



A story of the St. Johns River

The big picture

FAST FACTS

Untreated stormwater runoff, wastewater discharges and agricultural runoff pose significant challenges to the attainment of good water quality of the St. Johns River.

The St. Johns River Water Management District and its various partners have completed or are pursuing dozens of restoration projects, extending from the headwaters of the St. Johns River to its mouth, 310 miles to the north, with the goal of improving water quality in this American Heritage River.

A diverse water body

How can one describe the St. Johns River to someone who has never experienced it? Certainly not with simple, sweeping statements, for this 310-mile-long waterway takes a variety of forms as it flows lazily north from Indian River County through northeast Florida and into the Atlantic Ocean.

In Indian River County, the river's headwaters encompass a vast marsh supporting fish, alligators and waterfowl. In Brevard County, marshes coalesce into a navigable river, gently twisting as it meanders north. Surprises abound as the river reveals multiple personalities on its journey north: a tapestry of sawgrass lakes, bottle-clear spring runs and darkwater tributaries. As the river moves past Putnam County for Clay and St. Johns counties it widens considerably, in some locations exceeding 3 miles across. After passing through Jacksonville, the longest river contained in the state of Florida ends its journey at the Atlantic Ocean in Mayport where it mixes with salt water to form one of the most productive estuaries in the state.

Threats to the river

Today the St. Johns River remains an invaluable part of Florida, but development has challenged the unique environment that the early European explorers and inhabitants first encountered.

For decades, river water quality and floodplain habitat have declined from human activities and rapid development. In particular, stormwater runoff from burgeoning metropolitan areas, domestic and industrial wastewater discharge and agricultural runoff added nutrients to the system. Other challenges included the draining of wetlands and major diversions of water flow from and around the river.

Nutrient-rich discharges to the river have increased the severity and frequency of algal blooms and subsequent fish kills, and degraded in-river and shoreline habitat. As a result, by the end of the 20th century significant portions of the St. Johns River failed to meet state and federal water quality standards.



The lower St. Johns River meanders through north Florida.

Fixing the problems

There is no single solution for improving the condition of this celebrated and storied river. The St. Johns River Water Management District aggressively engages in habitat restoration and water quality protection in several watersheds along the river. Each basin is an interconnected part of the whole river. Improving water quality at the headwaters ultimately favorably impacts downstream watersheds as the river flows north.

Basin by basin, here are highlights of the benefits of restoration projects by the district and various federal, state and local partners and glimpses of what lies ahead.

Upper St. Johns River Basin

The 2,000-square-mile basin that makes up the St. Johns River's headwaters succumbed to decades of degradation as the marshes were drained to grow citrus and row crops and to raise cattle on the rich soils that were exposed.

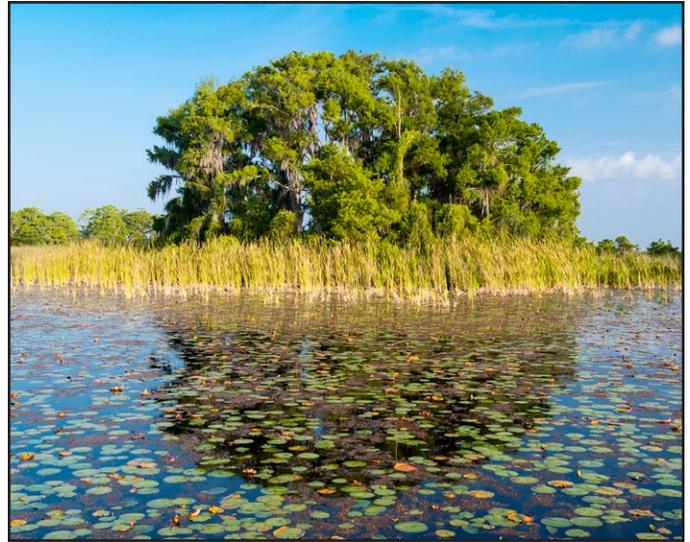
Since 1988, the district and the U.S. Army Corps of Engineers (USACE) have restored and enhanced more than 150,000 acres of marshes in Indian River and Brevard counties as part of a jointly funded flood control project.

While flood control was its primary purpose ancillary benefits include fish and wildlife habitat restoration, improved water quality, enhanced public recreation and a 70 percent reduction of stormwater discharges into the ecologically diverse Indian River Lagoon.

The \$200 million project calls for the district to fund all land acquisition and USACE to fund all construction. Work in the Upper St. Johns River Basin is in the final stages of completion.

Middle St. Johns River Basin

Spanning more than 1,200 square miles in east-central Florida, the Middle St. Johns River Basin encompasses a network of connecting lakes and tributaries fed by flow from the Upper St. Johns River Basin, underground springs, surface runoff and rainfall. The middle basin is situated within Orange, Lake, Seminole and Volusia counties — a highly urbanized corridor boasting more than 2 million residents who place ever-increasing demands on its natural resources.



Blue Cypress Conservation Area in the Upper St. Johns River Basin

The middle basin is composed of the watersheds for the Econlockhatchee River, Deep Creek, Lake Harney, Lake Jesup, Lake Monroe and the Wekiva River. Each watershed is unique so management of water resources requires variable and adaptive approaches. A Surface Water Improvement and Management (SWIM) plan laid out steps to correct and prevent problems. The district works with the Florida Department of Environmental Protection (DEP), local governments and other stakeholders throughout the middle basin to address some key problems from a regional perspective. DEP, the district and local governments work together in the development and implementation of Basin Management Action Plans. These plans are roadmaps for water quality improvement born out of the total maximum daily load (TMDL) process and are a fundamental tool in this restoration endeavor.

Accomplishments in the middle basin include the acquisition of environmentally significant land, elimination of untreated wastewater discharges, tighter stormwater and wetland protection regulations implemented in development permitting, adoption of pollutant load reduction goals to identify defensible targets for restoration efforts, reduced erosion in the Little Wekiva River, nutrient reduction efforts in key springsheds and partnerships with local governments to improve water quality and flood control in problem areas.

Work in this project area is expected to be completed by 2025, with \$33 million budgeted for restoration work and \$59 million for land acquisition.

Upper Ocklawaha River Basin (including Lake Apopka) and Orange Creek Basin

The Ocklawaha River Basin has undergone drastic declines in water quality and loss of river and marsh habitat over the last century.

Since the late 1800s, portions of the Upper Ocklawaha River Basin have been manipulated to accommodate farming and industry. The Ocklawaha River itself was dredged to improve riverboat navigation, and canals were dug to drain sawgrass marsh for muck. Similar draining occurred at Emerald Marsh on Lake Griffin and at Lake Apopka. For more than 40 years, farms established on former marshes pumped water loaded with fertilizers into the lakes and rivers of the Upper Ocklawaha River Basin. Excessive nutrients in the water caused algal blooms and fish kills, and native submersed aquatic vegetation declined. Deep organic sediments rich in nutrients accumulated on the lake bottoms as dead algae settled.

Orange Creek, another major tributary of the Ocklawaha River, was impacted by draining activities. As in the Upper Ocklawaha, the district has major restoration efforts under way in the 600-square-mile Orange Creek Basin. Orange, Lochloosa and Newnans lakes are the major watersheds in the Orange Creek Basin.

Since the 1980s, the district has been working to restore water quality and fish and wildlife habitat in the Upper Ocklawaha River Basin through Florida's SWIM program, Florida Forever and other state and federal initiatives. In total, \$64 million is budgeted for restoration work and \$166 million is allocated to land acquisition.



The eastern shoreline of Lake George

In cooperation with state and federal agencies, the district has:

- Harvested more than 3 million pounds of gizzard shad from Lake Griffin and 23 million pounds from Lake Apopka to remove phosphorus;
- Removed 110 million pounds of suspended solids and 67,000 pounds of total phosphorus from Lake Apopka water by filtering water through the marsh flow-way;
- Completed or begun construction on several parcels that will enhance restoration of more than 28,000 acres of muck farms to natural marshlands;
- Began restoring 15 miles of the historic Upper Ocklawaha River channel and surrounding floodplain marshes;
- Developed goals for reducing nutrient loads to lakes; and
- Began development of minimum flows and levels and revised regulation schedules for Upper Ocklawaha lakes.

Lake George Basin

Lake George is a vast 46,000-acre lake that lies within portions of Putnam, Lake, Marion and western Volusia counties. Lake George is unique as it is the second largest lake in Florida and the head of the St. Johns River estuary. It is fed by several large artesian springs along its western banks and at least one submerged spring just downstream of the lake outlet.

It is the nutrient storage area of the unique aquatic ecosystem that is the lower St. Johns River, transforming water quality as it flows through the lake from south to north.

Lake George has exhibited significant algal blooms. One unfortunate feature of these blooms is that they are dominated by species of algae that have the capability to extract nitrogen from the air and incorporate it into biomass for growth. As a result, the average nitrogen load exiting the lake exceeds that entering by more than 600 tons per year.

To address the problem of algal blooms in Lake George, the district and DEP are combining efforts to develop pollution limits for the lake. These limits, called total maximum daily loads (TMDLs), are expected at the end of 2016. Lake George will be the last major segment of the St. Johns River to adopt nutrient pollution limits under this federal water quality restoration process.

Similar to lakes Apopka and Griffin, the district has been engaged in selectively harvesting gizzard shad in the lake. In this unique restoration approach, phosphorus contained within the biomass of this detrimental “rough” fish is removed, with the added benefit of reduced in-lake nutrient cycling and improved aquatic food chain effects. In 2015, this effort removed 1.3 million pounds of rough fish and along with this 10,926 pounds of phosphorus and 27,845 pounds of nitrogen.

Lower St. Johns River Basin

Work in the Lower St. Johns River Basin began in the 1980s with the district’s development of the basin’s SWIM plan, which focused on water quality, biological health, sediment management, remediation of toxic substances, public education and intergovernmental coordination.

The goals of the basin’s SWIM plan were furthered in the 1990s by the creation of the River Agenda, a five-year cooperative plan among several partners. The River Agenda incorporated other actions of partnering agencies into the work already begun by the district, including reducing point source and stormwater pollution, eliminating bacteria in tributaries, restoring degraded aquatic habitat, increasing water quality compliance and enforcement, and increasing public awareness of the river and what individuals can do to improve its health.

The turning point for water quality in the lower St. Johns was the adoption of the TMDL in 2008, the first in the state to incorporate the process established in the impaired waters rule and the Florida watershed restoration act. The lower St. Johns River TMDL pioneered the pollution credit trading system and the marine waters dissolved oxygen criteria, which has since become the statewide standard.

In 2006, the district, in collaboration with DEP, the city of Jacksonville, JEA and other local government partners, entered into the River Accord by committing millions of dollars toward river restoration activities — primarily wastewater treatment facility improvements and reclaimed water system expansion projects. JEA, Clay County Utility Authority, the U.S. Navy, the cities of Atlantic Beach, Neptune Beach, Jacksonville Beach, Orange Park, Green Cove Springs and Palatka have completed projects committed to under the Accord.



Bayard Conservation Area in the Lower St. Johns River Basin

As a result of all the effort expended by local partners the lower basin has seen significant water quality improvements and reductions in the frequency, duration and severity of algal blooms. Still, there are challenges to continued improvement. Historically, algal blooms were most prevalent during times of dry weather when wastewater discharges were a large portion of flows. However, with decreased wastewater flows resulting from increased reclaimed water use, the majority of bloom activity has shifted to periods of wet weather when surface water runoff is dominant and seasonal conditions tend to favor algal growth. This places additional importance on efforts to treat surface (nonpoint) runoff from urban and agricultural land uses.

Moving ahead, local governments are working to implement stormwater projects to address urban runoff. The district, DEP, the Florida Department of Agriculture and Consumer Services, and the Natural Resources Conservation Service are providing cost-share funding to implement improved fertilizer and irrigation practices on farms in the Tri-County Agricultural Area (TCAA) in Flagler, Putnam and St. Johns counties. The goal of these improved management practices is to reduce fertilizer-laden farm runoff from reaching the river.

Through the TCAA Water Management Partnership and the district’s agricultural cost-share programs, growers have implemented a variety of best management practices that have resulted in more than 1.7 billion gallons per year in water conservation savings, a nutrient loading reduction of more than 300,000 pounds per year of total nitrogen and more than 66,000 pounds per year of total phosphorus since 2012.

