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St. Johns River Water Management District

Middle St. Johns River Basin Plan

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 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, the District is divided into four strategic planning basins: the Lower St. Johns River Basin (LSJRB); the Ocklawaha River Basin; the Indian River Lagoon/Upper St. Johns River Basin(IRL/USJRB), and the Middle St. Johns River Basin (MSJRB). Within each strategic planning basin, the District identifies regional priorities and works with stakeholders and local government partners to identify and implement solutions to protect our natural resources and support the state's growth by ensuring the sustainable use of Florida's water for the benefit of the people of the District and the state.

The MSJRB covers more than 2,000 square miles, and encompasses Seminole County, portions of Orange, Osceola, Volusia, Lake, Marion, and Putnam counties, and a small northwest corner of Brevard County. The MSJRB is known for its springs, lakes, creeks, streams, and rivers. This basin includes the middle section of the St. Johns River and its expansive floodplain wetlands, including lakes Harney, Jesup, Monroe, and George; the Econlockhatchee and Wekiva rivers, both designated as Outstanding Florida Waters (OFW); and Deep Creek. The Wekiva River is also designated as a National Wild and Scenic River and a Florida Scenic and Wild River. The basin also includes seven designated Outstanding Florida Springs (OFS): Rock, Wekiwa, Gemini, Volusia Blue, De Leon, Alexander, and Silver Glen springs.

Executive Summary

The strategic priorities for the MSJRB focus on improving water quality, protecting the OFS, and enhancing flood protection.

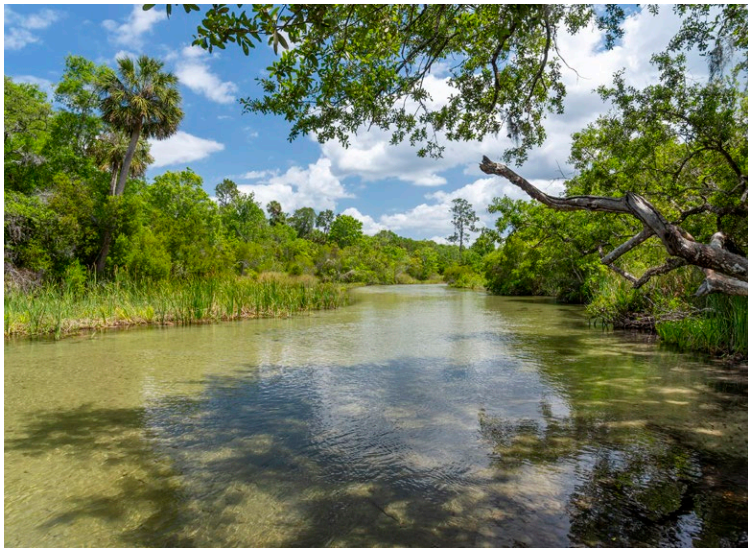
The MSJRB water quality priority includes reducing excess nutrient loadings and legacy nutrients in the lakes and waterways. Ongoing District water quality monitoring and reporting includes analysis and evaluation of water quality data to produce the annual Status and Trends Report. Additionally, District projects aimed at reducing legacy nutrients include the Lake Jesup Offline Media-Based Water Quality Improvement Project, the Lake Jesup Sediment Phosphorus Inactivation Project, and the Lake George Rough Fish Harvest Project.

The District will use information from the completed Loch Haven Chain of Lakes Final Feasibility Assessment Report and the ongoing MSJRB Feasibility Study to facilitate the development of cost-effective water quality improvement projects.

The MSJRB OFSs priority focuses on developing opportunities with local partners to protect OFSs within the basin. Efforts supporting this priority include reducing nitrogen loading within the springshed and protecting native submerged aquatic vegetation (SAV).

New project opportunities with local municipalities and agencies are essential to the analysis of water quality, water levels, and spring flows data that form the basis for regional projects to protect the OFSs. The District will continue to balance the protection of Florida's springs with the public enjoyment of these precious natural resources.

The flood protection priority in the MSJRB focuses on land acquisition within the St. Johns River floodplain and its major tributaries. Efforts supporting this priority include the District's



land acquisition programs; ongoing hydrologic monitoring and data reporting of surface water elevations and flows; and completion of the Upper and Middle St. Johns River Flood Forecasting Model. Protecting floodplain wetlands also supports public recreation and education while preserving natural systems and their associated plant and wildlife habitats.

Middle St. Johns River Strategic Planning Basin Water Quality

Priority:

- Improve water quality within the lakes and waterways

Objectives:

- Continue monitoring of water quality, SAV, and shoreline habitat to identify trends and document the success of water quality improvement projects.
- Develop projects that reduce internal legacy nutrient loads within water bodies, including the Lake Jesup Offline Media-Based Water Quality Improvement Project, the Lake Jesup Sediment Phosphorus Inactivation Project, and the Lake George Rough Fish Harvest Project.
- Develop cost-effective nutrient reduction projects identified in the Loch Haven Chain of Lakes Water Quality and Flood Protection Feasibility Study, the MSJRB Feasibility Study, and the proposed Lake George Conservation Area Hydrologic Restoration Project.

Highlight:

The District has many ongoing efforts to protect and improve water quality throughout the lakes and waterways of the MSJRB. A key component of this work is monitoring and reporting on water quality, SAV, and shoreline habitat. Results from these efforts are used to identify trends and document the success of water quality improvement projects, as well as SAV and shoreline habitat restoration and enhancement projects.

Project development to reduce internal recycling of legacy nutrients in Lake Jesup, where internal nutrient loading originates from in-lake sediments and groundwater seepage, is ongoing. In addition, the Lake George Rough Fish Harvest continues to improve water quality within the lake.

The District will also continue to facilitate nutrient reduction projects within the watersheds of the MSJRB by using recommendations from the Loch Haven Chain of Lakes Water Quality and Flood Protection Feasibility Study, the ongoing MSJRB Feasibility Study, and the proposed Lake George Conservation Area Hydrologic Restoration Project.

Water Quality, SAV, and Shoreline Habitat Monitoring

The District maintains sixty-eight surface water quality stations within the MSJRB that are monitored at least monthly. The District analyzes and evaluates these 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).

The District currently monitors SAV at selected locations within Lake George to assess the health of the water body. SAV serves as an important indicator of the water quality and ecosystem condition. Changes in SAV distribution or abundance may indicate environmental stress resulting from changes in water quality, herbivory, or other factors that limit SAV growth, coverage, and recruitment.

The District is partnering with the Florida Fish and Wildlife Conservation Commission (FWC) to conduct annual SAV monitoring within the MSJRB lakes. District staff assisted FWC with SAV surveys in lakes Monroe, Jesup, and Harney in 2025 and are continuing these efforts in 2026 in lakes Monroe, Woodruff, George, and Harney. The District will also independently survey Lake Monroe to determine the full extent of SAV beds. Sonar-based mapping may also be used by FWC as water levels permit.

The District monitors and assesses native shoreline and littoral native vegetation in lakes Jesup, Harney, Monroe, and George. These floodplain littoral areas provide important nursery and refuge habitat for many commercial, sport, and wetland-dependent species. Shoreline vegetation can also trap sediments and contribute to nutrient attenuation.

Initial surveys of littoral native vegetation in lakes Jesup, Harney, Monroe, and George will begin in summer 2026 and will be repeated annually as funding is available. Long-term monitoring will enable staff to compare current conditions with historical patterns and evaluate the ecological health of each water body.

Lake Jesup Offline Media-Based Water Quality Improvement Project

The District's Governing Board designated Lake Jesup as a priority for water quality restoration and enhancement of fish and wildlife habitats. Decades of excessive nutrient loading have resulted in accumulations of legacy nutrients within the lake sediments that continue to recycle into the water column, delaying improvements in the lake's water quality.

Reducing the release of legacy nitrogen and phosphorus from lake sediments through sediment removal or inactivation has been a focus of the District's restoration efforts.

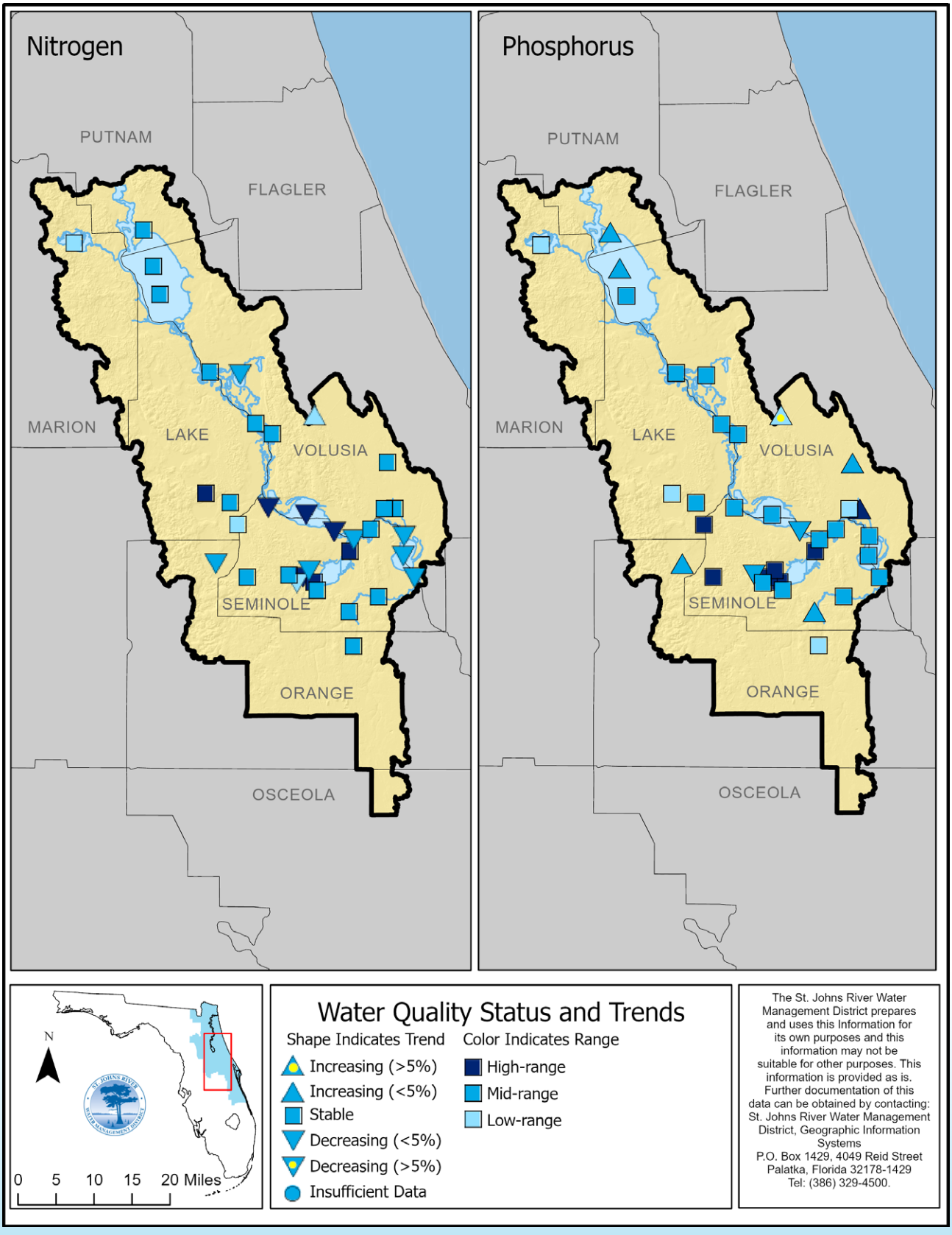


Figure 1. Water Quality Status and Trends in the MSJRB.

Flow-through nutrient treatment technologies were evaluated during fiscal year (FY) 2021–22. Results indicated that small-footprint treatment technologies, including nutrient sorption media, could remove nitrogen and phosphorus at higher rates than a flow-through wetland system at comparable costs.

The District is currently under contract to complete the design and permitting of a full-scale nutrient reduction project (Figure 2). The project will treat raw water pumped from Lake Jesup before returning the treated water to the lake. The facility is located on a 9.7-acre upland property owned by the District along the southeastern shoreline.

The design includes pilot-scale evaluation and testing of a media-based system, which is expected to be completed by October 2026. Final design and permitting of the full-scale project are anticipated to be completed by October 2027.

Lake Jesup Sediment Phosphorus Inactivation Project

In July 2025, the District received a $15 million legislative appropriation for a phosphorus inactivation project in Lake Jesup (Figure 2). The project will incorporate lanthanum-modified bentonite in the lake's sediments to bind biologically available phosphorus that would otherwise contribute to algal blooms in the water.

The contract will consist of three primary components: diagnostic sediment sampling to establish baseline phosphorus concentrations and determine dosing and spatial differences; application of the treatment material; and post-treatment sampling to evaluate effectiveness. The project is expected to begin in fiscal year 2026–27 and be completed by summer 2031.

Lake George Rough Fish Harvesting

Efforts to reduce legacy phosphorus from Lake George have focused on harvesting rough fish, primarily gizzard shad, a native species that thrives in nutrient-rich waters. Commercial harvest removes phosphorus contained within their bodies while reducing phosphorus recycling associated with feeding and sediment resuspension.

The District initiated the program in Lake George (Figure 2) in 2013, making the 2026 season the eleventh annual harvest. More than one million pounds of fish are removed each year, resulting in the removal of over 8,300 pounds of phosphorus annually.

Harvested fish are sold for use as bait in crayfish and crab traps, helping offset program costs and making the project one of the District's most cost-effective phosphorus reduction strategies.

Water Quality and Flood Protection Feasibility Study for the Loch Haven Chain of Lakes

The Loch Haven Chain of Lakes (LHCL) is a five-lake system within the upper Howell Creek Basin. Its watershed spans the City of Winter Park, the City of Orlando, and Orange County, and ultimately drains to Lake Jesup (Figure 2).

In fiscal year 2023–24, the District received a $1.35 million legislative appropriation to administer and implement a flood protection and long-term nutrient management study of the LHCL. The study included the identification of potential capital improvement projects that provide flood protection or water quality improvement.

The study established a foundation for developing sustainable projects that provide long-term efficacy that can be implemented by stakeholders. Three key issues were evaluated: water quality, flood protection, and aquatic vegetation management.

The first phase of the study, funded at $500,000, included data review, field reconnaissance, vegetation assessments, water quality and flood protection assessments, existing stormwater infrastructure evaluations (supported by stormwater modeling), and nutrient load assessment (supported by water quality modeling).

These efforts resulted in the identification of thirty-four conceptual projects intended to provide either flood protection or nutrient reduction benefits. The final report, Water Quality and Flood Protection Feasibility Study for the Loch Haven Chain of Lakes Final Feasibility Assessment, was completed in May 2025.

The second phase of the study, funded at $850,000, involved working with local stakeholders to identify one or more of the thirty-four project concepts for development of full-scale design and permitting.

Design of the first project for the City of Orlando began in January 2026. This project will reduce localized flooding and improve water quality within the Lake Winyah basin. Design of a second project for Orange County began in June 2026 and includes the utilization of a baffle box to improve water quality within the Lake Sue basin. Both projects are expected to be fully designed and permitted by September 2028. The City of Orlando and Orange County will be responsible for securing construction funding. Development of other project concepts will be led by the three local governments.

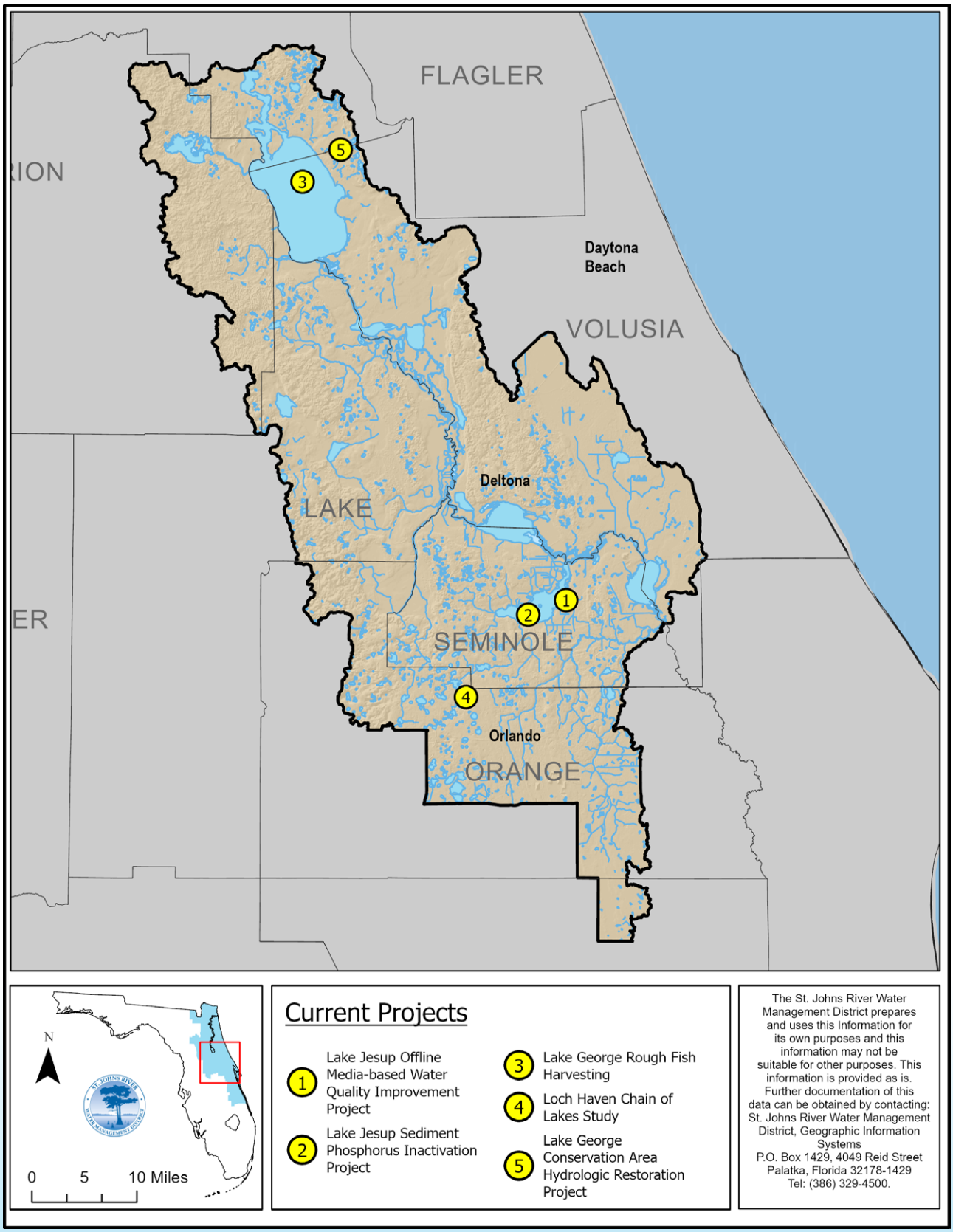


Figure 2. Current projects in the MSJRB.

Middle St. Johns River Basin Feasibility Study

The District initiated the Middle St. Johns River Basin Feasibility Study in fiscal year 2024–25. This $294,614 study, funded by the Florida Department of Environmental Protection (DEP), is intended to identify cost-effective nutrient reduction project concepts.

Preliminary findings indicate that several best management practices may provide meaningful nutrient reductions, including stormwater treatment ponds, baffle boxes with activated media, and alum injection systems.

The study will produce eight conceptual project designs and is scheduled for completion by October 2026.

Lake George Conservation Area Hydrologic Restoration Project

The Lake George Conservation Area (LGCA) is located in Putnam and Volusia counties. The property was formerly managed for pulpwood timber production. The historical silvicultural ditching resulted in altered hydrologic conditions and increased erosion.

During fiscal year 2020–21, District staff completed conceptual modeling of the primary impacted areas and determined that two low-water-crossing weirs could replace three existing culverts. The project would restore wetland hydroperiods within the Patty Wiggins Branch of the LGCA, improve hydrologic and ecological functions, and reduce erosion and turbid runoff entering Lake George.

Once funding for the project was secured, work on an updated model incorporating detailed topography was initiated and is expected to be complete by September 2026. Construction is anticipated to begin by January 2027 and conclude by March 2027. DEP is providing $80,000 through the Resiliency Grant and Wetlands Restoration and Protection Grant programs.

Middle St. Johns River Strategic Planning Basin
Outstanding Florida Springs

Priority:

- Protect OFSs

Objectives:

- Reduce contributing springshed nutrient loading
- Protect sustainable native SAV

Highlight:

The MSJRB includes seven designated OFSs: Gemini, Rock, Wekiwa, Volusia Blue, DeLeon, Alexander, and Silver Glen springs. These springs provide important natural, recreational, and economic benefits for Florida residents and visitors. The District works to balance the protection of these valuable natural resources with continued public access and enjoyment.

Many factors, including nutrient loading, can negatively impact springs. Ongoing water quality monitoring helps identify trends, evaluate changing conditions, and document the effectiveness of water quality improvement projects. Maintaining sufficient spring flows is also essential to protecting spring health. In addition, SAV serves as an important indicator of overall spring health, and the collection of timely, geo-referenced SAV data provides valuable information for assessing ecological conditions.

Nutrient Load Reduction

The District monitors water quality at sixty-eight surface water stations within the MSJRB, including stations located at the seven designated OFSs. These data help identify existing water quality concerns, detect emerging trends, and evaluate the effectiveness of water quality improvement, habitat restoration, and land management activities.

Five OFSs within the MSJRB have been designated by DEP as impaired for nitrogen. DEP has established Total Maximum Daily Loads (TMDLs) for these springs and adopted four Basin Management Action Plans (BMAPs) to address the nitrogen impairment: DeLeon, Volusia Blue, Wekiwa and Rock Springs systems, and Gemini Springs.

The District will continue to pursue funding opportunities and develop partnerships to support projects that reduce nitrogen loading within these impaired OFS springsheds.

Springs SAV Monitoring

District staff conduct annual monitoring at six first- and second-magnitude springs within the MSJRB to evaluate trends in SAV and benthic algae. The past several years have shown decreases in SAV biomass at several springs, including Silver Glen Springs, Salt Springs, and Juniper Creek.

Following Hurricane Irma in 2017, elevated water levels and increased color in the St. Johns River have persisted during wetter years, particularly within the lower portions of spring runs. These conditions have limited light penetration and affected the recovery of SAV communities.

Volusia Blue Spring also plays an important role in the winter refuge for the St. Johns River manatee population. Grazing by manatees keeps SAV abundance low in the spring.

The District anticipates initiating enhanced SAV monitoring and mapping in July 2026. The project will include the spring runs associated with Wekiwa, Rock, Alexander, Volusia Blue, Silver Glen, Juniper, and Salt Springs. Two to three spring runs will be mapped per year, with initial mapping expected to be completed within three years. Thereafter, mapping will continue on a three-year rotational schedule.

This mapping approach is replicable and provides georeferenced, archivable video, sonar, and location-specific environmental data. It also offers a timely and cost-effective means of monitoring major springs and spring runs of interest.
Data collected through this effort will improve understanding of fluctuations in SAV coverage and distribution.

Middle St. Johns River Strategic Planning Basin Flood Protection

Priority:

- Enhance flood protection along lakes and rivers

Objectives:

- Facilitate acquisition and management of floodplain wetlands
- Continue hydrologic monitoring and data sharing
- Complete the development of the Upper and Middle St. Johns River Flood Forecasting Model

Highlight:

The middle segment of the St. Johns River experiences the greatest fluctuations in water levels. As a result, the river's floodplain wetlands, lakes, and tributaries play a critical role in flood protection while also supporting the ecological health of the basin.

Preservation of these floodplains not only provides benefits of flood protection but also protects plant and wildlife habitat, improves water quality, supports public recreation, and enhances opportunities for environmental education. For these reasons, the acquisition and management of floodplain wetlands remain essential components of the District's flood protection strategy and its broader mission to protect Florida's water resources.

Hydrologic monitoring and reporting of surface water elevations and flows are important tools for evaluating existing and potential flood conditions. These data support operational and management decisions and are closely coordinated with agency partners, including the National Weather Service and the Southeast River Forecast Center.

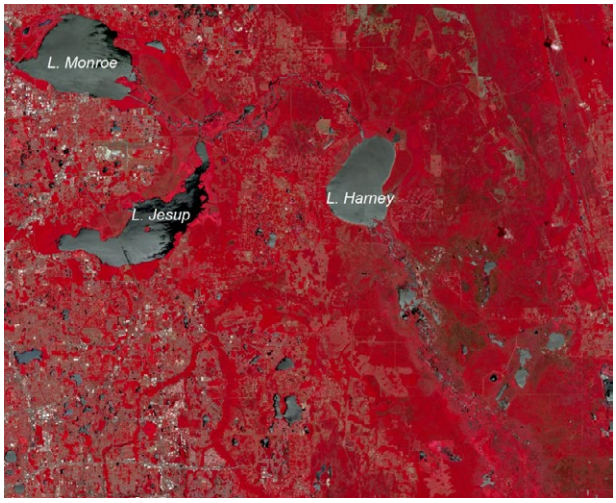
The District is developing a real-time flood forecasting model for the MSJRB and USJRB. Upon completion, the Upper and Middle St. Johns River Flood Forecasting Model will provide timely information beneficial to the public, emergency management officials, and District staff to improve flood preparedness, emergency response, and water management decisions.

District Land Acquisition Program

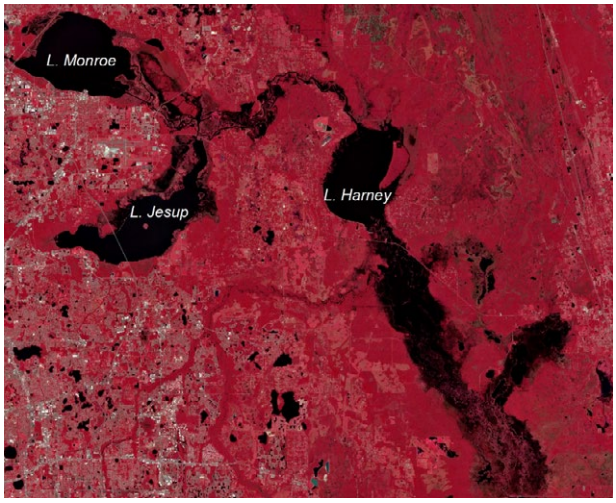
The District's land acquisition strategy within the MSJRB will continue to focus on opportunities along the St. Johns, Wekiva, and Econlockhatchee rivers and around lakes Jesup, Monroe, and Harney. These acquisitions support nonstructural flood protection, water resource protection, the enhancement or restoration of natural systems, floodplain connectivity, water quality improvements, and the protection of important natural areas and land management boundaries.

Floodplain wetlands play an important role in flood protection, as evident by satellite imagery. In October 2024, Hurricane Milton made landfall and caused widespread flooding across central Florida. Satellite imagery of the middle basin, including lakes Harney, Jesup, and Monroe, illustrates the dynamic nature of water levels and the extensive inundation of floodplain wetlands south of Lake Harney and along the St. Johns River between lakes Harney, Jesup, and Monroe. Much of this floodplain has been purchased through the District's land acquisition program.

The middle basin also experiences reverse flows during major storm events, with water moving southward from the mouth of the St. Johns River as far upstream as Lake Monroe. These conditions can delay the recession of floodwaters for up to 90–120 days, further highlighting the important flood storage function provided by these floodplain wetlands.



European Space Agency Sentinel satellite color infrared imagery from May 27, 2024.



European Space Agency Sentinel satellite color infrared imagery from October 14, 2024.

The District will continue to engage with local government partners and willing sellers to acquire lands identified for potential acquisition on the List of Critical Wetlands and the Five-Year Land Acquisition Map. The List of Critical Wetlands and Five-Year Land Acquisition Plan Map are part of the District's Strategic Plan and are available at Plans and reports for St. Johns River Water Management District.

In addition to non-structural flood protection opportunities, the MSJRB can also benefit from regional structural flood protection projects.

Collaboration with local government partners is key to planning, design, and implementation of these projects. Several local governments, including Lake, Orange, Seminole, and Volusia counties and their municipalities, have recently completed or are nearing completion of surface water basin studies that identify areas where additional flood protection measures may be needed.

Hydrologic Monitoring

The District and its partners operate an extensive network of surface hydrology data monitoring sites, including seventy-eight that monitor surface water elevation, and thirty-five that measure surface water discharge. This network provides near real-time data that supports flood forecasting, water management, and emergency response activities.

Upper and Middle St. Johns River Flood Forecasting Model

The District is developing a real-time flood forecasting model for the Upper and Middle St. Johns River Basins.

The consultant is collaborating with local governments to identify low-lying and flood-prone areas. This model will use observed rainfall, water levels, flow, as well as forecasted rainfall, to predict flood elevations and flows along the main stem and major tributaries of the St. Johns River within these two basins during heavy rainfall and hurricane events.

Information from updated basin-specific flood models developed by local governments will also be incorporated into the District's model. Once completed, the model will provide timely information to the public, emergency management officials, and District staff to support flood preparedness and response efforts.

The project is funded through a $1.5 million grant from the Resilient Florida Program and is expected to be completed by November 2027.

Basin Overview
Physiography of the Basin

The MSJRB includes a watershed area of more than 2,000 square miles within Seminole County and portions of Orange, Osceola, Volusia, Lake, Marion, and Putnam counties, as well as a small northwestern corner of Brevard County (Figure 3). The St. Johns River flows northward from the USJRB through the MSJRB to the LSJRB. The basin is known for its springs, lakes, creeks, streams, and rivers.

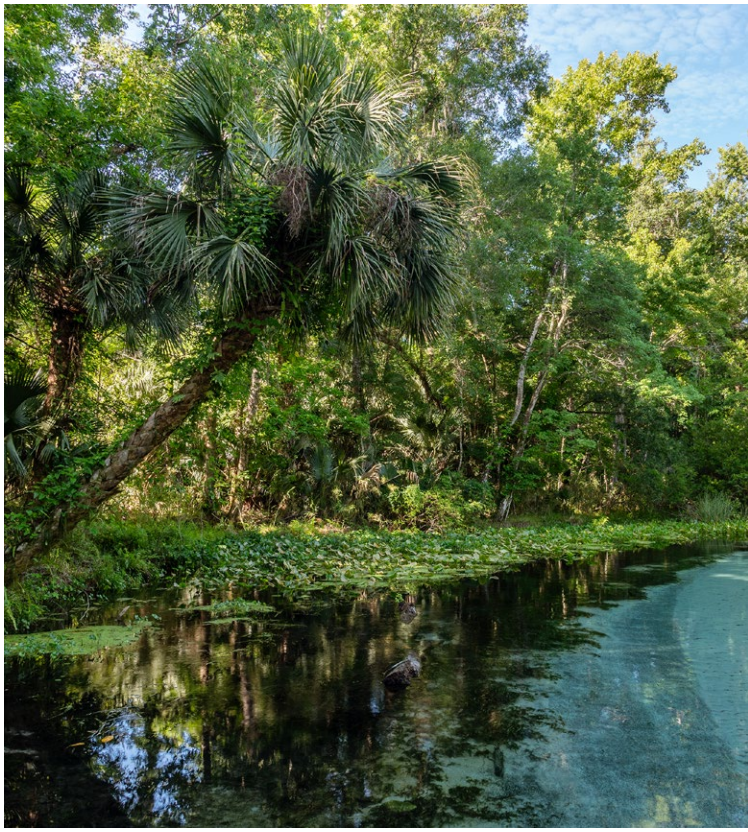
Major Tributaries and Springs

The Middle St. Johns River extends from the confluence of the Econlockhatchee River northward to the confluence of the Ocklawaha River. Major tributaries within this reach include Deep Creek, the Econlockhatchee River, and the Wekiva River (Figure 4)

Spring discharges and surficial aquifer system discharges are important components of the base flow to the river and its tributaries (Figure 5). During drier periods, water levels in this segment of the river exist at sea level, making this segment of the river vulnerable to reverse flows caused by tides and strong onshore winds at the river's mouth near Mayport. These periods of low flow, especially during the spring, can contribute to the development of algal blooms.

During wetter periods, prolonged rainfall can result in rapid and substantial increases in river water levels. Tropical systems may generate both heavy rainfall within the watershed and strong onshore winds at the river's mouth, driving reverse flows. The combination of upstream runoff and downstream reverse flows creates the greatest variability of high and low water elevations along the river; therefore, the river's floodplain wetlands' ability to store floodwater is a valuable natural resource.

Development that occurred between the 1940s and early 1980s significantly modified the



hydrology of the Little Econlockhatchee River and Little Wekiva River. Channelization and the installation of drainage infrastructure in portions of these systems increased sedimentation, transport of nutrients, and reduced the natural floodplain wetlands.

Similarly, Lake Jesup's connection with the St. Johns River has been altered over several decades. Reduced riverine flushing in Lake Jesup has contributed to increased accumulation of muck sediments, particularly in the western portion of the lake, which receives approximately 48 percent of external phosphorus loads from its three largest tributaries: Howell, Gee, and Soldier creeks.

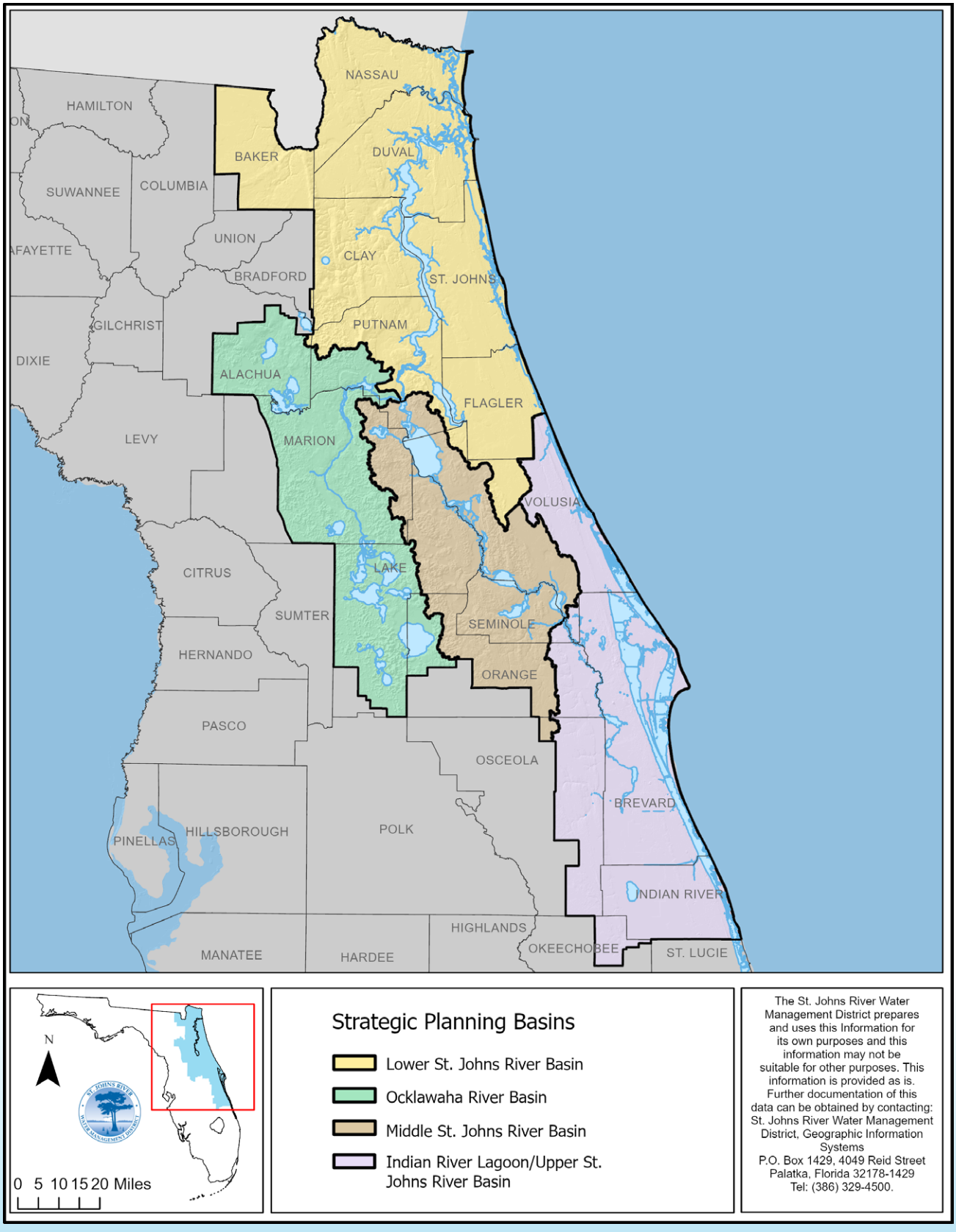


Figure 3. Strategic Planning Basins of the St. Johns River Water Management District.

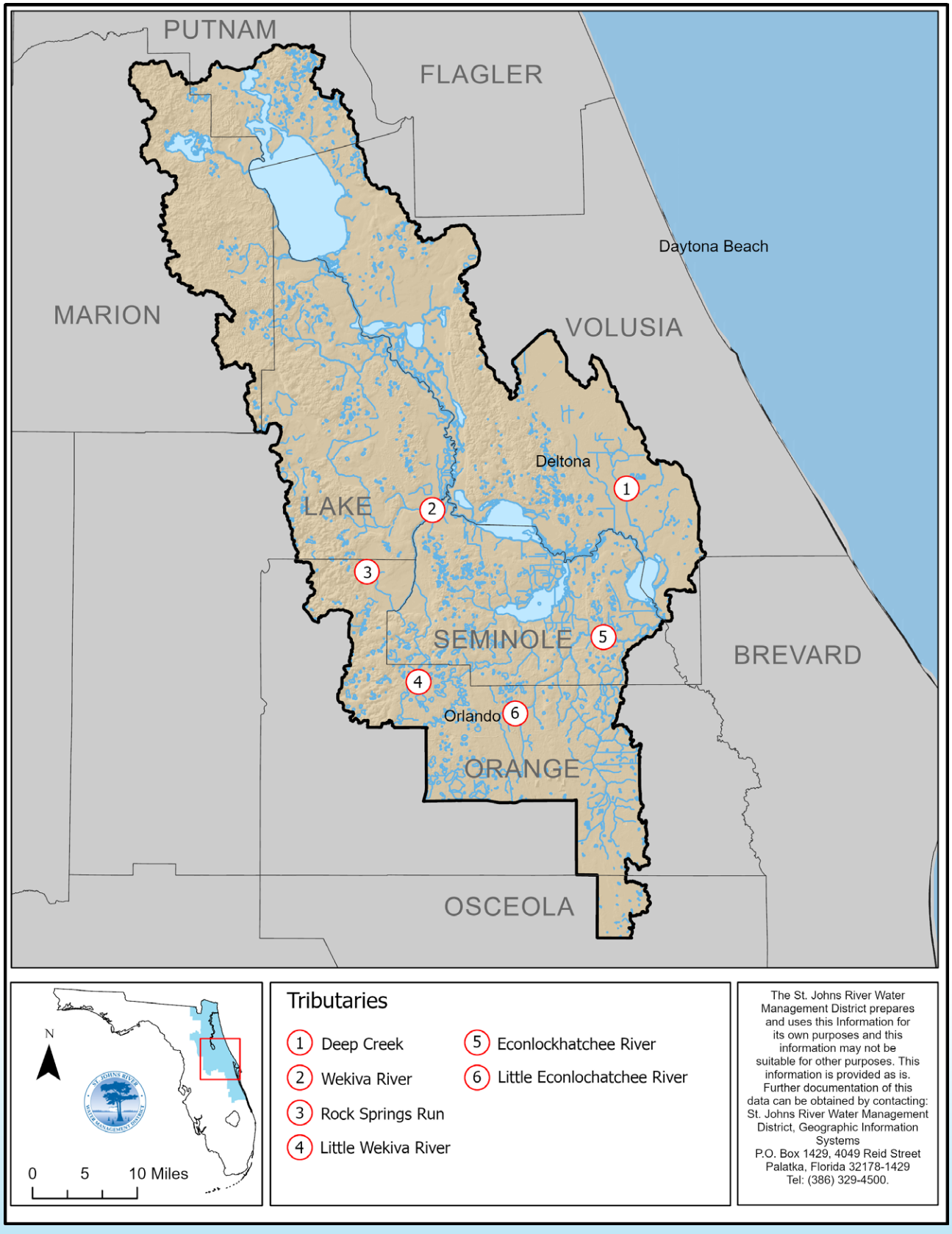


Figure 4. Major tributaries of the MSJRB.

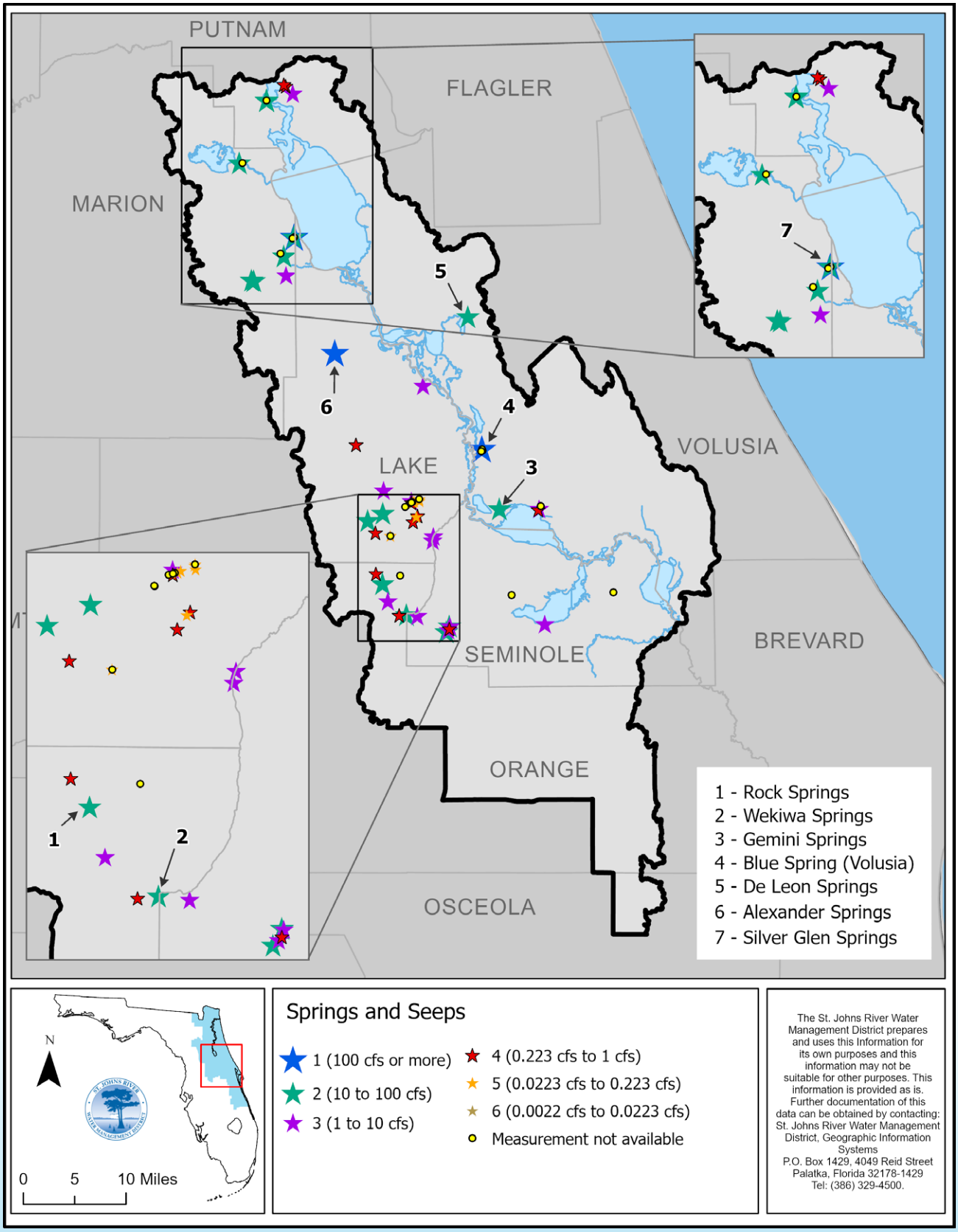


Figure 5. Springs and seeps within the MSJRB in cubic feet per second (cfs).

Water Quality

Protecting and restoring water quality is a core mission of the District. Water quality monitoring provides information that enables the District to make resource decisions based on accurate, timely information and to document the condition of more pristine waters. These efforts are closely coordinated with many partners, including the DEP's TMDL and BMAP programs.

The District relies on the ongoing collection of hydrologic and water quality data, as well as key ecosystem indicators, to support science-based decisions. The monitoring network includes seventy-eight surface hydrology stations, sixty-eight water quality stations, and biological indicators at key locations throughout the District. These data guide actions related to each of the District's core missions.

Because some water quality goals are associated with biological outcomes, such as the recovery of native SAV, monitoring these communities provides important feedback regarding the effectiveness of water quality improvement efforts. SAV monitoring is particularly important in spring runs, as these systems often contain a diverse SAV community.

DEP assesses all of Florida's major watersheds, or basins, every two years. Water bodies that do not meet the 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 many of the nutrient-impaired water bodies within the MSJRB, including the St. Johns River; lakes Harney, Jesup, and Monroe; the Wekiva system; Gemini Springs; Volusia Blue Spring; and DeLeon Spring. TMDLs are developed for water bodies verified as not meeting their established water quality standards. TMDL documents are available on DEP's website.

Current Status and Trends, District Reporting

The District monitors ambient surface water quality at sixty-eight stations within the MSJRB. These water quality data are analyzed annually and summarized in the Status and Trends Report.

For the 2025 report, the status assessment period was from January 1, 2020, through December 31, 2024. Stations with at least three years of data during the five-year assessment period of record were analyzed for their status. The fifteen-year trend assessment period was 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.

Based on the District's 2025 report, nitrogen, phosphorus, and chlorophyll-a were stable or decreasing at most surface-water stations within the MSJRB. Six surface water stations exhibited increasing phosphorus trends: Rock Springs Run, Little Econlockhatchee River at Lockwood, Deep Creek at Osteen, Lake Ashby, Lake George at Marker 5, and St. Johns River at Drayton Island.

Lake Winnesmissett was the only station exhibiting increasing trends in phosphorus, nitrogen, and chlorophyll-a by more than 5 percent annually. Among the spring sites, nitrogen concentrations were stable or declining at all locations except Gemini Spring and Volusia Blue Spring. Volusia Blue Spring exhibited an increasing nitrogen trend exceeding 5 percent annually.

Nutrient loading to the St. Johns River from major watersheds within the MSJRB is shown in Figure 6. The annual load entering from the USJRB is approximately 2,150 metric tons of nitrogen and 170 metric tons of phosphorus (Papacek, Canion, 2025). For both lakes Harney and Monroe, upstream loading from the St. Johns River represents approximately seventy percent of the nitrogen and phosphorus loads. This is largely because most of the flow coming into the system comes from upstream.

This pattern indicates that without reductions in loading from the USJRB, the nutrient TMDLs for the downstream lakes in the MSJRB will not be met (Gao, 2009). Watersheds north of the USJRB and the Wekiva River contribute an additional 119 metric tons of phosphorus and 1,275 metric tons of nitrogen annually. Downstream of Lake George, the MSJRB contributes approximately 4,350 metric tons of nitrogen and 240 metric tons of phosphorus to the LSJRB.

Annual nutrient load estimates for the major watersheds were developed using either model results or direct measurements. The annual nutrient loads from the Upper St. Johns River, Econlockhatchee River, DeLeon Spring, Volusia Blue Spring, and Alexander Creek were calculated using direct measurements of flow and nutrient concentration data collected during the period of 2013 to 2023.

The estimated annual nutrient loads from Deep Creek, and lakes Harney, Jesup, and Monroe were modeled using data collected between 1996 and 2003 in support of DEP's Middle Basin TMDL analysis. The annual nutrient loads from Lake George, Silver Glen Springs, and Juniper and Salt Springs were modeled using data collected between 2003 and 2013 for DEP's Lake George TMDL analysis. The estimated annual nutrient load from the Wekiva River was modeled by the District using data collected between 2003 and 2012.

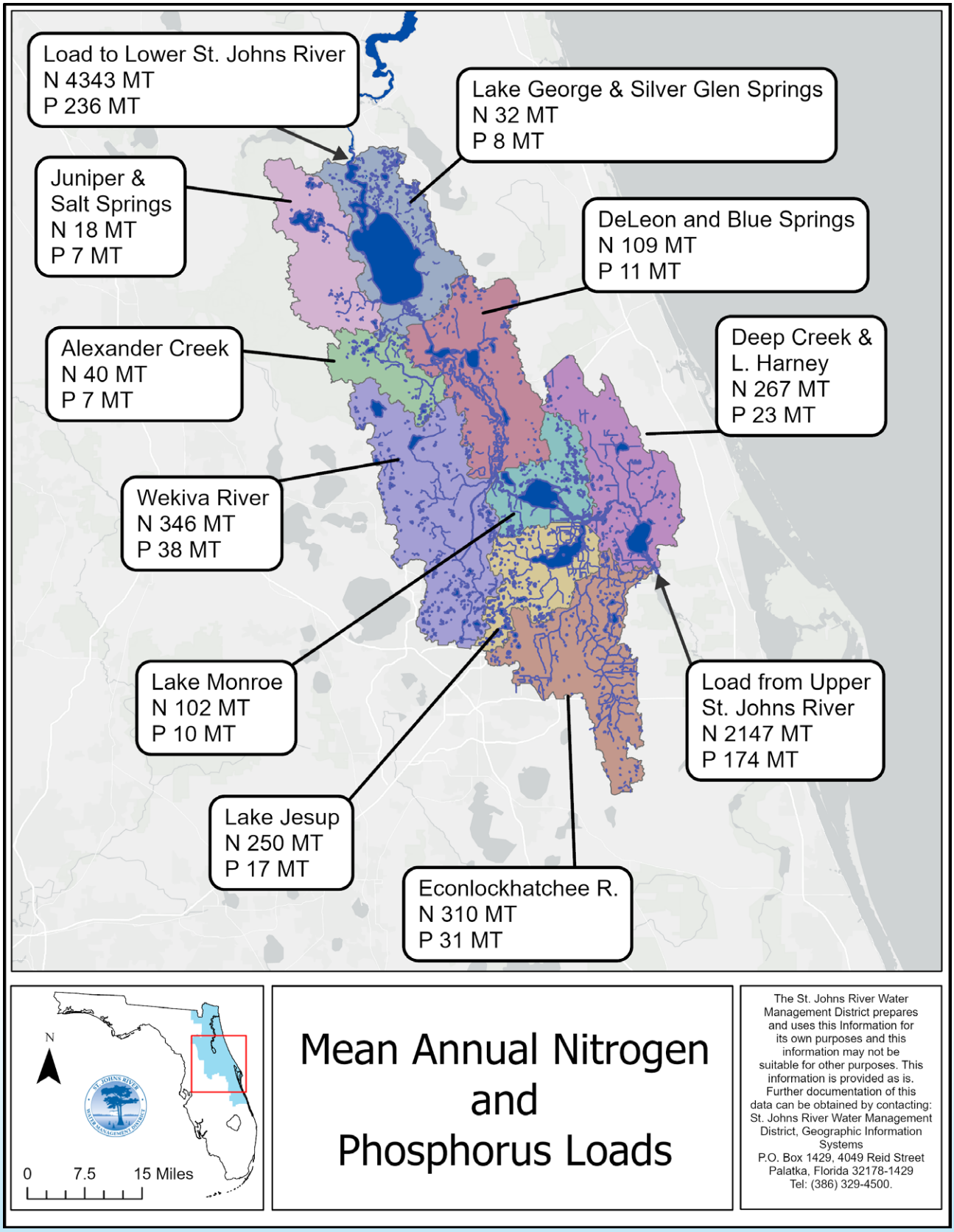


Figure 6. Mean annual nitrogen (N) and phosphorus (P) load in metric tons (MT) from MSJRB major watersheds.

Lake Jesup is a major focus of the District's restoration efforts within the MSJRB. In addition to runoff from its large watershed, Lake Jesup experiences significant internal phosphorus recycling from in-lake sediments and seepage (Figure 7). These sediments of Lake Jesup are nutrient-rich as a result of historic wastewater discharges, nutrient runoff associated with urban development and agricultural activities within the watershed, and the lake's relatively limited flushing from the St. Johns River.

Approximately 139 projects implemented by local governments and state agencies have achieved estimated watershed nutrient load reductions that exceed those required by the BMAP. The District's water quality data for Lake Jesup indicate stable trends for nitrogen, phosphorus, and chlorophyll-a concentrations. However, target concentrations established by the BMAP for nitrogen, phosphorus, and chlorophyll-a have not yet been met.

The persistence of elevated nutrient concentrations is largely attributed to legacy nutrients within the lake's sediments, which continue to release phosphorus and nitrogen to the water column. As a result, the District, DEP, and local governments are increasingly focusing on ways to reduce sediment contributions to nutrient availability in the water column.

Harmful Algal Bloom (HAB) Assessments

HABs occur when algal populations, especially cyanobacteria, increase in intensity, duration, and frequency. These blooms can turn the water noticeably green, although other colors can occur. Elevated concentrations of nitrogen and phosphorus, combined with environmental conditions such as warm temperatures, abundant sunlight, and low-flow conditions, can trigger an algal bloom. Some of these blooms can become harmful through the production of toxins or by causing other negative impacts to the environment, such as low dissolved oxygen or shading of the SAV.

Lakes Monroe, Jesup, and George are sampled seasonally as part of the DEP Algal Bloom Monitoring and Response Program. District staff also visit ad hoc sites, smaller lakes within the MSJRB, as well as sites along the St. Johns River and its tributaries. These assessments are conducted in response to public reports of algal blooms.

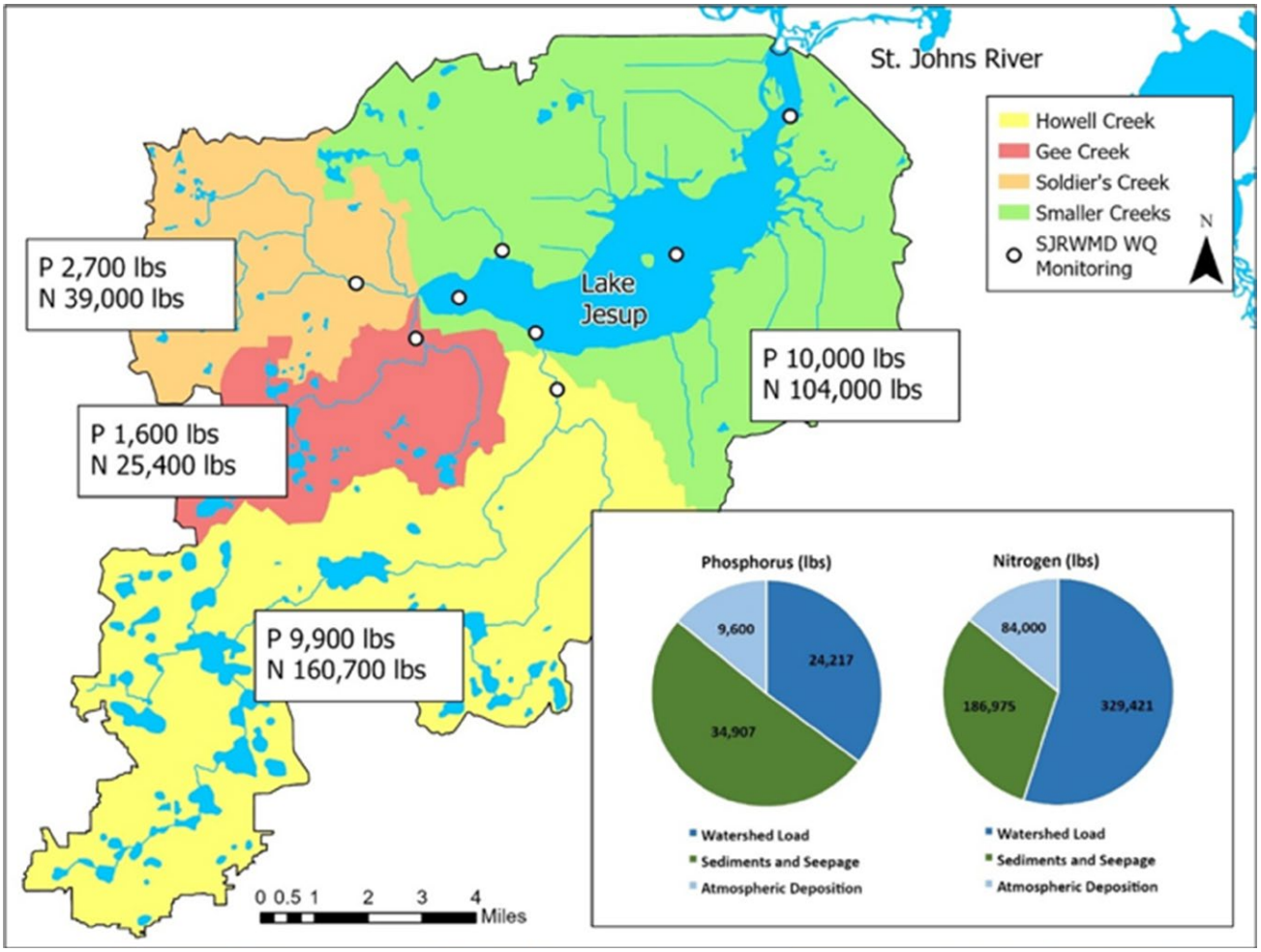


Figure 7. Watershed, atmospheric, and internal (sediments and seepage) nitrogen and phosphorus load contributions to Lake Jesup. (Data are from the Lake Jesup BMAP)

Submerged Aquatic Vegetation

The two dominant SAV species commonly found within the springs and spring-run streams of the MSJRB are freshwater eelgrass and spring tapegrass (Mattson et al., 2019). The invasive species hydrilla is also present in many spring systems and can proliferate in the clear waters of these environments if left unmanaged.

Multiple stressors affect SAV abundance within the MSJR, including shading from algal blooms, particularly in Lake Jesup, and prolonged periods of deeper, darker water. Hurricane Irma in 2017 caused widespread damage to SAV beds along the middle and lower St. Johns River, including lakes Harney, Monroe, and George. Between 2017 and 2025, above-average rainfall in the region resulted in higher water levels. This deeper water inundated the middle St. Johns River's extensive floodplain wetlands and leached color from vegetation, resulting in darker water. The combination of deeper and darker water reduced light availability for SAV growth.

SAV also serves as a valuable food source for many animals, including manatees, turtles, fish, and crabs. Reduced growth of SAV, combined with continued grazing, has resulted in low SAV abundance. There is also concern that burrowing and nesting of invasive fish, particularly tilapia and sailfin catfish, is causing uprooting of SAV and preventing recolonization.

Management actions to promote SAV recovery in Lake Jesup primarily focus on reducing nutrients and algal blooms that limit light availability. In the remainder of the middle St. Johns River, deeper and darker water conditions, grazing pressure, and increased disturbance from invasive fish remain the key factors. The District, in cooperation with FWC, has identified grazing as a significant factor influencing SAV canopy heights. Researchers with FWC and the University of Florida are assessing the potential feeding rates of manatees, turtles, crabs, and herbivorous fish to determine if the current SAV biomass is enough to sustain those feeding pressures.

Fisheries

The MSJRB supports a diverse freshwater native fish community typical of most lakes and streams in peninsular Florida. In addition, the reach from Lake Monroe to Lake George supports many estuarine species, including red drum and ladyfish. Atlantic croakers are also encountered due to the presence of salty springs, such as Volusia Blue Spring, and tributaries, such as Salt Creek. The estuarine influence extends upstream to Lake Monroe, where populations of Atlantic stingray and naked gobies, thought to be fully estuarine-dependent species, have been documented spawning.

The middle and lower reaches of the MSJRB also provide important riverine spawning habitat for anadromous fish species, including American shad, hickory shad, and blueback herring. All three species migrate into the river annually between January and April to reproduce. Management of these migratory shad species is closely regulated by the Atlantic States Marine Fisheries Commission.

Invasive Species

Since the 1990s, invasive fish populations within the MSJRB have increased, with tilapia and sailfin catfish representing the species of greatest concern. Tilapia, first introduced to Florida during the 1960s, has become the most widely distributed invasive fish in the world and has become one of the most abundant invasive fish in the state.

Although the abundance and distribution of tilapia and sailfin catfish within the MSJRB have not been comprehensively quantified, both species are common in spring runs, especially during winter months. Together, they now comprise a significant portion of the freshwater fish biomass in the MSJRB. There is growing concern that their burrowing and nesting behavior in sediments can dislodge SAV and prevent recolonization.

District Lands

Land Management

One of the ways the District fulfills its mission to preserve and protect Florida's water resources is through the acquisition and management of conservation lands. These acquisitions are intended to buffer and safeguard water resources, while also protecting native plant and wildlife habitat and providing opportunities for public recreation and environmental education. The District's future land acquisition strategy within the MSJRB will continue to prioritize properties along the St. Johns, Wekiva, and Econlockhatchee rivers, as well as lakes Jesup, Monroe, and Harney. These efforts support water resource protection, the enhancement or restoration of natural systems, improved floodplain connectivity, water quality improvements, and the connection of important natural areas and land management boundaries.

The MSJRB contains extensive floodplain wetlands along the St. Johns River, a result of the basin's pronounced seasonal variation in water levels. Acquisition and management of these areas have been a long-standing District priority due to the range of important ecological services they provide. These include the nonstructural storage of floodwaters and water quality improvements associated with interactions with wetlands, such as sediment storage and nutrient attenuation. These wetlands are also important nursery habitat for many species, including sport and commercial species.

The District's land management program responsibilities include habitat restoration, prescribed fire, wildfire response, and invasive species management. Each District property is managed under an approved land management plan adopted by the District's Governing Board, which establishes the philosophy and direction for land use and stewardship. These plans are designed to ensure water resource protection, maintain habitat diversity, support compatible recreational uses, wildlife habitat restoration and enhancement, and preserve traditional land and water resource uses when appropriate. Legislative directives guide the planning process from initial acquisition evaluations through plan development with public input during both review and update cycles of each plan.

The District owns approximately 84,184 acres within the MSJRB. Of this total, fifteen properties, encompassing 56,419 acres, are managed directly by the District, while the remaining lands are managed by cooperating partners (Table 1).

District Conservation Lands Within the MSJRB

Managed Area	Lead Land Manager	County	Acres
Buck Lake Conservation Area[1]	SJRWMD	Brevard and Volusia	485
Econlockhatchee Sandhills Conservation Area	SJRWMD	Orange	706
Hal Scott Regional Preserve and Park	SJRWMD	Orange	8,715
Heart Island Conservation Area[2]	SJRWMD	Volusia	8,921
Lake George Conservation Area	SJRWMD	Putnam and Volusia	11,782
Lake Jesup Conservation Area	SJRWMD	Seminole and Volusia	5,743
Lake Monroe Conservation Area	SJRWMD	Volusia and Seminole	7,514
Lake Norris Conservation Area	SJRWMD	Lake	3,682
North Central Region Mitigation Archipelago	SJRWMD	Volusia	218
Palm Bluff Conservation Area	SJRWMD	Volusia	4,173
Seminole Ranch Conservation Area[1]	SJRWMD	Seminole, Brevard, Orange, and Volusia	340
South Central Region Mitigation Archipelago	SJRWMD	Seminole	19
South Central Region Mitigation Archipelago	SJRWMD	Seminole	425
South Central Region Mitigation Archipelago	SJRWMD	Lake	102
Wekiva River Buffer Conservation Area	SJRWMD	Seminole	3,594
Rock Springs Run	DEP State Parks	Lake and Orange	533
Little-Big Econ State Forest	Florida Forest Service (FFS)	Seminole and Volusia	7,124
Seminole State Forest	FFS	Lake	3,533
Lake Woodruff National Wildlife Refuge	U.S. Fish and Wildlife Service	Volusia	2,384
Deep Creek Preserve	Volusia County	Volusia	3,674
Gemini Springs County Park	Volusia County	Volusia	207
Lake George Forest	Volusia County	Volusia	7,996
Longleaf Pine Preserve[1]	Volusia County	Volusia	913
Wiregrass Prairie Preserve	Volusia County	Volusia	1,401

Conservation lands are wholly within the MSJRB unless otherwise noted.

1. Also located in the IRL/USJRB

2. Also located in the LSJRB

Table 1. Conservation land within the MSJRB.

Lake Jesup Offline Media-Based Water Quality Improvement Project

Description

The Lake Jesup Offline Media-Based Water Quality Improvement Project will pump raw water from Lake Jesup, treat it to reduce nutrient concentrations, and return the treated water back to the lake. The project is located on a 9.7-acre District-owned upland property adjacent to the east shore of the lake (Figure 8).

The District has committed $1,386,745 to project development, which includes a pilot-scale evaluation and design and permitting of the full-scale project. Pilot testing of the media-based treatment technology is underway, with completion expected by October 2026. The preliminary opinion of the probable construction cost of the full-scale project is approximately $22.6 million.

Background

The District Governing Board has designated Lake Jesup as a priority basin for restoration of water quality and fish and wildlife habitats. In 2008, in conjunction with the Lake Jesup Interagency Management Strategy, DEP adopted a TMDL for nitrogen and phosphorus for Lake Jesup. The subsequent BMAP has guided implementation efforts by local government partners to implement projects to reduce the external nutrient loading to the lake.

As a result, progress is being made to reduce nutrient sources and concentrations, thereby improving the lake's water quality and clarity. However, decades of excessive nutrient loading have left a significant source of legacy nutrients in the lake's sediments that continue to recycle into the water column. This internal loading delays recovery and limits improvements in water quality and clarity.

The project will continuously remove nutrients from the lake water column and return treated water to the lake. This combined approach addresses both external and internal nutrient sources and is similar to the District's prior restoration strategy used in Lake Apopka.

Benefit and/or Impact

The full-scale media-based treatment technology could remove approximately 50,000 pounds of nitrogen and 5,000 pounds of phosphorus annually from the Lake Jesup water column.

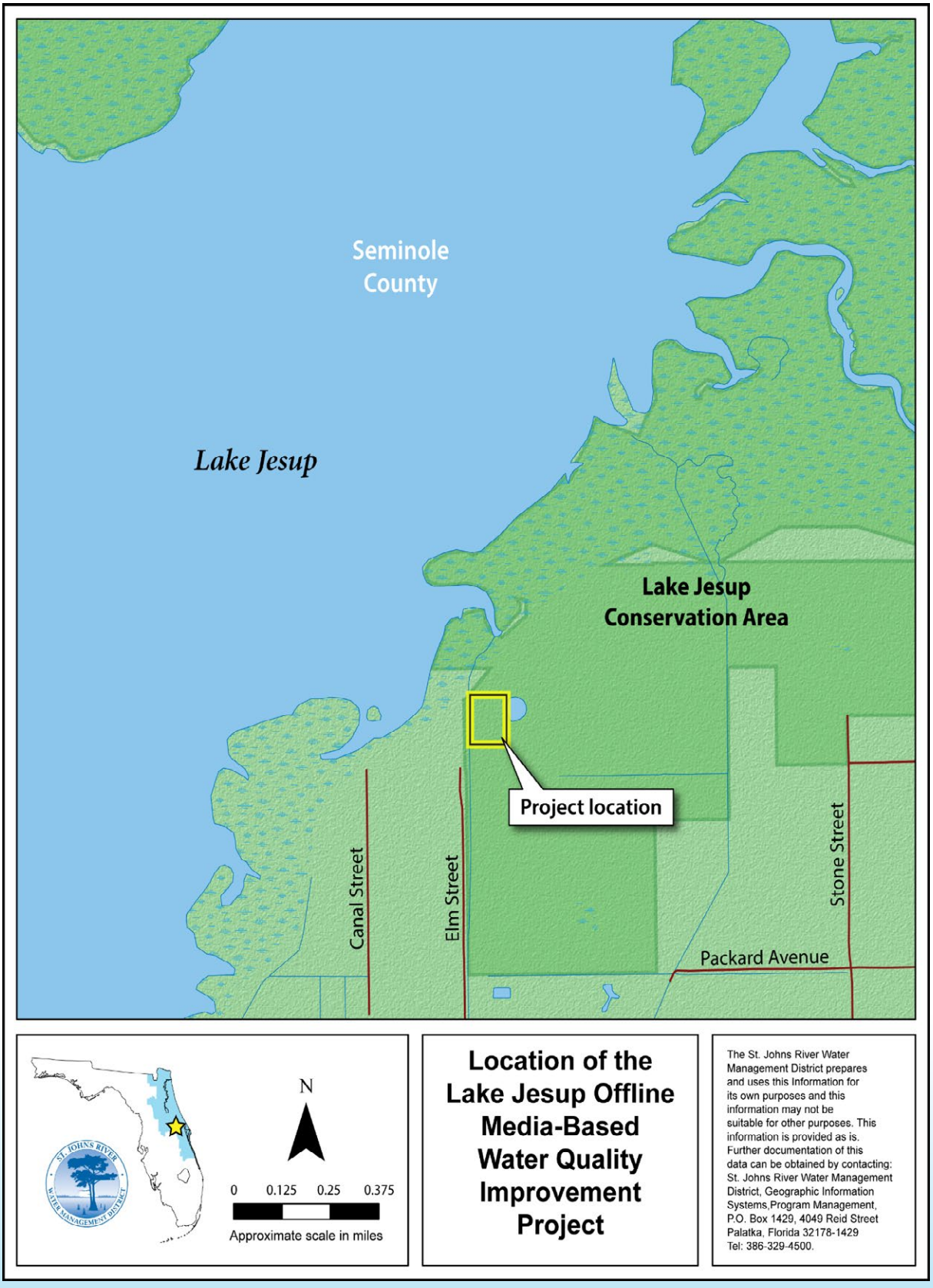


Figure 8. Lake Jesup Offline Media-Based Water Quality Improvement Project location map.

Lake Jesup Sediment Phosphorus Inactivation Project

Description

In July 2025, the District received a $15 million legislative appropriation to administer a contractual treatment of biologically available phosphorus in Lake Jesup's sediments using lanthanum-modified bentonite. The treatment will convert biologically available phosphorus within the sediments into inert forms of phosphorus, which can no longer support algal growth in the lake's water.

Work is expected to begin in the summer of 2026. The selected contractor will be responsible for evaluating the lake's sediments to determine site-specific dosing of lanthanum-modified bentonite, conducting the application, and monitoring the conversion of biologically available phosphorus to inert forms in the sediments (Figure 9).

Background

The District Governing Board has designated Lake Jesup as a priority basin for restoration of water quality and fish and wildlife habitats. In 2008, in conjunction with the Lake Jesup Interagency Management Strategy, DEP adopted a TMDL for nitrogen and phosphorus for Lake Jesup. The subsequent BMAP has guided implementation efforts by local government partners to reduce the external nutrient loading to the lake.

As a result, progress is being made to reduce nutrient sources and concentrations, thereby improving the lake's water quality and clarity. However, decades of excessive nutrient loading have left a significant source of legacy nutrients in the lake's sediments that continue to recycle into the water column, delaying recovery and limiting improvements in water quality.

This Lake Jesup Sediment Phosphorus Inactivation Project will utilize lanthanum-modified bentonite to inactivate biologically available phosphorus in the lake's sediments by converting the phosphorus into inert forms that cannot contribute to algal blooms.

Benefit and/or Impact

This project is expected to reduce biologically available phosphorus in Lake Jesup's sediments and decrease the internal recycling of phosphorus into the water column, thereby reducing conditions that support algal blooms.

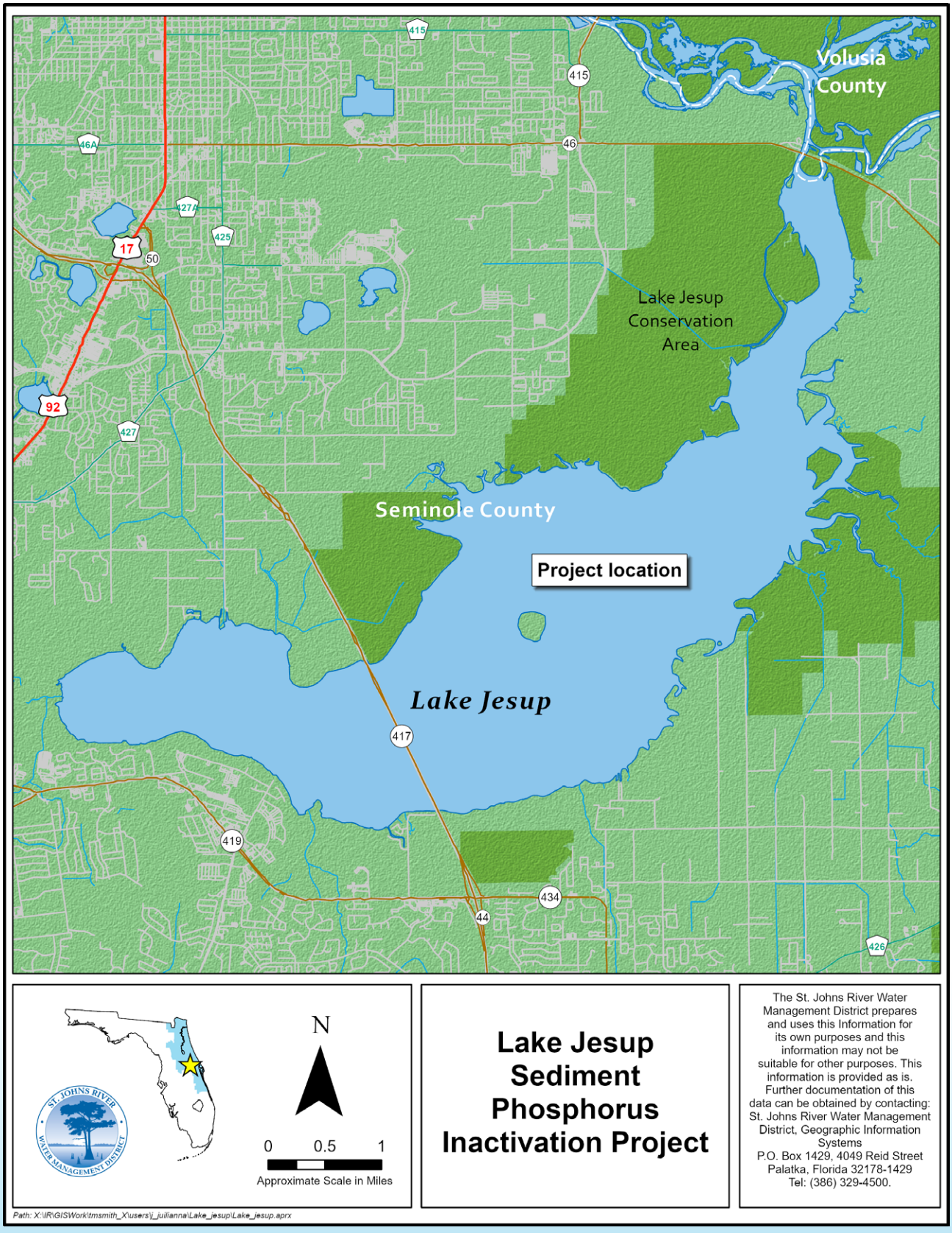


Figure 9. Lake Jesup Sediment Phosphorus Inactivation Project location map.

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 management action plan (BMAP): 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; and regional projects and conservation programs designed to achieve these reductions. BMAPs are adopted by Secretarial Order and are legally enforceable.

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, the 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 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 exotic and nuisance vegetation; providing structural habitat; and restoring dredged holes to elevations before they were dredged.

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 a spring onto the Earth's surface.

total maximum daily load (TMDL): 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 specific pollutants, such as nutrients, bacteria, and mercury. TMDLs must be developed, adopted, and implemented to reduce those pollutants and improve water quality.

watershed: A region or area bounded peripherally by water that drains to a particular watercourse or body of water. Watersheds conform to federal hydrologic unit code standards and can be divided into subwatersheds and further into catchments, the smallest water management unit recognized by water management operations.

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

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