

**DRAFT**

St. Johns River Water Management District

# Indian River Lagoon/ Upper St. Johns River Basin Plan

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2026







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# Introduction

The St. Johns River Water Management District (District) is a science-based organization responsible for managing and protecting water resources in northeast Florida. The District's job is to ensure there are adequate water supplies to meet the needs of current and future users while protecting and restoring water quality and related natural resources. Water resource opportunities and challenges vary across the District and evolve over time. To focus its resources and efforts more effectively and efficiently, the District is divided into four strategic planning basins: Lower St. Johns River Basin, Ocklawaha River Basin, Middle St. Johns River Basin, and Indian River Lagoon/Upper St. Johns River Basin (IRL/USJRB). Within each strategic planning basin, the District identifies regional priorities, working with stakeholders and local government partners to identify and implement solutions to protect our natural resources and support Florida's growth by ensuring the sustainable use of Florida's water for the benefit of the people of the District and the state.

The IRL/USJRB covers over 3,158 square miles, and encompasses Brevard and Indian River counties, and portions of Volusia, Seminole, Orange, Osceola, and Okeechobee counties. The IRL is a significant surface water basin in the south portion of the District and, despite its name, the IRL is not a river

but a shallow-water estuary. The IRL, in its entirety, is comprised of three lagoons (Mosquito Lagoon, Banana River, and Indian River) that, collectively, span 156 miles from Ponce de Leon Inlet in Volusia County to the southern boundary of Martin County.

The USJRB, the headwaters of the St. Johns River, begins in the vast freshwater marshes and swamps of Fort Drum Creek in Indian River and Okeechobee counties and continues northward for approximately 30 miles before a defined river channel finally forms just south of Lake Hell n' Blazes in southern Brevard County. The USJRB extends north at the confluence between the St. Johns and Econlockhatchee rivers in Seminole County, a distance of over 110 river miles. The Upper St. Johns River Basin project (USJRBP) is a multi-decade collaboration between the U.S. Army Corps of Engineers (USACE) and the District. The 166,500-acre USJRBP focuses on using the historic floodplain to provide flood protection, improve water quality, provide water supply benefits, and protect natural resources using a semi-structural approach to water management in addition to utilizing structural components including levees, pump stations, and structures.



# Executive Summary

## – Indian River Lagoon

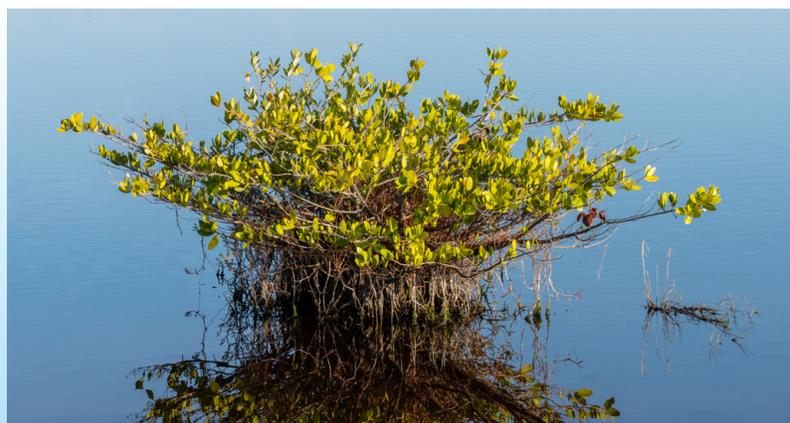
The strategic priorities for the IRL are water quality, seagrass assessment, and coastal wetland restoration and resiliency.

The IRL water quality priority success indicators include reducing excess nutrient loadings to the IRL through targeted nutrient-reduction projects, operating District projects which restore the historic watershed boundary between the IRL and USJRB, such as the USJRBP, Fellsmere Water Management Area (FWMA), Crane Creek/M-1 Canal Flow Restoration project, and completing the design of the C-10 Water Management Area project. The District will also continue enhanced monitoring efforts, conduct in-depth data analyses, and develop the annual Status and Trends Report to further project development. Finally, the District will advance the IRL Water Quality Modeling project by analyzing the effects of load reductions on nutrient and algal biomass concentrations in the IRL and by simulating and predicting water quality in both natural and engineered systems.

The priority for IRL seagrass focuses on continued seagrass research to support the successful establishment of submerged aquatic vegetation (SAV), improving understanding of the distribution and behavior of seaweed (*Caulerpa*) in the IRL, and developing opportunities with partners to advance seagrass restoration efforts. Success indicators supporting this priority include advancing the *Caulerpa* Mapping project to enhance understanding of how seaweed interacts with and potentially impacts seagrass, a factor essential to meeting restoration goals. Additional efforts involve providing guidance on a Mote Marine Laboratory–led project designed to improve knowledge of interactions between seagrass and seaweed and completing the 2025 Seagrass and *Caulerpa* Mapping initiative to produce lagoon-wide maps derived from aerial photography,

offering a comprehensive assessment of seagrass and seaweed distribution in the IRL. The District will also begin Phase 2 of the IRL Seagrass Seedbank Assessment project to identify factors influencing seagrass growth and seed abundance, which will inform site selection for future plantings. Monitoring efforts will include tracking seasonal changes in seagrass populations across 100 IRL sites. The District will continue cooperative research aimed at improving understanding of seagrass life history and resilience within the IRL.

The coastal wetland restoration and resiliency priority will focus on acquiring key parcels along the IRL, in collaboration with partners, to support the preservation and restoration of coastal wetlands. Success indicators for this priority include completing the Indian River County South Oslo Riverfront Conservation Area Restoration project, which will involve removing approximately 1,100 linear feet of perimeter dike associated with a mosquito impoundment, and the Riverside Conservancy Living Shoreline project. Additional efforts will focus on removing 14 miles of mosquito-impoundment dike at the Merritt Island National Wildlife Refuge, an action that will return more than 85 acres to natural wetland elevation and enhance roughly 1,100 acres of wetland impoundments.



# Executive Summary

## – Upper St. Johns River Basin

The strategic priorities for the USJRB include water quality and environmental restoration.

The lakes of the USJRB face multiple threats that require a clear understanding and effective management strategies to protect the health of the basin. Water quality success indicators include completing ongoing projects, advancing new project opportunities, and finalizing the Florida Department of Environmental Protection (DEP)-funded research on phosphorus management related to Class B biosolids applications. The USJRB water quality target projects support these goals through continued monitoring, analysis, and reporting—highlighted by the annual Status and Trends Report. Efforts also focus on reducing impacts from Class B biosolids, sustaining and expanding invasive fish harvest programs to accelerate nutrient reductions, and exploring incentives for commercial harvests. Additionally, the District provides essential modeling and analytical support to evaluate nutrient loading and enhance DEP's St. Johns River Water Quality Model, ensuring management decisions are grounded in strong scientific data.

The wetland communities, tributaries, uplands, and lakes that make up the USJRB form the ecological core of the entire St. Johns River system, and improving these interconnected natural communities is essential to effective, adaptive management of the basin. Environmental restoration success indicators for the USJRB focus on maintaining control of invasive and nuisance upland and aquatic vegetation, optimizing hydrologic management, and ensuring that the environmental needs of the system are met through targeted research and project development. Key initiatives include preserving and protecting water resources through strategic land acquisitions identified in the annual List of Critical Wetlands and Five-Year Land Acquisition Plan and supporting science-based decision-making through continued collection of hydrologic, water quality, and ecosystem indicator data. Additional efforts involve evaluating topographic changes in the marsh conservation areas (MCAs) to inform future management strategies; supporting endangered snail kite populations through monitoring, interagency coordination, and water management activities; and using remote sensing technologies to monitor plant communities and guide restoration actions. The District also prioritizes maintaining and enhancing District-owned lands through habitat restoration, prescribed fire, and invasive species management. Essential modeling support is also provided for environmental restoration and resilience projects, including evaluating alternative regulation schedules for the USJRBP, improving emergency response to flooding, and assessing changes within wetland communities to sustain valuable recreational resources.



# IRL/USJRB Strategic Planning Basin – IRL Water Quality

## Priority:

- Improve water quality within the IRL

## Objectives:

- Continue enhanced monitoring and conduct in-depth data analyses to further project development
- Complete design of C-10 Water Management Area project
- Operate the multiple flow diversion projects that restore the historic watershed boundary between the IRL and USJRB, such as the Crane Creek/M-1 Canal Flow Restoration project
- Reduce excess nutrient loadings and legacy nutrients through nutrient reduction projects

## Highlight:

The District has many ongoing activities to protect and improve water quality throughout the IRL/USJRB. A key component of this work is water quality monitoring and reporting. The District has water quality monitoring stations throughout the basin. Water quality monitoring data are a crucial part of identifying existing challenges and emerging trends. Monitoring also helps document water quality improvement, as well as successful habitat restoration/enhancement or land management projects. These monitoring efforts are closely coordinated with many partners, via DEP's total maximum daily load (TMDL) and basin management action plan (BMAP) efforts.

The District analyzes and evaluates the water quality data and trends in the annual Status and Trends Report. The 2025 Status and Trends Report is comprised of data from January 1, 2020, to December 31, 2024, and provides insights on the



condition and health of the waterbodies in the IRL/USJRB (Figure 1). Nitrogen and phosphorus concentrations are used to monitor nutrient levels in waterbodies, while SAV, or seagrass, serves as the key indicator of overall water quality. Changes or loss of seagrass may indicate that the system is being stressed.

Algae grow in fresh, brackish, and marine waters and are an integral part of food webs in healthy ecosystems. When ecosystems are stressed by excessive nutrients or hydrologic changes, algae may grow exponentially, resulting in algal blooms. While many algae are physically harmless, the abundance and persistence of blooms may shade out seagrass and reduce dissolved oxygen (DO) in the water, which can result in fish kills.

Some algal species produce harmful toxins that can pollute drinking and recreational waters as well as degrade water quality conditions near the algal sources and are known as harmful algal blooms (HABs). Combating conditions that lead to



prolonged intense or persistent bloom periods is necessary to reduce the intensity, duration, and size of algal blooms.

In the IRL, algal diversity and abundance are measured with partners at the IRL National Estuary Program (IRLNEP) and the University of Florida Philips Laboratory (ca. 2002–present). Chlorophyll abundance is also monitored via satellite imagery. The diversity of algal species can inform us of water quality conditions and trends within the IRL.

### **IRL Water Quality Modeling**

The IRL Water Quality Modeling project will implement improvements to the existing water quality model of the IRL and assist in developing IRL water quality management strategies.

The District is analyzing the effects of load reductions on nutrient and algal biomass concentrations in the IRL. These analyses involve updating the existing water quality model to better represent recent algal blooms and water quality conditions. The updated model will be used to simulate and predict water quality outcomes of potential projects. The model update is scheduled for completion in late 2027.

### **C-10 Water Management Area**

The C-10 Water Management Area project, located in southern Brevard County, includes pumping stormwater from the Melbourne Tillman Water Control District (MTWCD) C-9R and C-10 Canals, which currently flow to the MTWCD C-1 Canal and eventually to the IRL, into a new 1,300-acre Stormwater Treatment Area (STA) for passive nutrient load reduction before discharging the water into the Three Forks Marsh Conservation Area and the St. Johns River. This project provides both water quality and alternative water supply benefits. It will reduce freshwater, sediment, and nutrient loads to the IRL with annual nutrient load reductions of approximately 29,300 pounds of nitrogen and 1,300 pounds of phosphorus. The estimated flow restoration to the St. Johns River is 8 million gallons per day (mgd); this will increase alternative water supply availability to downstream users who withdraw water from the river for consumptive uses.

The District anticipates completing design and permitting in 2027. Pending funding, the District will commence construction in late 2028 and complete the project in 2032. The estimated total project cost is \$105,000,000. To date, the District has received state funding in the amount of

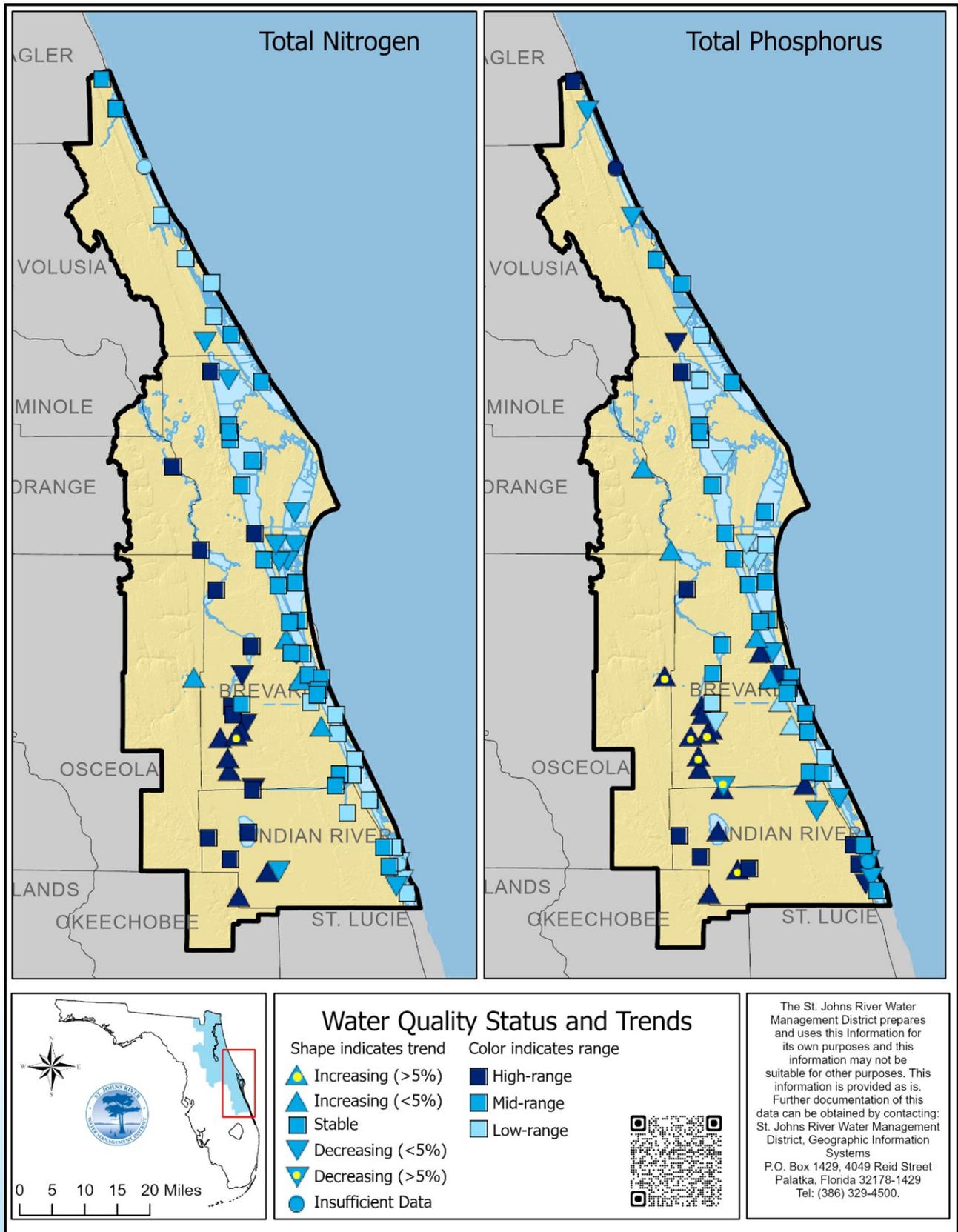


Figure 1. Water quality status and trends in the IRL/USJRB.

\$20,614,420, a Brevard County Save Our Indian River Lagoon Program grant of \$10,826,204, and the District's Governing Board committed \$20,866,779 in January 2026. The District is currently working to secure the remaining funds needed for construction.

### Flow Diversion Projects

Over the decades, the historic watershed boundary between the IRL and USJRB has been modified by a series of east-west canals that increased the drainage to the IRL at the expense of the USJRB. This artificially increased the loading of freshwater, sediments and nutrients to the IRL. Concurrently, these canals drained freshwater from the USJRB, and its vast floodplain wetlands. The District has been implementing projects to reverse the artificial drainage associated with each of these canals. The most recently completed project is the Crane Creek/M-1 Canal Flow Restoration project. Previous projects addressed drainage via the C-54 Canal, the Fellsmere Main Canal, and the C-1 Canal.

The Crane Creek/M-1 Canal Flow Restoration project is an important regional water resource development project completed in spring 2025. Drainage from a 5,300-acre urbanized watershed is diverted from the IRL through a STA and back to the St. Johns River. There are significant benefits to the IRL's water quality, including annual nutrient load reductions of approximately 24,000 pounds of nitrogen and 3,100 pounds of phosphorus. Furthermore, because flow is being restored west to the upper St. Johns River, there will be

approximately 7 mgd of additional alternative water supply created.

### IRL Feasibility Study Projects

The IRL Stormwater Capture and Treatment Project Development and Feasibility Study, completed in June 2024, identified eight local- to medium-scale stormwater treatment projects for further evaluation designed to enhance water quality within the IRL (SJRWMD 2024). The 2024 Study builds on the 2017 Indian River Lagoon Stormwater Capture and Treatment Preliminary Feasibility Analysis (2017 Study). From the eight projects, the District selected the Micco Water Management Area Improvements and the Chain of Lakes Enhanced Nutrient Reduction projects for further evaluation.

The Micco Water Management Area Improvements project has an estimated nutrient reduction of up to 40,000 pounds of nitrogen and 11,000 pounds of phosphorus per year, with an estimated cost of \$9,100,000.

The Chain of Lakes Enhanced Nutrient Reduction project has an estimated nutrient reduction of 900 pounds of nitrogen and 80 pounds of phosphorus per year, with an estimated cost of \$3,500,000.

Currently, the District is conducting water quality sampling to verify nutrient loads at these two sites. Water quality sampling will be completed in May 2026. Upon completion, the District will potentially seek funding and partnerships for these projects.



# IRL/USJRB Strategic Planning Basin – IRL Seagrass

## Priority:

- Protect and enhance seagrass within the IRL

## Objectives:

- Understand the distribution and behavior of seaweed in IRL
- Continue seagrass and seedbank research to ensure successful establishment
- Continue documenting seasonal changes in seagrass coverage

## Highlight:

Seagrass is a major structural habitat and the primary indicator of the health of the IRL. Determining how seagrass populations in the IRL recover after perturbations such as phytoplankton blooms is important in understanding the resilience of these critical habitats.

Through collaboration with Florida Institute of Technology (FIT) and other partners, the District is evaluating the distribution of seagrass seeds and how sediment and dissolved oxygen characteristics influence spatial and temporal patterns. Phase 1 of this project identified patterns in the distribution of seeds and was completed in June 2025. Phase 2 will further evaluate variability in seed densities with conditions in the sediment and changes in seagrass cover from the District's long-term monitoring of fixed transects. Phase 2 is anticipated to be completed by mid-2026. Cooperative efforts to understand the keys to successful establishment of seagrass are ongoing with the District leading the way through its comprehensive seagrass monitoring program and years of historical data.

Between 2011 and 2019, as a result of multiple algal blooms, 58% of the seagrasses were lost, with



seagrass beds moving shoreward and shallower, and percent cover of the beds decreasing to approximately 4%. Since 2021, data show a 24% increase in the areal extent of seagrass. However, most of the increase is in northern IRL and Mosquito Lagoon.

## IRL Seagrass and Seaweed (*Caulerpa*) Mapping

The IRL Seagrass Mapping effort produces lagoon-wide maps, derived from aerial photographs, and provides an overall picture of seagrass in the IRL every two years. These important management tools provide an inventory of this valuable resource and support the IRLNEP Comprehensive Conservation Management Plan, the principal objectives of Goals I and II of the IRL Surface Water Improvement and Management Plan, and the TMDL and BMAP processes. District partners on this mapping effort include DEP and South Florida Water Management District (SFWMD).

In 2023, seaweed was mapped in addition to seagrasses across 218 square miles of the northern IRL and Banana River Lagoons. Within the study area, 58 square miles of seaweed were documented and mapped. The seaweed maps, in addition to seagrass, will provide an understanding of how seaweed interacts and possibly impacts seagrass, which is important for meeting restoration goals.

The 2025 mapping effort included mapping seaweed with seagrass communities. Currently, the photo interpretation and mapping process of images taken during 2025 is underway and is anticipated to be completed by Spring 2026.

### **IRL Seagrass Seedbank Assessment**

The IRL Seagrass Seedbank Assessment project documents the distribution of seagrass seeds and sediment conditions within the boundary of the IRL. The goal is to understand potential impacts to seagrass growth and spatial understanding of the abundance of seagrass seeds, which will then guide site selection for future seagrass planting. FIT, DEP, Florida Atlantic University/Harbor Branch Oceanographic Institution, SFWMD, and the District are all working together on this project. Long-term data from over 20 years of District seagrass surveys and water quality were leveraged to guide site selection.

Data analyses from Phase 1 of the project, the Northern IRL boundary, was completed in June 2025. Phase 2 of this project will expand data collection into the entire IRL, including the SFWMD boundaries. The District will assist in data collection of seeds and sediments adjacent to existing long-term seagrass monitoring transects, data analyses, and reporting. Phase 2 of this project will be completed in June 2026.

### **IRL Seagrass Transects**

For 30 years, the IRL seagrass beds have been surveyed at least twice a year, during summer and winter. Staff monitor 100 sites to document seasonal increases and decreases in seagrass populations, working in conjunction with biologists at NASA, DEP, SFWMD, Florida Fish and Wildlife Conservation Commission (FWC), Florida Oceanographic Society, University of Florida and the Marine Discovery Center. The long-term data have been invaluable in revealing status and trends in seagrass growth and declines, especially changes documented following the algal “superbloom” in 2011.



# IRL/USJRB Strategic Planning Basin – IRL Coastal Wetland Restoration and Resiliency

## Priority:

- Continue acquisition and restoration of IRL wetlands

## Objectives:

- Acquire key parcels along the IRL in collaboration with partners for purposes of preservation and restoration of coastal wetlands
- Work with partners on the restoration of publicly owned and impacted coastal wetlands and shorelines

## Highlight:

Coastal wetlands are among the most biologically productive natural systems on Earth. Wetland habitats are transitional regions between land and sea that provide an array of valuable ecosystem functions. District staff will continue to pursue opportunities to preserve and restore these wetland areas. Through the District's List of Annual Critical Wetlands and Five-Year Land Acquisition Plan, the District and its many partners have worked to identify key lands for acquisition as part of the effort to reverse the damage done to coastal wetlands to recover the natural and economic benefits they provide. In addition, the District now has the ability to utilize intergovernmental agreements with our partners to accelerate and facilitate coastal wetland restoration work.

The Merritt Island National Wildlife Refuge T-10-H Dike Removal and Sternstein-Canaveral National Seashore Dragline are recent examples of coastal wetland restoration projects completed in cooperation with local partners and the U.S. Fish and Wildlife Service.



Design and permitting have been completed for the Riverside Conservancy Living Shoreline and the South Oslo Riverfront Conservation Area Restoration projects with construction to be completed in the fall of 2026.

### Additional IRL Acquisition and Restoration

The District identified previously impounded or impacted coastal resources in previous planning efforts. Preservation and restoration of impacted coastal wetlands are ongoing efforts with our collaborators. These projects may include acquisition (District or partner) to facilitate restoration or rehabilitation of these critical resources.

The District is also establishing intergovernmental agreements with collaborating local governments specifically for coastal wetland restoration projects. These agreements will facilitate coordination between the two entities for restoration projects and accelerate implementation.

## **Merritt Island National Wildlife Refuge Dike Removal**

The Merritt Island National Wildlife Refuge T-10-H Dike Removal project was completed in spring of 2025. The construction consisted of removing approximately 3-miles of a mosquito impoundment perimeter dike in the Merritt Island National Wildlife Refuge and restored and improved an impacted portion of coastal wetland in the IRL. The removed dike area becomes newly restored wetlands while the wetlands within the impoundment benefit from increased connectivity with the IRL. This improves both wildlife and surrounding fisheries habitat and wetland-driven water quality benefits.

With the funds remaining from these projects, an additional 14 miles of dike will be completed in 2026 returning over 85 acres to wetland elevation, enhancing about 1,100 acres of wetland impoundments.

## **Indian River County South Oslo Riverfront Conservation Area Restoration**

The Indian River County South Oslo Riverfront Conservation Area Restoration project consists of removing approximately 1,100 linear feet of perimeter dike of a mosquito impoundment. It will improve water exchange between impounded mangroves and the IRL and restore the area to provide more natural water levels. Other benefits include restoration of wetland vegetation and increased wildlife and surrounding fisheries habitat. The project is expected to be completed in the fall of 2026.

## **Riverside Conservancy Living Shoreline**

The District is collaborating with the Riverside Conservancy, located in southeastern Volusia County, to restore approximately one mile of shoreline by constructing a living shoreline that will include mangroves, salt marsh vegetation, and installing oyster reef modules. The project will be completed in 2026.



# IRL/USJRB Strategic Planning Basin – USJRB Water Quality

## Priority:

- Ensure the sustainability of the USJRB water quality improvement projects
- Work with DEP to meet existing TMDLs and BMAPs and establish new ones to address impairments

## Objectives:

- Complete ongoing water quality projects and investigate further project development
- Complete DEP-funded research on phosphorus management strategies from the application of Class B biosolids

## Highlight:

The lakes of the USJRB, like many of Florida's aquatic ecosystems, are threatened by a variety of factors. Nutrient enrichment stimulates HABs, which can be toxic and shade the water column, reducing the light available to support critical submerged aquatic vegetation. The USJRBP incorporates large water management areas (WMAs) that filter nutrients from the water before discharging downstream. These areas also segregate the nutrient rich water from MCAs.

Currently, approximately 50 water quality stations are monitored at least monthly within the USJRB. This includes two bi-weekly stations, three DEP HAB stations, and two continuous monitoring stations.

The District analyzes and evaluates water quality data and trends in the annual Status and Trends Report. The 2025 Status and Trends Report, comprised of data from January 1, 2020, to December 31, 2024, provides insights on the condition and health of the water bodies in the



USJRB (Figure 1). The full report is available at: [sjrwmd.com/data/water-quality/#status-trends](https://sjrwmd.com/data/water-quality/#status-trends).

Calculations of annual average total nitrogen (TN) and total phosphorous (TP) loading from 2016–2020 suggest a recent increase in TP loads to Lake Washington in exceedance of the nearby TMDL target.

## USJRB Invasive Fish Harvest

The USJRB Invasive Fish Harvest project consists of harvesting invasive fish (tilapia, brown hoplo, and armored sailfin catfish) to facilitate phosphorus removal. This effort began in 2022 on Lake Winder and has expanded each year since. Nine lakes will be included in 2026. Harvests are conducted annually by commercial fisherman from January through June. In addition to being an effective tool to reduce phosphorus levels, removal of these invasive species also reduces levels of excess sediments and minimizes destabilization of riverbanks caused by burrowing behaviors of these species.

## **Modeling to Support Water Quality Improvement Projects**

The District utilizes hydrologic, ecological, and water quality models to guide planning efforts, evaluate management decisions, and investigate various environmental dynamics. Key modeling efforts that support water quality improvement projects include developing methodologies for incorporating Class B biosolids nutrient loading into water quality models with model refinement planned to conclude in late 2026. Additionally, District staff provide data support and technical review for DEP's St. Johns River Water Quality Model, which guides TMDL and BMAP development and is scheduled to be completed in 2027.

## **Biosolids Investigation**

One increasing source of phosphorus in the USJRB is from the land application of municipal wastewater Class B biosolids. DEP is providing funding to conduct applied research to identify solutions to reduce the potential impacts that phosphorus-rich Class B biosolids can pose to water quality in USJRB receiving water bodies. This collaborative project with the University of Florida and Florida International University is scheduled to be completed in 2027.



# IRL/USJRB Strategic Planning Basin – USJRB Environmental Restoration

## Priority:

- Continue environmental restoration efforts in the USJRB

## Objectives:

- Complete research and develop projects to optimize hydrologic and water quality management and ensure environmental needs of the system are met
- Achieve and maintain control of invasive and nuisance upland and aquatic vegetation

## Highlight:

One of the many ways the District meets its mission to preserve and protect Florida's water resources is by acquiring and managing lands. The main goal of buying land is to protect water resources, especially wetlands. In addition, these lands protect plant and wildlife habitat and provide areas for public recreation and environmental education. The future acquisition strategy for the IRL and USJRB will focus on lands identified for potential acquisition on the annual List of Critical Wetlands and the Five-Year Land Acquisition Plan suitable for water resource protection, natural systems enhancement or restoration, floodplain connection and optimal land management boundaries. The List of Critical Wetlands and Five-Year Land Acquisition Plan map are available at <https://sjrwmd.com/documents/plans>.

The District requires ongoing data collection on hydrologic, water quality and key ecosystem indicators to make science-based decisions. As such, the District maintains ambient monitoring of hydrology, water quality and biological indicators at key locations around the District. These data guide actions related to each of the District's



core missions. In the USJRB, real time hydrologic monitoring is critical to the management of the many water control structures associated with the USJRB. These data ensure that flood protection operations are timely and that water levels sustain the abundant wetlands and water quality treatment areas. To ensure that the restored wetland plant communities are healthy, and meeting criteria associated with permits to construct the project, detailed wetland mapping is conducted. This is currently done via satellite imagery with community identification processed via machine learning with abundant on-site verification.

### Elevation Transects in Blue Cypress Marsh Conservation Area

The Elevation Transects in Blue Cypress Marsh Conservation Area (BCMCA) project will evaluate topographic elevations and soil characteristics to assess changes in topography and soil conditions to support future evaluations of hydrologic performance. Soil sampling and characterization will build upon this survey data and is anticipated



to be completed by late 2026. This project follows surveys in adjacent properties which illustrated large changes in land elevation due to changing hydrologic conditions.

### **Hydrologic Restoration in the St. Johns Marsh Conservation Area**

The Hydrologic Restoration in the St. Johns Marsh Conservation Area (SJMCA) project involves re-establishing more desirable water levels in the SJMCA. One project being contemplated involves the installation of two-1,000 ft. earthen plugs on the western side of the SJMCA. Four other earthen plugs on the eastern side of SJMCA in the C-40 Canal will also be improved to re-hydrate the marsh in the southern and mid-sections of the marsh. These changes will provide both water quality and habitat benefits.

### **Survey of Snail Kite Breeding and Habitat Use in the USJRB**

Annual surveys of the federally endangered snail kite have been conducted in the USJRB since the

mid-1980s. In cooperation with University of Florida researchers, these surveys record snail kite habitat use and reproduction efforts and provide valuable information that help guide water management activities within the USJRB. Snail kites require healthy, diverse wetlands to provide sufficient food resources (apple snails) and suitable areas for nesting and are therefore excellent indicators of wetland health. During peak nesting months, March through June, surveys are conducted every 2-3 weeks. Outside of peak nesting months, surveys are conducted monthly.

### **Modeling to Support Environmental Restoration and Resilience Efforts**

Modeling to support environmental restoration and resilience initiatives includes evaluating alternative regulation schedules for the USJRB, informing emergency responses to flooding, and updating the existing USJRB hydrology model to guide management decisions. Different water regulation options are being evaluated to see how the system can be managed more effectively for

wetland restoration and flood protection, with this work expected to be completed by mid-2026. The USJRB real-time flood forecasting model has been operating continuously since 2024 and will continue to operate during the 2026 hurricane season to forecast flooding at key lakes, rivers, and roads. In addition, the USJRB hydrology model will be updated by early 2026 using new elevation data to better understand how water moves through wetlands in the BCMCA and how management actions may affect wetland conditions.

### **Plant Community Mapping**

The Plant Community Mapping effort provides tools to monitor plant communities in the USJRB using remote sensing. Information collected from plant community monitoring is useful for a number of purposes ranging from evaluating the quality of fish and wildlife habitat to documenting the success or failure of various restoration and management activities. Detailed plant community maps are developed every 7 years for the entire basin. Initial mapping efforts began in 2001 and were based on aerial imagery. Satellite imagery was collected for the first time beginning in 2022 and will be used for future mapping efforts with the next mapping cycle to begin in 2029.

### **Land Management and Invasive Plant Management Programs**

The Land Management Program responsibilities include habitat restoration, prescribed fire and wildfire response, and invasive and nuisance species management. Land management plans approved by the District's Governing Board for each District property establish the philosophy and direction for management and use of District lands. Land management plans provide for water resource protection, a diversity of habitats, compatible recreational uses, wildlife habitat restoration and enhancement, and the continuation, where possible, of traditional land and water resource uses. Legislative directives guide the land management planning process from acquisition evaluations to the development of land management plans. These plans identify resource needs and compatible uses, and the District solicits public input in the review and update for each plan.

The District's Invasive Plant Management Program is charged with managing invasive and nuisance upland and aquatic vegetation on over 400,000 acres of District-owned properties. Goals of the program include maintaining invasive and nuisance plant populations at the lowest feasible levels to encourage beneficial native vegetation, protect surface water resources, and provide for operation and maintenance of District regional flood protection projects.



# Basin Overview

## – Physiography of Basin

To focus its resources and efforts more effectively and efficiently, the District is divided into four strategic planning basins: Lower St. Johns River Basin, Ocklawaha River Basin, Middle St. Johns River Basin, and IRL/USJRB (Figure 2).

Approximately two thirds of the IRL falls within the District boundaries, extending from Volusia County to Indian River County. In 2016, the IRLNEP extended the IRLNEP boundary north 25 miles into the Volusia County Halifax River and added 310 square miles to the IRL watershed.

The IRL is one of the most diverse estuaries and one whose natural resources provide substantial economic goods and services. The IRL waters span an area of 353 square miles and receives drainage from 2,284 square miles. The western side of the basin is separated from the USJRB by the Atlantic Coastal Ridge, which extends along the eastern portions of Indian River, Brevard, and Volusia counties. The IRL freshwater input includes stormwater runoff, groundwater, rainwater, and

tributary and canal discharges. The major natural tributaries to the IRL include Sebastian River, Turkey Creek, Crane Creek, Eau Gallie River, Addison Creek, Spruce Creek, and Tomoka River (Figure 3).

The USJRB encompasses over one million acres, that historically included nearly 400,000 acres of floodplain marsh that formed the headwaters of the St. Johns River. The western side of the basin is bordered by the Osceola Ridge, which rises 60 to 80 feet above sea level. The basin extends along the western edge of Brevard and Indian River counties and occupies small portions of Orange, Seminole, and Volusia counties. Forty-six blackwater streams flow east from the ridge into the Upper St. Johns River. Some of the major USJRB tributaries include Taylor Creek, Jane Green Creek, Cox Creek, Wolf Creek, Blue Cypress Creek, and Fort Drum Creek. There are also several shallow lakes in the basin including Blue Cypress, Hell'n Blazes, Sawgrass, Little Sawgrass, Washington, Winder, Florence, Poinsett, and Puzzle lakes (Figure 3).

Within this system of lakes, Lake Washington (a Class I Waterbody) serves as the primary public water supply for the City of Melbourne.

Several canals, some dating back to the 1800s, had been constructed to drain areas within the USJRB for agricultural purposes and flood protection, and to divert that water to the IRL. Some of the major canals include the Indian River Farms Water Control District canals, C-54 Canal, Fellsmere Main Canal, Sottile Canal, C-1 Canal, and M-1 Canal. Through these canals, large amounts of freshwater have been diverted from the St. Johns River watershed to the IRL and the Atlantic Ocean.

The C-54 Canal was constructed in the 1960s along the Indian River and Brevard county line for the purposes of flood protection and is owned and maintained by the District, while most of the



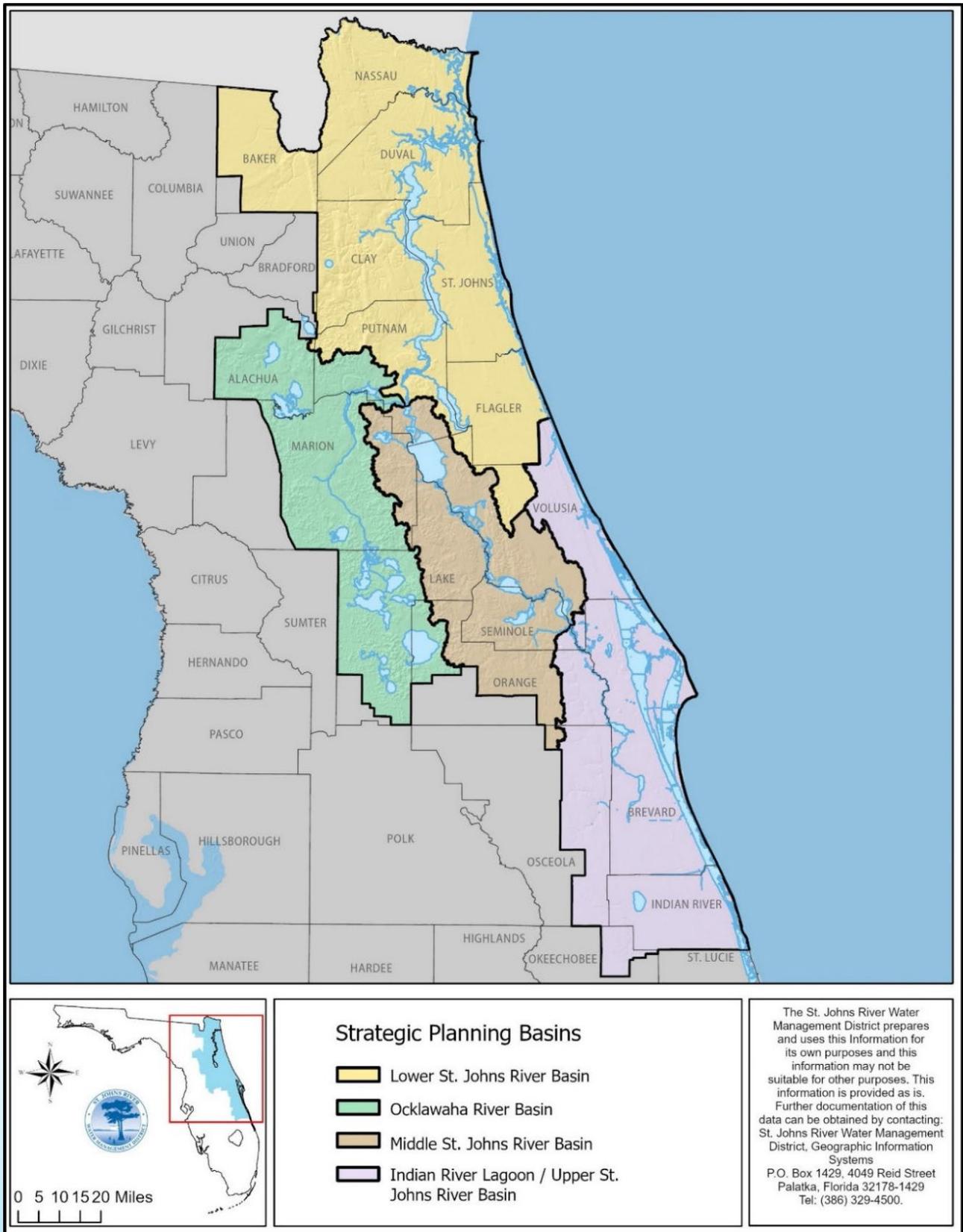


Figure 2. Strategic Planning Basins of the St. Johns River Water Management District.

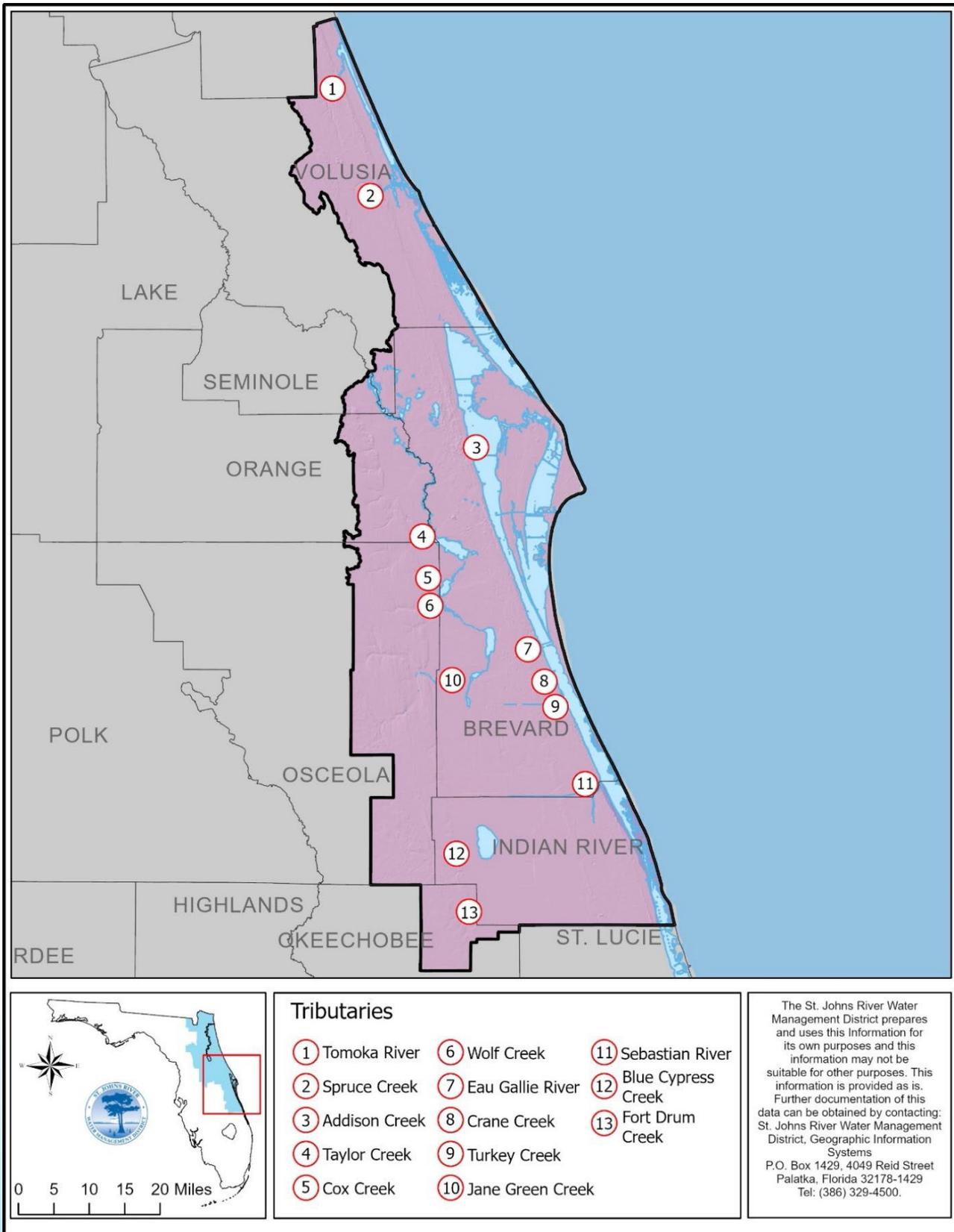


Figure 3. Major tributaries of the IRL/USJRB.



other canals were constructed as part of drainage projects through Special Water Control Districts (SWCD) and are owned and maintained by those specific SWCDs. SWCDs are special tax districts of the State of Florida (Chapter 298, F.S.) created, in part, to construct, operate, and maintain canals, ditches, drains, levees, and other works for the purposes of drainage, irrigation, and water control for agricultural and sanitary purposes. Within the USJRB, there are seven SWCDs situated in the southeast corner of the basin including:

- Delta Farms Water Control District
- Fellsmere Water Control District
- Indian River Farms Improvement District
- Melbourne Tillman Water Control District
- Sebastian River Water Control District
- St. Johns Improvement District
- Vero Lakes Water Control District

Flood protection within the upper reaches of the USJRB is facilitated by a joint Federal and State project known as the USJRBP. Flood protection activities in the USJRB were initially begun by the

USACE through the Central and South Florida Flood Control project (C&SF). The C&SF project planning efforts were initiated in the late 1940s in response to hurricanes and flooding in Central and Southern Florida. Construction began in 1966 in the USJRB portion of the C&SF project; however, construction was halted several years later with the passage of the National Environmental Policy Act (NEPA), pending development of an Environmental Impact Statement. Following a lengthy environmental review, the USJRBP was redesigned to minimize environmental concerns regarding negative impacts to wetlands and the IRL. Construction of the USJRBP resumed in the late 1980s with a focus on using the historic floodplain to store water, improve water quality, provide water supply benefits, and protect natural resources using a semi-structural approach to water management in addition to utilizing structural components including levees, pump stations, structures, etc. Construction of USJRBP components was completed in 2016 and the project is now fully operational and has moved into long-term maintenance. The District has developed

an Environmental Water Management Plan (EWMP) to describe operational guidelines that will inform USJRBP area discharges. The EWMP will be attached as an appendix to the Master Water Control Manual.

The EWMP is important because it provides the basis for predicting environmental impacts of the USJRBP, which will be needed for any future NEPA review.

The USJRBP itself extends approximately 40 miles from Indian River County north of the Florida Turnpike to Lake Washington in central Brevard County. The project includes over 100 miles of flood protection levees, seven major gated spillway structures, and numerous, smaller water control structures. Other primary features of the USJRBP include two WMAs, four Marsh Conservation Areas (MCAs), and two water retention/detention areas (RA) (Figure 4). All project areas store stormwater runoff to provide flood protection. However, when not being used for stormwater storage, individual project area purposes vary. WMAs primarily segregate and improve runoff and discharges from adjacent agricultural and urbanized lands and provide water supply for irrigation and freeze

protection. MCAs preserve and protect extant basin wetland habitats and provide water to augment dry season river flows. RAs are managed by other state agencies as wildlife habitat. Adjacent to the USJRBP, the District also constructed, or is planning to construct, four WMAs that lie outside the federal levee system.

These areas include FWMA, Blue Cypress Water Management Area-East, Sawgrass Lake WMA, and C-10 Water Management Area project. All WMAs, MCAs, and RAs, both within and outside the federal project footprint, serve to improve the quality of runoff water diverted to the basin and provide water supply benefits, provide valuable fish and wildlife habitat, support outdoor recreational opportunities (e.g., fishing, hunting, boating, birding), and contribute to USJRBP goals. Storing water in these areas greatly reduces the need to discharge potentially damaging quantities of freshwater, sediments, and nutrients to the IRL.



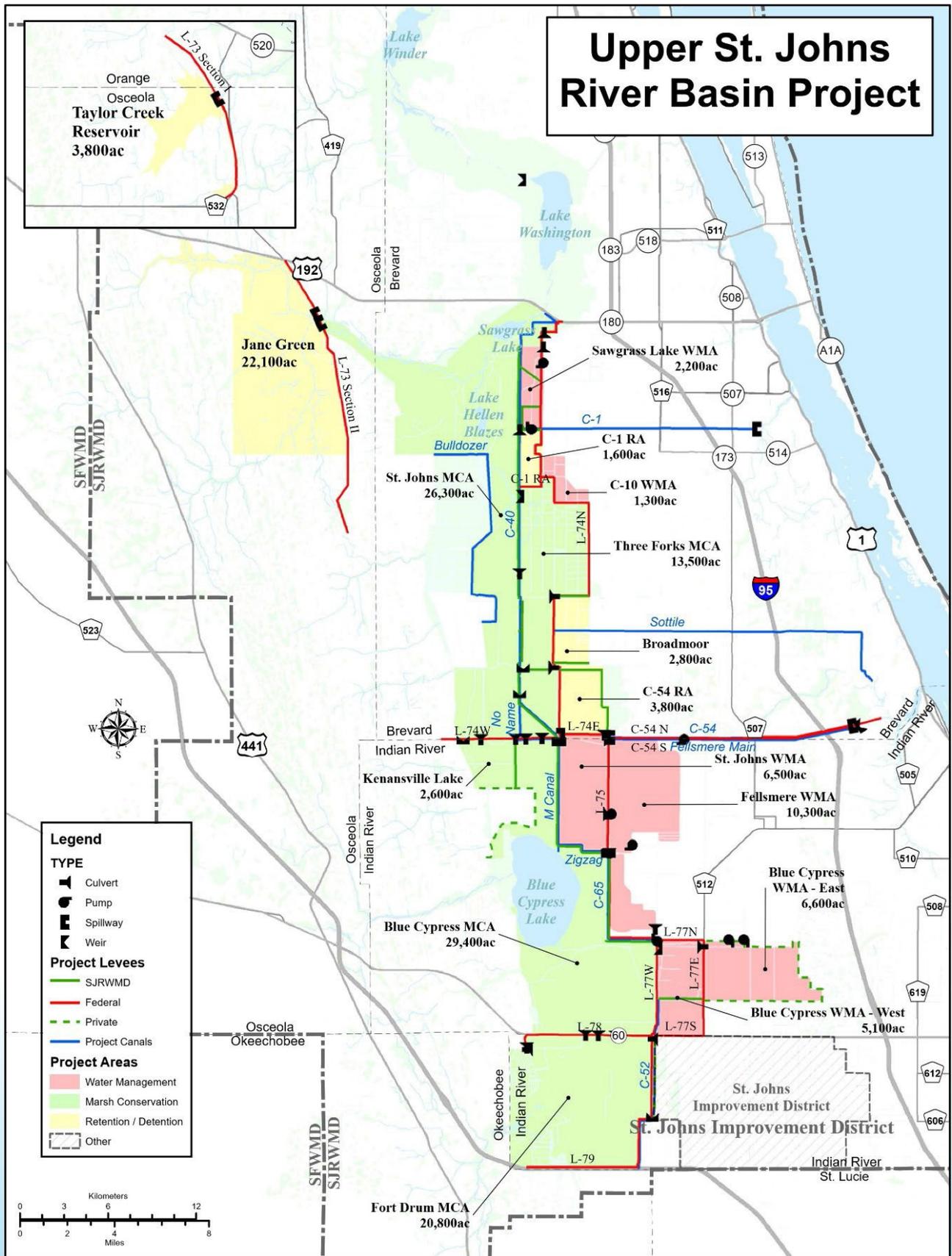


Figure 4. USJRB project map.

# Water Quality

Protecting and restoring water quality is a core mission of the District. Strategies to protect and restore water quality include a commitment to comprehensive monitoring to guide impairment determinations, manage restoration projects and evaluate effectiveness. Monitoring provides a wealth of information that enables the District to make resource decisions based on accurate and timely information and documents the condition of more pristine waters. These efforts are closely coordinated with many partners, including the DEP's TMDL and BMAP programs.

DEP conducts a "Biennial Assessment" of all the major watersheds, or basins, in Florida every two years. Water bodies that have been assessed and do not meet the standards set forth for them are determined to be impaired. The 2022-2024 Biennial Assessment, adopted on August 16, 2024, is available at <https://floridadep.gov/dear/watershed-assessment-section/content/assessment-lists>.

DEP has adopted TMDLs for 21 waterbodies and tributaries within the IRL, three waterbodies within the Halifax River system, and three waterbodies within the USJRB. Impairments for all of these waterbodies include TN and TP and/or low DO levels. TMDLs are developed for waterbodies that are verified as not meeting their water quality standards. TMDL documents are available at: <https://floridadep.gov/dear/water-quality-evaluation-tmdl/content/final-tmdl-reports>.

BMAPs contain a comprehensive set of solutions designed to achieve pollutant reductions established by a TMDL. There are three distinct IRL BMAPs in the basin due to the IRLs large geographical area and resulting hydrological differences. The three subbasin lagoon watershed BMAPs are Banana River Lagoon, Central IRL, and North IRL. No BMAPs have been developed for the USJRB. BMAP documents are available at: <https://floridadep.gov/dear/water-quality-restoration/content/basin-management-action-plans-bmaps>



## Current Status and Trends, District Reporting

Over many decades, the water quality in the IRL has degraded as a result of stormwater discharges, agricultural runoff, wastewater treatment plant effluent, and septic tanks. The residence time of water varies throughout the IRL due to the proximity of inlets and resultant oceanic flushing. For example, water residence time in the Banana River Lagoon can be up to two years. Thus, some portions of the IRL are more vulnerable to HABs as a result of nutrient loading. The water column shading caused by algal blooms has resulted in declines in seagrass density and cover as documented by the District's long-term seagrass monitoring. The water quality conditions necessary for seagrass regrowth in the IRL are the focus for determining IRL TMDLs. The median depth limits of seagrass coverage in the IRL decreased over the years because of changes in water quality conditions resulting from anthropogenic influences. The loss of seagrass has effected other important species, including commercial and sport fisheries and manatees, which depend on the seagrass meadows for habitat. Over the past decade, multiple prolonged HABs have occurred in the IRL.

For the IRL, the District developed Pollutant Load Reduction Goal (PLRG) targets, which were based on maintaining and enhancing the growth and distribution of seagrasses. Targets were developed on the premise that reducing the amount of nutrients and suspended material entering, or made available within the IRL system, will increase water clarity, and allow more light to reach the bottom to encourage seagrass expansion. PLRGs were used by DEP to develop the IRL basin TMDLs. Each segment of the IRL has a unique TMDL with required reductions ranging from 35 to 72% of the starting modeled loads. Additionally, eight tributaries of the IRL have established nutrient or DO TMDLs.

The lakes of the USJRB, like many of Florida's aquatic ecosystems, are threatened by a variety of factors. Nutrient enrichment stimulates HABs, which can be toxic and shade the water column, reducing the light available to support critical



submerged aquatic vegetation. The District's PLRG for the USJRB lakes along the river mainstem (Hell'n Blazes, Sawgrass, Washington, Winder, and Poinsett) established a target TP concentration threshold that is considered protective of these lakes in reducing the frequency and severity of HABs (Keenan et al. 2002).

Water quality monitoring occurs monthly throughout the IRL and major tributaries. Across the IRL there are 55 ambient monitoring stations that are monitored each month for a variety of parameters such as nutrients, metals, and environmental factors. In addition, there are six continuous monitoring sondes to measure relative chlorophyll, salinity, temperature, depth, fluorometric dissolved organic matter, turbidity, water temperature, pH, and conductivity. Sampling in small, brief watershed conveyances, such as ditches and feeder canals, is project based.

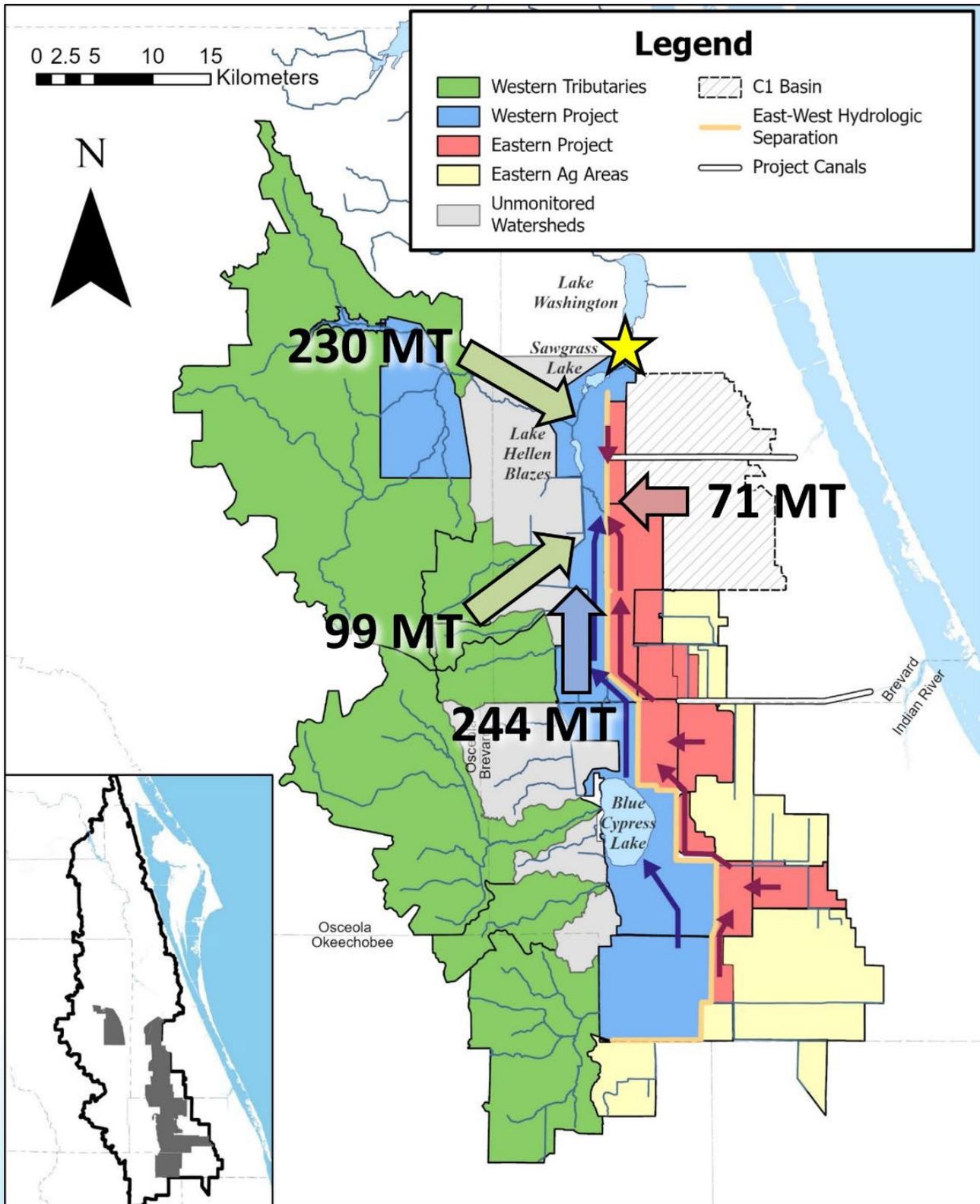


Figure 5. Mean annual TN loads from USJRB watersheds to Lake Washington from 2016-2020.

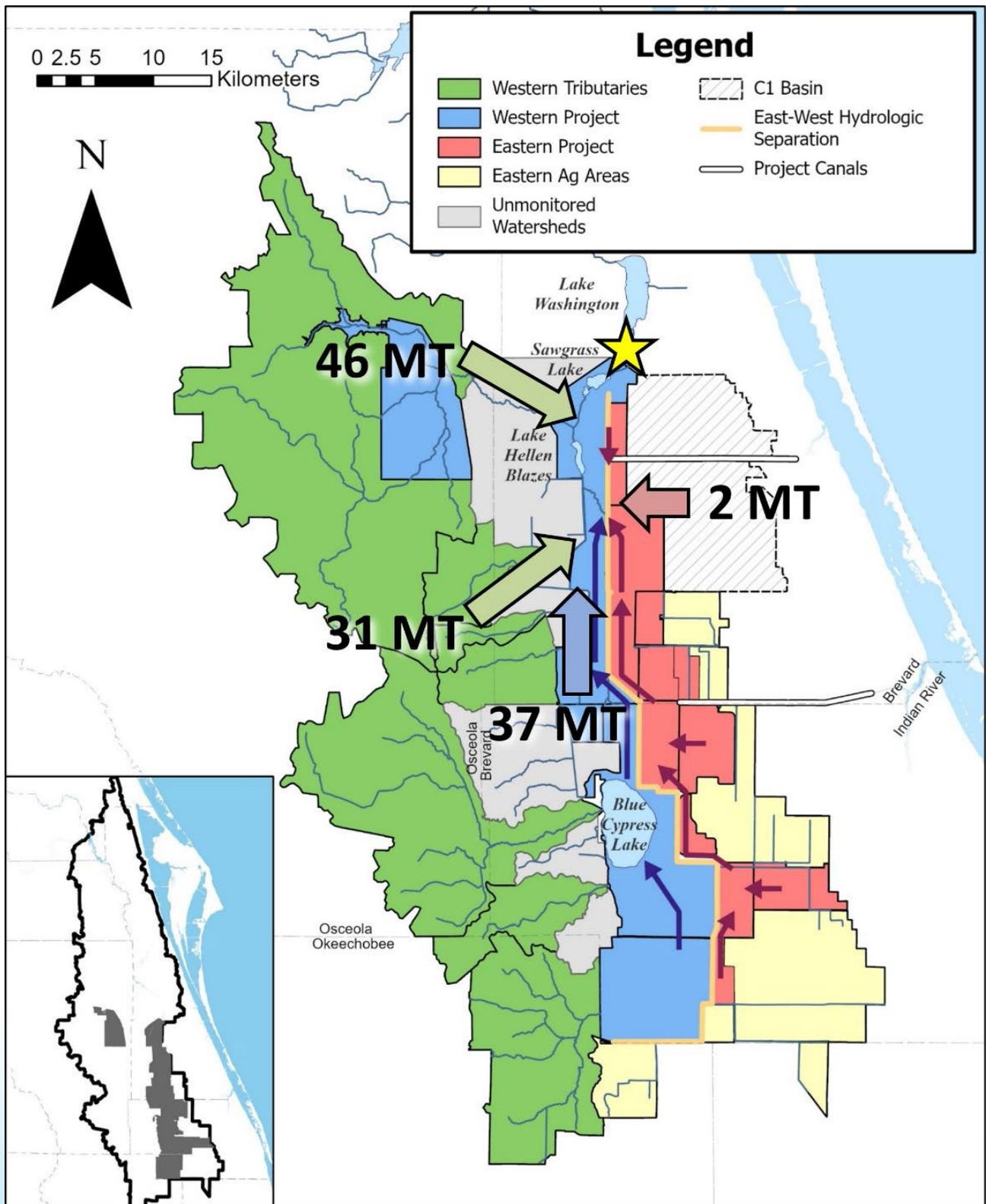


Figure 6. Mean annual TP loads from USJRB watersheds to Lake Washington from 2016-2020.

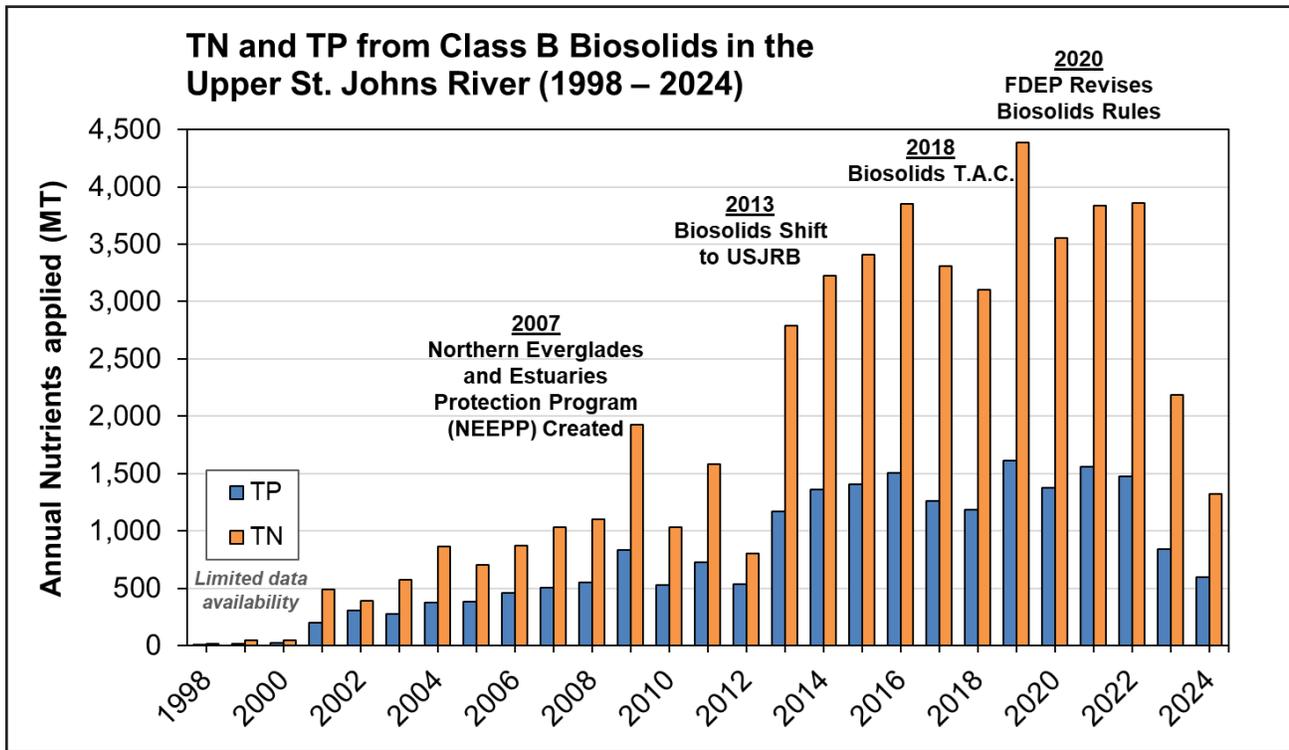


Figure 7. TN and TP annual applications derived from Class B biosolid applications in USJRB from 1998-2024.

Salinity trends in the IRL indicate a weak decrease in Banana River, North IRL, and Central IRL. As the IRL is an estuary, shifts in fresh and marine water composition are expected; however, timing of freshwater input events that coincide with other stressors, such as light or DO limitation events or cool temperatures, can lead to more impacts to flora and fauna throughout the IRL. The most abundant, canopy forming seagrass in the IRL, shoal grass, has a wide range of salinity tolerance and can be robust during short periods of fresher waters if other stressors are not present. Other seagrasses, such as widgeon grass, rebound well when salinity is lower and tend to form a robust seedbank. Understanding the cycle of water quality dynamics in the framework of the biological components of the ecosystem is integral to the management of the IRL.

Currently, approximately 50 water quality stations are monitored at least monthly within the USJRB. This includes two bi-weekly stations, three DEP HAB stations, and two continuous monitoring

stations. Calculation of annual average TP loading from 2016-2020 showed a 44% increase in TP loads to Lake Washington since the establishment of the TMDL in 2006 (Papacek, 2025; Gao, 2006). Most of this additional nutrient loading originates from the western watersheds, including the Jane Green Detention Area, the tributaries surrounding the St. Johns MCA, and the structures discharging to the C-40 Canal (Figures 5 and 6). This increase in TP loading is associated with land use changes in the western portions of the watershed since 2010. Calculation of TN and TP loading along the river mainstem shows that due to its large size and associated runoff, the basin contributes approximately 70% of the TN and TP load to downstream lakes in the Middle St. Johns River Basin. These lakes have TN and TP TMDLs which will not be met until loading from the basin is reduced (Gao, 2009).

The eastern portion of the watershed contributes 1-3% of the western watersheds nutrient contributions and has the benefit of the USJRB,

which was designed to provide both water supply (irrigation and freeze protection) and stormwater treatment for the large citrus groves to the east of the project.

Increases in TP loading in the western USJRB tributaries correlate to increases in the land-application of Class B biosolids in the region (Canion et al. 2021). Following modifications to state rules which effectively banned application in the Lake Okeechobee-St. Lucie-Caloosahatchee watersheds to the south, application of nutrients derived from biosolids has increased in the USJRB (Figure 7). There are several ongoing District projects directed at improving biosolids management in the USJRB, including increased monitoring within these impacted watersheds, as well as identifying potential solutions.

### **HAB Assessments**

Direct grab samples for HABs are collected and assessed for algal diversity and abundance based on cell counts and chlorophyll concentrations, while satellites also monitor chlorophyll abundance. The diversity of algal species can inform us of water quality conditions and trends within the IRL.

The District, in cooperation with DEP, has HAB monitoring stations in Blue Cypress Lake, St. Johns WMA, and Lake Washington. Samples are collected monthly or twice per month during the peak bloom season (April-October). Results from these samples are provided to the District, local county Departments of Health, and posted on DEP's public Algal Bloom dashboard <https://floridadep.gov/AlgalBloom>

## **Natural Systems**

### **Submerged Aquatic Vegetation**

Maps of the IRL documented locations and areal extents of seagrass beds have been periodically produced since the 1940s, and surveys of fixed transects yielded changes in percent cover and depths at the end of the canopy since 1994. In 2011, there was a widespread algal bloom and loss

of seagrass occurred throughout most of the IRL system, extending from southern Mosquito Lagoon to just north of Ft. Pierce Inlet (Figure 8). Between 2011 and 2019, approximately 58% of seagrasses were lost, with offshore ends of canopies moving shoreward and shallower, and percent cover decreased to approximately 4%. More recent data show an increase in seagrass extent between 2021 and 2023 of approximately 24%; however, most of the increase is in northern IRL and Mosquito Lagoon (Figure 9, Figure 10). In 2025, fixed transect monitoring recorded increases in seagrass percent cover and transect length in Mosquito Lagoon (ML), northern IRL (NIRL), Banana River Lagoon (BRL), south-central IRL (SCIRL) and southern IRL (SIRL) (Figure 10). Seagrass in the central IRL did not see improvement (Figure 10). Mosquito Lagoon, northern IRL, Banana River Lagoon, central IRL, south-central IRL, and southern IRL are sublagoons of the IRL. These sublagoons further define the seagrass coverage lagoon-wide.

Native species of SAV found in the USJRB include Eelgrass, Illinois Pondweed, Coontail, and Southern Naiad. SAV provides important habitat for both fish and wildlife. Hydrilla, an invasive species, is also present and at times has become extremely abundant.



## Bivalves

Hard clams have historically been significant contributors to healthy water quality in the IRL (Arnold et al. 2002) via filter-feeding that reduces turbidity from algae. This allows greater light penetration to the sediment surface, which supports seagrass beds that in turn sustain a diversity of species. Furthermore, clams remove organic nutrients from the water column and deposit them in sediments (Galmany et al. 2017), further reinforcing water clarity while isolating nutrients.

Unfortunately, overharvesting and degraded water quality have led to the collapse of native hard clam populations in the IRL. Restoration of impacted clam populations is a critical step towards restoring the IRL, as existed prior to the onset of major HABs in 2011 (Phlips et al. 2015). Because clams are highly dependent on local environmental conditions, it is critical to highlight restoration needs, obstacles, and knowledge surrounding clam restoration in the IRL. Research, management, and outreach priorities as detailed by local stakeholders

for successful implementation of clams in IRL restoration projects can be found here: [Clam Workshop 2022 White Paper.pdf \(sfwmd.gov\)](#)

The University of Florida, Whitney Lab for Biosciences have been actively working to restore native hard clams to the IRL. Building on previous successes, Blue Ocean Quest, in collaboration with the District and the Whitney Lab, experimented with a novel approach to deliver millions of juvenile clams to restoration sites via heavy lift drones. This approach negates the labor and time-intensive traditional aquaculture techniques of growing adult clams and restoring them with the use of cover nets or other protective gear. Further, this can be accomplished for approximately one third of the cost of clam restoration via the traditional methods currently being employed without the risk of marine animal entanglement from derelict netting or bags.

The eastern oyster has been classified as an ecosystem engineer as well as a keystone species because of the important benefits that oysters and oyster reefs provide. Oysters filter and clean

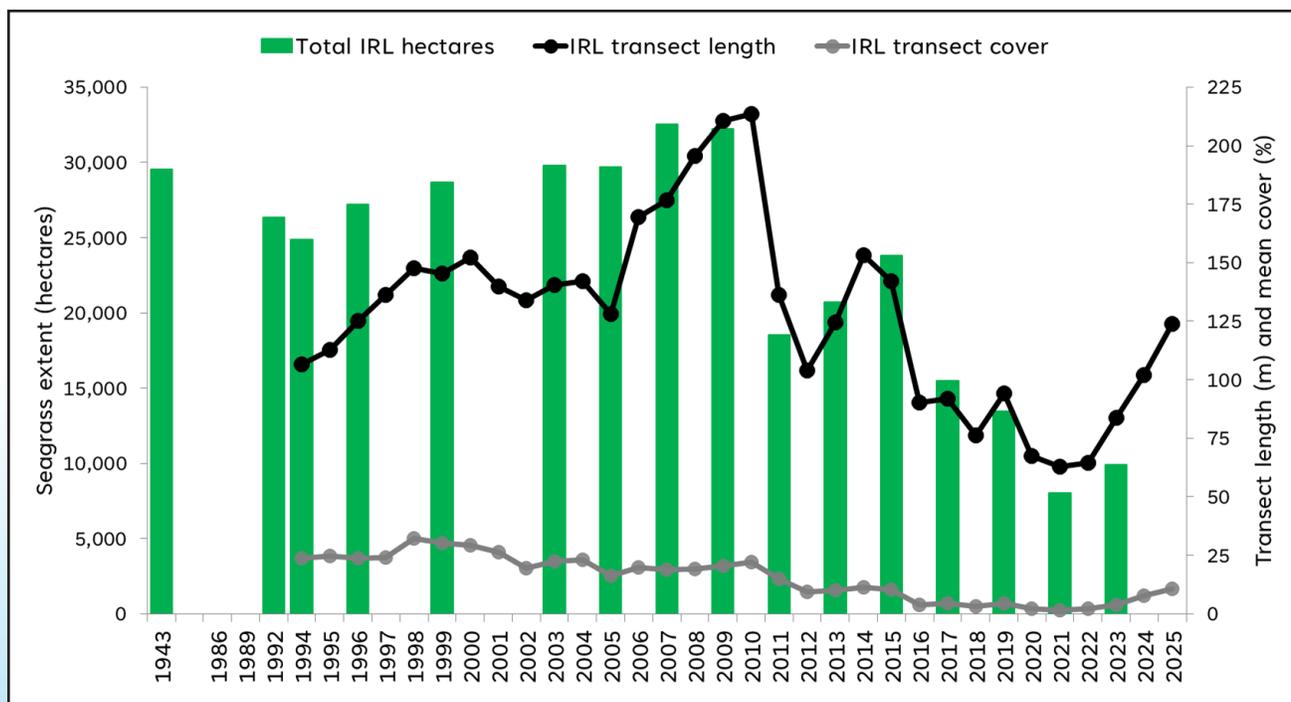


Figure 8. Seagrass areal extent and transect length and cover within the IRL.

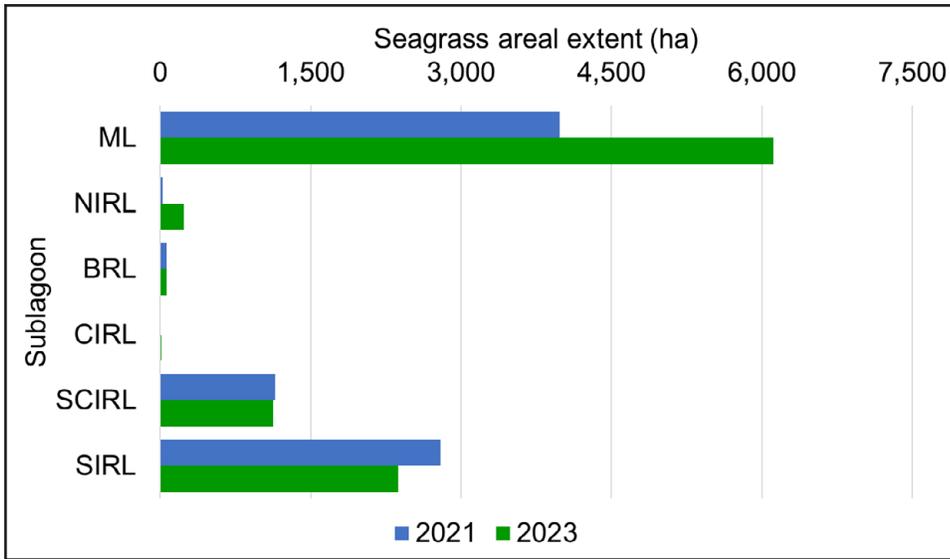


Figure 9. Seagrass areal extent from 2021-2023 by sublagoon.

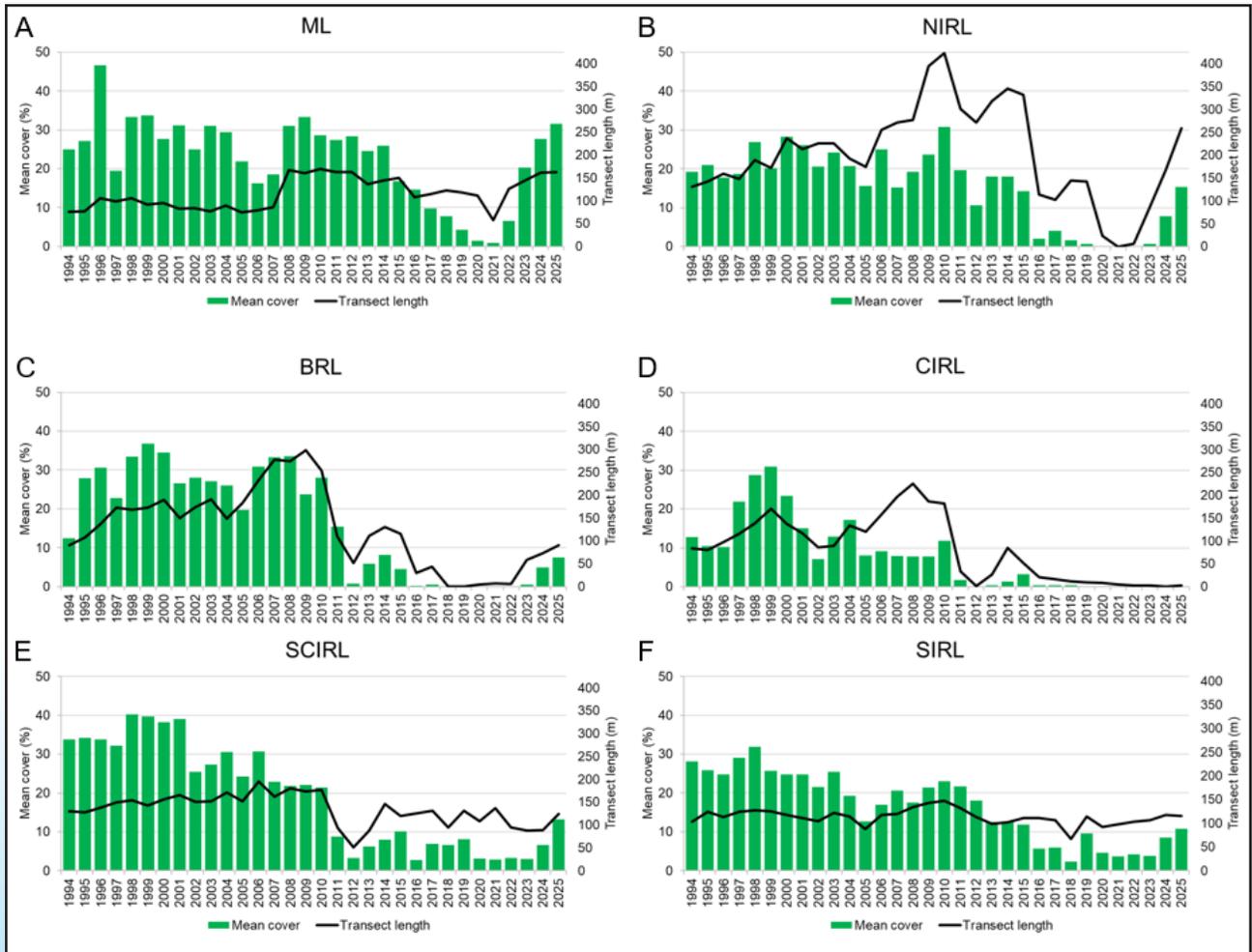


Figure 10. Seagrass mean cover and transect length from fixed transect monitoring by sublagoon (A-F).



the surrounding water and provide habitat to fish, invertebrates, and other shellfish. In some places, oyster reefs can serve as barriers to storms and tides, preventing erosion and protecting productive estuary waters. Due to their three-dimensional structure, oyster reefs can maintain high levels of ecosystem diversity. The loss of oyster reef coverage has encouraged different types of conservation, mapping, monitoring and restoration efforts throughout its native range, including within the IRL region. More information can be found here: <https://myfwc.com/research/habitat/coastal-wetlands/oimmp/>

## Fisheries

The IRL is home to many popular sport fish such as red drum, sea trout, flounder, snook, tarpon, sheepshead, permit, pompano, and black drum. The FWC Fisheries Independent Monitoring (FIM) program conducts monthly sampling of fish in the IRL. Sampling effort and catch are summarized each year into a FIM Annual Report. The latest report available can be found here: Fisheries Independent Monitoring Program 2024 Annual Data Summary Report.

Fisheries in the USJRB are managed by the FWC who conduct sport fish annual abundance surveys and monitor angler effort and success. Areas with the greatest recreational fishing effort include the Fellsmere, Blue Cypress, and St. Johns

River WMAs, and Kenansville Lake. Blue Cypress Lake and Lake Washington provide some of the best fishing with regards to the natural lakes. Activities by the District to enhance sport fishing generally center around aquatic weed control and protecting angler access. In 2023, the St. Johns WMA was drawn down to facilitate the planting of 40,000 spatterdock and 131,000 bulrush plants. These plants have done well and the improved sportfishing for bass, speckled perch and bluegill have improved as noted in the November 2025 issue of Florida Sportsman magazine.

## Invasive Species

Since 2007, there has been a significant increase in invasive fish abundance in USJRB. The species of greatest concern are tilapia and sailfin catfish. Tilapia are the most widely distributed invasive fish in the world. First introduced to Florida in the 1960s, they have spread throughout peninsular Florida and have become the most abundant invasive fish in the state. Tilapia dig large bowl-shaped nests that can potentially displace native SAV, and they aggressively compete for spawning grounds. Tilapia eat a wide variety of foods and their foraging on benthic algae can lead to increased eutrophication. Although the effects of sailfin catfish on native fishes are largely unknown, they build burrows along shoreline that can threaten the integrity of canal banks and levees. Burrowing has been especially evident upstream of State Road 50 in the primary spawning grounds of American and hickory shad where bank collapse due to sailfin catfish burrowing activity has shallowed the river channel and altered flow. Sailfin catfish burrows have also been documented as a potential problem for levee integrity in the USJRB. They also sequester high concentrations of TP in their flesh.

In 2022, the District initiated a haul seine harvesting program on Lake Winder that allowed commercial fisherman to harvest and sell tilapia. One goal of the program was to determine if tilapia harvest could be a cost-effective nutrient removal tool. Commercial fishermen were also required to remove all sailfin catfish as a condition of the

harvest agreement. In 2022, over 23,000 pounds of tilapia and 9,000 pounds of sailfin catfish were removed from Lake Winder. In 2023, the program was expanded to include Lakes Florence and Poinsett, where an additional 45,000 pounds of tilapia and 5,000 pounds of sailfin catfish were removed. In 2025, the harvest was expanded even further and now includes Lakes Cone, Poinsett, Florence, Winder, Washington, Sawgrass, Hell'n Blazes, Loughman, and Salt. Between 2022 and 2025, approximately 197,858 pounds of invasive fish and 1,721 pounds of TP were removed from USJRB lakes. From 2022-25, this effort generated \$124,945 in revenue for participating commercial fisherman.

### **Coastal Habitat Restoration**

Coastal wetlands perform a vast array of ecosystem functions, including food web support, habitat, wave attenuation, erosion control, purifying water by sequestering nutrients, pollutants, and sediments, sequestering carbon, and providing aesthetic and recreational value.

Many coastal wetlands along the IRL were impacted in past decades to help control mosquitoes. The impacts included dragline ditching, impounding, and isolating the wetlands. Impacted wetlands are less able to provide the critical nursery areas for important sport and commercial species. Properly functioning wetlands remove and permanently store nutrients and are helpful in protecting against sea-level rise.

Restoration of impacted wetlands generally involves the removal of dikes and spoil piles by returning the material to the adjacent borrow areas and then regrading the area to match the elevation of nearby functional wetlands. The acquisition and management of the IRL's wetlands continues to be a District priority.

There are four general types of impacted coastal wetlands targeted for rehabilitation or restoration: impounded wetlands, dragline-impacted ditched wetlands, dredge or fill-impacted wetlands, and impacted oyster reefs. An additional initiative that combines some of these efforts, the creation of "living shorelines", consists of pursuing opportunities to protect or enhance erodible or disturbed shorelines by creating habitats on or adjacent to shorelines (as opposed to using hardening methods like bulkheads, riprap, etc.). The District has been successful in implementing projects in all of these categories (Brockmeyer et al. 1997, 2022).

The large number of entities involved in management and restoration of these impacted wetlands led the District to develop successful partnerships to ensure that all mandated goals are met while achieving ecological goals. Furthermore, these partnerships have leveraged significant cost-share dollars, grant funds, and in-kind services; thus, multiplying the District's investment several-fold and achieving large-scale wetland rehabilitation.



# District Lands

## Land Management

Within the IRL/USJRB, 11 Conservation Areas, encompassing 235,677 acres, are managed directly by the District. The District also actively pursues partnerships for land management with other state agencies, local governments, and nonprofit organizations (Table 1). In fact, more than three-quarters of the District's land holdings have been purchased, and are being managed, in conjunction with other groups.

## Natural Systems Restoration

The District's primary goal in purchasing and managing land is to preserve and protect water resources. While doing this, the District also actively manages the properties to protect native plants and animals. Conservation lands within the IRL/USJRB have a diverse assemblage of natural

communities providing significant habitat for a variety of floral and faunal species. Natural systems restoration improves species diversity and the overall natural community health and vigor.

District staff utilize the principles of adaptive management when restoring lands, allowing for adjustments to decision-making as new information is gathered and put into context. One method of natural systems restoration is the usage of prescribed fire, reducing the possibility of dangerous wildfire while enhancing the land's environmental quality. Prescribed fire's benefits include restoring and maintaining natural communities, reducing chances of destructive wildfires, perpetuating fire-adapted plants and animals, cycling nutrients, controlling tree diseases and opening scenic vistas.



Managed Area	Lead Land Manager	County	Acres
Blue Cypress Conservation Area	District	Indian River	61,574
Buck Lake Conservation Area	District	Brevard and Volusia	9,606
Canaveral Marshes Conservation Area	District	Brevard	11,691
Fellsmere Water Management Area	District	Indian River	10,035
Fort Drum Marsh Conservation Area	District	Indian River	20,862
Micco Water Management Area	District	Brevard	458
River Lakes Conservation Area	District	Brevard and Osceola	41,011
Sand Lakes Conservation Area	District	Indian River	1,256
Seminole Ranch Conservation Area	District	Brevard, Orange and Volusia	29,223
Three Forks Marsh Conservation Area	District	Brevard	47,529
Turnbull Hammock Conservation Area	District	Volusia	2,432
Pine Island Conservation Area	Brevard County	Brevard	879
Sebastian Stormwater Park	City of Sebastian	Indian River	163
IRL Preserve State Park	DEP	Brevard	500+/-
Mosquito Lagoon Aquatic Preserve	DEP	Volusia	4,740
St. Sebastian River Preserve State Park	DEP	Brevard and Indian River	21,629
Charles H. Bronson State Forest	FFS	Seminole and Orange	11,246
Little-Big Econ State Forest	FFS	Seminole	10,336
Herky Huffman/Bull Creek Wildlife Management Area	FWC	Osceola	23,646
Salt Lake Wildlife Management Area	FWC	Brevard	7,805
T.M. Goodwin Waterfowl Management Area	FWC	Brevard	6,270
Triple N Ranch Wildlife Management Area	FWC	Osceola	16,295
North Sebastian Conservation Area	Indian River County	Indian River	407
Oslo Riverfront Conservation Area	Indian River County	Indian River	143

Table 1. Current projects within IRL/USJRB.

# Detailed Descriptions of Major Capital Projects

## C-10 Water Management Area

### Description

The C-10 Water Management Area project includes construction of four miles of a new earthen dam, modifications to four miles of an existing federal embankment, construction of a 300 cubic feet per second (cfs) pump station, primary and emergency discharge structures, and a public boat ramp. This project will reduce nutrient loading to Turkey Creek and the IRL, which are “impaired” with respect to nutrients and supports the DEP adopted BMAP for the Central Indian River Lagoon (Project Number SJRWMD-05). The C-10 Water Management Area project was identified in the 2017 Study, which was funded by the District and DEP. The purpose of the 2017 Study was to identify both local and regional scale stormwater capture and treatment projects within the IRL estuary. This project also provides an alternative water supply source because it will discharge to the St. Johns River, thus providing a benefit to downstream utilities. The project will reduce flood stages within the local region and reduce discharges to Turkey Creek and the IRL,

which are vulnerable to flooding, storm surge, and/or sea level rise based on the DEP Statewide Vulnerability Assessment. The project is located north and adjacent to Three Forks MCA and south of Sawgrass Lake WMA in Brevard County (Figure 11).

### Background

The C-1 Canal in Brevard County is a historic agricultural canal constructed in the 1920s that continues to drain portions of the historic USJRB to the IRL. This diversion from natural and historic flows to the USJRB to the IRL has increased nutrient loading and decreased salinity in the IRL, harming natural systems such as seagrasses. The District has restored a significant amount of surface water flow back to the USJRB through completion and continued operation of the C-1 diversion project, otherwise known as the C-1/Sawgrass Lake WMA project (C-1/SLWMA).

The C-10 Water Management Area project is essentially phase 2 of the C-1/SLWMA and will further restore additional surface water flows to the USJRB, while also reducing nutrient loading to the IRL. Importantly, the restoration of flows to



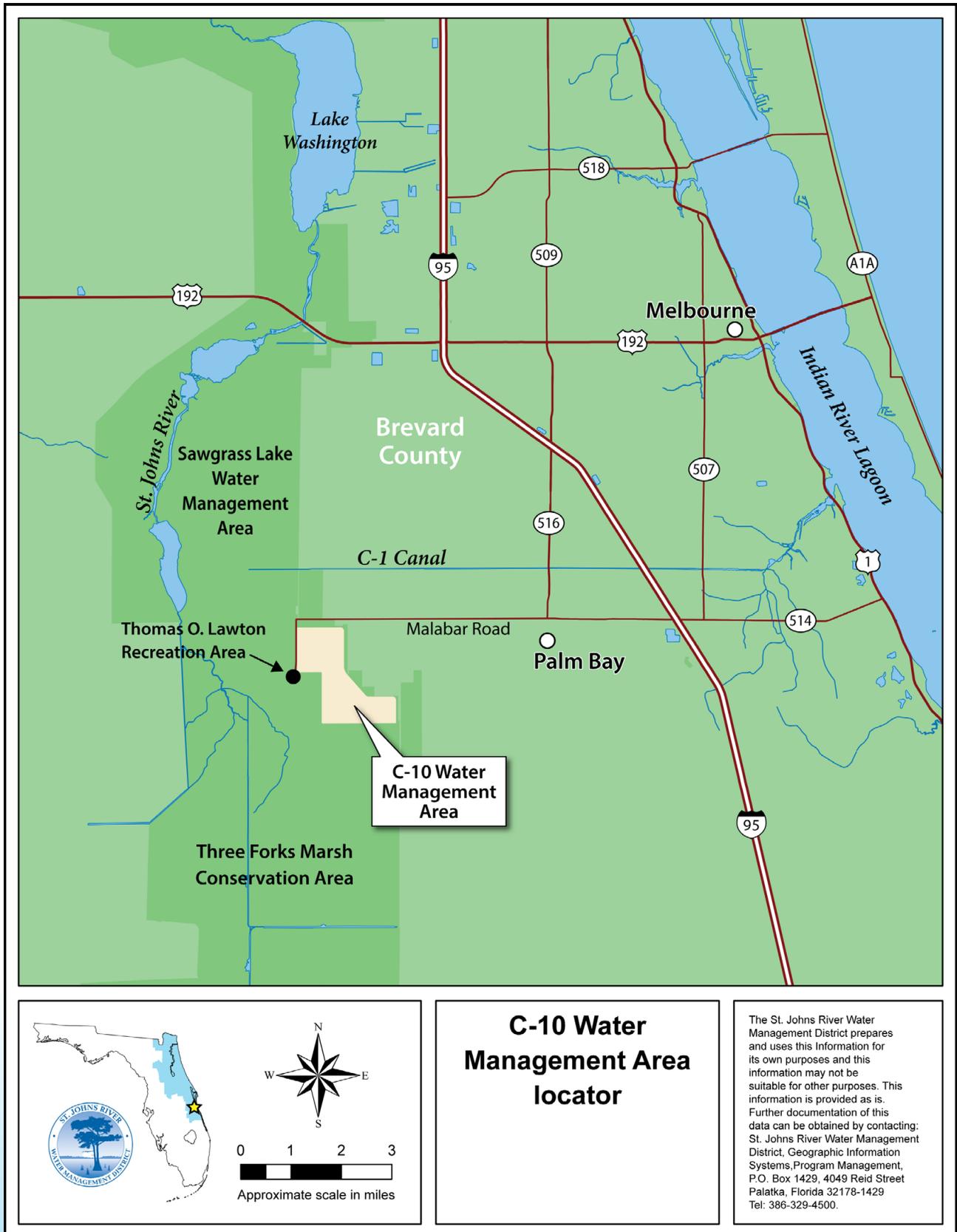


Figure 11. C-10 Water Management Area.



the USJRB will increase alternative water supply availability for downstream utilities like the City of Melbourne, which relies on both surface water from the St. Johns River and groundwater from the Floridan aquifer system as their raw water sources.

District staff were on track to complete the 100% design milestone during the 2024 calendar year. However, due to changes in available staff resources and the expansion of best management practices for dam safety, the District recently went under contract with an engineering firm to design, permit, and assume engineer of record responsibilities for the C-10 Water Management project. The District anticipates completing design and permitting in 2027.

Pending funding, the District will commence construction in late 2028 and complete the project in 2032. The estimated total project cost is \$105,000,000. To date, the District has received state funding in the amount of \$20,614,420, a Brevard County Save Our Indian River Lagoon Program grant of \$10,826,204, and the Districts Governing Board committed \$20,866,779 in January 2026. The District is currently working to secure the remaining funds needed for construction.

### **Benefit and/or Impact**

The C-1/SLWMA project currently returns 40% of C-1 Canal flows back to the USJRB and reduces nutrient loads to the IRL by an estimated 148,000 lbs./yr. TN and 13,000 lbs./yr. TP. With the addition of the C-10 Water Management Area, an additional 10% or 7.9 mgd average annual flow will be restored to the USJRB. The construction of C-10 will reduce nutrient loading to the IRL by an estimated 29,300 lbs./yr. TN and 1,300 lbs./yr. TP. Surface water will be pumped out of the C-1 lateral canals and treated in the proposed C-10 Water Management Area before discharging to Three Forks MCA and eventually to the St. Johns River. The addition of 7.9 mgd of surface water to the St. Johns River provides an appreciable alternative water supply source to downstream utilities, the closest of which is the City of Melbourne, who provides potable water to nearly 165,000 customers.

Furthermore, the DEP Statewide Vulnerability Assessment indicates the affected watershed, Turkey Creek, and the IRL are vulnerable to flooding, storm surge, and/or sea level rise. The proposed project will help reduce flood stages and improve resiliency to the local region.

## Upper St. Johns River Basin Flood Protection Infrastructure Projects

### Description

The District is the local sponsor for the USJRBP (Figure 12) and, therefore, is responsible for the operation and maintenance of 108 miles of flood control levees, eight major water control structures and over 100 minor water control structures, weirs, and pump stations. Significant investment is required to maintain the levees and structures to USACE standards.

USACE and the District have invested approximately \$250,000,000 over three decades to construct the USJRBP. The District's work plan includes repairs to the USJRBP over the next several years.

The USJRBP has won several awards for blending federal levee system structures with the District's floodplain wetland restoration including: 2008 Australian-based Thiess International River Prize as one of the most innovative environmental river restoration projects in the world; 2016 Project of the Century by the Florida Engineering Society; and in 2019, was featured as one of the nation's top wetland restoration projects by the Association of State Wetland Managers.

### Background:

In the early 1900s, the upper basin of the St Johns River was diked and drained for agricultural purposes. Canals were constructed to divert floodwaters from the basin east to the IRL. By the early 1970s, 62% of the marsh, which functions as a natural flood attenuation feature, was gone. The alterations degraded the upper basin's remaining marshes impacting its natural ability to provide flood attenuation and also diminished water quality in the IRL. In 1977, the District and USACE embarked on an ambitious, long-term flood control project that would revitalize the upper basin. The USJRBP reclaimed drained marshlands by creating reservoirs and replumbing existing canals. The goals were numerous: to provide flood protection,



improve water quality, reduce freshwater discharges to the IRL, provide for water supply, and restore or enhance wetland habitat. The main benefits of the listed USJRBP are to ensure that the federal flood protection systems are properly maintained and ready to provide flood protection. These projects also provide important water quality benefits to the St. Johns River and IRL. In addition, the USJRBP is a critical source of potable water, as the City of Melbourne meets a portion of its water supply needs via surface withdrawals from Lake Washington, just downstream of the USJRBP.

## Benefit and/or Impact

The main benefits of the USJRB projects listed below are to ensure that the federal flood protection systems are properly maintained. These projects also provide important water quality benefits to the St. Johns River and IRL.

The planned projects primarily focus on levee repair and stabilization, and flood protection infrastructure improvements. Additional benefits include protecting Blue Cypress WMA from high phosphorus loading from adjacent properties. The planned projects would help assimilate existing and additional water and help reduce downstream nutrient loads, while facilitating significant nutrient load reductions to the IRL. The total construction cost for infrastructure improvements is estimated to be \$9,300,000. This includes water control structure

S-161 improvements, USJRB levee stabilization and minor water control structure refurbishments, and enhancements and restoration to the Blue Cypress Water Management Area west levee.

S-161, for example, is one of the major water control structures that plays a strategic role in the USJRB federal flood protection project. As such, rehabilitation of the structure is key to ensuring the integrity of S-161 to secure the long-term reliability of the District's core mission of flood protection. While this structure has been maintained, it has not been completely refurbished since the structure was constructed in the early 1970s. Rehabilitation is currently planned for FY 2028-29, but funding has not yet been secured for the project.



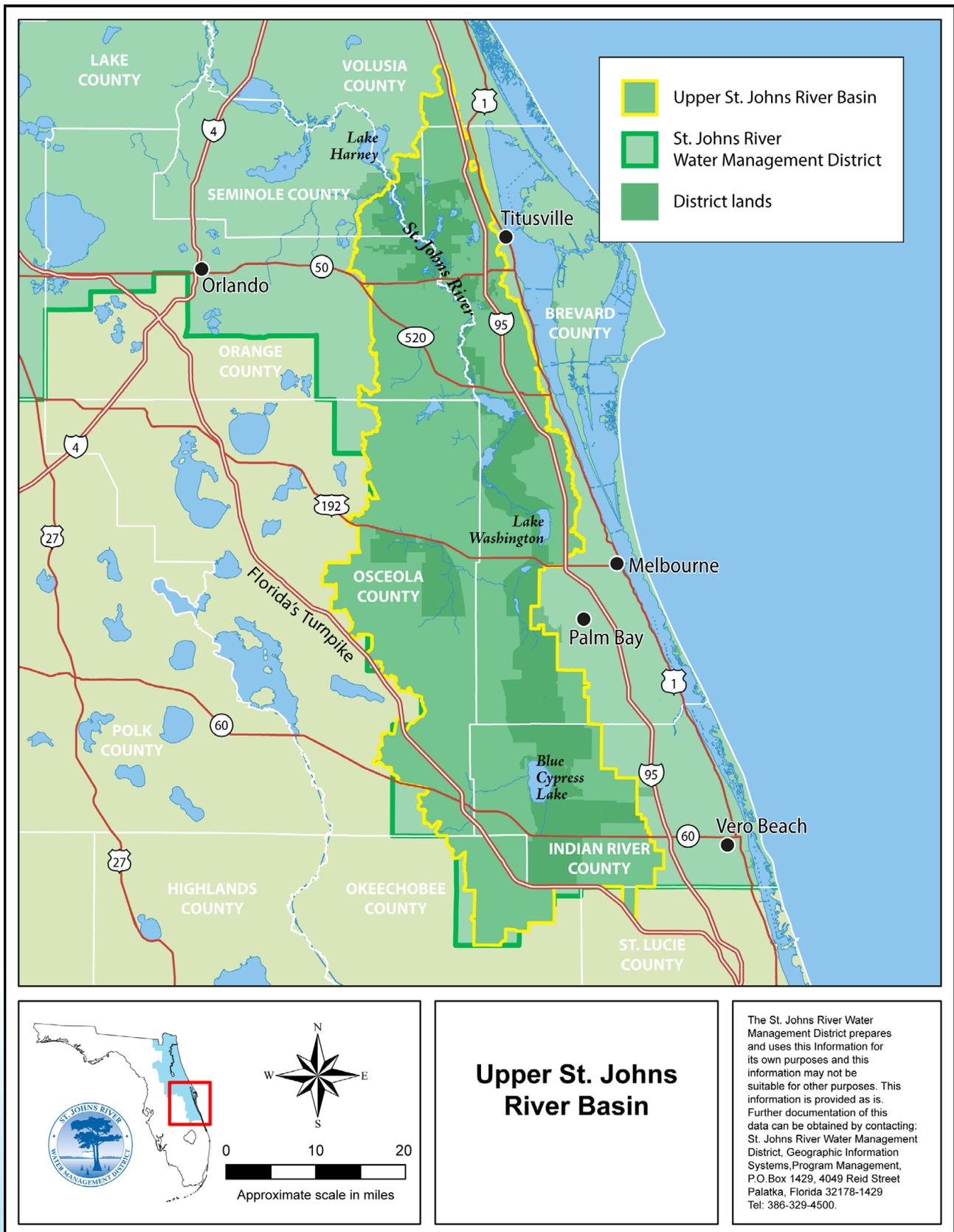


Figure 12. Upper St. Johns River Basin Project Area.

## Upper St. Johns River Basin

The St. Johns River Water Management District prepares and uses this information for its own purposes and this information may not be suitable for other purposes. This information is provided as is. Further documentation of this data can be obtained by contacting: St. Johns River Water Management District, Geographic Information Systems Program Management, P.O. Box 1429, 4049 Reid Street Palatka, Florida 32178-1429 Tel: 386-329-4500.

# Glossary

## Aquifer

A geologic formation, group of formations, or part of a formation that contains sufficient saturated, permeable material to yield significant quantities of water to wells and springs.

## Basin (groundwater)

A hydrologic unit containing one large aquifer or several connecting and interconnecting aquifers.

## Basin (surface water)

A tract of land drained by a surface water body or its tributaries.

## Basin Management Action Plan (BMAP)

A BMAP is a framework for water quality restoration that contains a comprehensive set of solutions to achieve the pollutant reductions established by a TMDL. Examples include permit limits on regulated facilities, urban and agricultural best management practices, wastewater and stormwater infrastructure, regional projects and conservation programs designed to achieve pollutant reductions established by a TMDL. BMAPs are adopted by Secretarial Order and are legally enforceable.

## Class B biosolids

Biosolids are a product of the wastewater treatment process. During wastewater treatment the liquids are separated from the solids. Those solids are then treated physically and chemically to produce a semisolid, nutrient-rich product known as biosolids. Biosolids are divided into "Class A" and "Class B" designations based on treatment methods. The different classes have specified treatment requirements for pollutants, pathogens and vector attraction reduction, as well as general requirements and management practices. Approximately two-thirds of the biosolids generated in Florida are Class B, the majority of which are applied to pastureland to improve fertility.

## Classification of surface waters

Florida has six surface water classifications reflecting designated uses, which are arranged in order of degree of protection required: Class I — Potable Water Supplies, Class II — Shellfish Propagation or Harvesting, Class III — Fish Consumption; Recreation, Propagation and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife, Class III-Limited — Fish Consumption; Recreation or Limited Recreation; and/or Propagation and Maintenance of a Limited Population of Fish and Wildlife, Class IV — Agricultural Water Supplies, and Class V — Navigation, Utility and Industrial Use. For a more detailed description of classes and specific waterbody designations, see 62-302.400, F.A.C.

## Drainage basin

Land area where precipitation runs off into streams, rivers, lakes, and reservoirs. It is a land feature that can be identified by tracing a line along the highest elevations between two areas on a map, often a ridge. The drainage basin is a part of the earth's surface that is occupied by a drainage system, which consists of a surface stream with all its tributaries and impounded bodies of water. It is also known as a watershed, a catchment area, or a drainage area.

## Ecosystem

Biological communities together with their environment, functioning as a unit.

## Fiscal Year (FY)

The fiscal year for water management districts begins on October 1 and ends on September 30 the following year.

## Groundwater

Water beneath the surface of the ground, whether or not flowing through known and definite channels. Specifically, that part of the subsurface water in the saturated zone, where the water is under pressure greater than the atmosphere.

## Hydrology

The scientific study of the properties, distribution, and effects of water on the earth's surface, in the soil and underlying rocks, and in the atmosphere.

## Invasive species

An invasive species is an organism that begins to spread or expand its range from the site of its original introduction and that has the potential to cause harm to the environment, the economy, or to human health.

## Million gallons per day (mgd)

A rate of flow of water equal to 133,680.56 cubic feet per day, or 1.5472 cubic feet per second, or 3.0689 acre-feet per day. A flow of one million gallons per day for one year equals 1,120 acre-feet (365 million gallons).

## Natural system

A self-sustaining living system that supports an interdependent network of aquatic, wetland-dependent, and upland living resources.

## Natural system enhancement

Activities conducted to improve the habitat value of wetlands or surface waters for fish and wildlife by eliminating harmful drainage, improving water quality, preventing erosion, stabilizing eroding shorelines, planting wetland vegetation, removing spoil, removing invasive or nuisance vegetation, providing structural habitat, and restoring dredged holes to elevations before they were dredged.

## Nuisance species

An animal or animals exhibiting behavior that: causes (or is about to cause) property damage, presents a threat to public safety, or causes an annoyance within, under or upon a building.

## Stormwater

Water that does not infiltrate but accumulates on land as a result of storm runoff, irrigation runoff, or drainage from areas, such as roads and roofs.

## Surface water

Water above the soil or substrate surface, whether contained in bounds, created naturally or artificially, or diffused. Water from natural springs is classified as surface water when it exits from the spring onto the earth's surface.

## Total Maximum Daily Load (TMDL)

A TMDL is a scientific determination of the maximum amount of a given pollutant that a surface water can absorb and still meet the water quality standards that protect human health and aquatic life. Waterbodies that do not meet water quality standards are identified as "impaired" for the particular pollutants of concern — nutrients, bacteria, mercury, etc. — and TMDLs must be developed, adopted and implemented to reduce those pollutants and clean up the waterbody.

## Watershed

A region or area bound peripherally by water and draining ultimately to a particular watercourse or body of water. Watersheds conform to federal hydrologic unit code standards and can be divided into sub-watersheds and further divided into catchments, the smallest water management unit recognized by water management operations.

## Wetland

An area that is inundated or saturated by surface or groundwater with vegetation adapted for life under those soil conditions (e.g., swamps and marshes).

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