

DRAFT

St. Johns River Water Management District

Lower St. Johns River Basin Plan

2026





Table of Contents

Introduction	4
Executive Summary	5
Lower St. Johns River Strategic Planning Basin	
Water Quality	6
Submerged Aquatic Vegetation.....	10
Northern Coastal Basin.....	13
Flood Protection	16
Basin Overview.....	18
Water Quality	22
Natural Systems	27
District Lands	32
Detailed Descriptions of Major Capital Projects	34
Glossary	36
Literature Cited	38

Introduction

The St. Johns River Water Management District (District) is a science-based organization responsible for managing and protecting water resources in northeast and east-central Florida. The District's mission is to ensure adequate water supplies are available 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 (LSJRB), Ocklawaha River Basin, Middle St. Johns River Basin, and the Indian River Lagoon/Upper St. Johns River Basin. Within each strategic planning

basin, the District identifies regional priorities and works with stakeholders and local government partners to identify and implement solutions that 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 LSJRB covers more than 4,500 square miles, and encompasses Baker, Clay, Duval, Nassau, St. Johns, Putnam, and Flagler counties, and portions of Volusia, Alachua, and Bradford counties. The LSJRB's water bodies include the lower St. Johns River, the St. Marys and Nassau rivers, and the water resources of the Northern Coastal Basin (NCB).



Executive Summary

The strategic priorities for the LSJRB are water quality, submerged aquatic vegetation (SAV), the NCB, and flood protection.

The LSJRB water quality priority focuses on protecting and improving surface water quality through monitoring, data analysis, and targeted nutrient reduction projects. Total nitrogen and total phosphorus load reduction goals have been met in both the freshwater and marine sections of the lower St. Johns River, but nutrient loading remains the central water quality concern. The District is addressing ongoing nutrient impairments through the Doctors Lake Enhanced Effluent Treatment Project; the Doctors Lake Sediment Analysis and Modeling Project to evaluate in-lake treatment options; and a Florida Department of Environmental Protection (DEP) funded feasibility study to identify cost-effective nutrient reduction strategies within the LSJRB. In addition, the ongoing Tri-County Agricultural Area Water Management Partnership (TCAA-WMP) continues to reduce nutrient loading from agricultural lands.

The SAV priority focuses on investigating the hydrologic, water quality, and biological factors affecting SAV abundance, distribution, and recovery in the lower St. Johns River. SAV is a key indicator of river health, and the District has conducted annual monitoring of SAV in the lower St. Johns River since 1995. SAV beds remain sparse since a hurricane-induced decline in 2017. The District continues annual monitoring while coordinating a newly established multi-agency collaborative forum to advance science-based approaches to SAV recovery across the lower and middle St. Johns River.

The NCB priority focuses on water quality, estuarine habitat restoration, coastal resilience, and the impact of urban watershed development. Priority NCB efforts include oyster reef mapping;



the development of hydrodynamic and salinity models including the Nassau and St. Marys rivers, which are contributing water bodies; and wetland restoration at the William C. Webb Coastal Research Station and the recently acquired Pablo Creek Conservation Area. The District monitors long-term wetland and mangrove dynamics across northeast Florida, where salt marshes are transitioning to mangrove-dominated systems.

The flood protection priority relies on non-structural approaches including stormwater management regulation, floodplain and wetland conservation and restoration, and hydrologic data dissemination.

The District is working with local partners to evaluate flooding in the Deep Creek Basin and to identify flood mitigation solutions. In addition, the District is developing a hydrodynamic flood model for the middle and lower St. Johns River, which will provide real-time flood stage forecasts accounting for both rainfall and storm surge.

Lower St. Johns River Strategic Planning Basin Water Quality

Priority:

- Protect and improve the water quality in surface waters throughout the LSJRB

Objectives:

- Continue water quality monitoring and data analysis throughout the LSJRB
- Develop cost-effective projects to reduce nutrient loading and internal nutrient recycling in LSJRB surface waters
- Identify and implement nutrient reduction projects in the Tri-County Agricultural Area (TCAA) beyond the required agricultural best management practices (BMPs).

Highlight:

As an estuary, the lower St. Johns River has highly variable salinity that transitions from freshwater to ocean water. Rainfall, river flow, tides, and wind influence not only salinity, but also how efficiently the river can flush nutrients. During seasonal low-flow periods, the river's current cannot easily flush excess nutrients, increasing sensitivity to

nutrient-related challenges like harmful algal blooms (HABs). This effect can be amplified by incoming tides from the Atlantic Ocean and sustained northeasterly winds, which can cause the river to reverse its flow.

Ongoing monitoring and reporting serve as a critical foundation for the District's efforts to protect and improve water quality throughout the lakes and waterways of the LSJRB. There are sixty-nine surface water monitoring stations in the LSJRB, with more than 70 percent monitored monthly and the remainder are monitored on a bimonthly basis. These monitoring efforts are crucial to identifying existing challenges, documenting changes or trends that may emerge in the future, and evaluating the effectiveness of water quality improvement, habitat restoration, and land management projects.

District water quality efforts in the LSJRB include targeted projects in Doctors Lake, a DEP-funded feasibility study to identify cost-effective nutrient reduction strategies, and continued agricultural partnerships in the TCAA. Together, these efforts support nutrient reduction, water conservation, and long-term protection of surface waters throughout the basin.

Water Quality in the LSJRB

Water quality monitoring provides the baseline for evaluating nutrient conditions and identifying long-term trends in the lower St. Johns River. The District analyzes and evaluates water quality data in the annual Status and Trends Report. For the 2025 report, the five-year status assessment period was from January 1, 2020, through December 31, 2024. At least three years of data during the five-year assessment period were required to complete the status assessment. The fifteen-year trend assessment period was from January 1, 2010,





through December 31, 2024. At least ten years of data during the fifteen-year period of record were required to calculate the trend (Figure 1).

Nitrogen and phosphorus levels are used to monitor nutrient concentrations in the lower St. Johns River. Although load-reduction goals for total nitrogen and total phosphorus have been met for both the freshwater and marine sections of the lower St. Johns River, excess nutrient loading continues to negatively impact water quality, as evidenced by seasonal algal blooms in some segments, as well as documented increases in chlorophyll and nitrogen within the freshwater reach of the river and Crescent Lake. Increasing nutrient trends from TCAA and the Deep Creek basin warrant additional investigation. Further characterization of these nutrient sources remains a priority to target nutrient “hot spots” and reduce the potential for future algal blooms.

Doctors Lake Enhanced Effluent Treatment Project

Doctors Lake, in Clay County, experiences water quality challenges including algal blooms, due to the lake’s shallow depth, limited flushing leading to long water residence time, and both external and internal nutrient loading. As part of the District’s broader efforts to protect and improve water quality in the LSJRB, Doctors Lake has been

identified as a priority area for nutrient reduction projects.

The Doctors Lake Enhanced Effluent Treatment Project addresses external nutrient loading by removing additional phosphorus from the treated wastewater stream at the Clay County Utility Authority’s Fleming Island Regional Wastewater Treatment Facility. This reclaimed water is then utilized for irrigation within the Doctors Lake watershed. This innovative pay-for-performance project can treat an estimated 1.6 million gallons per day (mgd) on an annual average basis. Since operations began in April 2020, this project has removed more than 9,200 pounds of phosphorus (through September 2025). The Florida Legislature appropriated \$5 million in fiscal year 2025–26 to support continued operation of the project through 2031.

Doctors Lake Sediment Analysis and Modeling Project

Doctors Lake continues to experience recurring algal blooms, driven in part by internal phosphorus recycling of legacy phosphorus from the lake’s sediments. The Florida Legislature appropriated \$5 million in June 2026 for a project to reduce nutrient availability in Doctors Lake, and the District is conducting the technical work needed to guide its implementation.

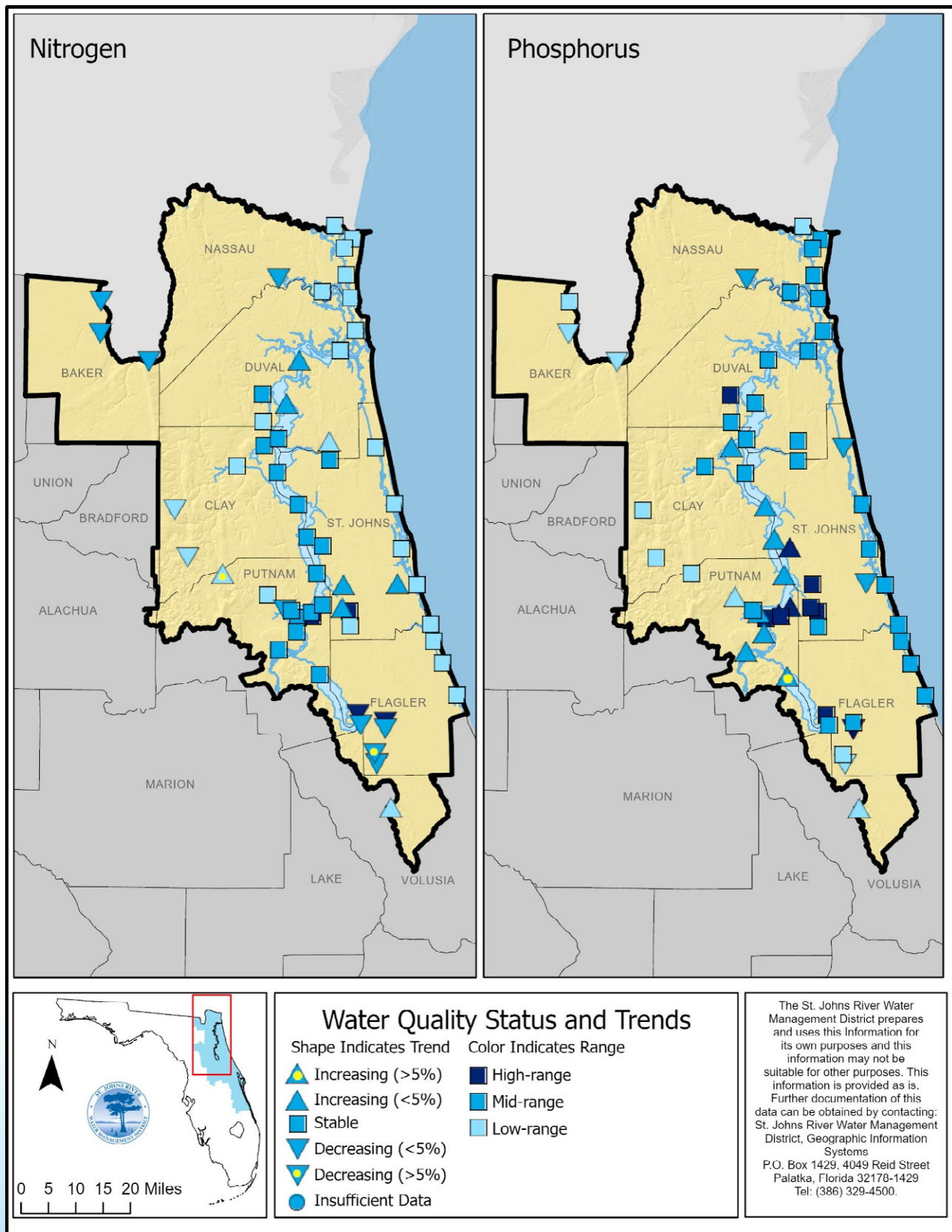


Figure 1. Water quality status and trends in the LSJRB

To evaluate how in-lake sediment treatments may impact water quality and algae abundance, the District began conducting sediment analyses in June 2026. The \$56,000 study, supported through ad valorem funding, will characterize sediment composition and chemistry to guide future efforts to reduce internal phosphorus recycling.

In parallel with the sediment analysis, the District will initiate development of a Doctors Lake hydrodynamic and water quality model in October 2026. Development is anticipated to take approximately three years, with completion expected by September 2029. The model will incorporate sediment processes to evaluate potential in-lake sediment treatments and their effects on water quality.

Nutrient Reduction Feasibility Study

Additional project options are needed to further reduce nutrient loading and achieve total maximum daily loads (TMDLs) for impaired water bodies throughout the LSJRB. The District initiated a basin feasibility study in fiscal year 2024–25. Funded by DEP, the study will identify potential nutrient reduction projects.

Preliminary findings include the use of various best management practices, including stormwater treatment ponds, living shorelines, baffle boxes, advanced stormwater treatment best management practices, and natural systems restoration projects. This \$294,853 study will produce eight conceptual project designs and is scheduled for completion in October 2026.

Agricultural Partnerships

The TCAA of Putnam, St. Johns, and Flagler counties, much of which is near the St. Johns River, continues to have increasing nutrient loads to the river. In response, the TCAA-WMP identifies and implements on-farm projects and practices that promote efficient water and nutrient use, reduce excess nutrient discharges, enhance water conservation, and support the long-term viability of agriculture in the region.



The partnership is supported by DEP and the Florida Department of Agriculture and Consumer Services (FDACS), with technical assistance provided by the University of Florida's Institute of Food and Agricultural Sciences and the Natural Resources Conservation Service. In fiscal year 2025–26, DEP provided \$1.5 million to support these efforts.

Since 2014, the District's Agricultural Cost-Share Program has invested more than \$20 million toward agricultural improvements, water conservation initiatives, and water quality improvement projects. The investments have resulted in estimated annual reductions of 287,000 pounds of nitrogen and 56,000 pounds of phosphorus, while conserving approximately 7 mgd of water.

Ongoing partnerships with local governments and agricultural producers support continued reductions in nutrient discharges, encourage additional water conservation, and support the long-term sustainability of this longstanding agricultural region. The retrofit of existing TCAA regional treatment areas with advanced stormwater treatment technologies, along with improvements to in-field irrigation practices, will further reduce nutrient discharges and loading to the river.

Lower St. Johns River Strategic Planning Basin Submerged Aquatic Vegetation

Priority:

- Promote recovery, protection, and long-term resilience of SAV communities in the LSJRB

Objectives:

- Continue annual SAV monitoring and assessment, tracking changes in abundance and distribution in the LSJRB through the District's online SAV dashboard
- Investigate stressors affecting SAV abundance, distribution, and recovery
- Coordinate with regional partners on ongoing SAV monitoring data and align collaborative SAV research efforts

Highlight:

SAV abundance is an important indicator of the overall health of the river. The District has conducted annual monitoring of SAV distribution and abundance in the lower St. Johns River since 1995. Mapping SAV allows scientists to evaluate spatial and temporal patterns and identify when the river system is stressed (Figure 2). Changes in SAV abundance or distribution may signal declining water quality, hydrologic changes, and/or other biological factors. SAV monitoring is conducted by District staff as an ongoing operational activity.

Monitoring data, including spatial coverage and abundance of SAV, are documented and available through the District's [SAV dashboard](#).

Multiple interacting stressors influence SAV abundance, distribution, and recovery. Documenting and assessing these stressors allows District staff to identify factors limiting SAV recovery and pursue projects that support recolonization, growth, and survival.

Regional cooperation among local governments, state agencies, educational institutions, and non-governmental organizations facilitates SAV research and the development of science-based management strategies to address SAV abundance, distribution, and recovery. The District has taken the lead in bringing these organizations together to share ideas, identify knowledge gaps, and develop strategies that support SAV recovery.

SAV Monitoring

Prior to Hurricane Irma in 2017, SAV formed dense, tall beds along shorelines throughout the lower St. Johns River, often exceeding 50 centimeters in height. The storm caused a decline in SAV abundance that has not fully recovered. Current SAV beds remain sparser, with canopy heights generally ranging from 4 to 5 centimeters, well below historic heights. Stressors to recovery differ between river reaches.

In the river's estuarine zone, a shift in salinity levels can stress SAV and may hinder growth and recovery. Salinity levels in the river rise and fall depending on rainfall, river flow, tides, wind, among other influences. Understanding long-term salinity trends and their potential effects on SAV requires a careful analysis that accounts for these factors.

In the freshwater zone, reduced light availability due to deeper, darker water conditions since 2017 has been identified as the primary limiting factor. Darker water, driven by dissolved organic matter that gives the St. Johns River its characteristic tea color, accounts for more than half of light attenuation at most monitoring sites. Herbivory by turtles, crabs, and fish has also emerged as an additional constraint on recovery.

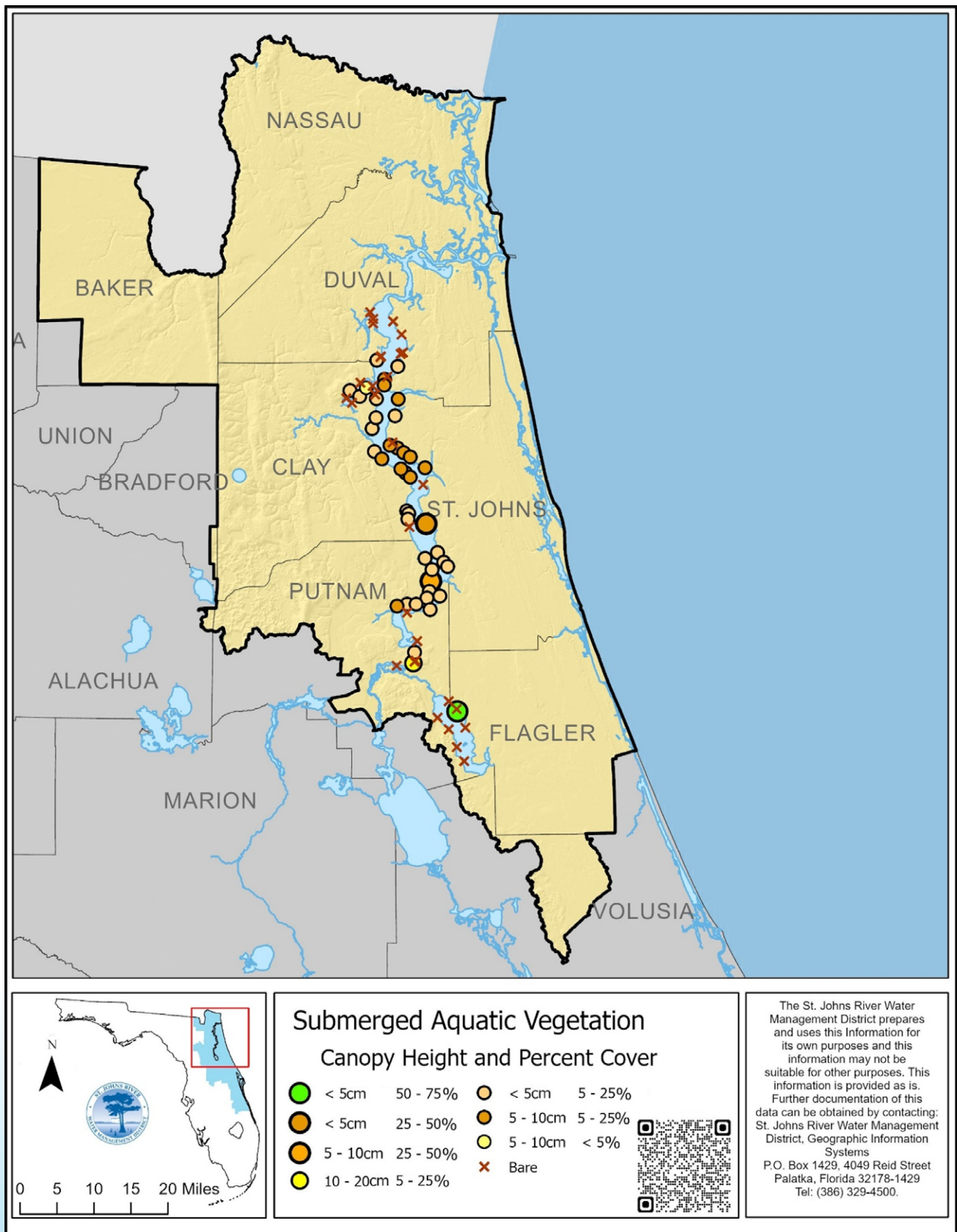


Figure 2. 2025 SAV canopy height and percent cover. Larger dots indicate denser bed.

Each summer from June through August, the District monitors a network of 200 SAV transects along the banks of the St. Johns River and Lake George. Data are made available to the public through the District's SAV dashboard. The SAV dashboard contains graphics, maps, and statistical tests of the annual LSJR SAV survey data from 2015 to present, along with sampling methods, terminology, and performance metrics.

SAV Applied Research

In addition to annual monitoring, the District is evaluating opportunities to support SAV recovery throughout the river system. The Florida Fish and Wildlife Conservation Commission (FWC), with technical assistance from District staff, has conducted enclosure experiments to investigate the role of herbivory by grazers including turtles, fish, and crabs on SAV recovery. Under conditions where grazing pressure was excluded, SAV recovered without transplants or seeding and demonstrated growth similar to those observed prior to 2017. These findings suggest that herbivory may be an important factor limiting SAV recovery and abundance in the lower St. Johns River.

The District will continue to monitor SAV and focus on the many factors that can affect SAV coverage, including light availability (influenced by water elevation, color, and other vegetation), salinity, wave action, and herbivory.

Regional Coordination

As new information emerges regarding factors affecting SAV recovery, the District works with regional partners to translate scientific findings into coordinated management strategies.

Recognizing the need for a coordinated, science-based approach to SAV recovery, the District has convened a new collaborative forum of agency scientists and nongovernmental organizations working on SAV and related resource management issues in the lower and middle St. Johns River. The forum will bridge the gap between ongoing research and practical management by facilitating the exchange of data and findings across organizations.

The inaugural session, held in November 2025, included presentations from federal and state agencies, as well as nongovernmental organizations, on topics ranging from herbivore exclusion experiments to invasive fish management. A follow-up symposium was held in May 2026 and included a collaborative strategy session focused on identifying data gaps and potential management approaches. Moving forward, the District plans to host this symposium annually to maintain long-term regional coordination and information exchange.



Lower St. Johns River Strategic Planning Basin

Northern Coastal Basin

Priority:

- Address water quality, coastal resilience, estuarine habitat alteration, and impacts of urban watershed development

Objectives:

- Map oyster reef distribution and develop a coordinated regional approach to monitor and restore oyster resources
- Restore coastal wetland habitat
- Monitor long-term wetland and mangrove dynamics
- Develop hydrodynamic, salinity, and wave models to support resource management and restoration planning

Highlight:

Within the LSJRB, the NCB encompasses the coastal areas extending from the Georgia border to southern Flagler County, spanning the eastern portions of Nassau, Duval, St. Johns, and Flagler counties. The full NCB planning footprint extends farther south into Volusia County to the Ponce de Leon Inlet, intersecting with the adjacent Indian River Lagoon/Upper St. Johns River Basin.

The NCB is a network of interconnected waterways, including portions of the Nassau, St. Marys, Guana, Tolomato, Matanzas, and Halifax rivers that are influenced by the Atlantic Ocean through multiple inlets. The Intracoastal Waterway runs the entire length through this coastal corridor. The region supports a diverse ecological mosaic where large tracts of public and private undeveloped uplands, floodplain wetlands, tidal marshes, and estuarine habitats are increasingly interspersed between highly urbanized areas.



Because the NCB spans overlapping municipal, state, and federal boundaries, resource management relies on shared interagency coordination and responsibility. The District works closely with its partners to restore and enhance coastal habitats through projects such as mosquito impoundment reconnection, dragline ditch restoration, and shoreline stabilization along the Intracoastal Waterway.

Oyster Reef Mapping

Oysters are a keystone species that contribute to water quality improvement through filter feeding, which reduces turbidity and removes nutrients from the water column. In addition, oysters are foundational ecosystem engineers, creating three-dimensional reefs that provide critical nursery habitat for estuarine species and wave breaks that can reduce coastal erosion.



Mapping the extent of oyster beds in the NCB is important to understanding the factors affecting health, abundance, and distribution of this species.

Building on a baseline oyster condition assessment conducted between 2015 and 2017, the District is partnering with the Guana Tolomato Matanzas National Estuarine Research Reserve (GTM NERR) and FWC to develop a coordinated regional approach for monitoring oyster extent, condition, and ecosystem services across the NCB.

Beginning in fall 2026, the District will map the extent and condition of oyster reefs throughout the NCB region, including previously unmapped areas. The mapping will also update existing oyster reef maps, which have not been updated since 2010. Geographic information system (GIS) photointerpretation of satellite and aerial imagery will be used to distinguish and map live and dead oyster reefs. Supported through District ad valorem funds, data collection is expected to be completed in fiscal year 2026–27.

Coastal Wetland Restoration Projects

The District is actively pursuing coastal wetland restoration at two sites within the NCB. At the William C. Webb Coastal Research Station, a biological field station operated by the University

of North Florida (UNF), the District will participate in the restoration of approximately 62 acres of wetland habitat affected by spoil deposited during the dredging of the Intracoastal Waterway and by the construction of a dredge material management area. Existing dredge material will be regraded and recontoured to restore the area to a resilient, functioning coastal wetland.

The restoration project is estimated to cost \$750,000 and is funded, in part, through the National Oceanic and Atmospheric Administration (NOAA) and UNF. Additional funding partners may participate. The project is expected to require two to three years to complete; however, the project schedule has not been finalized.

The District acquired fee simple title to the 2,721-acre Pablo Creek Conservation Area in December 2024. A small artificial drainage canal that intersects Pablo Creek within the lower Pablo Creek floodplain is planned for hydrologic restoration. Restoration timing remains contingent upon completion of a cultural resources assessment, with project initiation anticipated during fiscal year 2026–27.

Additional resource management actions, ranging from habitat restoration to recreational management, are planned throughout the property. The District has budgeted \$250,000 in fiscal year 2026–27 and \$100,000 each year from fiscal year 2027–28 through fiscal year 2029–30.

The District is also establishing intergovernmental agreements with collaborating local governments specifically for coastal wetland restoration projects. These agreements are intended to improve coordination, leverage resources, and accelerate project implementation.

Wetland and Mangrove Monitoring

Throughout northeast Florida, salt marshes are gradually transitioning into mangrove-dominated systems. This shift influences shoreline stability, habitat availability, ecosystem function, and water quality. Building upon previous research and in collaboration with our partners, District staff

continue to monitor the northward movement of mangroves and associated effects on salt marsh habitats.

In 2009, the District restored a degraded coastal wetland at North Peninsula State Park by reestablishing tidal flow and planting salt marsh vegetation. In January 2026, District staff completed a resampling effort of the site to quantify changes sixteen years post-restoration, specifically tracking shifts in vegetation, soil composition, and sediment accretion.

Since the project's completion, the site has transitioned to a salt marsh and mangrove mix, reflecting the northward expansion of mangroves along Florida's Atlantic coast. To better understand the long-term trajectory of these ecosystems, a series of additional restoration sites within the park completed between 2010 and 2021 are also being evaluated. This collaborative effort with FWC and the Fish and Wildlife Research Institute (FWRI) is anticipated to conclude early in fiscal year 2026–27.

The District is also monitoring mangrove expansion and sediment dynamics within the GTM NERR. The data collected will guide future restoration and resource management efforts. This annual monitoring is conducted by District staff as part of ongoing operational activities.

Hydrodynamic Modeling

The District utilizes hydrodynamic and salinity models to guide planning efforts, evaluate management decisions, and investigate coastal environmental dynamics. Key modeling efforts include development of a hydrodynamic and salinity model, a watershed hydrology model, and a wave model for the NCB, with completion anticipated by September 2028.

These models will support the evaluation of ecosystem conditions, identification of potential restoration projects, and assessment of coastal resilience, estuarine habitat changes, and shoreline erosion.

Additionally, a hydrodynamic model is planned for the Nassau and St. Marys rivers, completing model coverage for the major coastal systems within the NCB. Model development is expected to begin in October 2026 and conclude by September 2029. The completed model will support evaluation of oyster reef conditions, salinity dynamics, and coastal erosion processes.



Lower St. Johns River Strategic Planning Basin Flood Protection

Priority:

- Enhance flood protection throughout the lakes and rivers of the LSJRB

Objectives:

- Evaluate flooding conditions and mitigation strategies within the Deep Creek Basin in coordination with affected stakeholders
- Complete development of the Middle and Lower St. Johns River Hydrodynamic Flood Model



Highlight:

The District provides nonstructural flood protection through a combination of regulatory, land management, and data-driven initiatives. Stormwater management rules are implemented to help ensure that development addresses runoff responsibly and that drainage systems function effectively on a regional scale.

The District acquires and conserves extensive floodplain wetlands that provide natural storage for excess floodwaters. Hydrologic data collection and dissemination efforts further support communities and emergency managers by providing information needed for effective flood preparedness, forecasting, and response.

Hydrodynamic flood models provide resource managers with accurate and timely forecasts of river flows and flood stages during hurricanes and other storm events, supporting informed decision-making and emergency response.

Deep Creek Basin Flood Evaluation

Deep Creek is located in St. Johns County that originates within the TCAA and drains to the lower St. Johns River. Water levels within Deep Creek are strongly influenced by water levels in the St. Johns River, including tidal fluctuations, storm surge, and periodic reverse-flow conditions associated with wind events.

The Deep Creek Basin has experienced flooding resulting from extreme weather events. Agricultural lands and residential communities, including Flagler Estates, have remained inundated for weeks following hurricanes and other major weather events.

District staff are working with federal, state, local government partners, water control districts, and



affected landowners to identify and evaluate possible mitigation solutions, assess their feasibility and potential secondary effects, and identify cost-effective solutions that can provide flood relief without unacceptable ecological or hydrologic tradeoffs. Reducing flood impacts within this basin also minimizes water quality impacts to downstream receiving waters.

Middle and Lower St. Johns River Hydrodynamic Flood Model

The District is developing a hydrodynamic model to provide real-time flood forecasting along the main stem of the middle and lower St. Johns River.

The model is designed to provide District staff and local government emergency managers with accurate and timely forecasts of river flows and flood stages during hurricane and other storm events, supporting informed emergency response and operational decision-making.

The model will incorporate the effects of compound flooding from both rainfall and storm surge, including wind-driven effects, providing a more complete assessment of flood conditions during compound flooding events. The District anticipates completing this model by September 2026.



Basin Overview

Physiography of the Basin

To focus resources and management efforts more effectively, the District is divided into four strategic planning basins: the LSJRB, the Ocklawaha River Basin, the Middle St. Johns River Basin, and the Indian River Lagoon/Upper St. Johns River Basin (Figure 3). The sections that follow describe the physical, ecological, and land management characteristics of the LSJRB and provide the technical foundation for the strategic priorities and projects outlined in this plan.



Major Tributaries/Springs

The LSJRB contains four major tributaries and a coastal estuary: the lower St. Johns River, Nassau River, St. Marys River, Black Creek, and the NCB (Figure 4). Water bodies associated with the lower St. Johns River are classified as Class III waters, which are designated for recreation and maintaining a healthy fish population. Coastal waters within the basin are classified as Class II water bodies, which receive a higher level of protection, specifically for shellfish harvesting.

Two of the basin's largest lakes, Crescent Lake and Doctors Lake, are directly connected to the lower St. Johns River and are tidally influenced. Both lakes are eutrophic and affect water quality conditions in the river. Crescent Lake, located in Flagler and Putnam counties, receives flows from Haw, Middle Haw, and Little Haw Creeks and discharges to the St. Johns River through Dunns Creek. Doctors Lake, located in Clay County, joins the river at Doctors Inlet south of the City of Orange Park.

The LSJRB contains three Outstanding Florida Waters: Kingsley Lake, Black Creek (North Fork), and Lake Disston. In addition, eleven springs are located within the LSJRB (Figure 5), ranging from third magnitude to fifth magnitude, and have spring flows ranging from approximately 0.022 to 10 cubic feet per second (cfs).

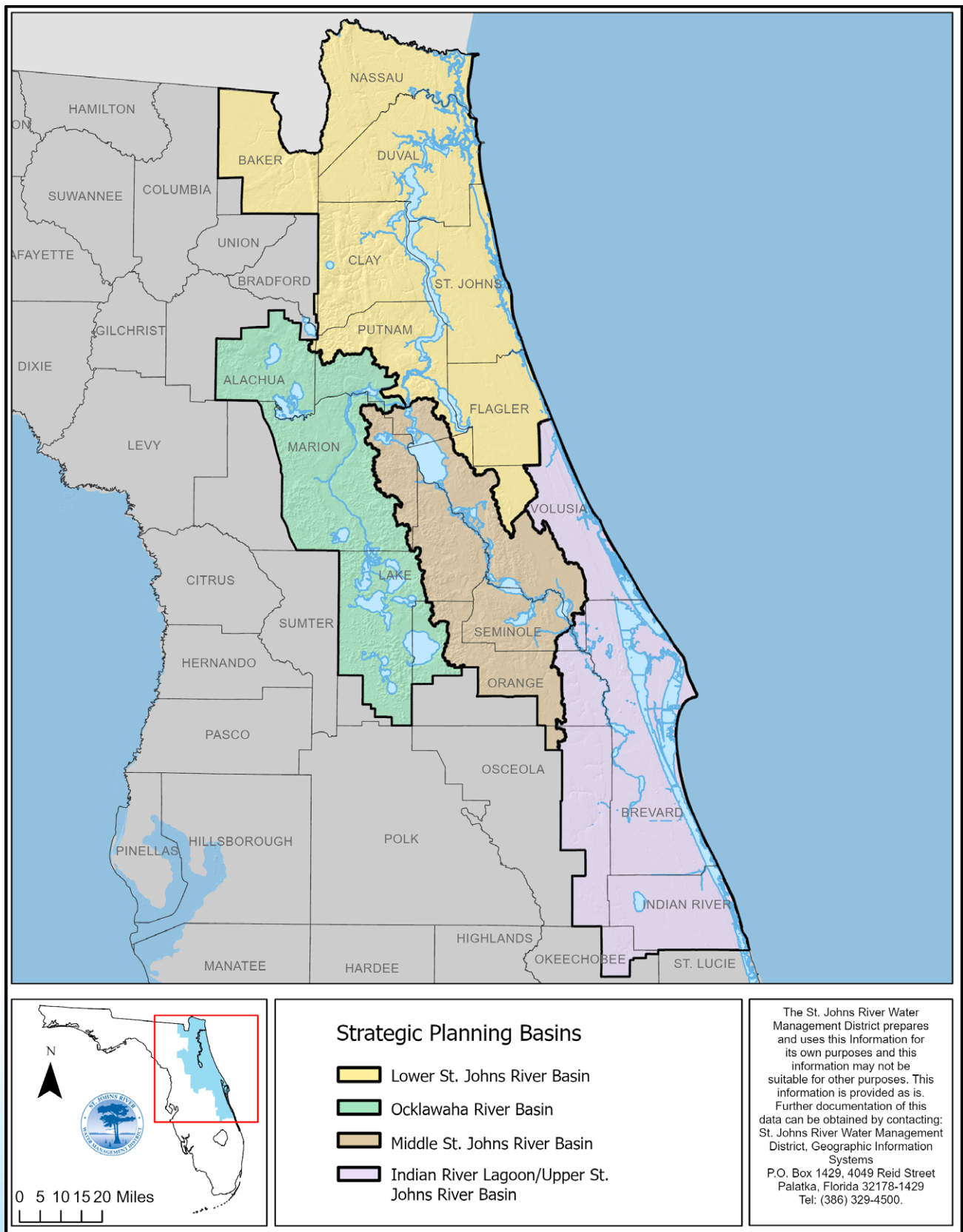


Figure 3. Strategic Planning Basins of the St. Johns River Water Management District.

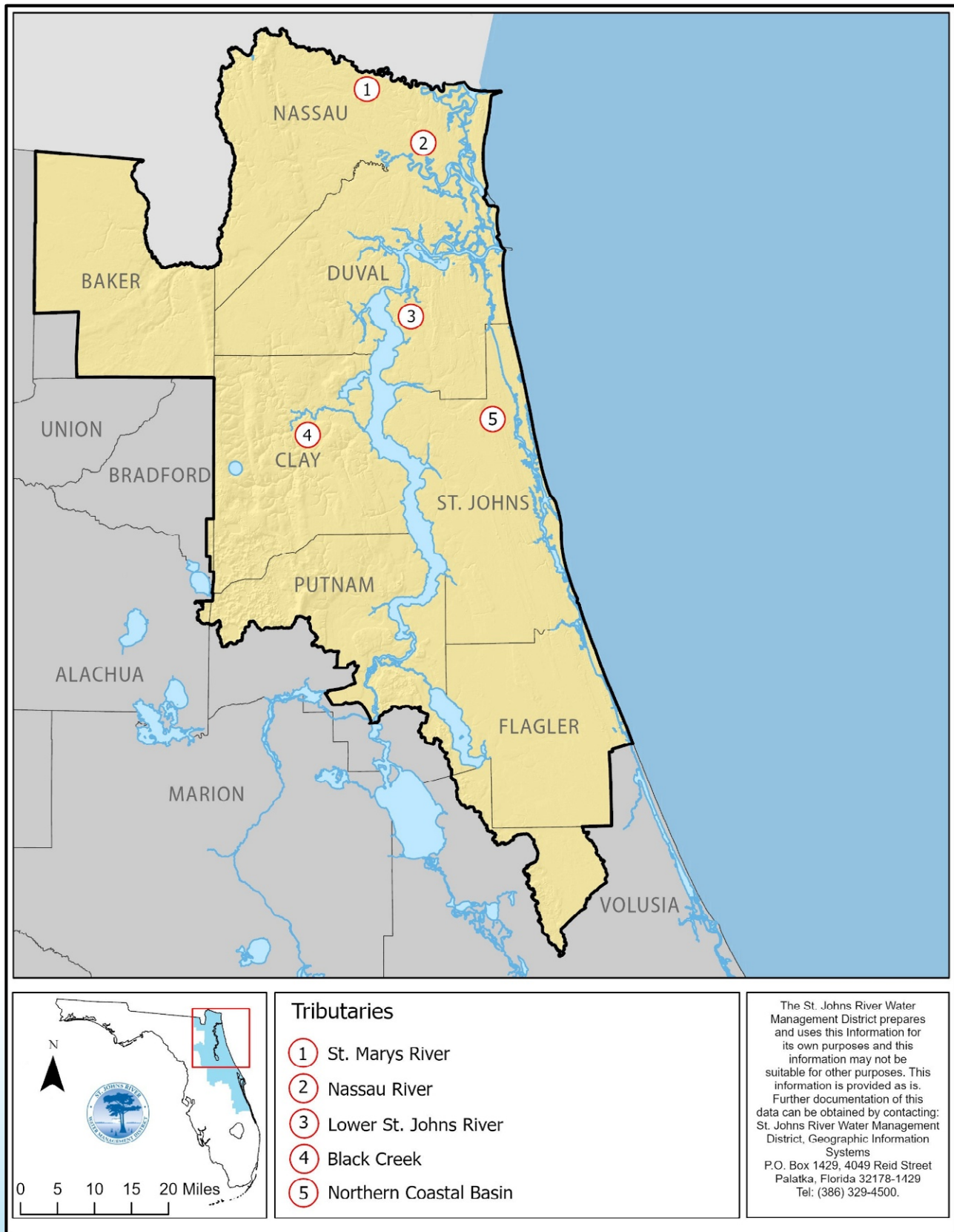


Figure 4. Major tributaries of the LSJRB.

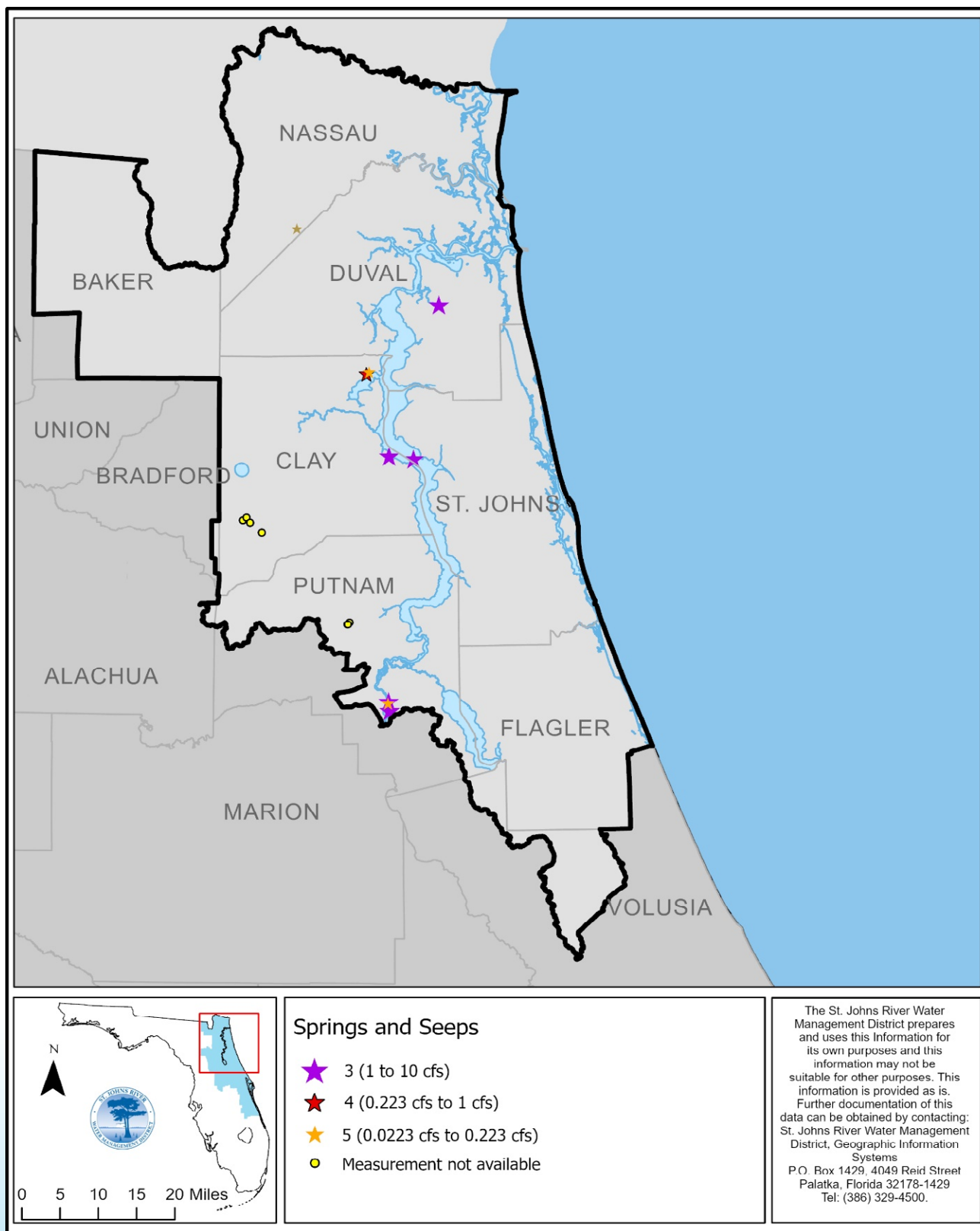


Figure 5. Springs and seeps within the LSJRB.

Water Quality

Protecting and restoring water quality is a core mission of the District. Strategies to achieve this goal include a commitment to comprehensive monitoring programs that support impairment determinations, manage restoration projects, and evaluate their effectiveness. Monitoring enables the District to make sound 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 DEP's TMDL and Basin Management Action Plan (BMAP) programs.

DEP assesses Florida's major watersheds, or basins, every two years. Water bodies that have been assessed and do not meet applicable water quality standards set forth for them are determined to be impaired. The [2022–2024 Biennial Assessment](#) was adopted on August 16, 2024.

DEP has [adopted TMDLs](#) for a number of impaired water bodies within the LSJRB. TMDLs are developed for water bodies that are verified as not meeting their water quality standards. [TMDL](#)

[documents](#) are available on DEP's website. BMAPs contain a comprehensive set of solutions designed to achieve pollutant reductions established by a TMDL. The LSJRB has [several BMAPs](#) located entirely or partially within its boundaries: Lower St. Johns River Main Stem BMAP; Lower St. Johns Tributaries I and II BMAP; Volusia Blue Spring BMAP; and the DeLeon Spring BMAP.

Current Status and Trends, District Reporting

The District monitors water quality at sixty-nine surface water stations throughout the LSJRB. Most stations are sampled monthly for a variety of water quality parameters, including nutrients, major ions, water temperature, pH, salinity, dissolved oxygen, and water depth. A subset of monthly monitored stations undergoes enhanced monitoring to support HABs monitoring, transitioning to biweekly monitoring from April to October.

Eleven surface water stations are located along the lower St. Johns River main stem, while many of the remaining stations are located in tributaries such as Rice Creek, Deep Creek, and Haw Creek. Additional monitoring stations are located within the Nassau and St. Marys rivers and throughout the NCB.

The lower St. Johns River receives nonpoint-source discharges through small streams, large tributaries, canals, ditches, groundwater seepage, and rainfall, making it difficult to monitor individual nonpoint sources. Nonpoint source changes are monitored by measuring the loads from the major tributaries, along with monitoring of the mainstem water quality itself.

Water quality trends are evaluated through the District's annual Status and Trends Report. The 2025 report includes data collected during the status assessment period from January 1, 2020,



through December 31, 2024. Stations with at least three years of data during this five-year assessment period of record were analyzed for their status. The fifteen-year trend assessment period spans from January 1, 2010, through December 31, 2024. At least ten years of data were required from the fifteen-year period of record to calculate a trend. Where possible, DEP Comprehensive Verified Impaired Water List was used to evaluate progress toward meeting annual mean TMDL targets.

Water quality trends can be confounded by changes in runoff and discharge volume, especially in watersheds with high agricultural land use, such as the TCAA. Most techniques that adjust for these variables are not viable for the lower St. Johns River due to the strong tidal influence that often causes the river and its tributaries to flow in reverse. The District is currently investigating an alternative trend analysis.

The lower St. Johns River receives nutrient loading from multiple sources, including atmospheric deposition, stormwater runoff, point sources, and even the Atlantic Ocean through reverse flows of the river. Annual nutrient loads to the LSJRB from some of the major tributaries are shown in Figure 6.

The largest nitrogen and phosphorus loads to the lower St. Johns River originate from upstream portions of the watershed outside the LSJRB, consistent with District calculations made during the development of the TMDL. This finding reflects, in part, the basin's hydrology, as the majority of freshwater flow entering the lower St. Johns River originates from these upstream sources in the middle and upper basins.

The middle and upper St. Johns River basins contribute more than four times as much phosphorus and five times as much nitrogen as the next largest tributary to the lower St. Johns River. It is a disproportionately large source of nitrogen due, in part, to the fixation of atmospheric nitrogen by algae in Lake George. The Ocklawaha River is the second-largest contributor, followed by Dunns Creek, which carries water from the Crescent Lake watershed. Deep Creek contributes a



disproportionately large phosphorus load relative to its watershed size due to a large amount of agricultural land use in the watershed.

The TMDL water quality target for the freshwater section of the river is based on algal bloom duration evaluated at two District stations located near Racy Point and the outlet of Rice Creek. The TMDL water quality target for the marine section of the river is based on dissolved oxygen measured at stations located at Dames Point and Clapboard Creek.

In general, chlorophyll, nitrogen, and phosphorus concentrations within the marine reach of the river have remained stable or exhibited downward trends since 2010. Although nitrogen and phosphorus load-reduction goals have been achieved for both the freshwater and marine sections of the river, chlorophyll and nitrogen concentrations within the freshwater reach of the river are trending upward.

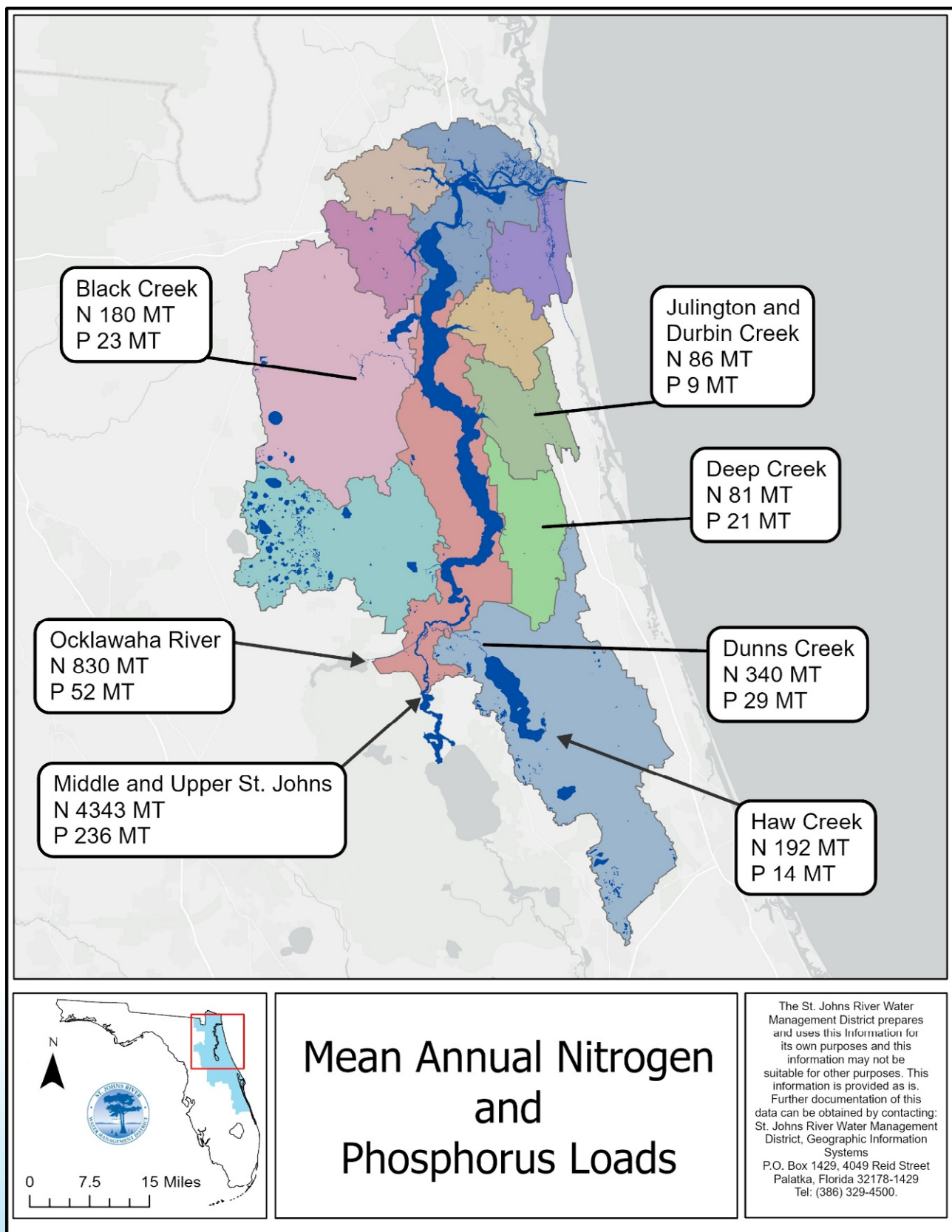


Figure 6. Mean annual nitrogen (N) and phosphorus (P) loads in metric tons (MT) from LSJR tributaries where discharge was measured from 2010–2024.

Crescent Lake chlorophyll *a* concentrations have declined over the past fifteen years but remain increasingly variable and consistently exceed the lake's TMDL target. Phosphorus concentrations have not met the TMDL target since at least 2011 and have risen rapidly, with mean annual concentrations in the 2020s at times doubling those of 2010–2015.

The causes of increasing phosphorus concentrations remain unclear. Land use changes within the drainage basin of Crescent Lake, altered rainfall patterns, and internal recycling may be contributing factors. Although phosphorus concentrations within the main tributary of the lake and Haw Creek have not trended upward within the Status and Trends Report fifteen-year evaluation window, high concentrations have been recorded more frequently after 2012 than before, and there is evidence of an upward trend when the evaluation window is expanded to thirty years.

Deep Creek is a significant source of nutrient loading to the lower St. Johns River mainstem and receives nonpoint-source runoff from the TCAA. Although the ambient water quality monitoring station at Deep Creek is not part of the Status and Trends Report, a separate analysis has indicated that phosphorus and nitrogen concentrations remained consistent from 2000 to 2022. However, DEP's 2022 Biennial Assessment indicated that Deep Creek has exceeded the Impaired Waters Rule nutrient threshold every year from 2012–2019 (DEP 2024).

Doctors Lake exhibits higher concentrations of phytoplankton, particularly nuisance cyanobacteria, than the adjacent St. Johns River despite having similar levels of color, phosphorus, and nitrogen. District staff considers phosphorus to be an important limiting factor in controlling phytoplankton growth in the lake. Excess phosphorus may promote the growth of nitrogen-fixing phytoplankton, which in turn increases the availability of nitrogen in the lake. Nitrogen, phosphorus, and chlorophyll *a* concentrations in Doctors Lake have remained stable across the Status and Trends fifteen-year evaluation window.

Data from the lower St. Marys River and Nassau River watersheds, previously insufficient for trend evaluation, were recently evaluated through a long-term study covering 1984–2023 (McAskill and Simpson 2025).

Across the NCB, monitored water quality parameters remain generally good, particularly near ocean inlets where tidal exchange is the greatest. Within the lower St. Marys River, nitrogen, phosphorus, and chlorophyll *a* concentrations show declining trends at multiple stations. At the same time, water temperatures have increased and dissolved oxygen concentrations have declined, although dissolved oxygen remains above the hypoxia stress threshold.

At the mouth of the St. Johns River and along the Intracoastal Waterway, long-term monitoring confirms that while nitrogen has been increasing, phosphorus has remained stable and chlorophyll *a* has continued to decrease. Within the Tolomato and Matanzas rivers, and Pellicer Creek, trends indicate phosphorus is decreasing while nitrogen and chlorophyll *a* remains generally stable.

A new concern is rising water temperatures, which may reduce dissolved oxygen and intensify eutrophication over time. Salinity shifts, pH declines, and localized dissolved oxygen



reductions have also been identified as spatially variable management concerns. Despite declining nutrient trends, several areas across the NCB remain impaired for nutrients and chlorophyll *a*, supporting the continued need for nutrient reduction efforts throughout the NCB.

HAB Assessments

As a part of DEP's HAB monitoring program, the District monitors four stations located within the main stem of the lower St. Johns River, Crescent Lake, and Doctors Lake. Sampling occurs monthly and increases to biweekly in the spring and summer to collect data on algal community makeup and toxin concentrations. The four stations include Crescent Lake at the mouth of Dunns Creek, the center of Doctors Lake, St. Johns River at the Shands Bridge, and at the St. Johns River near Mandarin. The District also visits ad hoc sites in response to public reports of algal blooms.

HABs occur when colonies of algae, especially cyanobacteria, increase in intensity, duration, and frequency, causing blooms to turn the water

noticeably green, although other colors can occur. When the concentrations of nitrogen and phosphorus increase in a water body, the right combination of temperature, sunlight, and low flow can trigger a HAB, typically in summer or early fall. Some of these HABs can become harmful through the production of toxins or by causing other negative impacts to the environment and aquatic ecosystem.

Cyanobacteria occur naturally in both the freshwater and marine sections of the river but have historically been most abundant within the estuary's freshwater reach. In Doctors Lake, toxin-producing species of algae are more common, and concentrations of the cyanotoxin microcystin have exceeded the Environmental Protection Agency's ambient water quality criteria with greater frequency. Crescent Lake also has a higher relative abundance of cyanobacteria that produce the cyanotoxin microcystin.



Natural Systems

SAV

SAV is an important ecosystem component that provides food and habitat for commercially and recreationally important animals, sequesters nutrients, provides dissolved oxygen, and stabilizes sediments. Twelve species of SAV have been documented in shallow waters (< 1 meter) along all sections of the St. Johns River within the LSJRB (Table 1). *Vallisneria* sp. has historically been, and remains, the dominant species (SJRWMD 2012, Sagan 2009).

The District conducts annual summer surveys of the lower St. Johns River and associated lakes to determine SAV status and trends. Prior to Hurricane Irma in 2017, SAV formed dense, tall beds with

canopy heights often exceeding 50 centimeters. Hurricane Irma caused severe SAV loss, with canopy heights and bed widths declining approximately 80 percent basin-wide. Since 2018, unlike the recovery observed following SAV declines during the 2002–2003 monitoring period, SAV beds have remained sparse, with canopy heights near the historic low of 4 to 5 centimeters and still composed predominantly of *Vallisneria* sp. (95 percent). Through 2023, recovery has been uneven. While some estuarine sections showed evidence of partial recolonization, SAV beds widths in freshwater reaches fluctuated and declined between 2022 and 2023.

Many factors influence SAV abundance, distribution, and recovery, including light

Relative abundance of SAV species at four long-term (1996 to 2008) monitoring sites in the LSJRB.

Common Name	Species	Relative Abundance
eelgrass, tapegrass	<i>Vallisneria</i> sp.	61%
southern naiad	<i>Najas guadalupensis</i>	17%
widgeon grass	<i>Ruppia maritima</i>	5%
hydrilla	<i>Hydrilla verticillata</i>	3%
chara	<i>Charophyte</i> sp.	3%
mudflower	<i>Micranthemum</i> sp.	3%
small pondweed	<i>Potamogeton pusillus</i>	3%
horned pondweed	<i>Zannichellia palustris</i>	2%
spikerush	<i>Eleocharis</i> sp.	1%
narrow-leaved arrowhead	<i>Sagittaria subulate</i>	1%
Illinois pondweed	<i>Potamogeton illinoensis</i>	< 1%
coontail	<i>Ceratophyllum demersum</i>	< 1%

Table 1. Relative abundance of SAV species at four long-term (1996 to 2008) monitoring sites in the LSJRB. The four sites are Bolles School, Buckman Bridge, Moccasin Slough, and Scratch Ankle.



attenuation, herbivory, sediment quality, nutrients, wave action, and salinity. A 2025 District technical report compared water quality, hydrological conditions, and herbivore abundance during the post-Irma period with conditions observed during earlier recovery periods and found that post-Irma conditions were less conducive for SAV recovery (Timbs et al., 2025). The primary factors limiting recovery were identified as reduced light availability and elevated salinity stress.

In freshwater sections of the river, light availability was approximately 40 percent lower than during the successful 2006 to 2008 recovery period, driven primarily by persistently higher water levels and elevated water color. Meanwhile, in estuarine sections of the river, SAV beds were exposed to more frequent and intense high-salinity events than those that occurred during the 2002 to 2004 recovery period.

In 2022, the District and FWC identified grazing as a significant factor affecting SAV canopy heights. Herbivore exclusion cages were constructed at four locations. After three months, plants inside the cages exhibited substantially greater growth

than plants outside, with leaf lengths often exceeding those outside the cage by a factor of ten (Timbs and Kolterman, 2023). Similar results were documented by FWC in Lake George in 2021, leading to the installation of larger exclusion cages intended to support SAV recovery in the lake. Evidence of grazing by turtles and blue crabs has also been documented within the LSJRB.

Analysis of long-term FWC nekton monitoring data found that populations of generalist grazers, including blue crab, gizzard shad, threadfin shad, white shrimp, and tilapia, have remained stable. While these species may have a limited impact on robust SAV beds, a fixed background population of generalist grazers may contribute to the suppression of canopy heights in the severely depleted post-Irma beds (Timbs et al., 2025). Ongoing research by FWC and the University of Florida uses test plots equipped with underwater cameras in Lake George to further investigate herbivore activity. Additionally, FWC will be assessing the potential feeding rates of manatees, turtles, crabs, and herbivorous fish to determine whether current SAV biomass is sufficient to sustain existing feeding pressures.

Bivalves

The eastern oyster, *Crassostrea virginica*, has been classified as an ecosystem engineer, as well as a keystone species, because of the important benefits that oysters and oyster reefs provide in the NCB. Oysters filter and clean 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 biodiversity. The loss of oyster reef coverage has encouraged different types of conservation, mapping, monitoring, and restoration efforts throughout its native range, including within the NCB.

The District and the University of Central Florida mapped oyster reefs in 2015 using remote-sensing aerial imagery to create a baseline for oyster habitat

within the region. The effort identified 17,953 individual reefs, with a total reef coverage of 651.85 hectares in the NCB (Table 2) (SJRWMD 2016). Of these reefs identified, 6.1 percent were classified as dead, and all occurred adjacent to major navigation channels. Remote-sensing methods achieved 96 percent accuracy in identifying oyster reefs. This effort represented the first successful fine-scale mapping of oyster reefs across the entire northeast Florida region (Garvis et al. 2020).

Fisheries

The LSJRB encompasses three coastal plain estuaries characterized by expansive salt marsh systems, hardwood forests, hardwood swamps, and habitats with mud, sand, and occasional vegetation/oyster substrate bottoms that support a large number of recreational and commercial fisheries (Solomon et al. 2006; SJRWMD 1993, 2000). Because of these varying freshwater, estuarine, and marine habitats, the LSJRB is home to many popular sport fish such as largemouth bass, red drum, sea trout, flounder, snook, tarpon, whiting, sheepshead, permit, pompano, and black drum. FWC conducts fisheries-independent monitoring throughout the LSJRB to evaluate fish populations, habitat use, and long-term ecosystem conditions.

Additionally, the LSJRB supports many valuable commercial fisheries. Table 3 presents the top ten highest-value commercial fisheries between 2013 and 2023, based on data from the FWC's Fish and Wildlife Research Institute's Commercial Landings Application (FWC 2024).

Invasive Species

Several invasive and nonindigenous aquatic species found in the LSJRB include tilapia, vermiculated sailfin catfish, water hyacinth, Indo-Pacific swimming crab, walking catfish, alligator weed, wild taro, and basket clam. A larger list of observed species can be found on the USGS Nonindigenous Aquatic Species online database (USGS 2024).

Coastal Habitat Restoration

Coastal habitats perform a vast array of valuable ecosystem functions. These ecological services include providing food that supports biological productivity and diversity, serving as habitat for species that support fisheries, attenuating or dissipating waves, controlling erosion, and purifying water by removing nutrients, pollutants, and sediments. Given the scale and importance of these functions, rehabilitation or restoration of impacted coastal habitats has been a priority



Summary of NCB Oyster Reef Coverage and Area by County in 2015

Volusia	40.13	1,632	400.04
Flagler	18.13	1,099	702.15
St. Johns	331.81	4,848	856.06
Duval	103.67	3,561	354.6
Nassau	158.11	6,813	470.02
Total	651.85	17,953	2,782.87

Data table adapted from Garvis et al. 2020

Table 2. Summary of NCB oyster reef coverage and area by county in 2015.

Top Ten Commercial Fisheries in the Jacksonville and St. Augustine Fishing Areas with the 10- Year Average Annual Poundage and Annual Value

Species	Average pounds per year	Average value per year
Shrimp	3,825,366	\$9,979,721
Blue Crab	1,647,668	\$3,362,148
Black Mullet	471,155	\$346,802
Vermilion Snapper	218,505	\$763,868
King Mackerel	183,962	\$499,643
Amberjack	158,242	\$265,966
Shark	151,942	\$101,421
Kingfish (Whiting)	118,949	\$186,548
Menhaden	116,703	\$20,678
Flounder	82,777	\$275,998

Table 3. The top ten commercial fisheries in the Jacksonville and St. Augustine fishing areas with the 10- year average annual poundage and annual value.

management goal since the District began its work in coastal systems. To support this objective, the District plans, funds, and implements coastal wetland restoration projects throughout its coastal areas to restore or enhance wetland habitats and the associated benefits for water quality, fish and wildlife habitat, recreation, and flood protection.

The four main types of impacted coastal habitats targeted for rehabilitation or restoration are impounded wetlands, wetlands impacted by dragline ditching, wetlands altered by dredging or filling, and degraded oyster reefs. The creation of living shorelines represents an additional integrated approach that combines restoration with shoreline protection. Rather than relying on hard infrastructure such as bulkheads or riprap, living shorelines stabilize eroding or disturbed shorelines by establishing submergent and emergent wetland habitat along the shoreline. Most projects of this type require little ongoing operation and maintenance once constructed, as the restored ecosystem sustains itself through processes such as sediment capture and carbon sequestration. The District has successfully implemented projects within each of these restoration categories (Brockmeyer et al. 1997, 2021).

Achieving large-scale restoration outcomes requires broad stakeholder engagement and the integration of varied financial, technical, and institutional resources. The complexity of land management and ownership and jurisdictional authority over impacted wetlands has led the District to establish successful partnerships that support coordinated restoration efforts and ensure alignment with the ecological goals outlined in relevant plans and initiatives.

These partnerships have leveraged cost-share funding, grant support, and in-kind services, multiplying the District's investment and enabling large-scale wetland rehabilitation. Public ownership of the impacted coastal wetlands further facilitates restoration activities, and the acquisition and management of coastal wetlands, with an emphasis on disturbed areas, has been one of the District's long-standing goals.

Within the LSJRB and NCB, notable restoration efforts have included the Flagler County Wetland Restoration Project and wetland restoration projects at the North Peninsula State Park. Collaboration with other governmental entities has been critical to many of these successful projects.

A shared recognition of the advantages of comprehensive watershed planning and cooperative interagency coordination led to the establishment of the Northeast Florida Estuary Habitat Restoration Team (NERT) in 2010. This informal group of practitioners works to plan and implement estuarine habitat restoration at a regional scale and provides an open forum for sharing programmatic and technical expertise, coordinating projects, and advancing restoration opportunities.

This regional team concept has been adopted throughout much of coastal Florida. NERT is a collaborative partnership among the District, the National Oceanic and Atmospheric Administration Restoration Center, the U.S. Fish and Wildlife Service Coastal Program, FWC, DEP Office of Resilience and Coastal Protection, FDACS, and The Nature Conservancy. Through coordinated planning and successful grant acquisition, NERT partners have expanded the scale, scope, and frequency of estuarine habitat restoration projects throughout northeast coastal Florida.



District Lands

Land Management

The District owns approximately 166,453 acres within the LSJRB. Twenty-two properties, encompassing 86,118 acres, are managed directly by the District, while the remaining properties are managed by cooperating partners (Table 4).

The District's future acquisition strategy for the LSJRB will focus on lands identified on the List of Critical Wetlands or [Five-Year Land Acquisition Plan Map](#), as well as additional properties as needed. Acquisition priorities include lands that provide water resource protection, natural systems enhancement or restoration, floodplain connectivity, and optimal land management boundaries. The List of Critical Wetlands and Land Acquisition Plan Map are components of the District's [Strategic Plan](#).

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 LSJRB contain a diverse array of natural communities that

provide significant habitat for a variety of floral and faunal species. Natural systems restoration helps improve ecological function, increase species diversity, and enhance the overall health and resiliency of these properties.

District staff apply adaptive management principles when restoring and managing District lands, allowing for adjustments to decision-making as new information is gathered and put into context. This approach supports continuous improvement in species diversity and overall natural community health and vigor. One method of natural systems restoration is the use of prescribed fire, reducing the possibility of dangerous wildfire while enhancing the land's environmental quality. The benefits of prescribed fire 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.

Most of the District's properties are open to the public for compatible recreation. The District also partners with FWC to provide and manage hunting opportunities on appropriate District lands.



District Conservation Lands Within the LSJRB

Managed Area	Lead Land Manager	County	Acres
9A Mitigation Parcels	District	Duval	326
Bayard Conservation Area	District	Clay	10,537
Black Creek Ravines Conservation Area	District	Clay	969
Clark Bay Conservation Area ¹	District	Volusia	5,007
Crescent Lake Conservation Area	District	Volusia and Putnam	3,583
Deep Creek Conservation Area	District	St. Johns	5,955
Dunns Creek Conservation Area	District	Putnam	3,153
Freedom Commerce Center	District	Duval	93
Gourd Island Conservation Area	District	St. Johns	513
Heart Island Conservation Area ²	District	Volusia and Flagler	4,724
Hull Swamp Conservation Area	District	Flagler	2,386
Julington-Durbin Preserve	District	Duval and St. Johns	2,042
Moses Creek Conservation Area	District	St. Johns	2,173
Murphy Creek Conservation Area	District	Putnam	4,840
North Region Mitigation Archipelago	District	Clay, Duval and Putnam	1,299
Pablo Creek Conservation Area	District	Duval	2,721
Pellicer Creek Conservation Area	District	Flagler	2,535
Rice Creek Conservation Area	District	Putnam	6,295
SJRWMD Campus Parcels	District	Putnam	35
Stokes Landing Conservation Area	District	St. Johns	281
Thomas Creek Conservation Area	District	Nassau and Duval	5,525
Twelve Mile Swamp Conservation Area	District	St. Johns	21,126
Fanning Island Preserve	City of Jacksonville	Duval	26
Faver-Dykes State Park	DEP - State Parks	St. Johns	4,866
Marjorie Harris Carr Cross Florida Greenway	DEP - State Parks	Putnam	41
Pumpkin Hill Creek Preserve State Park	DEP - State Parks	Duval	3,994
Belmore State Forest — Satsuma Tract	Florida Forest Service (FFS)	Clay	3,526
Cary State Forest	FFS	Duval and Nassau	2,415
Four Creeks Forest	FFS	Nassau	10,604
Jennings State Forest	FFS	Clay	12,488
John M. Bethea State Forest	FFS	Baker	24,297
Matanzas State Forest	FFS	St. Johns	4,658
Ralph E. Simmons Memorial State Forest	FFS	Nassau	3,638
Tiger Bay State Forest ¹	FFS	Volusia	4,804
Haw Creek Preserve	Flagler County	Flagler	1,041
Princess Place Preserve	Flagler County	Flagler	1,054
Caravelle Ranch Wildlife Management Area ³	FWC	Putnam	2,883

Conservation lands are wholly within the LSJRB unless otherwise noted.

1. Conservation lands within the LSJRB and IRL/USJRB.

2. Conservation lands within the LSJRB and MSJRB.

3. Conservation lands within the LSJRB and Ocklawaha Basin.

Table 4. District conservation lands within the LSJRB

Detailed Descriptions of Major Capital Projects

Doctors Lake Phosphorus Sequestration

Description:

Doctors Lake experiences HABs despite ongoing improvements to the surrounding watershed. The lake's shallow depth, long water residence time, and nutrient-rich sediments create ideal conditions for algal blooms.

A five-year, \$10 million phosphorus sequestration project in Doctors Lake would involve one or more contracts to assess the current abundance and availability of phosphorus in the lake sediments, treat the sediments with a phosphorus sequestration technology, and monitor project performance for three years following the conclusion of treatment. Sequestration will convert biologically available forms of phosphorus in the sediments to biologically inert forms that do not support algal growth. Sequestration treatments also typically provide some additional binding capacity for new phosphorus from watershed loading.

Background:

Doctors Lake is located in the lower St. Johns River adjacent to Orange Park (Figure 7). The District has conducted water quality sampling in the lake since 1984. For thirty-two of the last thirty-five years, Doctors Lake has experienced algal blooms due to increased nutrient loading in the watershed from urban development. Watershed phosphorus loading sources have been reduced, which makes internal sediment loading proportionally more influential on algal growth, by replacing septic tanks for homes near the lake with municipal treatment.

Previous District studies indicated that phosphorus was present in moderate abundance in Doctors Lake sediments, indicating that this could be an active source of nutrients feeding algal blooms. Furthermore, sediment phosphorus concentrations appeared higher in the central portion of the lake, which suggests that targeted sequestration treatments in certain parts of the lake could be a viable option.

Benefit and/or Impact:

Doctors Lake is an urban lake extensively used by the public for fishing, boating, and other watersports. Chronic algal blooms are an aesthetic deterrent and present potential health risks. The phosphorus sequestration project will inactivate legacy phosphorus in Doctors Lake sediments and sequester new inputs. This sequestration will improve the lake's water quality and clarity, reduce risk of HABs and fish kills, promote expansion of submerged vegetation to further stabilize restored water quality, improve habitat for fish and other wildlife, and will allow greater recreation and tourism for the benefit of local economies.



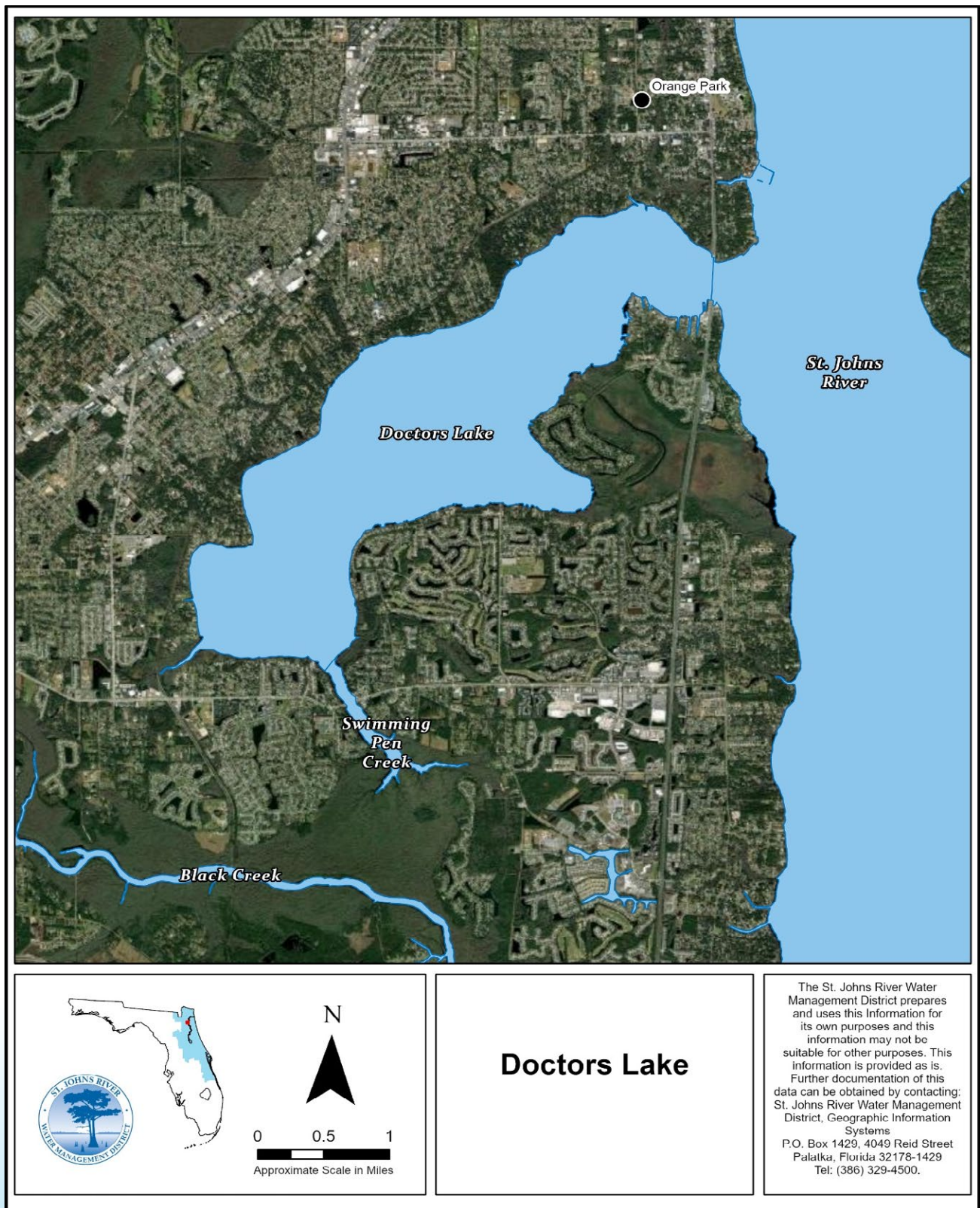


Figure 7. Location of Doctors Lake in relation to the St. Johns River.

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 total maximum daily load (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.

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, Florida Administrative Code (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: The fiscal year for water management districts begins on October 1 and ends on September 30 the following year.

mesohaline: Moderately salty waters with salinities that range from 5 to 18 parts per thousand (ppt).

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.

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 bounded 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. Unlike drainage basins, which are defined by rule, watersheds are continuously evolving as the drainage network evolves.

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

Literature Cited

- Brockmeyer, R.E., Jr., J.R. Rey, R.W. Virnstein, R.G. Gilmore, and L. Earnest. 1997. Rehabilitation of impounded estuarine wetlands by hydrologic reconnection to the Indian River Lagoon, Florida. *Wetlands Ecology and Management* 4(2):93-109.
- Brockmeyer, R.E., Donnelly, M., Rey, J.R., Carlson, D.B. 2021. Manipulating, managing and rehabilitating mangrove-dominated wetlands along Florida's east coast (USA): balancing mosquito control and ecological values. *Wetlands Ecol Manage* 30, 987-1005
- [DEP] Florida Department of Environmental Protection. 2024. Assessment Lists. Accessed on May 8, 2024, on the DEP website at <https://floridadep.gov/dear/watershed-assessment-section/content/assessment-lists>
- [FWC] Fish and Wildlife Research Institute. 2024. *Commercial Fisheries Landings Summary*. Accessed May 7, 2024, on the FWC website at <https://app.myfwc.com/FWRI/PFDM/ReportCreator.aspx>
- Garvis, S., Donnelly, M., Hernandez, E., Walters, L., Weishampel, J., & Brockmeyer, R. 2020. Remote sensing of live and dead intertidal oyster reefs using aerial photo interpretation in Northeast Florida. *Journal of Coastal Conservation*, 24(1), 14.
- McAskill, S., Simpson, L.T. *Water Quality Trends in the Northern Coastal Basin (1984–2023)*. Palatka: SJRWMD, 2025.
- Timbs, R., Fink, R., Ehnert-Russo, S., Solomon, J., Brodie, R.B. *Long-term Dynamics of Submerged Aquatic Vegetation Abundance and Obstacles to Recovery in the Lower St. Johns River, Florida*. Palatka: SJRWMD, 2025.
- Sagan, J.J. *A summary of submerged aquatic vegetation (SAV) status within the Lower St. Johns River: 1996–2007*. Palatka: SJRWMD, 2009.
- Solomon, J. J., R. B. Brodie, and G. S. Ehlinger. 2006. *Distribution and abundance of fish assemblages and select macroinvertebrates from the lower St. Marys River basin in northeast Florida*. Florida Scientist 69(1):1–18.
- [SJRWMD] St. Johns River Water Management District. 1993. Lower St. Johns River Basin SWIM Plan. 3 pp.
- SJRWMD. 2000. St. Marys River Basin: Overview Issues and Strategies. 4 pp.
- SJRWMD. 2012. *St. Johns River Water Supply Impact Study*. Palatka, FL. Available from https://static.sjrwmd.com/sjrwmd/secure/technicalreports/TP/SJ2012-1_Chapter09.pdf
- SJRWMD. 2016. *Northern coastal basin intercoastal oysters map*. Palatka, FL: SJRWMD. Accessed May 2, 2024, on the SJRWMD website at https://data-floridaswater.opendata.arcgis.com/datasets/7779f2353b644d6cb513fe2649e4d74b_0/explore.
- [USGS] U.S. Geological Survey. 2023. Continuous Stream Discharge, Salinity, and Associated Data Collected in the Lower St. Johns River and Its Tributaries, Florida, 2021. Open-File Report 2022- 1111. Available from <https://doi.org/10.3133/ofr20221111>.
- USGS. 2024. Nonindigenous Aquatic Species Database. Accessed May 7, 2024, on the USGS website at <https://nas.er.usgs.gov/viewer/omap.aspx>.



sjrwmd.com