amnesty Program: The FWC Exotic Pet Amnesty Program's goal is to reduce the number of nonnative species released into the wild by pet owners by offering a legal alternative. This program provides pet owners the opportunity to surrender exotic pets, whether kept legally or illegally, without penalty or cost. Healthy animals are made available for adoption by pre-approved adopters who have the knowledge, permits, and ability to care for these exotic pets. Exotic Pet Amnesty Day events are held throughout the state, but pet owners can also surrender unwanted pets year-round by calling 1-888-IVEGOT1 (Exotic Species Hotline). This program also encourages responsible pet ownership through outreach and education at Exotic Pet Amnesty Days. During this reporting period, over 2,300 animals have been rehomed through this program.

Targeted Outreach: Outreach to the veterinarian community in south Florida to inform current pet owners about the FWC's Amnesty and "Don't Let It Loose" programs was initiated in April 2018 in partnership with USDOL's Office of Everglades Restoration Initiatives (OERI), Miami Zoo, and FWC through the Everglades Cooperative Invasive Species Management Area (ECISMA) partnership. Over 200 members of the South Florida Veterinary Medical Association were provided outreach materials to share with their clients. This effort is a directed outreach program to current pet owners to prevent releases of exotic pets and increase the number of willing adopters to support the amnesty program.

Don't Pack-a-Pest Partnership: Don't Pack a Pest (DPAP) is an outreach program that delivers a simple message: *When You Travel, Declare Agricultural Items, DPAP*. The program's goal is to educate travelers about the risks associated with bringing undeclared agricultural items into the U.S. and into neighboring Caribbean countries. The FDACS works in collaboration with the USDA, USCBP, and air and seaports to administer the program.

Habitattitude: Habitattitude is a national campaign developed by the Aquatic Nuisance Species Task Force to promote prevention. The USFWS serves as the lead federal agency and the partnership has the significant support and involvement of the pet and aquarium trade, represented by the Pet Industry Joint Advisory Council, and the nursery and landscape industry. Additional partners include NOAA's National Sea Grant College program and state fish and wildlife agencies.

Lacey Act: The USFWS announced a final rule on September 30, 2016, to add 11 nonnative freshwater species to the list of injurious wildlife under the Lacey Act: 10 fish (crucian carp, Eurasian minnow, Prussian carp, roach, stone moroko, Nile perch, Amur sleeper, European perch, zander, wels catfish) and 1 crayfish (common yabby). The rule went into effect on October 31, 2016. These 11 species are not in U.S. trade or are negligible in trade, so the listing results in only a minor, if any, effect on the U.S. economy. If introduced into the wild in the South Florida Ecosystem, the 11 species have the potential to become highly invasive and cause harm to freshwater habitats, native species, and the local economies these natural resources support. Therefore, the USFWS took this proactive step to keep these species out of the country. As a result of the injurious listing, importation and shipment between the continental U.S., the District of Columbia, Hawaii, the Commonwealth of Puerto Rico, or any possession of the U.S. is prohibited, except as authorized by permit from the USFWS for scientific, medical, educational, or zoological purposes.

To help prevent a deadly fungus from killing native salamanders, the USFWS published an interim rule to list 201 salamander species as injurious wildlife under the Lacey Act. The fungus *Batrachochytrium salamandrivorans*, also known as Bsal or salamander chytrid, is carried on the skin of various salamander species. Bsal has caused major die-offs of salamanders in Europe and poses an imminent threat to U.S. native salamander populations. The fungus is not yet known to be found in the U.S., and to help ensure it remains absent, the USFWS published an interim rule that took effect on January 28, 2016. The importation and shipment between the continental U.S., the District of Columbia, Hawaii, the Commonwealth of Puerto Rico, or any possession in the U.S. of the listed species is prohibited.

EARLY DETECTION AND RAPID RESPONSE

It is imperative to respond quickly and deal with emerging threats while they remain localized. After prevention, eradication through EDRR is the second most cost-effective method to deal with invasive exotic species. EDRR includes monitoring, decision tools, response teams, response resources and evaluation, and retreatment if needed. Early Detection can refer to a new introduction in Florida or an expansion of a current exotic species into new areas of Florida.

Decision Tools

EDRR Decision Framework/Screening Tool: The need for a decision support tool was identified in the Task Force's Framework document under Strategy 2B1: "Rapidly assess the status and potential threat of newly detected invasive exotic species populations and develop a response/no response plan." Starting in 2015, the U.S. Geological Survey (USGS) funded the University of Florida (UF) to develop a response decision support tool (screening tool) and FWC has taken that support tool to develop it for the entire State of Florida.

The decision screening tool provides a standardized and transparent process for ranking those nonnative species that warrant a rapid response after their detection within the Everglades ecosystem. The screening tool is a living document, it will be updated and calibrated for optimal performance over time as new information is obtained and uncertainty is reduced. The screening tool can stand alone or be used in concert with other risk assessment tools currently under development and it will fit into a greater framework for EDRR efforts in the Everglades ecosystem.

The FWC has been working closely with the UF to adapt the invasive species risk screening tool for statewide use in Florida. The intent of the screening tool is to quickly assess the potential risk posed by a species, given some knowledge of the species' biology, climate matching, history of invasiveness, and ecology of the introduced area. Based on the information provided, the tool provides an Invasion Assessment Score (how likely the species is to successfully invade) and a Feasibility of Control Score (how feasible it will be to control the species where it has been introduced). These scores help managers decide whether to rapidly respond to a sighting and the FWC intends to use it to inform whether additional in-depth risk assessment is needed. The FWC is currently using the first version of the tool and will continue to work with the university to refine, develop, and improve it.

Monitoring Network for Plants and Animals

Monitoring at all Levels for Invasive Plants: Since 1993, the SFWMD, in collaboration with the NPS, USFWS, and other agency partners, has conducted landscape-scale monitoring for priority invasive exotic plants in America's Everglades. The monitoring program has evolved in response to new technologies and refined monitoring objectives. The program currently utilizes several distinct monitoring protocols, including systematic landscape-level aerial reconnaissance, a sample-based spatially stratified monitoring system, detailed inventories in planned control areas, and a set of methods focused solely on EDRR.

Reptile Driving and Camera Monitoring Networks: Everglades Invasive Reptile and Amphibian Monitoring Program (EIRAMP): The SFWMD and UF have established survey routes for new and emerging invasive exotic species within the ECISMA footprint. During this reporting period, EIRAMP activities resulted in the discovery of three new populations of veiled chameleons, an Oustalet's chameleon (*Furcifer oustaleti*) population, and a Panther chameleon (*Furcifer pardalis*) population, and response activities were initiated. Additionally, these routes help to identify and remove species that are classified as containment or long-term management as part of resource protection. Recently an initiative to manage green iguanas has resulted in removal of over a thousand individuals. Over 40 caimans, 700 Argentine black and white tegus, and a Morelet's crocodile (*Crocodylus moreletii*) were also removed.

Public Monitoring Activities

Web-Based Mapping: The public Early Detection and Distribution Maps (EDDMapS) is a web-based mapping system for documenting invasive plant and wildlife species distribution. It tracks and verifies sightings from species professionals and members of the public of all taxa of invasive exotic species. EDDMapS combines data from other databases and organizations as well as volunteer observations to create a national network of invasive species distribution. For the reporting period of June 1, 2016 – June 15, 2018, EDDMapS had over 7,200 nonnative wildlife records.

Exotic Species Reporting Hotline (888-IveGot1): The FWC Nonnative Fish and Wildlife Program uses sightings, many by the public, to determine if a new nonnative species may have the potential to reproduce and become established. From June 1, 2016 – June 15, 2018, the average reporting per day was 7 calls with a total of 5,233. Hotline reports have increased our collective knowledge of many otherwise unknown potential nonnative species issues, such as Argentine black and white tegu expansion and releases, monitor (*Varanus spp.*) distribution in Palm Beach, Broward, Miami-Dade, and Monroe counties, and recent sightings of chameleon species in south Florida. The hotline also provides a way for the public to surrender unwanted exotic pets through the Pet Amnesty program.

Response Teams and Response

Invasive Exotic Plant Rapid Response: Regional partners, coordinating through the ECISMA, continued monitoring and treatment of several EDRR priority species including Asian black mangrove (*Lumnitzera racemosa*) and mile-a-minute weed (*Mikania micrantha*). Previous efforts removing the Asian black mangrove resulted in the removal of all mature Asian black mangrove. Ongoing efforts focus on seedlings emerging from the seed bank and will continue until the seed bank is depleted. Work continues in locating and removing mile-a-minute, a federally-listed noxious weed, from known locations in the Homestead area of Miami-Dade County.

USFWS Invasive Species Strike Team (ISST): For 2017, the bulk of ISST funding was directed towards the emergency response to the invasive New World screw worm fly outbreak on the National Key Deer Refuge and adjacent Lower Keys. The remaining balance of ISST funds were targeted directly to the LNWR for on-going nonnative invasive plant control efforts. In addition, the ISST identified and treated two state-listed nonnative invasive plants at the LNWR that had never been documented by staff in the interior of WCA-1: laurel fig (*Ficus microcarpa*) and umbrella tree (*Schefflera actinophylla*). Both trees were treated in rapid response fashion to prevent the chance of any further establishment and spread in the refuge interior. Since its inception in 2004, the ISST has provided over \$6 million to Florida and Southeast refuges for the control and management of nonnative invasive plants and non-indigenous wildlife.

Invasive Exotic Animal Rapid Response: During the reporting period, the FWC and partners continued rapid response efforts to control expanding populations of several high priority invasive animal species including Argentine black and white tegus, Nile monitors, and Burmese pythons. These responses helped contain the spread of these high priority species that can be detrimental to Florida's ecology and reduce the likelihood of incipient population establishment. Additionally, rapid response teams have removed high priority nonnative wildlife species that are not yet breeding in Florida, including several species of monitors, such as water, Savannah, and black-throated monitors as well as conditional or injurious constrictors like the yellow anaconda. During FY 2017/2018, the FWC ramped up efforts to increase response capability by developing the Nonnative Wildlife Responder Network. This network of volunteers is required to take FWC training that teaches them how to identify, survey for, trap, safe capture, or assist with other rapid response scenarios across the state for high priority invasive wildlife. To date, over 100 members of the public have completed this training.

Nonnative Fish Round-Up: Each year the ECISMA recruits anglers to participate in a nonnative freshwater fish removal event. The Round-Ups raise public awareness about potential impacts of releasing nonnative fish in Florida waters and promote consumptive use of these species. Participants can fish in Collier, Miami-Dade, Broward, and Palm Beach counties and compete for prizes. Partner agencies assist with weigh-in stations and determine winners for each category. In spring 2018, the 9th annual event was held with 64 anglers participating. During this event, 18 distinct species and over 1,800 pounds of nonnative fish were removed from Florida freshwater. Some of the catch is donated to a local wildlife sanctuary as food for the captive animals. Data from the anglers also assists managers with distribution and abundance information.

CONTAINMENT

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 to minimize the damage to the ecosystem and reduce long-term control costs. The containment phase focuses on the utilization and often rapid deployment of control tools at containment boundaries and known pathways.

Containment of Invasive Exotic Animals

The FWC continues to conduct systematic removal of high priority nonnative species across south and southwest Florida, including Nile monitors in Palm Beach County, Argentine black and white tegus in Miami-Dade and Hillsborough counties, and black spiny-tailed iguanas in Sarasota, Collier, and Broward counties. Between July 1, 2016 – June 15, 2018, the FWC and partners have removed over 50 Nile monitors from a breeding population in Palm Beach County.

During the reporting period, partners increased coordination efforts and resources to control expanding populations of several invasive animal species. The total number of Argentine black and white tegus removed from the south region/core area is approaching 2,000 between July 1, 2016 to the present. The FWC, UF, SFWMD, NPS, and USGS are all contributing to trapping and monitoring for tegus in southern Miami-Dade County. Biologists have conducted trapping efforts for nonnative invasive reptiles primarily targeting the green iguana and the Argentine black and white tegu within the park and in immediately adjacent areas. Even though all partners have increased trapping efforts each year, tegus are being spotted further away from the core of the population more frequently and ongoing efforts may be insufficient to contain tegus in this area.

Trap Loan Programs: The FWC has also ramped up efforts to engage the public in invasive species removal by developing and improving trap loan programs for tegus in Homestead, Florida City, and Hillsborough and Charlotte counties. Homeowners that report tegus to the FWC are issued a loaner trap that they maintain and check throughout the active season. If a tegu is captured, the homeowner contacts FWC biologists immediately and transfers the animals to FWC, thus removing it from the wild in Florida.

Containment of Invasive Exotic Plants

The FWC, SFWMD, and other agencies continued efforts to contain and control several invasive plant species that have limited but expanding populations in the Everglades region. These species include Tropical American watergrass on Lake Okeechobee, feathered mosquito fern in canals of the Northern Everglades, and Wright's nut-rush in WCA-3.

The SFWMD is actively monitoring for and controlling a recently discovered population of West Indian marsh grass in WCA-2A. This plant is an aggressive invader in the Kissimmee River floodplain and has the potential to invade open water sloughs within the Everglades.

RESOURCE PROTECTION AND LONG-TERM MANAGEMENT

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 wide-spread 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 of native habitats and recovery of ecosystem functions.

Long-term Maintenance of Invasive Exotic Plants: The status of invasive plant management in the Everglades remains a mix of successes and continued challenges during the reporting period. Regional, coordinated efforts have yielded large portions of the Everglades with very low infestations free of melaleuca and several other high profile invasive plant species, though periodic management is still necessary to prevent reestablishment of these species. Sufficient resources are needed to maintain this success along with continued monitoring for spread of existing species and new invasions.

Knowledge gained from coordination, operational experience, and recent herbicide trials allows regional land managers to more effectively treat priority invasive plant species with reduced collateral harm to the environment. Management evaluations for aquatic and terrestrial invasive plants have improved management outcomes. For example, SFWMD scientists and collaborators from the UF are developing herbicide recommendations for control of priority aquatic and terrestrial invasive plants.

In 2018, the USFWS and SFWMD entered into a new 20-year lease agreement for the LNWR. While the USFWS Refuge System will continue to manage the area (WCA-1) as a refuge, the SFWMD will now be responsible for implementing invasive plant management. The Refuge currently has substantial infestations of Old World climbing fern and melaleuca. Mitigating the impacts of these two species at the refuge will likely require significant resources and 10 or more years to approach maintenance control levels.

Long-term Maintenance of Invasive Exotic Animals: Invasive animal species are a rapidly increasing environmental and economic problem in the United States. As of 2016, USFWS wildlife inspectors process more than 170,000 declared wildlife shipments annually and that number is expected to grow. By law, most international commercial wildlife shipments come through 18 "USFWS designated ports" in the United States of which Miami is one. The USFWS law enforcement works at designated ports to inspect shipments and enforce laws concerning wildlife and commercial trade in endangered animals and plants. Tampa is a non-designated port. Both offices work with and respond to growing airports such as Orlando and Fort Lauderdale regarding wildlife interdiction and facilitation of legal wildlife shipments.

During the reporting period, efforts to develop control tools and management strategies for several priority nonnative animal species continued. These included the Burmese python and other large constrictors, the Nile monitor, and the Argentine black and white tegu. Control tools are very limited for free-ranging reptiles and the application of developed methods is often impracticable in sensitive environments where impacts to non-target species are unacceptable. Available tools for detecting and/or removing invasive reptiles generally include trapping, barriers, and detection dogs, as well as visual searching and pheromone attractants.

Python Removal Contractor Programs: The FWC has developed two programs to engage local experts and the public in Burmese python removal in south Florida. In April 2017, the FWC launched the Python Removal Contractor Program and the public incentives program called Python Pickup. Python Removal Contractors are experienced individuals who are compensated for survey time and removal of pythons from public lands. The FWC's contractor program also compensates these individuals for response to reports of large nonnative constrictors received via the Exotic Species Hotline. To date, contractors have removed 120 pythons and almost 40 python eggs from Wildlife Management Areas in south Florida. Starting in July 2018, FWC contractors will be authorized to work within ENP to remove Burmese pythons from within the boundaries of the park (see Python Removal Authorized Agent Program below).

The SFWMD launched the Python Elimination Program in March 2018. This management effort employs 25 experienced individuals who are compensated for survey time and removal of pythons from SFWMD properties in Miami-Dade, Broward, Collier, and Palm Beach counties. As of the date of this report, contractors have removed 1,094 pythons under the SFWMD program.

Python Pickup: The FWC has created Python Pickup, a new public engagement and incentive program that encourages the public to remove Burmese pythons in Florida and report removals to the FWC for a chance to win monthly and grand prizes. Pythons can be removed from any property where the individual has authorization to work. Executive Order 17-11 allows anyone to remove nonnative reptiles, including Burmese pythons, from 22 public lands in south Florida without a permit or hunting license. Pythons killed on these properties are eligible as part of the Python Pickup Program, but participants can also remove pythons from private lands. To participate, only a photograph and GPS coordinates are required. In early 2018, the first grand prize given to a participant was a Lifetime Sportsman's License for Florida.

Python Removal Authorized Agent Program: Following declines in python removal efforts (and consequently fewer pythons removed) in 2017, ENP expanded its Python Removal Authorized Agent Program in 2018 from 40 to 120 authorized agents. The expansion will not only allow for more participation from volunteers and partners but will also allow FWC contractors to get paid for python removal efforts within the park. Big Cypress National Preserve is also allowing FWC contractors to remove pythons from their lands.

WATER MANAGEMENT

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 states that implementation of the CERP shall not reduce levels of service for flood protection that were in existence on December 11, 2000, the date that the law was enacted, and in accordance with applicable law.

FLOOD PROTECTION

Broward County: The S-13 Pump Station has been fully refurbished, including installation of new engines, a new generator building, new trash rakes, new automated controls, and complete removal and overhaul of the pumps. The project allows an aging pump station constructed in the 1950s to continue to provide flood protection to highly populated southern Broward County.

C-4 Flood Mitigation Project: The C-4 Flood Mitigation Project includes 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. Two forward pumps (S-25B and S-26) and six of the seven canal bank improvement projects have been completed. Of the remaining canal bank improvements, the final segment is in construction.

Hillsboro Canal Bank Stabilization Project: Construction is complete on the first two phases of the Hillsboro Canal Bank Stabilization Project. The project replaced collapsing banks on both the north and south sides with properly sloped, armored, and vegetated banks and removed sediment from the canal that resulted from the collapsing material. This returned the canal to its full hydraulic capacity. The first two phases covered 7.5 miles of canal from the southeast corner of Site 1 eastward to the G-56 coastal structure. Design is nearing completion on the last phase, covering the westernmost 3 miles of remaining canal. The Hillsboro Canal is a primary flood control feature serving southern Palm Beach County and northern Broward County.

J.W. Corbett Wildlife Management Area Levee: In August 2014, the FDEP issued a permit for the construction of a new 6.25-mile levee system to increase flood protection for south Florida residents. This project is located within the J.W. Corbett Wildlife Management Area located in western Palm Beach County. The levee system improvement project consists of constructing a new levee within uplands and wetlands in areas which separate J.W. Corbett from the Indian Trail Improvement District's M-O Canal. This project is a cooperative effort between the SFWMD, the FWC, and the Indian Trail Improvement District. The SFWMD has completed the first phase of the project and the second phase is awaiting funding for construction.

Lake Okeechobee's North Shore: Construction is complete for the Lake Okeechobee's North Shore series of pump stations (S-127, S-129, S-131, S-133, and S-135). These pump stations installed new control systems to provide the ability to remotely operate all five stations from a control center at S-127, thereby improving flood control response and operational efficiency for surrounding lakeside communities and agricultural lands.

Palm Beach County: Construction is complete for the S-46 Tailwater Weir and Gate Replacement Project. The S-46 is a coastal flood control structure serving northern Palm Beach County that was constructed in the 1950s. A tailwater weir was needed to assure future stability of the structure due to the large difference in water elevation from the upstream to downstream sides. Additionally, the gates and operators of the structure were removed and replaced and a fishing area was created on each side of the tailwater weir.

Herbert Hoover Dike (HHD): Lake Okeechobee is a 730-square mile lake that is surrounded by the 143-mile long HHD. The dike is currently being rehabilitated due to safety concerns. During the reporting period the USACE continued work on 32 federal water control structures, also known as culverts, that are considered to be the greatest threat to the dike due to loss of material into and around them. Replacing these structures is the current priority. To date, the USACE has taken action on twenty-seven of the culverts: one was removed, nine were replaced, and seventeen are under contract for replacement. The USACE plans to award contracts to replace two additional culverts and seal off three abandoned structures by FY 2019. Work on all culverts is anticipated to be finished by 2022.

In August 2016, the Dam Safety Modification Report (DSMR) was approved and includes the final risk reduction feature needed to bring HHD within tolerable risk guidelines. The planned work includes 28.5 miles of cutoff wall construction between Lake Harbor and Moore Haven and around Lakeport. Additional remediation includes armoring around the State Road 78 Bridge crossing the Harney Pond Canal along with embankment raising adjacent to the S-71 and S-72 water control structures. With an adequate funding stream, the physical construction of these features is expected to be completed by 2022.

Construction is currently underway to close the gaps in the 21.4 miles of the Reach 1 cutoff wall from Port Mayaca to Belle Glade. A 6.6-mile extension of the cutoff wall from Belle Glade to Lake Harbor is under contract. The State of Florida appropriated \$50 million during the 2017 legislative session and an additional \$50 million during the 2018 legislative session to expedite the rehabilitation of the HHD. A Section 1024 Contributed Funds Memorandum of Agreement (MOA) was executed for the first \$50 million and the funds were received in April 2018. The funds are being applied to the Reach 1 Cutoff Wall Extension contract as specified in the agreement. A second MOA was still underway at the time of this report. It will provide an additional \$50 million to be applied to Reaches 2 and 3 of the Cutoff Wall. The HHD project also recently received \$514 million in supplemental construction funding to accelerate and fully fund the completion of rehabilitation of the dike from 2025 to 2022.

To streamline the regulatory process for the rehabilitation and repair project, the FDEP developed a comprehensive approach that will reduce the timeframe necessary to process future culvert replacement activities associated with the dike. The department estimates this proactive comprehensive approach will save over 1,000 work hours and more than \$40,000 in taxpayer money, resulting in a significant reduction in time needed for future permit authorizations.

WATER SUPPLY PLANNING

The SFWMD conducts water supply planning for five regions: Upper Kissimmee Basin, Lower Kissimmee Basin, Upper East Coast, Lower East Coast, and Lower West Coast. These long-range plans project water demands and identify potential sources of water for each region and help local governments and utilities in their facility and comprehensive planning efforts. Water supply plans are updated every five years.

Central Florida Water Initiative (CFWI)/Upper Kissimmee Basin: Three water management districts (South Florida, Southwest Florida, and St. Johns River), along with the FDEP, FDACS, regional public water supply utilities, and other stakeholders, are working to develop a unified water supply plan for central Florida as part of the CFWI. The initiative area includes southern Lake, Orange, Osceola, Seminole, and Polk counties. In November 2015, the CFWI Regional Water Supply Plan was approved by the governing boards of the three water management districts, including the 2035 Water Resource Protection and Water Supply Strategies document and associated appendices. The 5-year update has been initiated and is scheduled to be completed in 2020. <https://cfwiwater.com/RWSP.html>

Lower Kissimmee Basin: The Lower Kissimmee Basin Water Supply Planning area includes portions of Okeechobee, Highlands, and Glades counties. The most recent plan update assessed water needs and water sources for the period from 2010 to 2035 and was approved by the Governing Board in 2014. The 5-year update to this plan has been initiated and will be completed in 2019.

2018 BIENNIAL REPORT

Lower East Coast (LEC): The LEC Water Supply Planning area includes Palm Beach, Broward, and Miami-Dade counties and parts of Monroe, Collier, and Hendry counties. The SFWMD is developing the 2018 LEC Water Supply Plan Update to assess projected water demands and potential sources of water for the period from 2016 to 2040. The draft plan has been posted for public review and comment and the final plan is scheduled for approval in November 2018.

Lower West Coast (LWC): The LWC Water Supply Planning area includes Lee County and portions of Charlotte, Collier, Glades, Hendry, and Monroe counties. The 2017 LWC Plan Update assessed water demands and supply for the period from 2014 to 2040.

Upper East Coast (UEC): The UEC Water Supply Planning area includes Martin and St. Lucie counties, as well as the northeast portion of Okeechobee County. The 2016 UEC Plan Update assessed water demands and potential sources for the period from 2013 to 2040.

WATER CONSERVATION

Comprehensive Water Conservation Program: The SFWMD continues to implement its 2008 Comprehensive Water Conservation Program to develop a year-round conservation ethic and promote the efficient use of water. Water supply plans produced by the SFWMD continue to report downward trends in the average per capita water use rate for utilities.

ALTERNATIVE WATER SUPPLY

Reuse: In 2016, a total of 106 treatment facilities provided reuse within the SFWMD. These facilities reused a total of 275 million gallons per day (mgd) of treated wastewater. Most of the reclaimed water (173 mgd) was used for landscape irrigation at over 146,222 residences, 202 golf courses, 340 parks, and 83 schools.

The FDEP maintains the largest and most comprehensive database of permitted reuse systems in the world. Domestic wastewater treatment facilities (0.1 mgd and greater) that provide reclaimed water are required to submit annual reuse reports to the FDEP as well as the applicable water management district. These annual reports are the basis for the FDEP's reuse inventory database, from which a Reuse Inventory Report is compiled and published.

Wastewater Discharges: 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 176 mgd by the 2025 deadline.

Alternative Water Supply Program: SFWMD funding from 1997 to 2017 was \$131,564,507. Total approved SFWMD and State funding from 1997 to 2016 was \$199,145,207. Between FY 2012 and FY 2017, \$13.7 million dollars in SFWMD funding was awarded to 38 projects. No state funding has been allocated since FY 2009. Approximately 505 projects have been funded that made available 472 mgd of water. In addition, there are 42 operational desalination facilities with a total capacity of approximately 269 mgd (all but two utilize brackish ground water as source water).

Dispersed Water Management: From 2016 to 2018, the FDEP has provided \$77.8 million to expand the Northern Everglades Dispersed Water Management Projects to create large scale regional water storage on private property.

PROTECTING WATER RESOURCES

Several mechanisms exist to protect water resources for the natural system. These mechanisms include minimum flows and levels (MFLs), water reservations, and allocations. The 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 for each CERP project is identified during

the planning process in the project implementation report, prior to Congressional authorization and appropriation. The SFWMD will also continue to establish water reservations or reevaluate MFLs, as needed, for regionally significant ecosystems within its boundaries. These important water resources are listed on the SFWMD's Priority Water Body List and Schedule which is prepared annually, approved by the Governing Board, and then submitted to the FDEP for review and approval. Once MFLs, water reservations, or restricted allocation areas rules are adopted, they are implemented through the SFWMD's consumptive use permitting and water supply planning programs.

Minimum Flows and Levels: Florida law directs the SFWMD to set MFLs to prevent significant harm to water resources. Since 2001, MFLs and recovery and prevention strategies have been adopted for waterbodies covering approximately 7.2 million acres. There are currently nine MFL waterbodies within the SFWMD boundary.

Water Reservations and Allocations: Water reservations set water aside from consumptive use permitting for the protection of fish and wildlife or public health and safety. Five water reservation rules are currently adopted: Picayune Strand (July 2009), Fakahatchee Estuary (July 2009), the North Fork of the St. Lucie River (February 2010), the Biscayne Bay Coastal Wetlands Project - Phase 1 (June 2013), and the CERP Caloosahatchee River (C-43) West Basin Storage Reservoir (May 2014).

The SFWMD is currently in the rule development process to establish a water reservation for the Kissimmee River Basin, which includes the Kissimmee Chain of Lakes (19 lakes total), the Kissimmee River, and its floodplain. The Kissimmee River Restoration Project is expected to be completed in 2020. This water reservation will ensure protection of the public investment of approximately \$900 million. Adoption of this water reservation rule is scheduled to be completed in December 2018.

Restricted Allocation Area (RAAs): RAA criteria are established by rule to protect natural systems from consumptive use impacts. These rules are implemented where there is a lack of water available to meet the projected needs of a region. RAA rules help ensure that water will be available when future CERP projects are completed. RAA rules have been adopted to protect natural system water for the Loxahatchee River and the Everglades. These types of rules have also been adopted for other MFL waterbodies.

LOOKING AHEAD

INTEGRATED DELIVERY SCHEDULE

The Integrated Delivery Schedule (IDS) provides a sequencing strategy for project planning, design, and construction based upon ecosystem needs, benefits, costs, and available funding. The schedule helps restoration planners, stakeholders, and the public focus on priorities, opportunities, and challenges and provides a path forward to complete construction on previously authorized projects while outlining future projects to undergo planning and design. The IDS describes a path to complete construction on projects already authorized and identifies potential future planning efforts. However, the IDS does not represent a commitment by the federal government to include amounts reflected on the IDS in the federal budget.

The IDS is a living document that is updated as needed to reflect progress and/or program changes. The IDS synchronizes program and project priorities of the USACE and the State of Florida. The 2015 update to the IDS utilized the Task Force's successful public workshop model to engage the public and stakeholders and enable meaningful input towards identifying priorities for completing construction of projects underway as well as priorities for the next phase of CERP planning. Updates to the 2015 IDS were published in December 2016 and July 2018. Included in the 2018 update are current restoration planning efforts like the Loxahatchee River Watershed Restoration Project, Western Everglades Restoration Project, Lake Okeechobee Watershed Project, and the EAA Storage Reservoir as well as future restoration planning efforts such as Biscayne Bay Coastal Wetlands Phase 2 and C-111 Spreader Canal Eastern project.

CEPP POST AUTHORIZATION CHANGE REPORT

In 2017, the SFWMD initiated a Post Authorization Change Report (PACR) to the CEPP. The purpose of the PACR is to increase the amount of water storage and treatment currently authorized in the CEPP. The proposed modification to the CEPP addressed in the PACR is to change the proposed A-2 Flow Equalization Basin to a deep water reservoir with 240,000 acre-feet of storage with multipurpose operational flexibility and a 6,500-acre STA. The SFWMD prepared the PACR under the authority provided by Section 203 of WRDA 1986, as amended. The PACR was authorized in the America's Water Infrastructure Act of 2018. Currently, the USACE is working with stakeholders to address the required analyses, concerns and recommendations of the Assistant Secretary of the Army for Civil Works stated in his "Review Assessment" of the SFWMD's PACR.

WATER RESOURCES DEVELOPMENT ACT OF 2018

On April 27, 2018, the USACE transmitted the Kissimmee River Restoration Project Director's Report to the Congress for consideration in WRDA 2018. As of the writing of this report, no other transmittals have been added for WRDA 2018 consideration.

THE ROLE OF SCIENCE IN PLANNING AND EVALUATING RESTORATION SUCCESS

The Task Force sponsors a biennial System-wide Ecological Indicators (SEI) report and the Corps and the SFWMD sponsor a five-year System Status Report (SSR) that both track the health of the Everglades ecosystem. Both of these reports evaluate environmental monitoring information to determine if the goals and objectives of Everglades restoration are being met. The SEI report focuses on a broader range of restoration actions using eleven system-wide ecological indicators, while the SSR focuses on the CERP using a larger set of indicators. Both reports build from a Monitoring and Assessment Plan (MAP), which was developed by the interagency RECOVER team. The goal of the MAP program is to document the status and trends of the essential and defining attributes of the South Florida Ecosystem. These reports document how the hydrology and ecology of the Everglades respond to restoration, project implementation, and water management operations. This scientific information is fed into the decision-making process, allowing managers and decision makers to use the best available science and adaptive management principles to track and guide restoration success.

In 2019, the RECOVER team will also produce an Everglades Report Card. Ecological report cards have been successfully used in other restoration programs to clearly communicate ecosystem health to a geographically broad constituency. The Everglades Report Card will revolve around the four MAP modules – the Northern Estuaries, Lake Okeechobee, Greater Everglades, and Southern Coastal Systems – and the indicator species that are unique to each. A second 2019 RECOVER effort will identify geographic areas and ecological components or processes that are most vulnerable to stress, and the ability of current or future restoration actions to mitigate or minimize this vulnerability. Identifying and diagnosing the most vulnerable locations, species, and ecological components or functions in the Everglades will help us focus our actions and address our most crucial vulnerabilities.

HOW WE USE SCIENCE TO PLAN

High-quality science is the foundation for the successful restoration of the Everglades. Monitoring, research, and modeling provide management-relevant information that is used for selecting restoration alternatives and making natural resource management decisions. This report describes successful applications of science from the past, such as the application of hydrological and ecological modeling to the decision-making process in CEPP. Continuing application of science is occurring in the Restoration Strategies Project, the WCA-3 Decompartmentalization Physical Model, the Western Everglades Restoration Project, the Lake Okeechobee Watershed Project, the Loxahatchee River Watershed Restoration project, and the ongoing effort to examine the impacts of nonnative plants and animals and to find ways to lessen their impacts and prevent future invasions. Science describing the ecological importance of restoring water quantity and flows to the Everglades was pivotal in the decision to build bridging on Tamiami Trail to remove barriers to flow. Science topics will evolve as restoration planning and implementation proceed, but are likely to include an increasing emphasis on topics such as: fostering the compatibility of built and natural systems; the long-term impacts of hurricanes and other tropical storms and their interaction with restoration efforts; the benefits of CERP, Restoration Strategies, and Tamiami Trail Next Steps; and the causative factors leading to harmful algal blooms in Lake Okeechobee and the estuaries.

TASK FORCE & OFFICE OF EVERGLADES RESTORATION INITIATIVES (OERI)

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 for 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 (SCG) 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. The Office of Everglades Restoration Initiatives (OERI) supports and implements all Task Force, Working Group, Science Coordination Group, and team efforts. The South Florida Water Management District's Water Resources Analysis Coalition acts as an advisory body to the Task Force.

PARTNERSHIPS

Intergovernmental Coordination

The Task Force and its subgroups with the support of the OERI, 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

The Task Force met once during the reporting period (December 2016) and twice just outside of the reporting period (June 29, 2016 and July 25, 2018). During the reporting period, the Working Group and SCG conducted two joint meetings on Everglades restoration activities. The Biscayne Bay Regional Restoration Coordination Team (BBRRCT) continues to meet monthly to coordinate on restoration and science activities in the Biscayne Bay. In addition, the SCG conducted a hurricane impact workshop and a two-day meeting in 2017 on conceptual ecological models (see Stakeholder Workshops below).

Invasive Exotic Species

The Task Force’s Invasive Exotic Species Framework (2014) continues to provide common goals and objectives for combatting invasive exotic species within the South Florida Ecosystem. Subsequent work efforts have included creation of an enhanced web-based Framework and a prioritized list of strategies. The need for a decision support tool was identified in the Framework document under Strategy 2B1: Rapidly assess the status and potential threat of newly detected invasive exotic species populations and develop a response/no response plan. During this reporting period, a decision support tool was developed in response to this identified need and is currently being adapted by the FWC for state-wide use. The need to develop a system-wide regional monitoring network was identified in Strategy 2A1: Implement a systematic, prioritized, multi-species monitoring and inventory plan. A journal article titled, "Multiscale Invasive Plant Monitoring: Experiences from the Greater Everglades," was accepted to Weed Technology and defined the ongoing efforts to monitor invasive plants. Work on filling any monitoring needs is underway.

In addition, the OERI has partnered with Zoo Miami, FWC, and ECISMA to conduct outreach to the veterinarian community in south Florida, specifically to inform current pet owners and potential exotic pet owners about the FWC’s Exotic Pet Amnesty and Don’t Let it Loose programs. The OERI office continues to expand outreach initiatives on invasive exotic species in partnership with local government officials and businesses. Since 2015, OERI has partnered annually with Coconut Creek Commissioner Sandra Welch, the local Pet Supermarket, and several other ECISMA member agencies to hold an Invasive Exotic Species Awareness Event. During the 2017 and 2018 annual events almost 400 pet owners were informed in person, and countless more may have seen the event on the local Coconut Creek television channel. This model has been expanded into Homestead, Florida, an area inundated with priority invasive exotics such as the Argentine black and white tegu, and will be included in the next reporting period.

STAKEHOLDER ENGAGEMENT

Stakeholder Workshops: The OERI on behalf of the Task Force has developed and employed a workshop process to enhance public engagement. Initially developed for the expedited planning process for the CEPP, this model has also been used for other CERP planning efforts as well as the 2015 update of the IDS. The workshop model has been very successful and has received widespread praise from the public, agency staff, and decision makers. During the reporting period, four stakeholder workshops were conducted, two for the Lake Okeechobee Watershed Project (August 2016 and April 2017) and two for the Western Everglades Restoration Project (August 2016 and June 2017). Results of these workshops are available at: evergladesrestoration.gov.

The SCG conducted a two-day workshop on Conceptual Ecological Models (CEMs) in January 2017. This science meeting focused on revisiting conceptual ecological models that were developed under the RECOVER team and published in 2005. The information gathered will inform efforts listed in RECOVER’s 5-year plan. The CEMs served as a framework for identifying ecosystem stressors, pathways of stressor effects, and key response attributes that served as candidate CERP ecological indicators and restoration performance measures. The CEMs also identified scientific uncertainties that limited our understanding of change within the Everglades and our ability to forecast and understand the effects of potential and realized restoration actions, which occur concurrently with changes in other ecosystem drivers. The meeting focused on the review of the CEMs in light of the knowledge gained over the past two decades and the update of the CEMs to reconsider ecosystem drivers and stressors, pathways of stressor effects, response attributes, and new critical scientific uncertainties and hypotheses. During this process, invasive exotic species were identified as a stressor to be incorporated in several CEMs.

The BBRRCT sponsored a science meeting in June 2017 to discuss the health of Biscayne Bay. The meeting goal was to allow stakeholders, including seagrass scientists, to coordinate existing science, such as monitoring related to the observed seagrass die off in Biscayne Bay in the area known as the Julia Tuttle Basin. The team also discussed additional informational needs and possible opportunities to improve resiliency of the area.

2018 BIENNIAL REPORT

In September 2017, after Hurricane Irma, the SCG sponsored a coordination meeting for scientists to share early scientific results and plans for future studies. Approximately 100 scientists participated in this effort to enable coordination and communication among agencies and research scientists conducting emergency post-hurricane ecological damage assessments in the Everglades.

EvergladesRestoration.gov: In 2013, a partnership between the USACE and OERI on behalf of the Task Force was initiated to consolidate the Everglades restoration web presence. Evergladesrestoration.gov was launched in 2014 and OERI continues to maintain and update the website. The information contained in this report as well as the report itself can be found on the EvergladesRestoration.gov website along with other reports produced by the Task Force. Additionally, information relative to the overall restoration effort, such as the status of the projects being implemented, the latest news on restoration, and announcements on upcoming events, can be found either on the website itself or through links shown on the website.

Web-based Briefing Tool: The OERI and ENP staff have combined efforts to create a web-based primer on Everglades restoration. This tool walks through the history and status of Everglades restoration via a “storymap” with illustrations developed through an on-line geographic information system. Viewers can easily scroll through an introduction to Everglades restoration with links provided to delve into further details on a variety of topics and issues. This tool is accessible through EvergladesRestoration.gov.

Appendix A

Seminole Tribe of Florida Views on the 2018 Biennial Report

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February 13, 2019

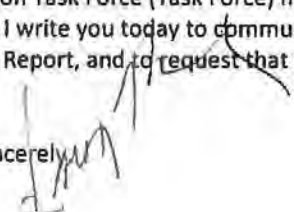
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Drew Bartlett
Deputy Secretary for Water Policy and Ecosystem Restoration Florida Department of Environmental
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3900 Commonwealth Blouvard, MS 23
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Dear Chairperson Travnicek and Vice Chairperson Bartlett:

I am the South Florida Ecosystem Restoration Task Force (Task Force) member representing the Seminole Tribe of Florida (Seminole Tribe). I write you today to communicate the Seminole Tribe's approval of the 2018 Strategy and Biennial Report, and to request that the enclosed report be included in this Task Force report.

Sincerely,


Jim Shore
General Council
Seminole Tribe of Florida

Enclosure

cc: Kevin Burger, Office of Everglades Restoration Initiatives, DOI
Cherise Maples, ERMD, Seminole Tribe
Patricia Power, Bose Public Affairs Group for Seminole Tribe

sofecosystem02-12-19

2018 BIENNIAL REPORT

Seminole Tribe of Florida Views on the 2018 Biennial Report

The Seminole Tribe of Florida is committed to restoring the South Florida Ecosystem. The identity of the Seminole Tribe of Florida is tied to the lands and waters of South Florida, our ancestral home. Our elders believe that the health of the Tribe and our members directly relates to the health of our ecosystem. We focus on managing our lands within our reservation boundaries; we also watch the land and water that surrounds this boundary because our history is not limited to the lines on current day maps. Our future will be controlled by a large extent by the decisions made regarding land use and water control all around our reservations. So we look to our region, including lands in the western basins and surrounding Lake Okeechobee, to see how the federal, state, and local governments are providing resources and planning for a healthy future.

The Seminole Tribe of Florida's commitment to Everglades restoration is unquestioned. On the Big Cypress Reservation, the Tribe, in partnership with the US Army Corps of Engineers, planned and built a critical project to improve water quality and hydrology on the Reservation and in the Big Cypress National Preserve. The Tribe dedicated a significant amount of trust land and over \$30 million to build the project, and will continue to support its operation and maintenance. This is a significant investment for the Tribe.

The Seminole Tribe of Florida approves the release of this report on ecosystem restoration-related activity in the South Florida Ecosystem undertaken by federal, tribal, state, and local governments. As a member of the South Florida Ecosystem Task Force (Task Force) since its inception in 1996, the Seminole Tribe values its role and contributions to the long and complicated effort to restore America's Everglades. And the Seminole Tribe applauds the continuing progress on the many projects and programs that together will restore and protect our fragile ecosystem, which is necessary to support our people.

However, the Seminole Tribe does not support each of the projects and programs described in this report. The Seminole Tribe works with our fellow Task Force member agencies and departments outside of the Task Force process to communicate our positions. For those in Washington, Tallahassee, and in Indian County who review this report, it is important that you do not read the Seminole Tribe's approval of this report as support for every element described in the report. Specifically, the Seminole Tribe objects to:

- Lake Okeechobee Watershed Restoration Plan; and
- Dispersed Water Management Program;

And has concerns about the following projects and programs:

- Northern Everglades and Estuaries Protection Program (Basin Management Action Plans (BMAPs) and Watershed Protection Plans (WPPs)); and
- Central Everglades Planning Project (CEPP).

Finally, given the direct impact the following projects and programs have on the Seminole Tribe, we are engaged in the planning and development of:

- Western Everglades Restoration Project (WERP);
- Integrated Delivery Schedule (IDS); and
- State of Florida's Restoration Strategies.

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Appendix B

System-wide Ecological Indicators

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System-wide Ecological Indicators

The South Florida Ecosystem Restoration 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 a summary of broader and more detailed science assessments available in companion reports, including the 2018 System-wide Ecological Indicators for Everglades Restoration, the Restoration Coordination and Verification (RECOVER) team’s 2019 Systems Status Report, and the South Florida Water Management District’s (SFWMD) 2018 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 were 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 crocodilians respond more slowly to change at intermediate and large spatial scales. As indicators, they cover different aspects of the ecosystem.

As with the 2016 Biennial Report, the ecological indicator sections are brief and describe only composite results for the previous reporting period (Water Year 2016) and the current reporting period (Water Year 2018). Readers looking for more detailed information on regional status and changes in these indicators will find it within the full report (2018 System-Wide Ecological Indicators Report available at Evergladesrestoration.gov).

Hydrologic Context for Water Years 2017 and 2018

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 2017 (May 1, 2016 to April 30, 2017) and 2018 (May 1, 2017 to April 30, 2018). A more detailed discussion of south Florida hydrology is available in the 2018 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.

Table 1. System-wide Ecological Indicators
<ul style="list-style-type: none"> • Invasive Exotic Plants • Lake Okeechobee Nearshore Zone Submerged Aquatic Vegetation • Eastern Oysters • Crocodilians (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)

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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 meteorological inputs, the Everglades becomes flooded with an ankle-to waist-deep, slow-moving pool of water through summer and fall, leaving only the high-ground tree islands and hardwood hammocks above water. The term sheetflow 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 slowly 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 pinelands 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 evaporation.

Although south Florida is generally considered a wet area by merit of its abundant average annual rain total of 52.7 inches in the SFMWD region (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 associated with operation of the Central and Southern Florida Project (C&SF) project and other drainage works for the purpose of:
 - 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 inter-annual variation – in other words, seldom do we experience average years.

The previous two water years (WY) illustrate this variation well and are summarized next.



South Florida **Monthly** Rainfall Summary for Water Years 2017 and 2018

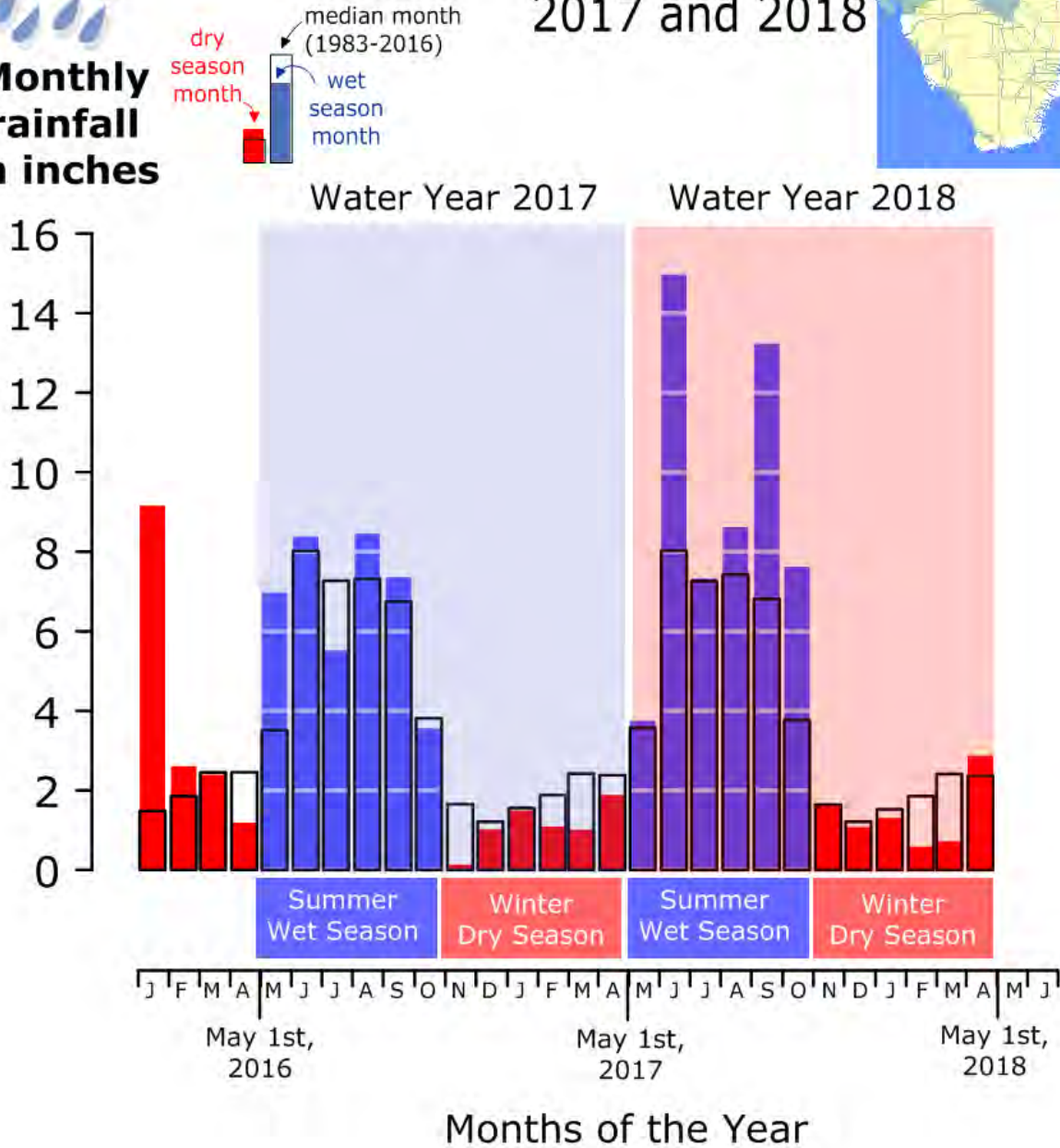


Figure 1. Summary of monthly rainfall in WY 2017 and WY 2018 throughout the South Florida Ecosystem. The graph was produced using daily rainfall data provided by the SFWMD. SFWMD meteorologists compute a daily rainfall value for the fourteen major basins and district-wide from rain gauge measurements. See <http://www.gohydrology.org/p/about.html> for more information.

Water Year Summaries

Water Year 2017 (May 1, 2016 to April 30, 2017)

Water Year 2017 featured a "normal" wet season and "below average" dry season — 40 inches of rain fell across south Florida during the six-month (May through October) summer wet season with 7 inches falling in the six-month (November through April) dry season that followed, for an annual total of 47 inches. This is nearly a 6-inch rainfall deficit from the SFWMD's annual average of 52.7 inches.

Accordingly, wetlands and waterways of the Everglades filled up through the summer wet season and reliably receded during the winter dry season months. The biggest boost of rain came in August [and in particular in Water Conservation Areas (WCA) 1 and 2 where 12 inches were recorded for the month] resulting in slough water depths to crest at a 2 foot depth through much of the Everglades by early October, more or less coinciding with the vast wetland's normal annual peak — but one that, too, was short lived.

To combat high water conditions, the Florida Department of Environmental Protection (FDEP) issued an emergency final order (EFO No:16-0286) on May 11, 2016, authorizing the SFWMD and the U.S. Army Corps of Engineers (USACE) to take immediate action to deviate from permitted water management practices to move significant volumes of flood water out of the WCAs. The FDEP authorized temporary operation deviations to the SFWMD and the USACE to maximize benefits to the environment and to minimize detrimental impacts such as harmful flooding and degradation of water quality, with the overarching goal of lowering WCA water levels below their respective regulatory discharge zones.

Continuing a decade-long trend of anomalously low tropical storm activity, October (a month which historically accounts for a quarter of Florida's hurricane-strength storms) had little rain to offer, thus ushering in an early start to a winter recession of water, and one that would last particularly long. Of note and continuing a two-decade trend, the spring dry down was especially pronounced in the Big Cypress Swamp as evidenced by Corkscrew Swamp's central marsh drying out and the outbreak of a large wildfire in Big Cypress National Preserve.

Water Year 2018 (May 1, 2017 to April 30, 2018)

Water Year 2018 was a year of wet and dry extremes featuring a "record rainy" summer wet season and, in a repeat of the previous year, a "below average" dry season. A whopping 55 inches of rain fell across south Florida during the six-month (May through October) summer wet season (the long-term average is 38 inches) and 8 inches fell in the six-month (November through April) winter dry season that followed, for an annual total of 64 inches. This is nearly an 11-inch rainfall surplus from the SFWMD's annual average of 52.7 inches.

Despite the bountiful summer rains, a sweltering May actually started Water Year 2018 off on a rather dry note with a continuation and deepening of the drought from the previous winter. Reminiscent of the saying "all droughts end in flood," an epic three-day onslaught of rain in early June ushered in an "instant" wet season across all of south Florida and set the stage for the "record rainy" wet season to come. Abundant tropical moisture and regular afternoon storms combined with the exclamation points of Tropical Storm Emily, Hurricane Irma, and Tropical Storm Philippe to produce a wet season that went down in the history books with rarely seen events, including water sheetflowing over a few miles of Turner River and Wagonwheel Roads after the June deluge and a brief overtopping of the Tamiami Trail between Forty Mile Bend and Fifty Mile Bend in the days following Irma for the first time since 1995.

The "instant" wet season stayed well above average for most areas of the ecosystem from June into January, peaking for much of the summer 1-2 feet above normal levels, causing even high-ground tree islands in the WCAs and pine flatwoods of the Big Cypress National Preserve to submerge for multiple months.

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A series of emergency measures was taken to alleviate the unusual bounty of summer water, some of which had negative connotations — such as mandatory releases from Lake Okeechobee to the Caloosahatchee and St. Lucie estuaries to protect the integrity of the lake's perimeter levee as it is being repaired — whereas others had a positive Everglades restoration note. Most notable in that regard were three efforts focused on spreading the water out: (1) to the East, water managers sent water through the new one-mile bridge into Everglades National Park's (ENP) Northeast Shark River at an unprecedented scale; (2) to the West, the newly-constructed Merritt Pump Station went into action to spread water into downstream Picayune Strand; and (3) in the center, a series of pumps was utilized for a second straight year to send water west across the L-28 levee into Big Cypress National Preserve.

The FDEP issued an emergency final order (EFO No:17-0867) on June 23, 2017, authorizing the SFWMD and the USACE to take immediate action to deviate from permitted water management practices to move significant volumes of flood water out of the WCAs. The FDEP authorized temporary deviations from authorized operations for ten permits, six issued to the SFWMD and four issued to the USACE, to maximize benefits to the environment and to minimize detrimental impacts such as harmful flooding and degradation of water quality, with the overarching goal of lowering WCA water levels below their respective regulatory discharge zones. In addition, the FDEP also issued an Emergency Final Order for Hurricane Irma on September 5, 2017, in response to the imminent or immediate danger to the public health, safety, and welfare of the citizens of the State of Florida posed by Hurricane Irma.

The meteorologic pendulum swung to the dry side of the spectrum for the winter, producing both good and bad results. On the positive side, the paucity of winter rains (combined with a high summer climb) set the stage for a remarkably fast, if also steady and prolonged, water recession that sparked a frenzy of foraging and nesting activity among wading birds across the Everglades. Super colonies of wading birds were observed for the first time in ENP in decades. Wood stork rookeries were reported in Big Cypress National Preserve for the first time since the 1990s. On the negative side, the Big Cypress half of the ecosystem was plagued by an unusually long wildfire season as a result of the lack of timely winter rains. Fires in the Picayune Strand and Big Cypress National Preserve generated plume clouds of smoke across the region throughout March, April, and into May.

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 WY 2018 (May 1, 2017 to April 30, 2018). The “Previous Status” column contains information for WY 2016 (May 1, 2015 to April 30, 2016). Status is shown using green, yellow, and red stoplight colors as explained below.

Ecological Indicator	Previous Status WY 2016	Current Status WY 2018
Invasive Exotic Plants	Y	Y
Lake Okeechobee Nearshore Zone Submerged Aquatic Vegetation	R	R
Eastern Oysters - Modified (Northern Estuaries only)	R	R
Crocodilians (American Alligators & Crocodiles) - Modified (DOI Lands Only)	R	R
Fish & Macroinvertebrates (WCA-3 and ENP only)	R	R
Periphyton - Modified (no species composition)	Y	Y
Wading Birds (White Ibis & Wood Stork)	R	R
Southern Coastal Systems Phytoplankton Blooms	Y	R
Florida Bay Submersed Aquatic Vegetation	Y	Y
Juvenile Pink Shrimp - Modified (no sampling)	B	B
Wading Birds (Roseate Spoonbill)	R	R

Stoplight Color Legend



(R) Substantial deviations from restoration targets creating severe negative condition that merits action. Well below restoration target.



(Y) Current situation does not meet restoration targets and may require additional restoration action. Below restoration target.



(G) 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. Meets restoration target.



(B) No data or inadequate amount of data were collected due to reductions in funding.

Invasive Exotic Plant Indicator

STATUS	PREVIOUS (WATER YEAR 2016)	CURRENT (WATER YEAR 2018)
SYSTEM-WIDE	Y	Y

The status of the invasive exotic plant indicator (Doren et al. 2009) was below the restoration target (yellow stoplight) at the end of WY 2016 and remains below the restoration target at the end of WY 2018. Though there continue to be positive results for some invasive plant species in some ecological systems, others showed negative results as measured by abundance and/or geographic distribution.

The region-wide interagency effort to manage the highly invasive melaleuca tree remains a national example of coordination success. Melaleuca distribution and abundance within the Everglades Protection Area decreased 54% in areas with intermediate to high infestation levels between 1995 and 2015 (LeRoy Rodgers, SFWMD, unpublished data). However, the overall geographic distribution of the species has increased and in some areas populations previously under control have resurged, largely due to inadequate resources for management.

Old World climbing fern continues to present significant challenges to restoration. Long-term data confirm continued increases in abundance and geographic range throughout the region. Substantial impacts to forested wetland ecosystems are attributed to the colonization of this vining fern, which displaces native plant species, degrades wildlife habitat, and promotes destructive wildfires. Expansion of Old World climbing fern is particularly severe in the floodplain swamps of the Kissimmee River basin, Everglades tree islands of the Arthur R. Marshall Loxahatchee National Wildlife Refuge (LNWR), and cordgrass marshes of ENP. Current conditions in these areas do not meet restoration criteria. Since 2014, the State of Florida and U.S. Department of Interior (USDOI) have increased coordination and control measures for Old World climbing fern and melaleuca at the LNWR. While significant challenges remain, this interagency effort is slowing the expansion of these species and localized areas are now well managed.

Invasive plant species continue to threaten restoration of native plant communities in the Kissimmee River floodplain. Numerous invasive exotic plant species have expanded in the restored floodplain (Rodgers et al. 2017). Several invasive grass species (e.g. paragrass, *Urochloa mutica*) and several species of water primrose (primarily *Ludwigia peruviana*) have developed into large nearly single species stands preventing recovery of maidencane and broad leaf marsh plant communities. New research to develop herbicide control techniques compatible with restoration initiatives is underway.

Given the diversity of south Florida’s invasive species and their varied impacts, managers must prioritize responses. Science-based assessments help inform managers of predicted impacts of invasive species and associated impediments to restoration success. Management approaches that combine a variety of treatment and control techniques as a means of mitigating invasion impacts are proving useful. For example, integrating herbicide treatments, fire, and biological controls through the Comprehensive Everglades Restoration Plan (CERP) Biological Control Implementation Project is improving overall management outcomes for some invasive species. Continued improvements in invasive species management through coordinated planning, construction, and operation phases of restoration efforts (see CERP Guidance Memorandum 062.00, 2012) are necessary to promote more cost-effective management.

The greatest threats to invasive plant management success in the Everglades are: (1) insufficient resources to address invasive species in critical areas; and (2) the continued establishment of new invasive species. Experience gained over the last two decades confirms that containing and reducing populations of highly invasive species often requires substantial initial investment of resources as well as commitment to long-term maintenance control of the populations as restoration proceeds.

The invasive plant indicator remains below the restoration target.

LAKE OKEECHOBEE NEARSHORE ZONE SUBMERGED AQUATIC VEGETATION (SAV) INDICATOR

STATUS	PREVIOUS (WATER YEAR 2016)	CURRENT (WATER YEAR 2018)
SYSTEM-WIDE	R	R

The status of the Lake Okeechobee Nearshore Submerged Aquatic Vegetation (SAV) indicator was well below the new RECOVER approved restoration target (red stoplight: for more details, see the full report) at the end of WY 2016 and remains well below the restoration target at the end of both WY 2017 and WY 2018. Submerged aquatic vegetation covered less than the 50,000-acre target threshold during the annual summer mapping exercise in both WY 2017 and WY 2018, and also was below the new interim goal of 35,000 acres during both WY 2017 and WY 2018. The total number of acres covered by SAV did increase slightly during WY 2018 (26,429 ac) as compared to WY 2017 (19,513 ac), although it has decreased significantly after Hurricane Irma in September of WY 2018.

Since its establishment in 2008, the Lake Okeechobee Regulation Schedule (LORS) has generally kept the lake within or below the ecologically preferred range of 12.5 to 15.5 feet above sea level. That changed in WY 2017 when El Niño generated very wet conditions in January and February and after Hurricane Irma in September through most of December in WY 2018. As a result, the lake stage went above 16 feet at the end of January and remained above 15.5 feet until the middle of March in WY 2017 and went above 17 feet in October and remained above 15.5 feet until late December in WY 2018. Most of the sentinel sites when sampled in November 2016 and 2017 and February 2016 and 2018 had associated losses of SAV.

Based on annual SAV coverage data collected since 2000, maintaining lake stage within the ecologically beneficial stage envelope, in terms of water depth and temporal ascension and recession rates, provides good conditions to maximize nearshore SAV coverage. When lake stages have been significantly above the ecologically beneficial stage envelope, SAV coverage has declined. Significant deviations below the envelope may cause temporary reductions in SAV coverage but lead to substantial regrowth afterwards and are critical for recovery after high lake stages. Restoration activities that provide a significant increase in water storage in the Lake Okeechobee watershed, thereby allowing the lake to more closely follow the timing and depths of an ecological beneficial stage envelope, should enhance SAV coverage and density in the nearshore region. However, even with better control of lake stage, periodic events such as tropical storms and seasonally increased turbidity and droughts will continue to influence nearshore SAV coverage.

The six recently developed ecological performance measures and data to develop them, summer cyanobacteria abundances (July 1994 and 2000-2011 and June 1995), January and February (1997-2005) bluegill and red-ear sunfish creel data, summer (July and August 2000-2013) nearshore *Chara* and vascular SAV (2000-2012) areal coverage, and spring (March and April) and fall (September and October) epiphyte (2003-2005 and 2009-2012, lives on plants) and epipedon (2003-2005, 2008-2010, lives on bottom soil surfaces) algae abundances have been approved by the RECOVER approval process. A revised littoral region emergent aquatic vegetation (EAV) performance measure consisting of areal coverage for nine taxa is currently under review by the RECOVER approval process. The EAV taxa also have interim goals and targets for helping with Lake Okeechobee restoration.

The Lake Okeechobee SAV indicator remains well below the restoration target.

Eastern Oysters (*Crassostrea virginica*) Indicator

STATUS	PREVIOUS (WATER YEAR 2016)	CURRENT (WATER YEAR 2018)
SYSTEM-WIDE (Modified Northern Estuaries only)	R	R

The status of the eastern oyster was well below the restoration target (red stoplight, for more details, see the full report) at the end of WY 2016 and remains well below the restoration target at the end of WY 2018. This summary reports on the status of the eastern oyster in the Northern Estuaries (Caloosahatchee River Estuary, St. Lucie Estuary, Loxahatchee River Estuary, and Lake Worth Lagoon). Monitoring in the Lake Worth Lagoon could be impacted by a lack of consistent funding. Efforts to continue have succeeded thus far on an ad hoc basis, but a long term source of funding for this effort is needed.

Restoration activities that provide additional water storage in the Lake Okeechobee watershed, the St. Lucie and Caloosahatchee watersheds, as well as storage south of the lake, will help to reduce the severity of excess freshwater discharges from Lake Okeechobee, minimize huge fluctuations in salinity, enable oyster populations to thrive, and lead to increased oyster population densities. Too much fresh water impacts reproduction, larval recruitment, survival, and growth, while too little fresh water impacts the survival of oysters due to predation and higher prevalence and intensity of the *Perkinsus marinus* pathogen.

Increased rainfall and freshwater inflows associated with the 2015/2016 El Niño event and the subsequent effects on estuarine salinity were the driving force behind patterns in oyster survival, abundance, and health in WY 2017. Oysters in the St. Lucie Estuary (SLE) were the most severely impacted as salinities remained at sub-optimal levels from May through October 2016. Although there was not a complete oyster die-off related to the low salinities, oysters were extirpated from the most upstream stations by July 2016. In addition, larval recruitment rates were low throughout the year suggesting that most of the larvae were either killed outright by low salinities or physically flushed downstream by the high flow rates. In contrast, although salinity was highly variable, it generally remained within the optimal range through late 2016 in the Loxahatchee River Estuary (LRE) and in Lake Worth Lagoon (LWL). The benefits of this extended period of optimal salinities are reflected in the high live oyster densities present at stations in both the LRE and LWL.

In WY 2018, salinities were relatively high in May but decreased abruptly in June and remained low for the remainder of the calendar year. This was less pronounced in the LRE and at the two most downstream stations in the Caloosahatchee River Estuary (CRE). The primary cause of these low salinities was the extremely powerful and intense Hurricane Irma which hit Florida in early September. Excessive rainfall and runoff associated with the storm increased Lake Okeechobee water levels and subsequently those waters were released into the SLE and CRE. Flow rates into the CRE and SLE during the months following the storm were among some of the highest recorded since 2005. Those excessive freshwater inputs and the resultant low salinities caused a massive oyster die-off in the SLE and at the two most upstream stations in the CRE. The timing and duration of the event (late in the year) exacerbated the effects of the storm and prolonged the recovery period in the SLE by suppressing larval recruitment during the last few months of the spawning season. In the LRE and LWL, where the salinity regime is generally higher, there were minimal negative effects on oyster density and recruitment; however, recruitment rates in both estuaries were somewhat depressed in the months following the storm.

The oyster indicator remains well below the restoration target.

Crocodilians (American Alligators & Crocodiles) Indicator

STATUS	PREVIOUS (WATER YEAR 2016)	CURRENT (WATER YEAR 2018)
SYSTEM-WIDE (Modified USDOI lands only)	R	R

A full system-wide status assessment for crocodilians for WY 2016 - WY 2018 cannot be provided because some survey routes have not been sampled since funding was suspended in WY 2012. However, surveys have continued on USDOI lands (LNWR, Big Cypress National Preserve, Crocodile Lake National Wildlife Refuge, Biscayne National Park, and ENP). Funding for surveys in WCA-3A and 3B was restored in WY 2016 and if funding continues, will be included in the WCA-3 2020 assessment.

The status of the crocodilian indicator in the areas listed above remained well below the restoration target (red stoplight) in WY 2017 and remains well below the restoration target at the end of WY 2018. The overall score for USDOI lands has remained well below the restoration target for five consecutive years. There are fluctuations from year to year, but overall this result reflects low relative densities of alligators, variable alligator body condition, and low crocodile growth and survival. In addition, estimates of crocodile relative density have shown a negative trend over time from 2004-2015.

Data collected for both alligators and crocodiles are being used in the RECOVER 2019 System Status Report (SSR) and alligator surveys in Northeastern Shark River Slough support monitoring of Modified Water Deliveries and the Tamiami Trail bridge projects.

Data are being used to develop a better understanding of the relationship between hydrology, salinity, and alligator relative density and body condition and salinity and crocodile growth, survival, relative density, and body condition. Data collected from 1978-2015 in ENP show that high salinity conditions during the dry season strongly reduced crocodile growth rates. In addition, as salinity increases, estimates of crocodile relative density decreased. Refined statistical techniques are allowing us to get better estimates of crocodile survival. This new analysis will be incorporated to update crocodile survival targets. See the 2018 System-wide Ecological Indicators for Everglades Restoration for more details and a list of publications.

Alligator body condition and relative abundance should respond positively (increase) in areas where restoration projects restore multi-year hydroperiods and more natural fluctuations in water depths. Positive responses to Modified Water Deliveries and the Tamiami Trail bridge projects are anticipated over the next five years.

Completion of projects such as the C-111 Spreader Canal, designed to improve freshwater flow and water delivery to Florida Bay, will improve conditions and is expected to result in an increase in growth, survival, relative density, and body condition of crocodiles. Over the next five years, increases in crocodile performance measures and other metrics similar to what have been observed in the Cape Sable area where restoration projects have improved conditions for crocodiles and other indicators are anticipated.

The crocodilian indicator remains well below the restoration target.

Fish & Macroinvertebrates Indicator

STATUS	PREVIOUS (WATER YEAR 2016)	CURRENT (WATER YEAR 2018)
SYSTEM-WIDE	R	R

The status of the fish and macroinvertebrates indicator assessed in ENP (Shark and Taylor Sloughs) and WCA-3A and WCA-3B was well below the restoration target (red stoplight) in both WY 2017 and WY 2018. This indicator contains multiple components (see full System-wide Ecological Indicators Report) and those in Shark River and Taylor Sloughs in ENP that are sensitive to hydrological drying have been below targets for both years. This is in contrast to the same indicators in WCA-3A and WCA-3B, where they have been within expectations based on rainfall. There is continued evidence that Shark River Slough and Taylor Slough dried more than required to meet the rainfall-based restoration targets, even with the high rainfall in the 2018 wet season. This is because of the persistent effects of over-drying from past years and because the dry season of the 2018 water year was relatively dry.

The regional relative abundance of nonnative fish has exceeded 2% in Shark and Taylor sloughs, but not WCA-3A in this reporting period. The relative abundance of nonnative fishes dropped this year compared to the 2015 and 2016 water years. The most common nonnative fish were African jewelfish in Shark River Slough and Mayan cichlids in Taylor Slough. Asian swamp eels and spotfin spiny eels were also collected, but only in Taylor Slough. While in the last assessment there was statistically supported evidence that these nonnative fish were impacting native species by causing decreases in both density and biomass, this was not so clearly the case in the current assessment period. The long-term impacts of these new species remains to be determined.

The fish & macroinvertebrates indicator remains well below the restoration target.

Periphyton Indicator

STATUS	PREVIOUS (WATER YEAR 2016)	CURRENT (WATER YEAR 2018)
SYSTEM-WIDE	Y	Y

The system-wide status assessment for periphyton for WY 2016 was based on a combined quality, quantity and composition metric (using periphyton total phosphorus content, ash-free dry biomass, and percentage endemic diatoms, as previously reported). The status report for WY 2018 is based on quality and quantity only because funding for endemic diatoms was not provided. Surveys were conducted in LNWR, ENP (Shark River Slough and Taylor Slough), WCA-2, and WCA-3.

The status of the periphyton indicator in the areas listed above remained below the restoration target (yellow stoplight) in WY 2016 and 2017 (overall score = 77% in both years). This score has remained relatively consistent for the last nine consecutive years. The most recent nine years (WY 2009-2017) are slightly improved from the prior two years (WY 2006-2008). There are fluctuations from year to year, but overall this result reflects low biomass of calcareous periphyton mats, higher periphyton total phosphorus content than expected background levels, and a higher number of “weedy” diatom taxa inhabiting the mats (indicative of enrichment). Some temporal trends are noted at some subsets of sites, but there is no consistent trend at the regional or full-system scale

Data collected for periphyton are being used in the RECOVER 2019 SSR and more comprehensive studies are being conducted in the Northeastern Shark River Slough and Upper Taylor Slough in conjunction with the Modified Water Deliveries and the Tamiami Trail bridge projects.

Data are being used to develop a better understanding of the relationship between hydrology, phosphorus, and conductivity on periphyton abundance, quality and composition. Periphyton communities in Shark River Slough and Taylor Slough are consistently healthy except within 2 km of inflows, where phosphorus enriched communities continue to be detected. Signals of enrichment are also evident in the near-coastal regions of both sloughs where phosphorus enrichment is resulting from marine water intrusion. Periphyton in the WCAs show impairment near canal inputs of phosphorus, but also where water levels have remained higher than anticipated, especially in southern WCA-3A, where calcareous mats are absent. In addition, the northern boundary of LNWR appears to also have impacted periphyton communities, likely due to exposure to higher conductivity inflows.

Modeling studies have been used to predict periphyton condition under alternative restoration scenarios. These studies assume that the stormwater treatment areas are allowing water flowing into the Everglades Protection Areas to achieve phosphorus limits. Model outcomes suggest that the Modified Water Deliveries and the Tamiami Trail bridge projects will improve periphyton community attributes as long as inflowing water meets the phosphorus criterion.

Although completion of these projects should improve water flow into ENP, water flow volumes are unlikely to be sufficient to reverse marine water intrusion into freshwater wetlands at the marsh-mangrove ecotone until the full CERP is completed. For this reason, the Everglades Landscape Model is being expanded to predict periphyton condition in these regions. Over the next five years reductions in periphyton condition in the coastal ecotone regions due to saltwater and phosphorus exposure are anticipated.

The periphyton indicator remains below the restoration target.

Wading Birds (Wood Stork & White Ibis) Indicator

STATUS	PREVIOUS (WATER YEAR 2016)	CURRENT (WATER YEAR 2018)
SYSTEM-WIDE	R	R

The status of the wading birds indicator was well below the restoration target (red stoplight) in the previous reporting year (WY 2016) and the current reporting year (WY 2018) in all but one indicator. Normal water levels in calendar year 2016 and early 2017 were followed by a reasonable drying pattern, resulting in strong but not exceptional nesting in spring 2017. Nest starts were relatively early for wood storks (December for some nests) and the second highest nesting numbers for wood storks in 18 years were recorded. Because the end of the WY (April) falls inconveniently in the middle of the wading bird nesting season, the water year reporting reflects the previous spring nesting. For this reason, this report is on the spring 2017 nesting season, with appropriate comments on the 2018 season.

Three of the four key restoration parameters for wading birds (see full 2018 System-wide Ecological Indicators Report for Everglades Restoration) remained in the red, or poorest response category. Although there was some progress on timing of nesting in 2017 for wood storks, the indicator is a five- year average and the single result from 2017 did not move that dial appreciably. The mean interval between exceptional ibis nesting years now routinely exceeds target levels and has in both 2017 and 2018 nesting years.

While still ongoing, it is possible to make some inferences about the 2018 nesting season which will be reported on in WY 2019. Nesting by storks was early (December and January) and largely successful. Exceptional numbers of ibises have begun nesting on a normal schedule (March and April) and, notably, several very large colonies have formed in the coastal zone in ENP. These trends of more nesting in the coastal zone and earlier nesting are both positive developments that are likely to affect the averages of those two indicators. The proportion of tactile to visual foragers does not seem to be strongly affected in 2018.

Overall, both 2017 and 2018 spring nesting events occurred under good water and weather conditions and had reasonable to exceptional responses. This might be predicted as a result of the weather patterns alone, however, and it is not clear that any of the positive results are directly attributable to restoration actions. These responses of wading birds are what would be predicted (trends are stable to negative) since large scale restoration of hydrological conditions that should positively affect birds has not yet taken place.

The wading birds indicator remains well below the restoration target.

Southern Coastal Systems Phytoplankton Blooms Indicator

STATUS	PREVIOUS (WATER YEAR 2016)	CURRENT (WATER YEAR 2018)
SYSTEM-WIDE	Y	R

Phytoplankton blooms, commonly called algal blooms, are an indicator of water quality. In the context of Everglades restoration, the bloom indicator is cautionary, helping to ensure that restoration actions cause no indirect harm to coastal ecosystems via water quality degradation. The status of the Southern Coastal Systems Phytoplankton Blooms Indicator was generally poor in Southern Coastal Systems (SCS) waters in WY 2017 and WY 2018, with the overall SCS-wide score being yellow in WY 2017 and red in WY 2018. Conditions varied greatly in WY 2017. While good (green) conditions occurred in 4 of 10 SCS zones, north-central and western Florida Bay, where seagrass mass-mortality occurred in the previous year (WY 2016), and Biscayne Bay were areas of concern. The only very poor score (red) in WY 2017 was in northern Biscayne Bay. In WY 2018, very poor conditions were widespread, with red scores in 5 of the 10 zones, including north-central and northeastern Florida Bay and Biscayne Bay. It is of concern that northern Biscayne Bay had red scores for the last 5 years and the central Bay had red scores for 4 of the last 5 years.

Causation of generally poor SCS water quality conditions over the past two years appears to be related to two events: the north-central and western Florida Bay seagrass die-off in WY 2016 and Hurricane Irma in September 2017. Prior to the die-off, the bloom indicator showed good conditions for 8 straight years in the north-central bay and 16 straight years in the western bay. In the two years following the die-off, with the release of nutrients from dead seagrasses, the indicator had yellow and red scores in the north-central bay and yellow scores in the western bay. Extremely high salinity conditions in the summer of 2015 contributed to initiating the die-off and Everglades restoration is expected to decrease the risk of such conditions occurring in the future. Hurricane Irma disturbed the entire SCS, mobilizing and transporting nutrients throughout. The mobilization of seagrass die-off associated nutrients by Irma likely had a strong effect on Florida Bay.

Poor conditions in central and northern Biscayne Bay, the most urbanized portion of the bay, have persisted for the last 5 years. Algal blooms have been coincident with seagrass die-off in the northern bay. Causation is not known, but likely is related to local nutrient sources and not to restoration activities.

The phytoplankton bloom indicator is well below the restoration target.

Florida Bay Submersed Aquatic Vegetation Indicator

STATUS	PREVIOUS (WATER YEAR 2016)	CURRENT (WATER YEAR 2018)
SYSTEM-WIDE	Y	Y

The Florida Bay SAV overall status indicator was Yellow for WY 2017 and WY 2018, below restoration targets for both years. The Composite Index summarizing overall SAV status indicates that the SAV community regressed in several areas due to residual effects of a large-scale die-off event beginning in June 2015 and the impact of Hurricane Irma in September 2017. Die-off occurred primarily in the western sector of the Central Zone and in the Western Zone of the bay. The hurricane impacted the entire bay. In addition to physical loss of tens of thousands of acres of SAV habitat, a release of excess nutrients to the water column by these events caused two prolonged algal blooms which increased turbidity, reduced photosynthesis, and either killed or inhibited regrowth of SAV. The Composite Index is composed of two sub-indices. The Abundance Index, which measures both a spatial coverage component and a density component, was Poor in the Southern Zone, Fair in the Transition, Central, and Western Zones, and Good only in the Northeast Zone for both years. The grade of Fair in the Western Zone represents a regression following a Good grade earned the year prior to the die-off. The Abundance Index was reduced by declines in SAV density in the Western Zone. The net effect of these declines is that as of WY 2018, of the five zones in the bay, three are now yellow and one is red for Species Abundance.

The Target Species Index, which combines an indicator for presence of ecologically valuable seagrass species and an indicator for diversity in species composition, showed declines in status in several areas of the bay, falling from green to yellow for desirable species in the Northeast and Transition Zones in WY 2018 and from yellow to red for diversity in the Northeast Zone in both years and the Central Zone in WY 2018. The effect of these declines is that as of WY 2018, four of the five zones are in yellow status for Target Species.

Previous incremental gains in the quality of SAV habitat over several years were reflected in generally improving scores in the late 2000s and early 2010s. The wetter years of 2012 and 2013 resulted in lower salinities, more favorable conditions, and improving SAV status in many areas of the bay. These improvements proved to be precarious and were reversed by two climatological events in 2015 through 2018: prolonged drought and a tropical cyclone. The extreme drought of 2015/16 led to the SAV die-off event in areas of the bay that became most hypersaline (Central) or were most abundant in *Thalassia* (Western). The die-off may have been fortuitously curtailed by the very wet dry season of WY 2016 and the el Niño rains into WY 2017 which brought freshwater to the bay and reduced hypersaline conditions. The algal bloom events that followed, one in the Central and Western bay in WY 2017 and one bay-wide following the hurricane in WY 2018, each subsided within about six months, improving water clarity. Most recent indications are that SAV regrowth is occurring and may show more favorable status in the coming months.

The Florida Bay SAV indicator remains below the restoration target.

Juvenile Pink Shrimp Indicator

STATUS	PREVIOUS (WATER YEAR 2016)	CURRENT (WATER YEAR 2018)
SYSTEM-WIDE	B	B

Funding was suspended in WY 2012. No data were available for assessment of the juvenile pink shrimp indicator condition at the end of WY 2018.

Wading Birds (Roseate Spoonbill) Indicator

STATUS	PREVIOUS (WATER YEAR 2016)	CURRENT (WATER YEAR 2018)
SYSTEM-WIDE	R	R

Overall the stoplight color for the wading bird (Roseate Spoonbills) indicator remains red for WY 2018, though conditions throughout Florida Bay appear to be somewhat improving for spoonbills based on nest production and nesting success in recent years.

The total number of nests in Florida Bay in 2018 was 278 with a 5-year average of 282 nests. Although an improvement over the low point of 191 nests recorded in 2014 (5-year average of 268), the number of nests declined from 367 nests in 2016 (5-year average of 345) and is still well short of the target of 1,258 nests and scores red on the stoplight. The two nesting location metrics were also scored red. Nest numbers in Northwestern Florida Bay (NWFB) dropped from yellow in 2016 (5-year mean of 141) to red (5-year mean of 128 nests with a target of 210). Northeastern Florida Bay (NEFB) declined from 189 nests in 2016 (5-year mean 160) to 58 nests in 2018 (5-year mean 107) and also well short of the 688 nests target making the score red.

The 2016 report predicted that nest production would decline following the cessation of drought conditions, however, there was only a slight decline in NEFB (5-year mean went from 0.96 chicks/nest in 2016 to 0.93 c/n in 2018) and actually increased slightly in NWFB from a 5-year average of 1.33 c/n in 2016 to 1.37 c/n in 2018. Therefore, the stoplight score in NEFB was yellow in 2018 while in NWFB it remained green. In contrast, the Successful Nesting metric (number of years out of the last ten that nest production averaged >1 c/n) remained Green in NEFB (8 successful years in the last 10) and Yellow in NWFB (6 successful years out of the last 10). Overall the Nest Production and Success metric was yellow for both the northeastern and northwestern nesting regions of Florida Bay.

The Mangrove Prey Base Fish Community Structure sub-metric was removed from the calculation of the spoonbill indicator and elevated to a full stand-alone indicator (see full System-wide Ecological Indicators Report) because it is not as affected by on-going sea level rise as the spoonbill nesting indicator.

Three of the five metrics for spoonbills were red with the other two being yellow so overall the spoonbill indicator was red.

The spoonbill indicator remains well below the restoration target.

For further information on this document please contact:

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