SAVe Our River's Grasses Expedition

Report

Prepared By
St. Johns RIVERKEEPER

ST. JOHNS
RIVERKEEPER®

2025

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Letter from the St. Johns Riverkeeper

Dear St. Johns River Enthusiasts,

Submerged aquatic vegetation (SAV) is the foundation of our river's health – providing water quality filtration, fish habitat, erosion control, oxygenation of the water column, carbon sequestration and storage, and more.

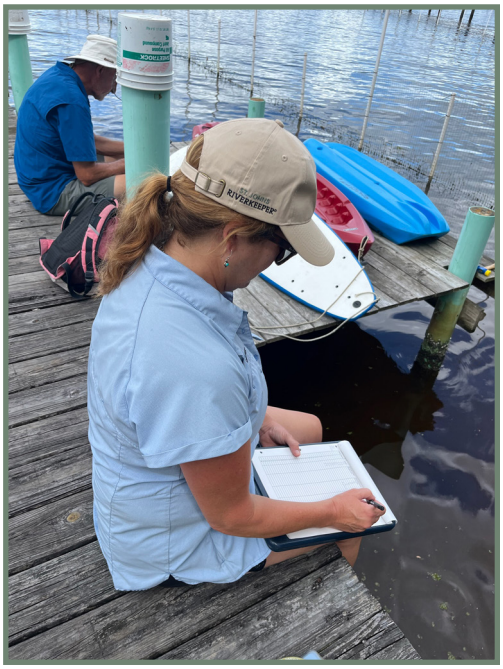
SAV is also an ecological indicator of the river's heath, its canary in the coal mine.

Alarmingly, SAV is struggling throughout the St. Johns Watershed. We are witnessing the decline of submerged aquatic vegetation in the Upper, Middle and Lower basins.

The St. Johns River is a Class III water that should have healthy fish habitat and waters that are fishable and swimmable. ***Currently, the St. Johns does not meet this standard.***

For three years, SJRK has surveyed river sites from Doctors Lake to Lake George three times each summer during the SAV growing season.

In early 2025, we installed 10 protective enclosures to determine if SAV could recover once protected from herbivory grazing pressure and to expand our research.



The good news is we are seeing some signs of recovery, but overall, there are significant reasons for concern. All 14 of our monitoring sites are showing signs of intense grazing pressure from wildlife, high, dark water and frequent algae outbreaks.

In Clay and St. Johns Counties, there is additional stress from **frequent salinity spikes.**

From Georgetown to Welaka, the river consistently looks like pea-green soup and **tests positive for toxic cyanobacteria.** In this segment, there is an almost complete loss of this ecosystem's vital eelgrass.

We are encouraged to report that there is SAV growth within most of the protective enclosures and in some cases near to historic levels. However, outside the protected areas, the submerged grasses are grazed to near stubble.

While SAV can still thrive in the St. Johns, multiple stressors may be slowing SAV growth enough for it to succumb to background grazing pressure. Stressors include saltwater intrusion, less light availability due to higher, darker water, frequent algae outbreaks, herbicide spraying, and invasive species.

In 2025, the St. Johns River Water Management District (SJRWMD) released their technical publication SJ2025-04 titled *Long-term Dynamics of Submerged Aquatic Vegetation Abundance and Obstacles to Recovery in the Lower St. Johns River* that underscores our concerns:

- Salinity intrusions in the estuarine sections have been more stressful to SAV during the post-Irma recovery than during the successful 2002-2004 recovery period
- Light availability in the fresh sections during the post-Irma period is lower than during the successful 2006-2008 recovery period, driven by deeper water and higher color.
- It is possible that the higher ambient total phosphorus (TP) concentrations in the recent period contributed to a greater epiphyte load on SAV or contributed to algal blooms localized to the littoral areas inhabited by SAV, but these data are not collected by the current ambient center-channel monitoring.
- Overall, water quality and hydrological conditions in the wake of Hurricane Irma are less conducive to SAV recovery than during previous periods of successful recovery after less severe die-offs.

SJRWMD also committed in their recently approved 2026-2030 SJRWMD Strategic Plan to investigate, continue monitoring and develop plans for natural systems improvement.

We will continue to advocate for a holistic approach for immediate relief, restorative and protective measures and long-term sustainability.

While there is not a silver bullet solution that will SAVe Our River's Grasses, **there are restorative and proactive measures that can reduce stress sooner than later.**

Our river needs an action plan that includes immediate relief, restoration projects, long-term preventative strategies and proactive measures to protect and restore the St. Johns River way of life for future generations to come.

For starters, steps must be taken to **reduce upstream nutrient pollution** in the St. Johns as the 2008 LSJR Basin Management Action Plan promised 17 years ago. One way to do this is to **ban the transfer of South Florida's sewage sludge to the St. Johns River Upper Basin.**

In addition, restoration of the Ocklawaha River will promote a more natural, healthy ecosystem in the Lower St. Johns by restoring the natural delivery of eelgrass seeds, freshwater and of both silica and nitrate-nitrogen that can offset harmful algae blooms.

In 2026, our SAV team will return to the St. Johns to conduct the 4th year of monitoring SAV and water quality. We will expand our water quality monitoring to include sediment and nutrient analysis to address insufficient data and to further our understanding of SAV stressors and solutions to save eelgrass in the St. Johns for today and future generations.

Thank you to everyone who makes this effort possible. Together, we are making a difference.

For the River!

Lisa Rinaman

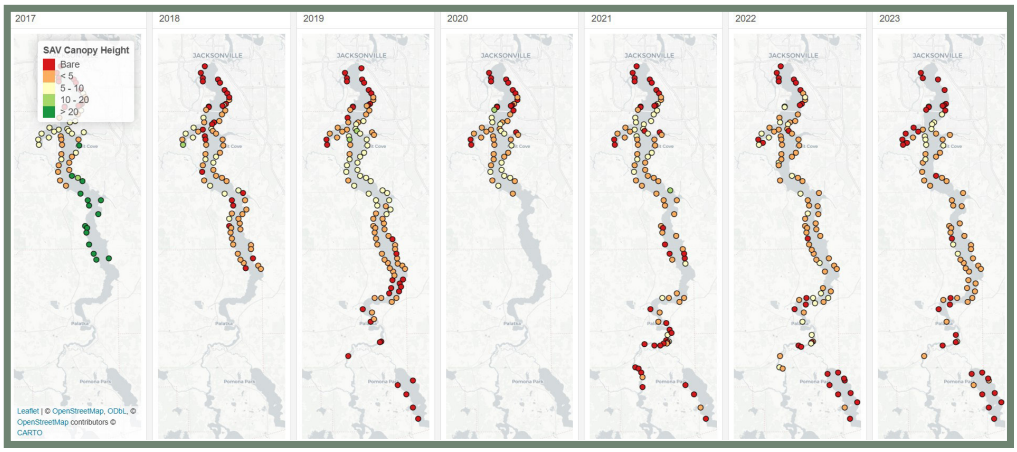
Lisa Rinaman
Your St. Johns Riverkeeper

SAV Significance and Trends

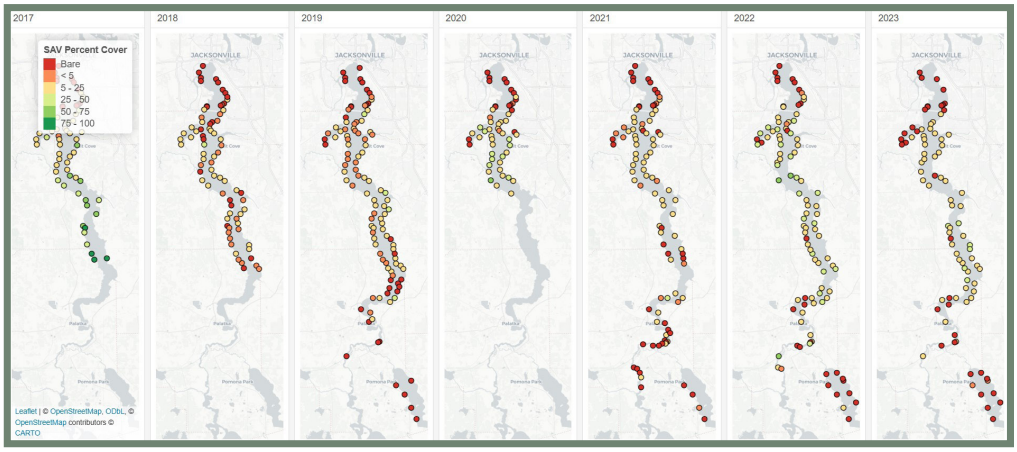
Submerged aquatic vegetation (SAV) is the foundation of our river's health – providing biofiltration, habitat for both commercial & recreational fisheries, erosion control, oxygenation of the water column, carbon sequestration & storage, and more.

Dan Kolterman, project manager Florida Fish & Wildlife Commission (FWC), stated that SAV "are one of the most important biological components of the river. These grasses provide key ecosystem services including nursery and foraging habitat for many species of fish and wildlife, they help bind up nutrients, stabilize the sediments, and wave energy attenuation." (Palatka Daily News, 2023).

SAV Canopy Height 2017-2023 (SJRWMD)



SAV Percent Cover 2017-2023 (SJRWMD)



Unfortunately, the St. Johns River SAV is suffering mounting threats and stress resulting in the near demise of our river's submerged grasses much to the alarm of scientists, fishermen, homeowners and river enthusiasts. SAV stressors are often compounded by one another, making recovery all the more difficult for this fragile ecosystem.

These maps by St. Johns River Water Management District (SJRWMD) show the stark reality of SAV's significant decline from 2017-2023. Both the canopy height (how tall the grass stalks are from root to tip) and percent cover (a/k/a grass bed density) have suffered extreme loss as a result of multiple stressors. Stressors are conditions that cause damage, kill, or stunt SAV growth.

SAV Stressors Watershed-Wide

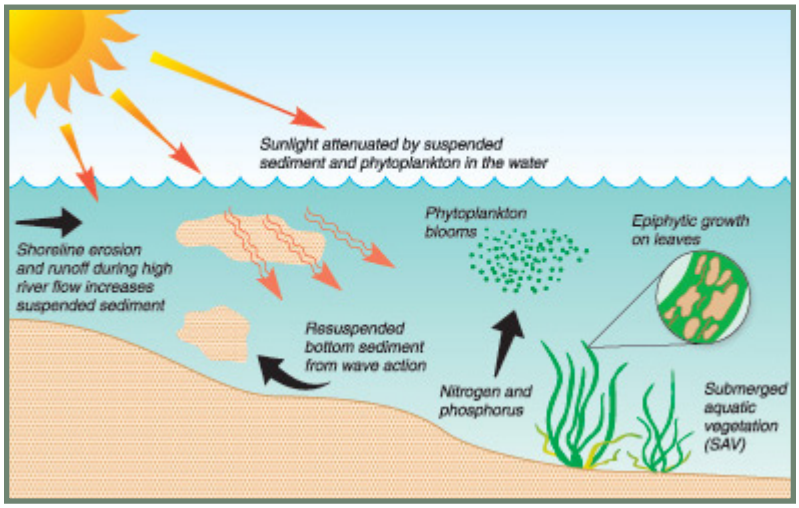
State and federal agencies have identified a variety of stressors that negatively affect SAV. They are often linked together, and thus separating each into individualized causation factors is difficult. Additionally, stressors affect the St. Johns' grasses differently, depending on location, species, and whether these stressors are compounded upon one another. In general, documented stressors (Sagan, 2007; Goldberg, et al., 2018; & Pinto, et al., 2022) fall into the following categories:

1. **Increased light attenuation** (aka lack of light penetration) due to conditions such as algal blooms, higher water levels, high color content, turbidity, & irresponsible development
2. **Increased salinity** due to dredging, overpumping of our aquifer, structural flow interference, sea level rise, & drought
3. **Extreme climatic events** including hurricanes, flooding & drought
4. **Water quality degradation** due to factors such as nutrient pollution & sedimentation
5. **Grazing pressure or disruptive behaviors** by species such as turtles, blue crabs, and manatees
6. **Invasive Species and Invasive Plant Spraying -** Invasive species and plant spraying harm the river by destroying SAV, increasing turbidity, and adding chemicals and nutrients.

Following Hurricane Irma in 2017, scientists concluded that the vast majority of SAV disappeared in the Lower St. Johns River with estimates as high as 99% (Virnstein, 2022).

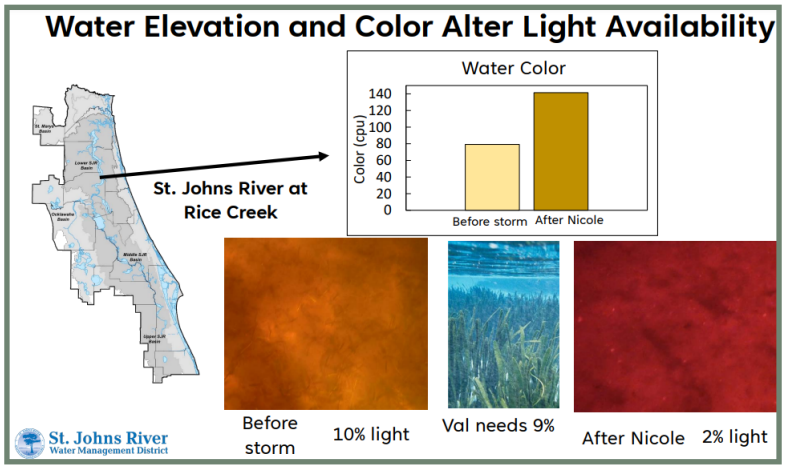
SAV does periodically decline as a result of droughts or hurricanes, but the grasses typically begin to grow back within a few years. However, SAV diversity and abundance in the St. Johns have not bounced back since Hurricane Irma due to persistent higher, darker water that has decreased light availability.

Light Attenuation



Light attenuation is the gradual decrease in light intensity as it passes through water due to light being absorbed or scattered by water, suspended particles or dissolved chemicals. A function of water clarity, light attenuation has been identified as a major factor limiting the depth at which SAV can thrive (Midwood, et al., 2021).

As light attenuation increases, light intensity decreases and SAV is unable to photosynthesize as efficiently. Light attenuation is increased by factors like high color, algal blooms, and suspended solids. High color can be caused by changes in flow (due to powerful storms & precipitation events), accumulation of sediment, and algae particulates. While the light-attenuating color of the Lower St. Johns River is mostly of natural origin, the two other factors that increase light attenuation, chlorophyll-a and total suspended solids, are often anthropogenic, caused by human activity. (Sagan, 2007).



Irresponsible development practices and urban sprawl can also lead to increased light attenuation in the water column. Coastlines developed with residential units are associated with nutrient enrichment in the adjacent waterways and phytoplankton blooms, which contribute to low-light conditions (Goldberg, et al., 2018). The figure above depicts a conceptual diagram of

factors affecting water clarity as they relate to light attenuation. Impacts of nutrients, sediments, algal blooms, and epiphytic growth on SAV can affect the amount of sunlight reaching the plants (USGS, 2018).

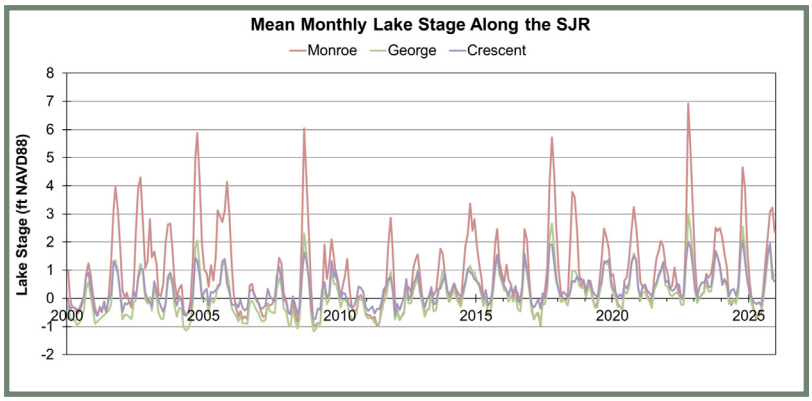
The chlorophyll-a target for the Lower St. Johns River has been exceeded since 2018. There are increasing occurrences of light-blocking harmful algae blooms and toxins making the river's freshwater cloudier and more dangerous for public use.

According to SJRWMD, water color and water depth are the dominant light attenuation factors in the Lower St. Johns.

Extreme Climatic Events

"Tropical storms and hurricanes not only increase light attenuation by increasing color and suspended solids in the system, they can also remove SAV through physical scouring of the littoral zone" (Sagan, 2007).

In 2017 Hurricane Irma wiped out SAV from Lake George north through Putnam County to Southern Clay and St. Johns Counties. The typical flow rate of the St. Johns River is between 2-11 billion gallons/day, depending on drought and flood conditions. During Irma, the flow rate hit 88 billion gallons/day; this rate may not even represent the maximum, however, as the gauge on the Acosta Bridge was rendered inoperable after this measurement. More than 90% of the SAV was lost after Hurricane Irma and the stressors continue to stunt the return of the grasses.



Since Hurricane Irma, water levels remain persistently higher in the Middle and Lower St. Johns River during the periods of the year with typically low water elevations.

Higher water levels mean greater light attenuation due to both deeper water depth and darker water color resulting from dissolved organic matter from the submerged floodplain's vegetation. Less light means less growth of SAV making it more susceptible to grazing pressure.

Though Hurricane Ian in September 2022 did not have the sheer magnitude of water in comparison to Irma, the St. Johns still saw as much as 20 inches of rainfall in the Upper and Middle Basins. This caused prolonged flooding of homes and businesses near the river for weeks triggering sewage system discharges and damage to septic systems, spilling millions of gallons into Floridian waterways.

Tropical Storm Nicole in November 2022 was less extreme than Hurricane Irma, but the fact that it landed on the East Coast impacted the St. Johns River more quickly and directly than Irma or Ian which landed on the Southwest coast. Additionally, its path was significantly wider. Nicole also claimed the area's worst storm surge since the early 1900s with the exception of Irma, reaching 3.57 feet (News4JAX, 2022), which when combined with wind gusts of 70 mph, sent repeating bulges of water into the river mouth.

Storm impacts are even more disastrous in areas where wetlands have been reduced; under normal conditions, the river's network of vegetation and wetlands act like a sponge by slowing the flow, providing flood control, absorbing nutrients, and filtering out sediment. When the wetlands are reduced through human impacts (i.e. dredging the river, industry, residential housing & commercial real estate), the river's natural ability to slowly filter runoff is inhibited. This increases flooding in areas near the river and increases the risk of toxins, turbidity, and nutrient runoff, which can cause extreme harm to SAV health.

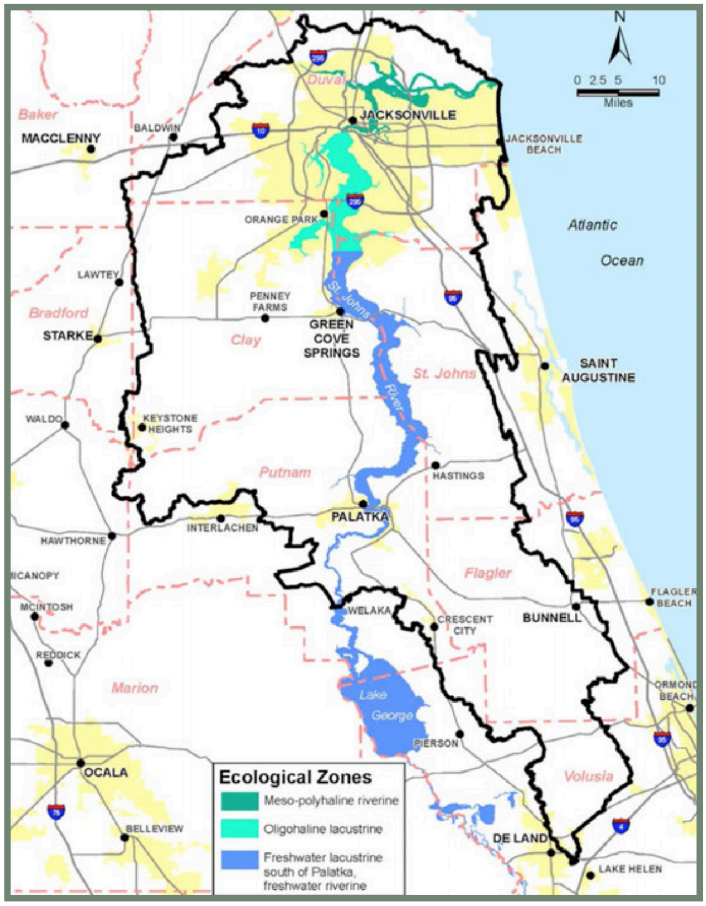
Historically, our river's grasses bounced back after extreme climatic conditions, but SAV abundance and diversity has not bounced back since the 2017 die off. This failure to recover underscores the importance of identifying and understanding all of the stressors as they relate to SAV.

Consecutive hurricanes, Hurricanes Milton and Helene in 2024, also resulted in darker, deeper water and flooded the river with excess tannins from nearby swamps, transforming our blackwater river from an iced tea clarity to a coffee-like opacity.

Hurricane Milton resulted in prolonged floods, as sustained northeasterly winds caused the river to reverse flow for several days. During storms such as these, downstream water levels remain elevated due to the St. Johns' naturally slow flow, and can be further exacerbated by seasonal king tides that increase tidal levels by 1-2 feet. These conditions block essential sunlight from reaching the river's struggling eelgrass.

Salinity

SAV found in the Lower St. Johns River Basin is primarily freshwater and brackish water species (Pinto, et al., 2025), meaning that they are highly sensitive to salinity stress. *The Summary of Submerged Aquatic Vegetation (SAV) Status Within the Lower St. Johns River 1996-2007* prepared by Jennifer Sagan documents the effects salinity has on SAV during drought periods occurring from 1999-2001 and 2006-2008. During these periods, some areas in the lower (Duval, and northern parts of Clay & St. Johns Counties) reaches of the river were completely stripped of SAV presence due to higher than normal salinity concentrations.



The 2025 SJRWMD Publication looking at long-term trends in SAV confirms the importance of salinity: from 2002-2004, SAV recovered after the drought-induced salinity die-off. After Hurricane Irma, estuarine SAV beds were again exposed to more severe salinity maximums and greater overall salinity stress than their 2002-2004 recovery period. Increased saltwater intrusion is accelerating due to sea level rise, deepening of the St. Johns River at the mouth, and overuse of our aquifer that is reducing freshwater spring flow.

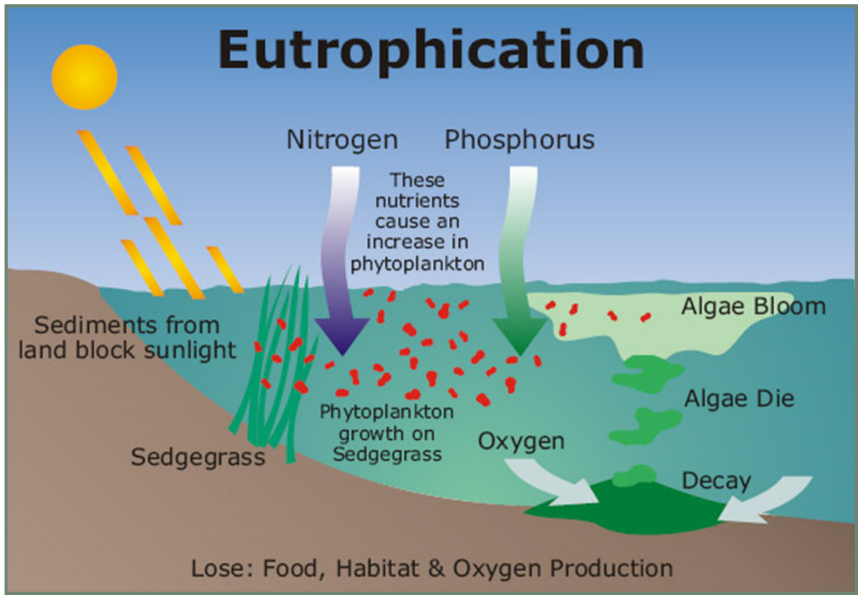
According to the 2025 State of the River Report for the Lower St. Johns River Basin, the St. Johns River can be split into three Ecological Zones based on salinity (Pinto, et al., 2022): **Ecozone 1** - Mesohaline (closest to the Atlantic Ocean); **Ecozone 2** - Oligohaline; and **Ecozone 3** - Freshwater Lacustrine as one moves upstream (southward).

The graphic on the previous page depicts these zones and their ranges throughout the St. Johns River. Due to their salinity intolerance, SAV can only fully establish itself in Ecozones 2 and 3. This is more true now than in years past with more recent and frequent salinity intrusion.

The 2025 State of the River Report for the Lower St. Johns River Basin reports that the river's ecology has been negatively impacted as a result of long-term rising salinity and is worsening due to increasing saltwater intrusion that is harming wildlife, SAV, and river health.

Water Quality: Harmful Algal Blooms & Nutrient Pollution

A harmful algal bloom (HAB) occurs when algal density rapidly increases in an aquatic system; this is often caused by excess nutrients, commonly referred to as eutrophication. The graphic below (IRL, 2020) portrays the eutrophication process and its effects on the water column. With millions of cells per liter, HABs deplete available oxygen in the water column, block available sunlight penetration, and can be highly toxic. While they can occur naturally, nutrient pollution increases their frequency, duration and intensity.



Increased dissolved nutrients can also increase both populations and density of light-blocking epiphytes (Stallings, et al., 2015). Epiphytes are any non-parasitic plant that grows upon another plant for physical support. Overall, SAV productivity can be greatly hindered by competition with phytoplankton for light and epiphytic growth on shoot and blade surfaces (Goldberg, et al., 2018; Boustany et al. 2010).

"Nutrient enrichment stimulates harmful algal blooms, which can produce toxins and shade the water column, reducing the light available to support critical SAV." - SJRWMD Strategic Plan 2026-2030

Nutrient pollution is caused by various factors; these include sewage sludge (biosolids) seepage from land disposal, fertilizer run-off, wastewater discharge, and septic tank or lift station leaks.

Grazing Pressure

Blue crab, turtles, and manatees are some of the known dominant grazers of SAV in the St. Johns River. Other species like invasive tilapia damage SAV by disruptive feeding behaviors and nest building. Grazing pressure has not historically been a major stressor of SAV due to the river's

naturally abundant grasses. However, due to other stressors (primarily light attenuation, salinity, and water quality), SAV is unable to increase its growth rate (Morris & Tomasko, 1993) and build the biomass (Goldberg, et al., 2020) necessary to revive the once-ample beds throughout the river. This creates a ripple effect up the trophic chain and starves aquatic wildlife that rely on SAV.

According to a FWC and SJRWMD 2023 Report, herbivory (grazing pressure) is a limiting factor for SAV in the Lower St. Johns, and atypically high grazing pressure may ultimately be limiting recovery amid typical water clarity conditions. However, there are a number of alternative scenarios for which grazing is only a proximate limiting factor. Elevated salinities and epiphyte loads increase light requirements for SAV (Sand-Jensen 1977, Kraemer et al. 1999, French and Moore 2003, Dobberfuhl 2007). Either stressor, or a combination of the two, may slow plant growth enough such that background grazing pressure is enough to limit recovery. (Timbs & Kolterman 2023).

Invasive Species and Invasive Plant Spraying

The introduction and spread of non-native invasive species constitute one of the most pressing and far-reaching challenges to the ecological stability of aquatic systems, including the St. Johns River. Non-native invasive species are organisms or biological materials that appear outside their natural range, often because of human activity, and pose a threat to native species. In the St. Johns River, many of these invasive species are changing the balance of native species and altering habitat conditions.

Of particular concern are tilapia and armored and brown hoplo catfish, due to their burrowing behavior. Continuous burrowing by these invasive species destabilizes sediments, elevates turbidity, and contributes to eutrophic conditions, all of which negatively affect SAV habitat. Notably, armored catfish have been found to retain significantly more phosphorus in their bodies than many other fish species. They alter nutrient dynamics not by releasing more soluble phosphorus, but by storing it, effectively becoming large biological sinks. This can reduce the amount of phosphorus immediately available to native species and, if large die-offs occur, may ultimately contribute to nutrient spikes that degrade SAV communities.

Invasives such as these also exert competitive pressure on native fish populations, often displacing them and altering species composition.

Tilapia pose a significant ecological threat in the St. Johns River and surrounding systems. Tilapia nests can occur at very high densities, and their extensive nesting activity can severely damage aquatic vegetation, including SAV, ultimately degrading habitat quality. The species is rapidly increasing in abundance; in Silver Springs, tilapia comprise over 88% of the total fish population. Expanding harvesting efforts may be necessary to help mitigate their impacts and reduce pressure on native plant and animal communities (Moody, 2021). The invasive nature of tilapia, coupled with their resilience to stressors affecting SAV, including elevated salinity and poor water quality, illustrates the hazard these species pose to natural aquatic plant communities.

Although additional research is needed to fully quantify their impacts on SAV, tilapia's increasing abundance, facilitated via fewer severe freezes, underscores the need for continued evaluation of these species and their potential threats to the St. Johns River and its native species.

Managing tilapia and other invasive fish in the St. Johns River presents significant challenges, and no simple solutions currently exist. Permitting agencies, such as the St. Johns River Water Management District (SJRWMD), may authorize targeted removal efforts in specific areas of the river. Potential control strategies, including incentive-based removal programs (e.g., "reward challenges") and genetic manipulation, could be a consideration but require further research to assess feasibility, efficacy, and ecological safety.

Another significant threat to the St. Johns River and its SAV is the current approach to managing invasive plants through herbicide spraying. Herbicide applications intended to control invasive aquatic plants present additional challenges for SAV recovery. Treatments using chemicals such as 2,4-D, Diquat, Carfentrazone, Glyphosate, Imazamox, Penoxsulam, Triclopyr, or Flumioxazin are often applied on a recurring schedule rather than as a one-time intervention.

After herbicide application, the treated plants die but remain in the water column for a period before sinking to the riverbed, where they are decomposed by bacteria and other microorganisms. This decomposition consumes substantial dissolved oxygen, which can create hypoxic conditions and lead to fish mortality, especially during warm or low-light periods.

Decomposing plant biomass also contributes nutrients that can stimulate algal proliferation, leading to algal blooms, which further deplete dissolved oxygen upon decomposition. Over time, this leads to a buildup of nutrient-rich organic material on the river bottom, often several feet deep, which inhibits the reestablishment of SAV, increases water turbidity, and concentrates nutrients such as nitrogen and phosphorus, creating conditions conducive to recurrent algal blooms.

Managing invasive aquatic plants in the St. Johns River requires strategies that are both effective and protective of native vegetation and water quality. Promising approaches include mechanical removal, such as cutting, raking, or harvesting invasive plants, which can reduce their abundance without the use of chemicals.


Photo Credit The Gainesville Sun

Better oversight and quality control is also needed to ensure the prevention of excessive or unintended herbicide application. Targeted chemical treatments can be effective; applying herbicides only to specific problem areas, rather than broad-scale spraying, helps minimize impacts on native SAV. Combining chemical treatments with mechanical or biological controls is often the most sustainable approach.

Prevention and monitoring are also critical; educating the public to clean boats and equipment, restoring native plants along shorelines, and conducting regular surveys can help prevent the spread of invasives and allow rapid response to new infestations.

The SJRK team continues to collaborate with partner organizations and review monitoring data from SJRWMD, USACE, and FWC to improve understanding of SAV loss in the St. Johns River, including impacts from invasive plant management practices such as herbicide applications, and to inform proactive restoration strategies.

SAVe Our River's Grasses Expedition Overview

St. Johns RIVERKEEPER (SJRK) launched the SAVe Our River's Grasses Expedition in 2023 in response to the substantial decline of submerged aquatic vegetation (SAV) within the Lower St. Johns River system. This initiative aims to investigate the causes of SAV loss and identify strategies for restoration. The SJRK team surveys an 80-mile stretch of the river between Doctors Lake and Lake George three times during the SAV growing season, which typically extends from March through October. During each survey, the team documents the presence and extent of remaining grass beds, collects detailed habitat and water quality data, and works to develop science-based solutions to support the recovery of this critical aquatic ecosystem.

Year 3 - 2025

In 2025, SJRK's SAV team returned to the river during the growing season to continue this critical research, marking the third year of the ongoing multi-year study (2023–2027) aimed at identifying solutions to reverse the extensive decline of SAV within the St. Johns River. The 2024 Expedition expanded from the original 11 monitoring sites established in 2023 to a total of 14 sites, which were continued in 2025 to maintain consistency in long-term data collection.

Protective Enclosure Initiative

In Spring 2025, St. Johns Riverkeeper (SJRK) installed 10 small-scale exclusion fences along its expedition route in the St. Johns River, with support from riverfront homeowners and volunteers, and funding from a generous donation by the Coastal Conservation Association (CCA), following Florida Fish and Wildlife Conservation Commission (FWC) installation guidelines. This effort did not involve SAV planting: its goal was to simply protect the native, viable seed bank/rhizome network and the existing grasses' ability to grow, germinate and disperse without grazing pressure. This strategy does not harm wildlife and has proven to quickly facilitate the regrowth of native grasses.

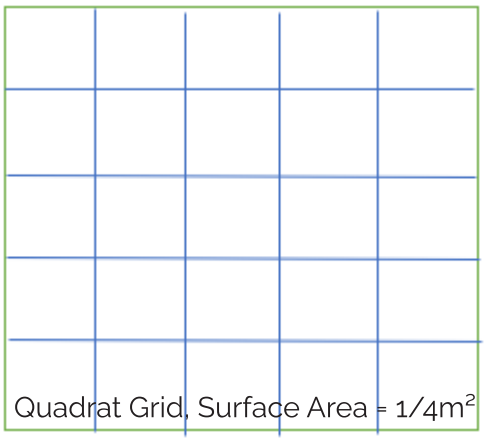
This initiative expands our research and understanding of SAV growth rate combined with our continuing water quality data collection and surveying of SAV within the enclosures and outside the protective fencing for at least 2 years.

Research Methods

Research methods include quadrat and transect sampling to assess SAV canopy height, percent cover, and bed density, along with comprehensive water quality analyses measuring depth, temperature, turbidity, chlorophyll-a, dissolved oxygen, salinity, and pH. The 2025 findings derived from these methods are presented in this document.

SAV were analyzed using Quadrat Sampling and Line Intercept Sampling methods. Quadrat Sampling was employed to quantify percent cover and canopy height of SAV along established transect lines. Intercept Sampling was used to determine the bed length and spatial distribution of individual SAV species.

At each site, two fixed stakes were installed: one adjacent to the shoreline and another positioned 10 meters offshore. A 10-meter transect line, marked at one-meter intervals, was secured between the stakes. In addition, a transect tape was laid along the substrate to ensure measurement accuracy to the millimeter. This setup established the standardized transect from which both quadrat and line intercept sampling were conducted.


Quadrat Grid, Surface Area = 1/4m^2

Quadrat Sampling: Using a 10-meter transect line attached to two fixed stakes, team members placed one stake at the shoreline and extended the line 10 meters offshore. Depending on SAV presence, sampling was extended offshore to the point where vegetation was no longer observed, in order to obtain a more accurate assessment of overall bed extent. At the start of each 10-meter section, a compass bearing was recorded to ensure consistent transect orientation for future sampling events. Water depth measurements were recorded at each meter mark along the transect. At each meter, a 0.25 m^2 quadrat grid (see above) was placed directly along the transect line. Within each quadrat, team members conducted nondestructive assessments by manually feeling for SAV to determine (1) presence/absence and (2) canopy height. When species identification was uncertain in the field, a representative sample was collected for further analysis.Percent cover was calculated by counting the number of occupied grid squares out of 25; for example, if 13 of 25 grid squares contained SAV, the percent cover was recorded as 52%.

Intercept Sampling: This sampling method utilized the transect tape previously placed along the substrate between shoreline and offshore stakes. Beginning at the shoreline, observers carefully felt along the transect tape to detect the presence of SAV within a 0.5-meter swath extending to the left of the tape for the entire transect length.

When SAV was detected, observers recorded both the starting and ending distances from shore for each occurrence, along with the corresponding species identification. If species identification was uncertain in the field, a representative sample was collected for further analysis. This method provides quantitative data on SAV bed length, spatial distribution, and species composition.
In addition to the two primary sampling methods described above, qualitative observations were also recorded, including the presence of flowering SAV, evidence of epiphytic growth or animal activity on vegetation, unusual wildlife behavior, shoreline vegetation composition, and substrate type.

Site No.*	WBID No.**	Salinity Zone***	Species Observed
1	2372	Oligohaline	- *Vallisneria americana*
2	2372, 2213H	Oligohaline	- *Vallisneria americana* - *Eleocharis sp.* - *Ruppia maritima* - *Najas guadalupensis*
3	2213I	Freshwater lacustrine	- *Vallisneria americana* - *Eleocharis sp.* - *Chara sp.* - *Najas guadalupensis*
4	2213J	Freshwater lacustrine	- *Vallisneria americana* - *Chara sp.* - *Najas guadalupensis*
5-8	2213L, 2213M	Freshwater lacustrine	- *Vallisneria americana* - *Chara sp.* - *Ruppia maritima* - *Najas guadalupensis* - *Sagittaria subulata*
9	2213N	Freshwater lacustrine	- *Vallisneria americana* - *Chara sp.*
10-11	2213O	Freshwater lacustrine	- *Vallisneria americana* - *Chara sp.*
12-14	2893A5	Freshwater lacustrine	- *Vallisneria americana* - *Chara sp.* - *Ruppia maritima*

***Site Number** refers to St. Johns RIVERKEEPER Expedition sites

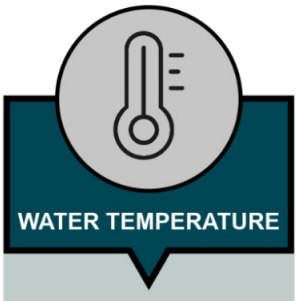
****WBID Number** refers to the Florida Department of Environmental Protection (FDEP) Water Body Identification number, which is a unique code for a specific assessment unit of Florida's water bodies, such as a lake, stream, spring, or coastal area.

*****Salinity Zone** refers to the ecological zones of the Lower St. Johns River.

2025 Detailed Site Findings

For Reference

This Report provides an overview of water quality parameters measured at each site and compares them to data from the previous year. For reference, exceedances are defined as follows:



WATER TEMPERATURE

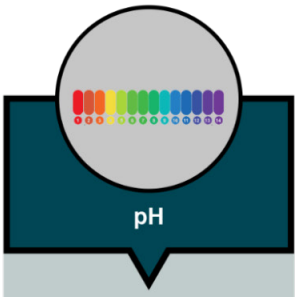
- Eelgrass does not tolerate excessively high temperatures well.
- **The upper limit is between 95-105°F** (35-40°C).
- Exceeding this range can damage the foliage and flowers, leading to wilting, drooping, and even leaf sunburn.
- Eelgrass can survive in temperatures as low as 55°F
- **It grows the best around 82°F (28°C).**

DISSOLVED OXYGEN

- The DO should **not be less than 38% saturation** in this studied river section.
- This is equivalent to approximately 2.9 mg/L at 30°C and 3.5 mg/L at 20°C.

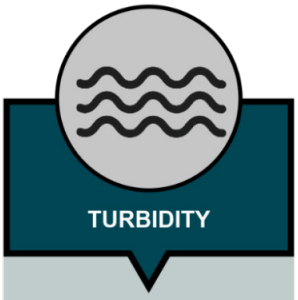
SALINITY

- Full strength seawater is 35 ppt
- Downtown Jacksonville is characterized by brackish water (a mix of fresh and saltwater), with salinity ranging from 10-18 ppt (saltwater) and 0-5 ppt (freshwater).
- Buckman Bridge and south, the river averages 0-5 ppt (freshwater)
- Eelgrass can survive in a **maximum salinity of about 10-12 ppt** but **does best at salinity levels around 5 ppt or below.**



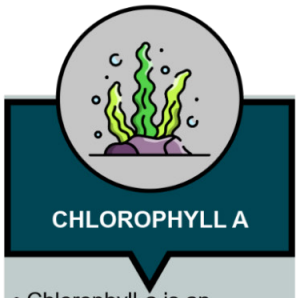
pH

- The national guidelines for water quality recommend that lakes and rivers have a **pH of 6.5-8.0** for the protection of aquatic organisms.
- SAV is essential for increasing pH levels by intaking CO_2, which mitigates the effects of ocean acidification.



TURBIDITY

- Anything **over 29 NTUs** above background exceeds Florida standards
- Background turbidity is the level of water cloudiness that naturally occurs due to normal conditions
- Above background is the turbidity measurement is elevated *beyond* that natural baseline, suggesting an additional source of suspended particles.



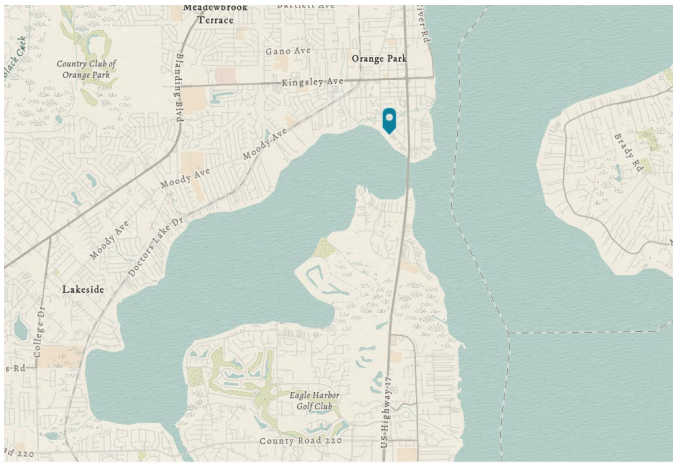
CHLOROPHYLL A

- Chlorophyll-a is an indirect measure of biological responses to nutrient enrichment.
- According to the Numeric Nutrient Criteria established by 62-302.531, Doctors Lake to Lake George has a Chlorophyll a threshold of **20µg/L**. The state has a BMAP-established Chlorophyll a freshwater threshold of 40µg/L, but this report will use the more site-specific threshold of **20 µg/L.**

Featured Species 2025

Species	Common Name(s)	Description	Image
Vallisneria americana	Eelgrass, Tape grass	• Leaf edges have fine teeth • Leaves are flat and ribbon-like, 0.5–4 cm wide • Leaf tips gradually taper to a point • Plant lacks a distinct stem • Grows 4–90 cm tall	
Najas guadalupensis	Water naiad, southern naiad, guppy grass	• Leaf whorls are loosely arranged, not tightly packed • Pairs or whorls of leaves are spaced widely along the stem • Leaves are opposite (in pairs) or occasionally occur in whorls of three • Leaf margins have fine teeth (visible under close inspection); leaves about 2 mm wide	
Ruppia maritima	Widgeon grass	• Leaves alternate along the stem and taper to a slender tip • Leaves are thread-like, approximately 0.5 mm wide • Plant height ranges from 4 to 20 cm	
Chara sp.	Muskgrass	• Leaf whorls are spaced noticeably along the stem • Leaves are not forked • Leaves are stiff and rough to the touch • Plant height ranges from 2 to 8 cm	
Eleocharis sp.	Spikerush	• Leaf margins smooth, without teeth • Leaves cylindrical and pencil-like, 1–3 mm wide • Leaves uniform in width from base to tip • Plant height ranges from 1–5 cm	
Sagittaria subulata	Dwarf Sagittaria, Dwarf Arrowhead, Awl-leaf Arrowhead, Narrow-leaved Arrowhead	• Leaf margins smooth, without teeth • Leaves triangular and spongy, 3–8 mm wide • Leaves taper to a pointed tip • Plant height ranges from 1–5 cm	

Site 1 - Doctors Lake



Doctors Lake is an inlet of the St. Johns River located in Clay County, Florida, encompassing approximately 13 square miles. Although termed a "lake," it functions as an estuarine inlet. Its hydrology is influenced by tidal exchanges with the Atlantic Ocean, resulting in a gradient of freshwater and saltwater conditions that support a diverse assemblage of aquatic organisms and provide multiple recreational opportunities.

Site 1 possesses a bulkheaded shoreline, with benthic substrate primarily composed of mucky sand. This site has an SAV enclosure, installed July 10, 2025 approximately 2,500 square feet in size. Sampling at this location is focused both inside and outside the enclosure.

WBID No.	Salinity Zone	Species Observed
2372	Oligohaline	*Vallisneria americana* (Eelgrass, Tapegrass)

Figure 1: Site Overview

Doctors Lake - Canopy Height: 2023-2025

Canopy heights at this site have generally remained short over time, with minor fluctuations observed across sampling months and years. Following the most recent sampling event, ***the overall trend appears to be worsening***.

May: In May 2023, no SAV was present. May 2024 showed improved canopy height at approximately 7cm, but by May 2025, canopy height had again decreased to 3 cm. The only species present at each field visit was *Vallisneria*. ***Overall, comparative May-May conditions appear to show decreased canopy height from 2023-2025.***

August & July: August 2023's minimal SAV canopy height increased to 6 cm by August 2024. 2025's sampling occurred in July rather than August, in an attempt to reduce exposure to potentially toxic algae. Five days prior to the July sampling, the protective enclosure was installed. Unfortunately, outside the enclosure still showed no SAV, but inside the enclosure SAV had begun to recover, exhibiting an average canopy height of 3 cm. ***Overall, comparative August/July conditions appear to show decreased canopy height from 2023-2025.***

October & September: In 2023, October's canopy height reached 3 cm. Due to consecutive hurricanes in September and October of 2024, this site was inaccessible for a full SAV transect in October 2024. A preliminary sweep for SAV was conducted in 2024, but no SAV was found. 2025's sampling occurred in September rather than October, in an attempt to reduce exposure to potentially toxic algae. SAV was likewise absent in September 2025, both inside and outside the enclosure. ***Overall, comparative October/September conditions appear to show decreased canopy height from 2023-2025.***

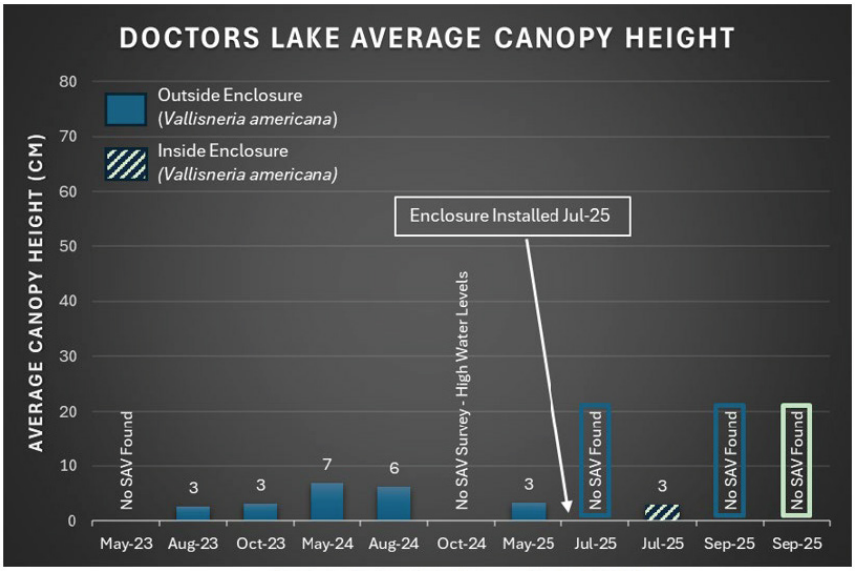


Figure 2: Doctors Lake Average Canopy Height

Doctors Lake – Percent Cover: 2023-2025

Percent cover at this site was consistently low across all field visits, with the highest occurring in October 2023 at 34%. Following the most recent sampling event, ***the overall trend appears to be worsening***.

May: In May 2023, no SAV was present coinciding with high salinity levels. May 2024 showed improved percent cover at approximately 33%, but by May 2025, cover had decreased to a mere 1%. ***Overall, comparative May-May conditions appear to show decreased percent cover from 2023-2025.***

August & July: The percent cover in August 2024 was slightly less than 2023, averaging 21% compared to 30%. 2025's sampling occurred in July rather than August, in an attempt to reduce exposure to potentially toxic algae. Five days prior to the July 2025 sampling, a protective enclosure was installed. Unfortunately, outside the enclosure still showed no SAV, but inside the enclosure SAV showed a preliminary attempt at recovery, exhibiting 1% cover. ***Overall, comparative August/July conditions appear to show decreased percent cover from 2023-2025.***

October & September: October 2023's percent cover was 34%, but as previously mentioned, consecutive hurricanes in September and October of 2024 resulted in the decimation of SAV and the surrounding littoral zone in 2024.. A preliminary sweep for SAV yielded no discovery. SAV was likewise absent in September 2025, both inside and outside the enclosure. ***Overall, comparative October/September conditions appear to show decreased percent cover from 2023-2025.***

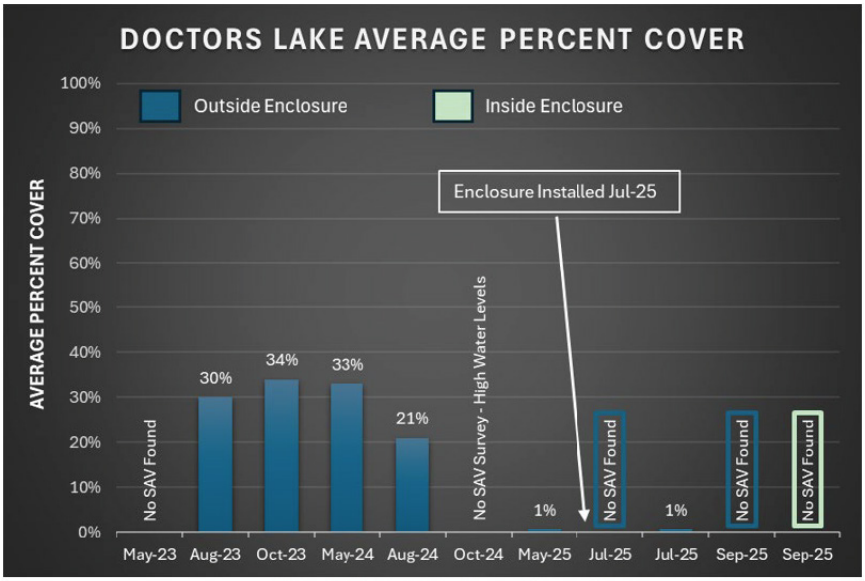


Figure 3: Doctors Lake Average Percent Cover

Growing Season Trends: Canopy height and percent cover ***increased*** from May - October 2023. Canopy height and percent cover ***decreased*** from May - October 2024. Likewise, canopy height and percent cover ***decreased*** from May - September 2025, both outside and inside the enclosure.

Doctors Lake – Water Quality: 2023-2025

Overall, water quality parameters at this site remained consistent with comparative year-onyear conditions and were within SAV's optimum thresholds for growth, with the exception of **salinity, pH, and Chlorophyll a**. Salinity rose above the upper cap of the optimum range (05.0) in both May 2023 and May 2024 at 6.3 and 6.0, respectively. Though within the optimum range, salinity also showed notable increases in May and July 2025 compared to August 2024, rising from 1.3 parts per thousand (ppt) to 4.5 and 4.8 ppt in May and July, respectively. This may be partially explained by the fact that Clay County experienced less rainfall in July compared to the previous 4 years (see Fig. 7). Florida's wet season, running from MayOctober annually, typically causes an influx of freshwater flow from increased rainfall, thereby reducing salinity in the receiving area. If an area experiences less-than-average rainfall, it could contribute to higher salinity, as seen at the Doctors Lake site. pH was above the upper cap of the optimum range (6.5-8.0) in October 2023 and May 2024 at 8.3 and 8.5, respectively. Chlorophyll a spiked to 17.4, nearly at the 20 µg/L threshold, in May 2023.

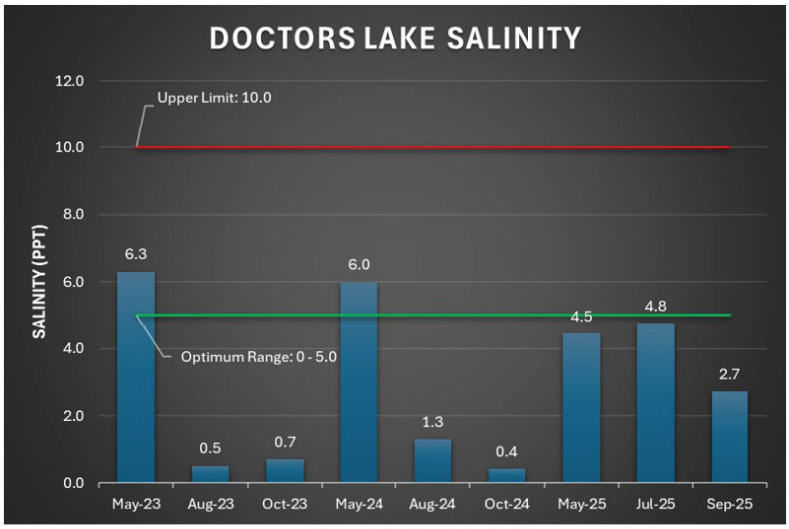


Figure 4: Doctors Lake Salinity

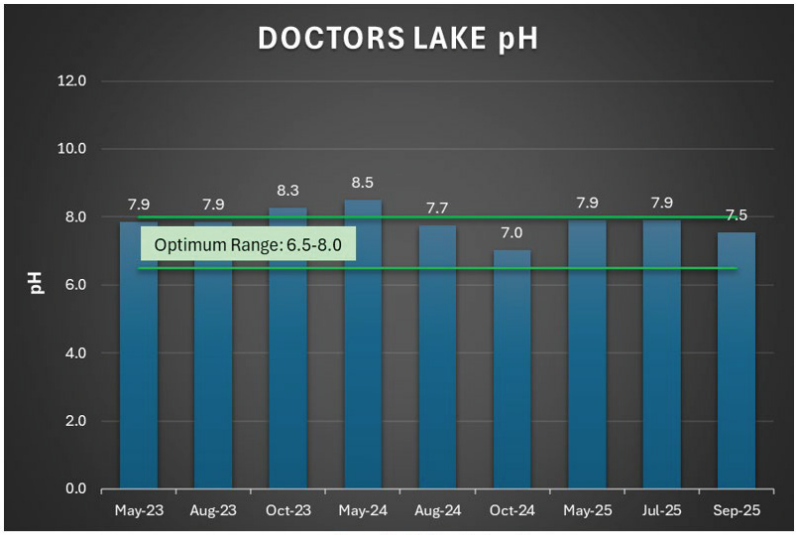


Figure 5: Doctors Lake pH

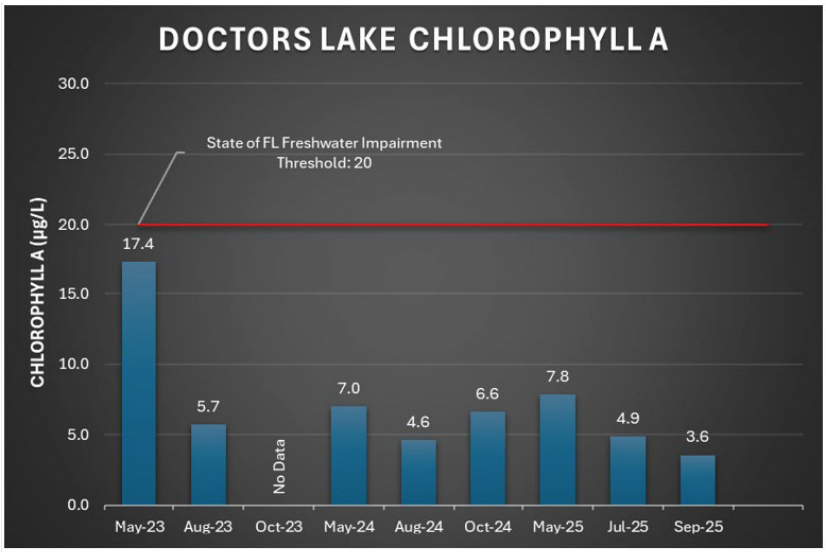


Figure 6: Doctors Lake Chlorophyll A

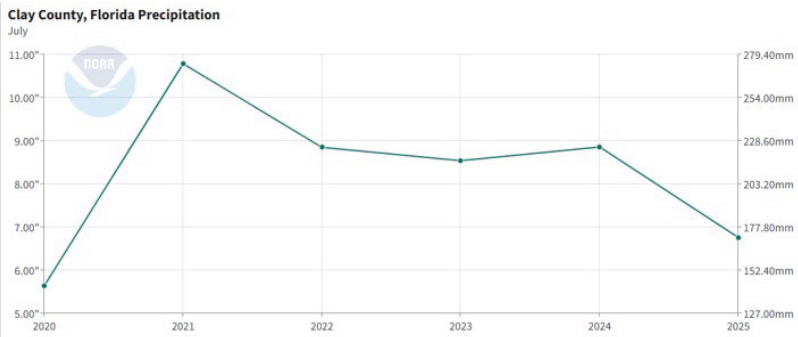
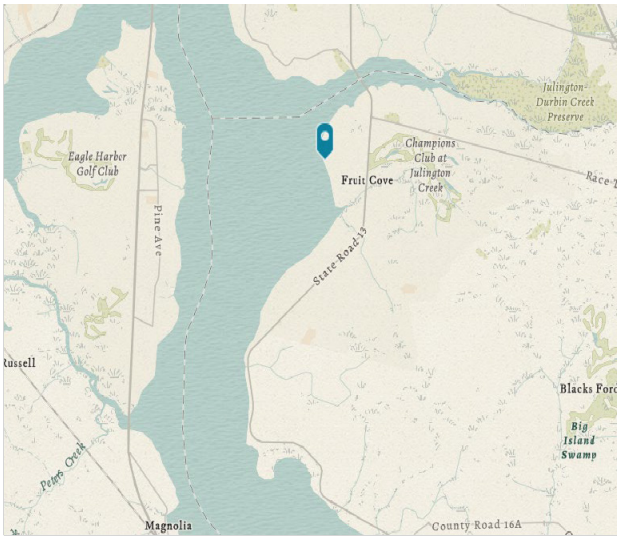


Figure 7: 5-Year Average July Precipitation, Clay County



Site 2 - Fruit Cove

Site 2 is located at Fruit Cove in St. Johns County, positioned along the eastern shoreline of the St. Johns River just south of Julington Creek.

This site is important due to its proximity to freshwater inputs, its historical SAV abundance, and its position within a transitional zone where shifts in water quality and salinity gradients can strongly influence SAV resilience and recovery.

The site possesses a natural shoreline, with benthic substrate primarily composed of fine sand. This site has an SAV enclosure installed May 1, 2025 approximately 8,700 square feet in size. Sampling at this location is focused both outside and inside the enclosure.

WBID No.	Salinity Zone	Species Observed
2213H	Oligohaline	*Vallisneria americana* (Eelgrass, Tape grass) *Eleocharis sp.* (Spikerush) *Ruppia maritima* (Widgeon grass) *Najas guadalupensis* (Water naiad, Southern naiad, Guppy grass)

Figure 8: Site Description Overview

Fruit Cove - Canopy Height: 2023-2025

Canopy height at this site has generally remained short over time, with minor fluctuations observed across sampling months and years, until the installation of the protective enclosure when height and species diversity improved. Following the most recent sampling event, ***the overall trend appears to be improving, both inside and outside the enclosure***.

May: In May 2023, no SAV was present. May 2024's canopy height improved slightly to 4 cm, and May 2025's canopy height showed similar canopy heights with increased species diversity (see Fig. 9). The protective enclosure at the Fruit Cove site was installed on May 1, 2025, and early results have been promising. Notably, there were encouraging signs of both increased species diversity and growth of the SAV canopy. ***Overall, comparative May-May conditions appear to show increased canopy height and species diversity from 2023-2025.***

August & July: August canopy heights improved slightly from 2023 to 2024, increasing from 2 cm to 5 cm. 2025's sampling occurred in July rather than August, in an attempt to reduce exposure to potentially toxic algae. Compared to the years prior, canopy height remained relatively consistent outside the enclosure in July 2025, and a slight increase in species diversity with the addition of *Ruppia maritima*. Inside the enclosure, the results were markedly improved: species diversity again improved, with the addition of *Eleocharis sp.*, but even more notably, the canopy height jumped to 9 cm and 23 cm for *Vallisneria* and *Eleocharis*, respectively. ***Overall, comparative August/July conditions appear to show increased canopy height and species diversity from 2023-2025.***

October & September: October canopy heights worsened slightly from 2023 to 2024, decreasing from 3 cm to 2 cm. However, after four months of enclosure presence, canopy height showed remarkable improvement. Outside the enclosure, canopy heights remained relatively consistent at 6 cm and 7 cm for *Vallisneria* and *Eleocharis*, respectively. Inside the enclosure, canopy height and species diversity increased substantially to 15 cm (*Vallisneria*), 22 cm (*Eleocharis*), and 9 cm (*Najas guadalupensis*). ***Overall, comparative October/September conditions appear to show increased canopy height and species diversity from 2023-2025.***

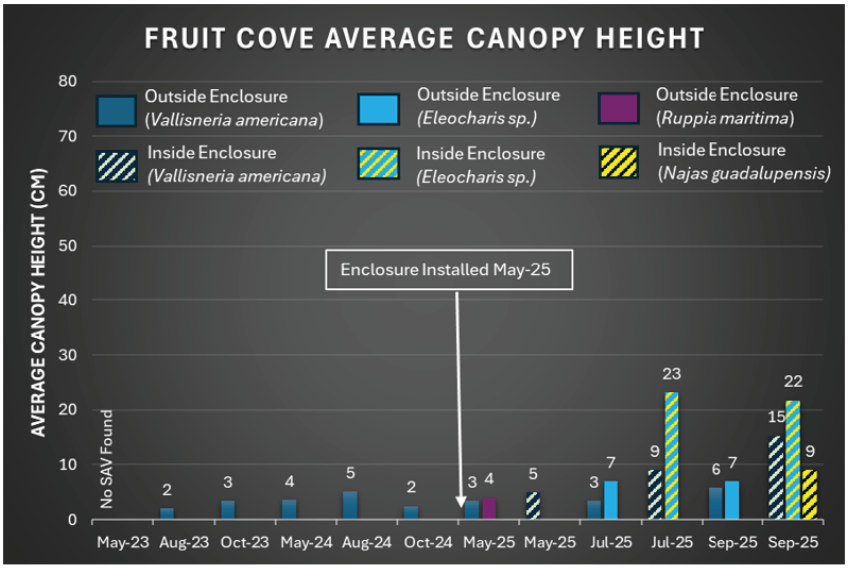


Figure 9: Fruit Cove Average Canopy Height

Fruit Cove - Percent Cover: 2023-2025

Percent cover at this site has generally remained low (0%-46%) from 2023-2024, with minor fluctuations observed across sampling months and years, until the installation of the protective enclosure when coverage improved inside the enclosure (39%-80%). Following the most recent sampling event, ***the overall trend appears to be improving inside the enclosure and worsening outside the enclosure***.

May: In May 2023, no SAV was present. May 2024's percent cover improved to 46%, but May 2025's cover decreased to 12% (see Fig. 10). This could have resulted from a slow recovery after 2024's hurricane season. The protective enclosure at the Fruit Cove site was installed on May 1, 2025, and early results inside the enclosure showed great improvement compared to outside the enclosure: while outside was a mere 12%, inside showed a much improved 39%. ***Overall, comparative May-May conditions appear to show stable percent cover from 2023-2025.***

August & July: August percent cover was substantially reduced from 2023 to 2024, decreasing from 34% to 18%. 2025's sampling occurred in July rather than August, in an attempt to reduce exposure to potentially toxic algae. Compared to the years prior, percent cover remained relatively consistent outside the enclosure in July 2025 at 17%. Inside the enclo-

sure, percent cover showed great improvement at 80%. ***Overall, comparative August/ July conditions appear to show decreased percent cover outside the enclosure and increased coverage inside the enclosure from 2023-2025.***

October & September: October percent cover remained consistently low at 21% and 20% for 2023 and 2024, respectively. However, after four months of enclosure presence, percent cover showed remarkable improvement in the protected area. Outside the enclosure, cover remained low at 11%. Inside the enclosure, percent cover increased substantially to 73%. ***Overall, comparative October/September conditions appear to show increased canopy height and species diversity both inside and outside the enclosure from 2023-2025.***

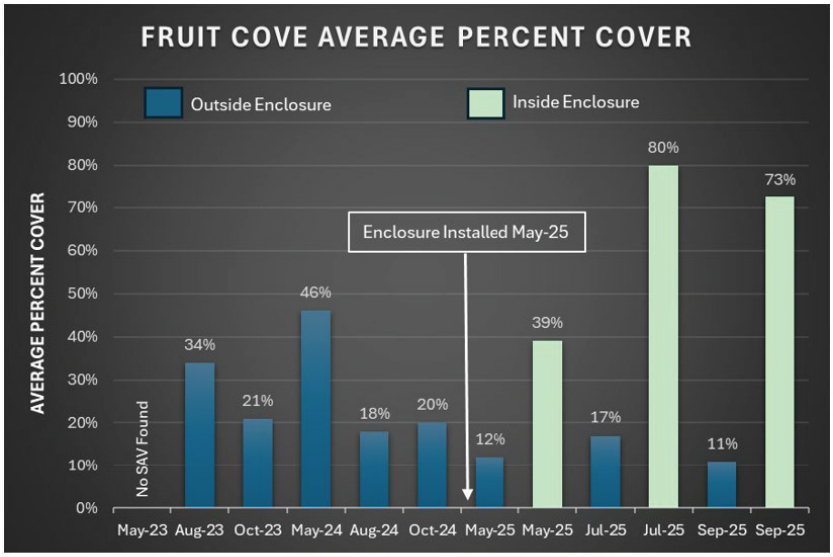


Figure 10: Fruit Cove Average Percent Cover

Growing Season Trends: Canopy height and percent cover ***increased*** from May - October 2023. Canopy height and percent cover ***decreased*** from May - October 2024. Canopy height and species diversity ***increased*** from May - September 2025, both outside and inside the enclosure, but percent cover saw a slight drop outside the enclosure.

Fruit Cove - Water Quality: 2023-2025

Overall, water quality parameters at this site remained consistent with comparative year-onyear conditions and were within SAV's optimum thresholds for growth, with the exception of **salinity, pH, and Chlorophyll a**. Salinity rose above the upper cap of the optimum range (05.0) in both May 2023 and May 2024 at 5.1 and 7.0, respectively. Though within the optimum range, salinity also showed notable increases in May and July 2025 compared to August 2024, rising from 0.3 ppt in August to 4.0 and 3.4 for May and July 2025, respectively. As was the case with the Doctors Lake site, this could've been caused by lower-than-average rainfall in the St. Johns County area (see Fig. 11 below), which reduces freshwater influx into the receiving waterways. pH was above the upper cap of the optimum range (6.5-8.0) in August & October 2023 and September 2025 at 8.1, 8.3, and 8.3, respectively. Compared withother field visit readings, Chlorophyll a increased to 10.8 and 7.6 for August 2023 and August 2024.

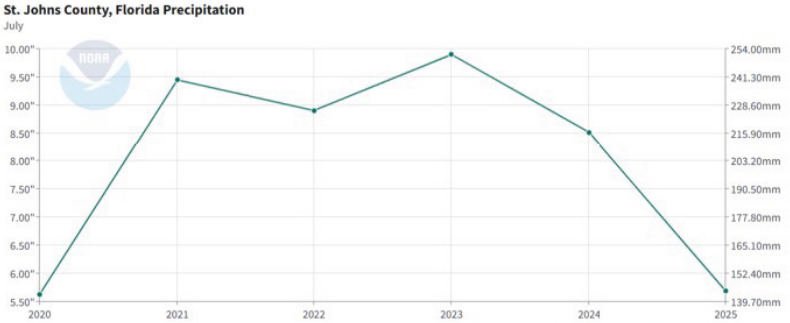


Figure 11: 5-Year Average July Precipitation, St. Johns County

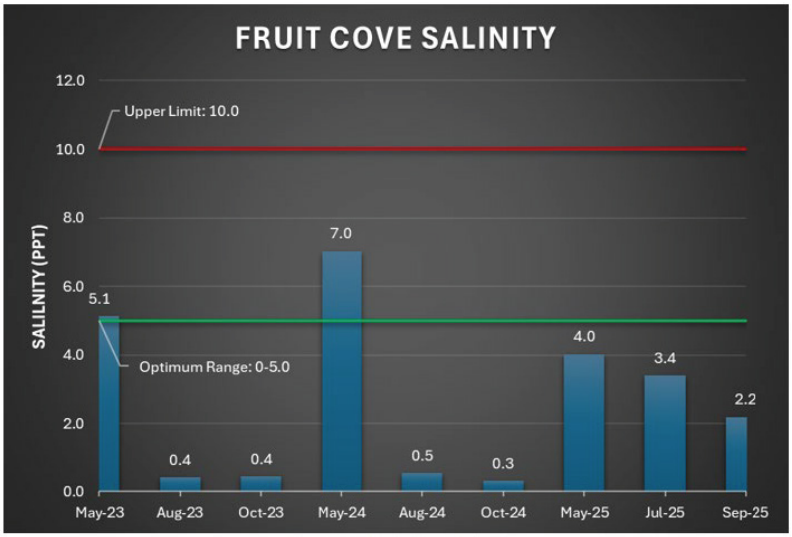


Figure 12: Fruit Cove Salinity

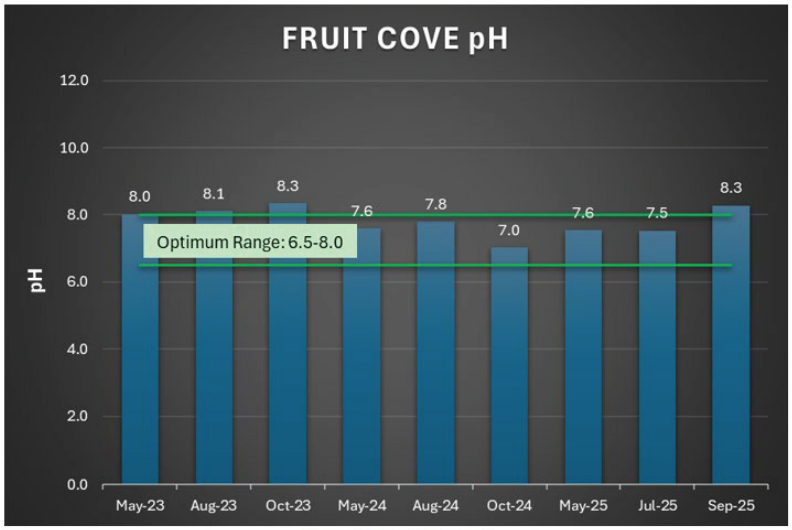


Figure 13: Fruit Cove pH

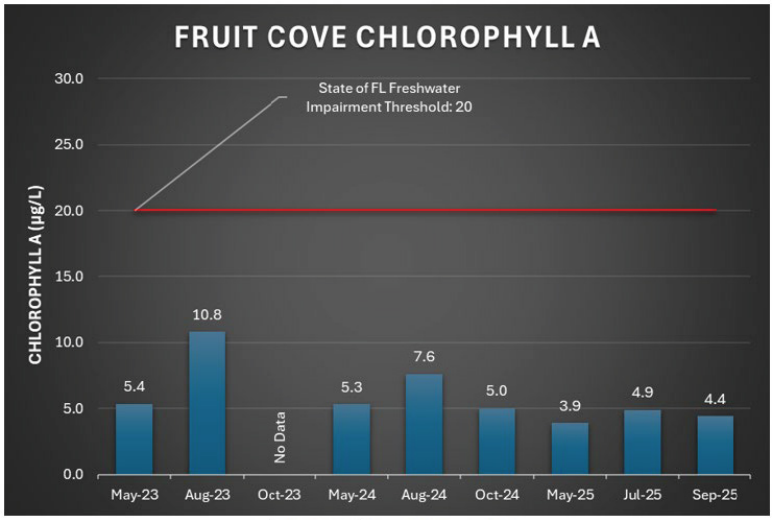
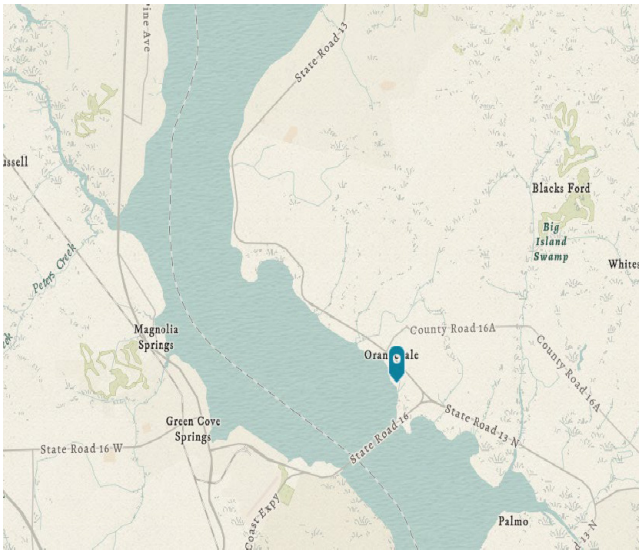


Figure 14: Fruit Cove Chlorophyll A

SITE 3 - Orangedale



Site 3 is located in Orangedale in St. Johns County, positioned along the eastern shoreline of the St. Johns River just north of the Shands Bridge.

Site 3 was added in 2024 due to its proximity to freshwater inputs, its historical SAV abundance, and its position within a transitional zone where shifts in water quality and salinity gradients can strongly influence SAV resilience and recovery.

This site has a natural shoreline, with benthic substrate primarily composed of fine sand. This site has an SAV enclosure installed May 1 & 2, 2025 approximately 1,800 square feet in size. Sampling at this location is focused both outside and inside the enclosure.

WBID No.	Salinity Zone	Species Observed
2213l	Freshwater lacustrine	*Vallisneria americana* (Eelgrass, Tape grass) *Eleocharis sp.* (Spikerush) *Chara sp.* (Muskgrass) *Najas guadalupensis* (Water naiad, Southern naiad, Guppy grass)

Figure 15: Site Description Overview

Orangedale - Canopy Height: 2024-2025

Canopy height and species diversity at this site have generally increased over time, with minor fluctuations observed across sampling months and years, until the installation of the protective enclosure when height and species diversity improved. Following the most recent sampling event, ***the overall trend appears to be improving***.

May: May 2024's canopy height was relatively low, but species diversity was high with the presence of *Vallisneria*, *Najas*, and *Chara*. (see Fig. 16 below).The protective enclosure at the Orangedale site was installed on May 1, 2025, but by the May 2025 sample event, SAV had not had time to recover. Species diversity decreased in May to only *Vallisneria*, both inside and outside the enclosure. ***Overall, comparative May-May conditions appear to show decreased canopy height and species diversity from 2024-2025.***

August & July: Canopy heights and species diversity varied, with *Vallisneria* decreasing from 6 cm in August 2024 to 3 cm in July 2025. July 2025 displayed greater species diversity outside the enclosure with the addition of Chara (18 cm). Inside the enclosure, improvement was even more pronounced with *Vallisneria* at 13 cm and *Chara* at 26 cm. It should be noted that 2025's sampling occurred in July rather than August, in an attempt to reduce exposure to potentially toxic algae. ***Overall, comparative August/July conditions appear to show increased canopy height and species diversity from 2024-2025.***

October & September: Unprotected SAV improved slightly in canopy height from October 2024 to September 2025, increasing from 3 cm (*Vallisneria*) and 4 cm (*Eleocharis*) in 2024 to 7 cm (Vallisneria) in 2025. No *Eleocharis* was present in 2025. After four months of enclosure presence, SAV presence showed remarkable improvement. Inside the enclosure, canopy height and species diversity increased to 21 cm (*Vallisneria*) and 21 cm (*Najas*). ***Overall, comparative October/September conditions appear to show increased canopy height and species diversity from 2024-2025.***

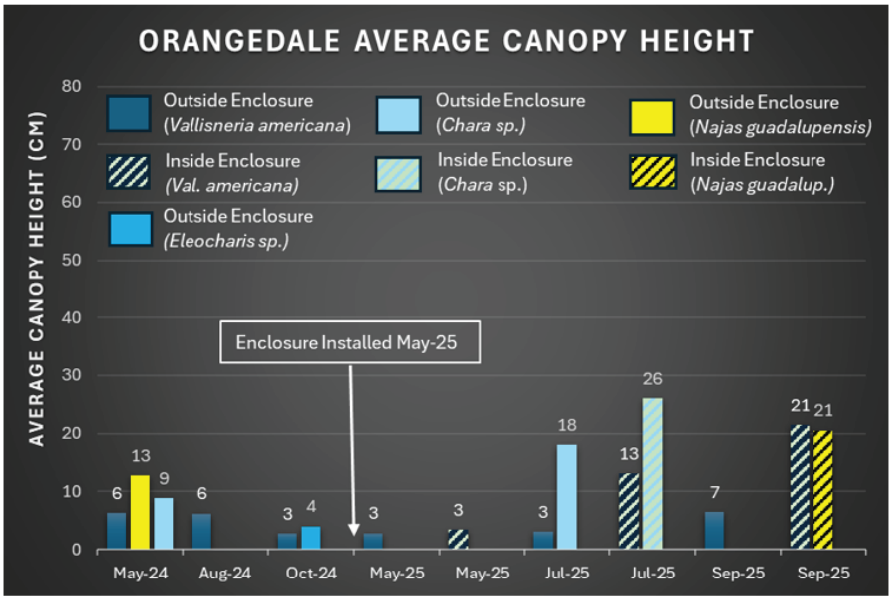


Figure 16: Orangedale Average Canopy Height

Orangedale – Percent Cover: 2024-2025

Percent cover at this site was initially high at approximately 50% in the beginning of 2024, but lowered drastically through September 2025 outside the enclosure. Upon installation of the protective enclosure, coverage improved inside the enclosure (16% - 57%). Following the most recent sampling event, ***the overall trend appears to be improving inside the enclosure and worsening outside the enclosure***.

May: May 2024's percent cover was reasonably high at 55%, which is understandable considering the presence of 3 different species (*Vallisneria*, *Najas*, and *Chara)*. By May 2025, percent cover had decreased to 17% outside the enclosure and 16% inside the enclosure. Back to back hurricanes in September and October of 2024 could be a reason that SAV hadn't yet recovered by May 2025. ***Overall, comparative May-May conditions appear to show decreased percent cover from 2024-2025.***

August & July: The relatively high percent cover from May of 2024 remained consistent through the August 2024 visit, at 51%. In July 2025, the enclosure had been in place for approximately 2 months, and displayed its protective capabilities by possessing a significantly higher percent cover. Outside the enclosure, percent cover had dwindled to 8%; inside, however, percent cover reached the highest peak since beginning the expedition, at 57%. ***Overall, comparative August/July conditions appear to show decreased percent cover outside the enclosure and increased coverage inside the enclosure from 2024-2025.***

October & September: As previously mentioned, the 2024 hurricane season was underscored by back to back hurricanes. Unsurprisingly, the percent cover was reduced from 51% in August to a mere 9% in October. In September of 2025, there was stark contrast in percent cover outside the enclosure vs. inside; outside barely contained any SAV, at a mere 1%. Inside, however, percent cover remained stable and high at 53%, again demonstrating the recovery potential of protected areas. ***Overall, comparative October/ September conditions appear to show decreased percent cover outside the enclosure and increased coverage inside the enclosure from 2024-2025.***

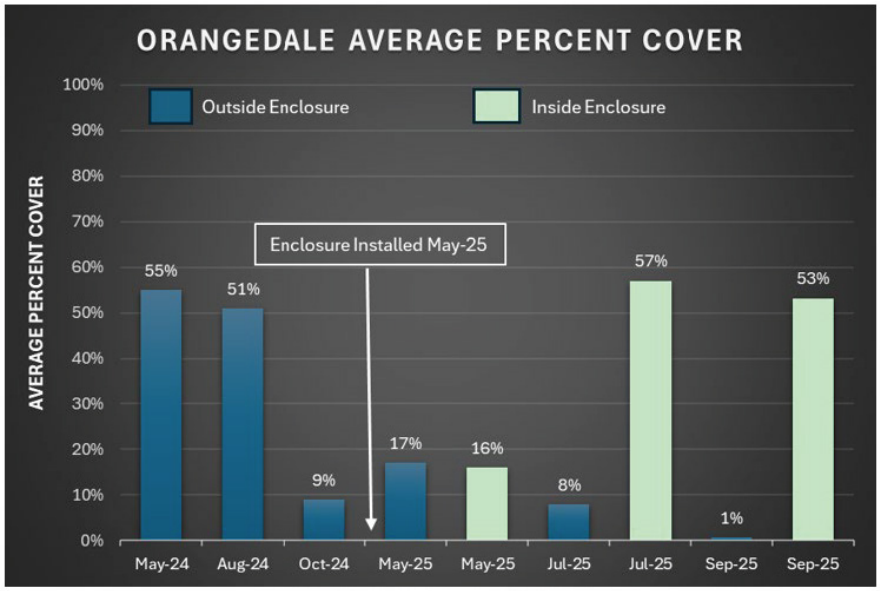
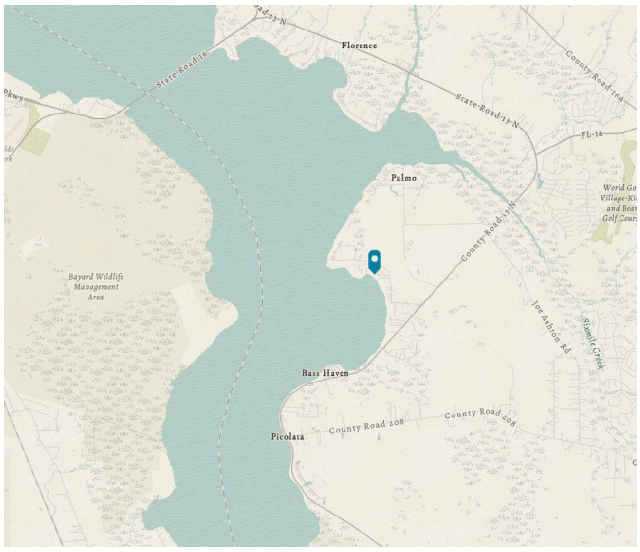


Figure 17: Orangedale Average Percent Cover

Growing Season Trends: Canopy height, percent cover, and species diversity ***decreased*** from May - October 2024. Canopy height, percent cover, and species diversity ***increased*** from May - September 2025 inside the enclosure, but ***decreased*** outside the enclosure.

Orangedale - Water Quality: 2024-2025

Overall, water quality parameters at this site remained consistent with comparative year-onyear conditions and were within SAV's optimum thresholds for growth. Some general trends were observed as follows: from May-October, salinity showed a slight increase year-on year. Chlorophyll a also increased slightly from 2024-2025.



SITE 4 - Colee Cove

Site 4 is located in Colee Cove in St. Johns County, positioned along the eastern shoreline of the St. Johns River. This site is ideal due to its proximity to freshwater inputs, its historical SAV abundance, and its position within a transitional zone where shifts in water quality and salinity gradients can strongly influence SAV resilience and recovery.

The site has a wooden bulkhead, with benthic substrate primarily composed of fine sand. It has an SAV enclosure, installed May 2, 2025 approximately 8,450 square feet in size. Sampling at this location is focused both outside and inside the enclosure.

WBID No.	Salinity Zone	Species Observed
2213J	Freshwater lacustrine	*Vallisneria americana* (Eelgrass, Tape grass) *Chara sp.* (Muskgrass) *Najas guadalupensis* (Water naiad, Southern naiad, Guppy grass)

Figure 18: Site Description Overview

Colee Cove - Canopy Height: 2023-2025

Canopy height and species diversity at this site have generally increased over time, with minor fluctuations observed across sampling months and years, until the installation of the protective enclosure when height and species diversity improved. Following the most recent sampling event, ***the overall trend inside the enclosure appears to be improving, while the overall trend outside the enclosure is uncertain***.

May: In May 2023, SAV was present but very stunted at an average of just 2 cm for *Vallisneria*. In May 2024, both canopy height and species diversity began to show some improvement, with canopy heights increasing to 6 cm (*Vallisneria*) and 9 cm (*Najas*). The protective enclosure at the Colee Cove site was installed on May 2, 2025, but due to algal presence, the later May 2025 survey was not possible. ***Overall, comparative May-May conditions appear to show increased canopy height and species diversity from 2023-2024 (May 2025 survey was not conducted).***

August & July: Unfortunately, in August of 2023 the Colee Cove site was plagued with potentially toxic algae, making an SAV survey unsafe. In August of 2024, the previous species diversity seen 3 months prior had dwindled to *Vallisneria* with an average 5 cm canopy height. 2025's sampling occurred in July rather than August, in an attempt to reduce exposure to potentially toxic algae. Compared to 2024, canopy height varied and speciesdiversity improved: *Vallisneria*'s canopy height decreased to 4 cm, but *Chara* appeared as an additional species, measuring a more robust 15 cm high. Inside the enclosure, only *Vallisneria* was present, but the protective nature of the enclosure allowed canopy height to improve to 25 cm. ***Overall, comparative August/July conditions appear to show increased canopy height and species diversity from 2024-2025 (August 2023 survey was not conducted due to algae).***

October & September: In October 2023, the Colee Cove site was plagued with potentially toxic algae, making an SAV survey unsafe. The October 2024 canopy height was extremely short at just 2 cm for *Vallisneria*. However, after four months of enclosure presence, October 2025 SAV height and diversity showed improvement. Outside the enclosure, *Chara* was present at an average 10 cm tall; inside the enclosure, *Vallisneria* soared to an astounding 67 cm, and *Chara* was not present. ***Overall, comparative October/September conditions appear to show increased canopy height and species diversity from 2024-2025 (October 2023 survey was not conducted due to algae).***

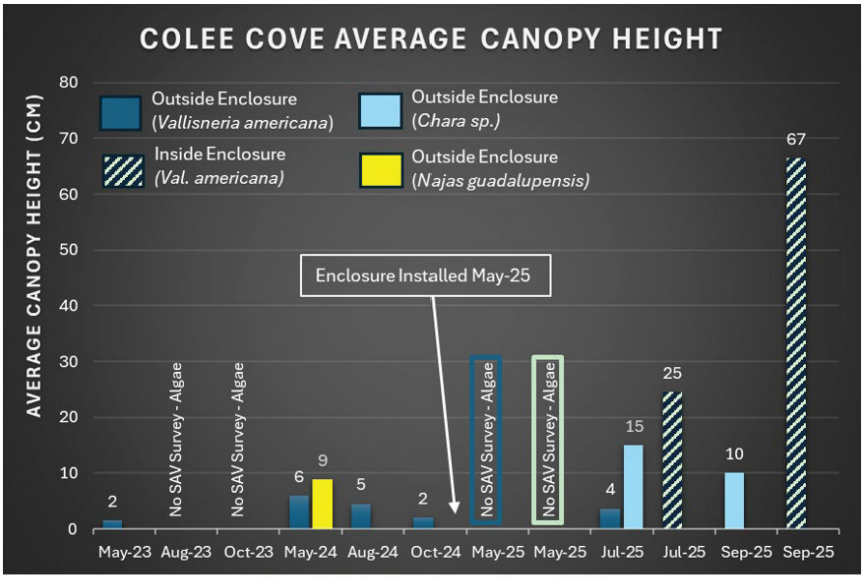


Figure 19: Colee Cove Average Canopy Height

Colee Cove - Percent Cover: 2023-2025

Percent cover at this site was initially high, ranging from 50% in May 2023 to 88% in August 2024, but lowered drastically to 3% in September 2025 outside the enclosure. Upon installation of the protective enclosure, coverage improved inside the enclosure (80%-94%). Following the most recent sampling event, ***the overall trend appears to be improving inside the enclosure and worsening outside the enclosure***.

May: In May 2023, percent cover was relatively robust at 50% even though grass was short. May 2024's percent cover increased to 88%. Due to algal presence, a May 2025 survey was unable to be conducted. ***Overall, comparative May-May conditions appear to show increased percent cover from 2023-2024 (May 2025 survey was not conducted due to algae).***

August & July: No SAV survey was conducted in August 2023 due to algal presence. By August 2024, percent cover had decreased to 62% from 88% in May 2024. Compared to the year prior, 2025 percent cover decreased substantially outside the enclosure to a mere 15%. Inside the enclosure, percent cover improved to nearly full coverage at 94%. ***Overall, comparative August/July conditions appear to show decreased percent cover outside the enclosure, while increased percent cover inside the enclosure from 2024-2025 (August 2023 survey was not conducted due to algae).***

October & September: Due to algal presence, an October 2023 SAV survey was not conducted. In October 2024, back-to-back hurricanes, compounded with other stressors, decimated percent cover to 1%. Outside the enclosure, percent cover was 3% in September 2025, compared to 15% in July 2025. Inside the enclosure, percent cover remained robust at 80%. ***Overall, comparative October/September conditions show minimal cover outside the enclosure and nearly full coverage inside the enclosure 2024-2025 (October 2023 survey was not conducted due to algae).***

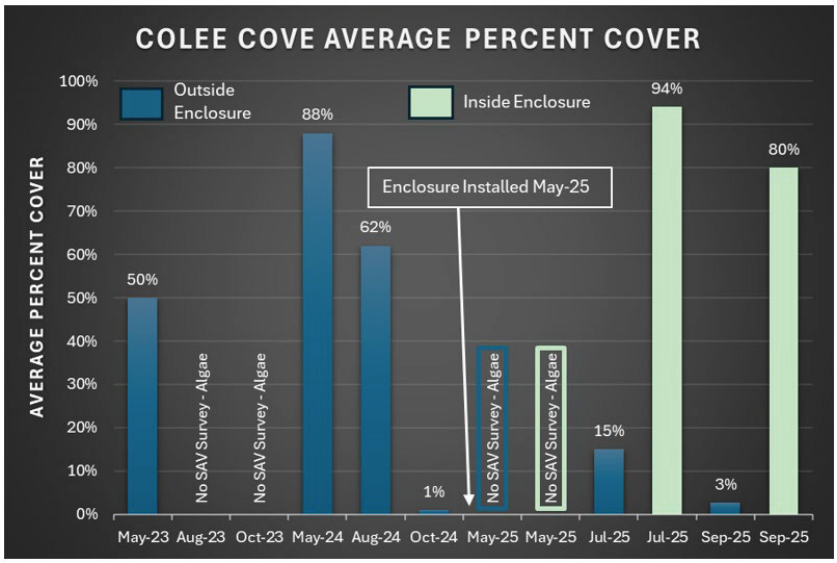


Figure 20: Colee Cove Average Percent Cover

Growing Season Trends: A 2023 analysis is not possible, as both August and October had harmful algae present in the water column. Species diversity, canopy height, and percent cover ***decreased*** from May - October 2024. In 2025, a May survey was impossible, but July - September 2025 showed ***decreased*** canopy height, species diversity, and percent cover **outside** the enclosure. **Inside the enclosure, however, canopy height more than doubled** from 25 cm to 67 cm, and although percent cover decreased somewhat from July-September, **coverage remained robust at 80% at the end of the season**.

Interestingly, although growing season trends generally show a decrease in height and diversity from the beginning to the end of the growing season, the height and diversity appear to be improving when month-to-month comparisons are made between expedition years. This could be evidence of a slow, steady recovery of SAV at Colee Cove.

Colee Cove - Water Quality: 2023-2025

Overall, water quality parameters at this site remained consistent with comparative year-on-year conditions and were within SAV's optimum thresholds for growth, with the exception of **pH**. During May of 2023 and 2025, pH exceeded the optimum range (6.5-8.0) at 9.3 and 8.8 for 2023 and 2025, respectively. Some general trends were observed as follows: Compared to 2023 and 2024, Chlorophyll a levels were elevated on all three 2025 expeditions.

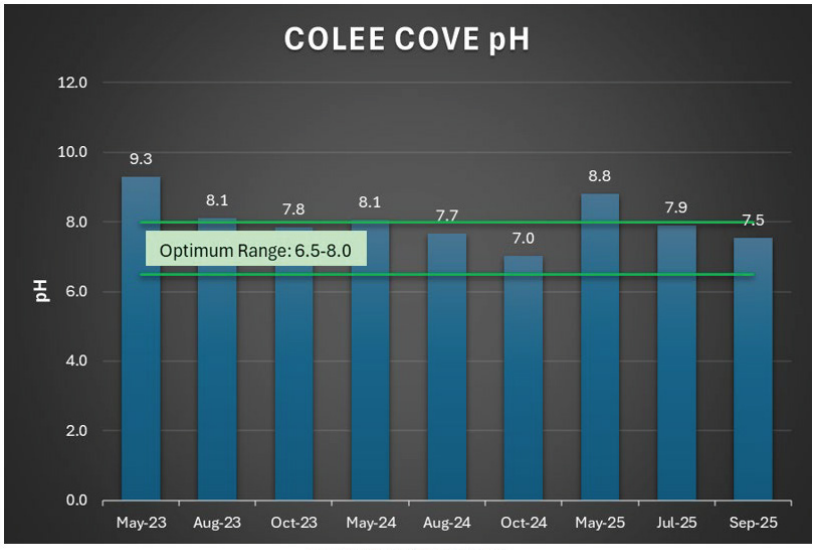


Figure 21: Colee Cove pH

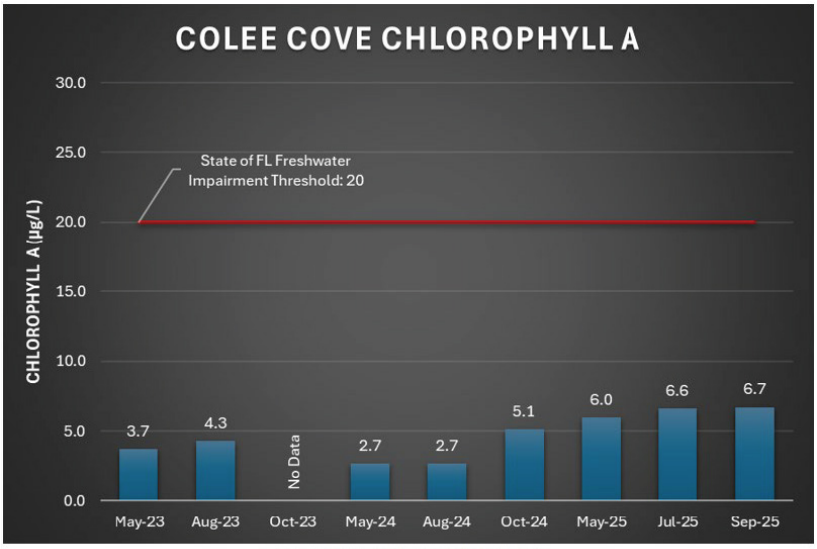
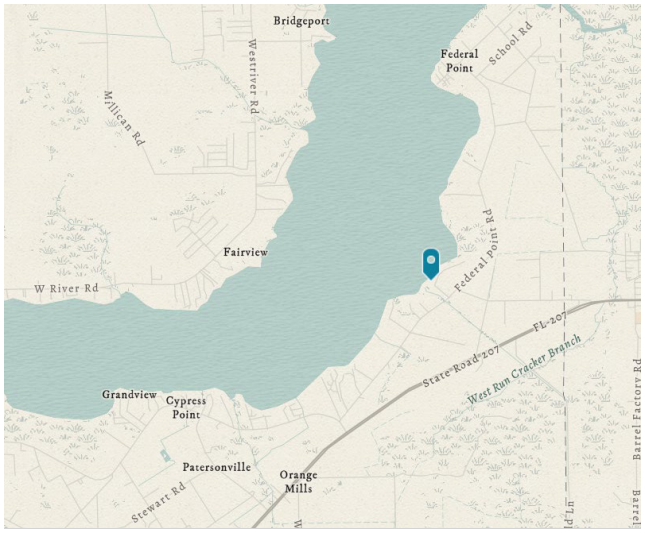


Figure 22: Colee Cove Chlorophyll A



SITE 5 - Mays Cove

Site 5 is located in Mays Cove in Putnam County, positioned along the eastern shoreline of the St. Johns River. Added in 2024, Site 5 remains a selected monitoring location due to its proximity to freshwater inputs, its historical SAV abundance, and its position within a transitional zone where shifts in water quality and salinity gradients can strongly influence SAV resilience and recovery.

This site has a natural shoreline, with benthic substrate primarily composed of fine sand. It has an SAV enclosure, installed April 28, 2025 approximately 7,500 square feet in size. Sampling at this location is focused both outside and inside the enclosure.

WBID No.	Salinity Zone	Species Observed
2213L	Freshwater lacustrine	*Vallisneria americana* (Eelgrass, Tape grass) *Chara sp.* (Muskgrass) *Ruppia maritima (Widgeon grass)* *Najas guadalupensis* (Water naiad, Southern naiad, Guppy grass) *Sagittaria subulata* (Dwarf Sagittaria, Dwarf Arrowhead, Awl-leaf Arrowhead, Narrow-leaved Arrowhead)

Figure 23: Site Description Overview

Mays Cove - Canopy Height: 2024-2025

Canopy height and species diversity at this site have generally increased over time, with minor fluctuations observed across sampling months and years, until the installation of the protective enclosure when height and species diversity improved. Following the most recent sampling event, ***the overall trend outside the enclosure appears to be unchanged and inside the enclosure appears to be improving***.

May: In May 2024, two species of SAV were present, with relatively low canopy heights of 4 cm and 7 cm for *Vallisneria* and *Chara*, respectively. One week after its installation, the protective enclosure began to show initial evidence of its capability to allow grass to recover; by the field visit, canopy heights for *Vallisneria* and *Chara* were higher inside the enclosure (3 cm and 8 cm) compared to outside (2 cm and 6 cm). Species diversity outside the enclosure was slightly higher, with the additional presence of *Ruppia* at 6 cm tall. ***Overall, comparative May-May conditions appear to show increased canopy height and species diversity from 2024-2025.***

August & July: In August of 2024, both species diversity and canopy height had increased since May; Vallisneria stood at 4 cm, Eleocharis stood at 4 cm, and Chara at 9 cm. July 2025canopy heights outside the enclosure remained relatively similar to the previous year, with the exception of Chara, which increased to 11 cm, and Sagittaria subulata (a newly observed species in 2025) at 13 cm. This species is known by many common names (see table above), and was 1 of 4 observed outside the enclosure. Species diversity inside the enclosure was slightly less at 3 species, but canopy heights remained either the same (Chara was 11 cm), or slightly elevated compared to outside the enclosure (Eleocharis was 5 cm and Vallisneria was 6 cm). ***Overall, comparative August/July conditions appear to show increased canopy height and species diversity from 2024-2025.***

October & September: Compared to May & August 2024, SAV diversity in October 2024 decreased to only *Vallisneria* at 3 cm. September and October 2024 were hit with back-toback hurricanes, potentially resulting in the decreased species diversity and canopy height. September 2025 showed improved results compared to the year prior. Outside the enclosure, species diversity was relatively robust, but with stunted canopy heights; *Vallisneria* stood at 3 cm, *Eleocharis* at 3 cm, and *Chara* at 5 cm. Inside the enclosure, both diversity and height had increased; *Vallisneria* stood at 8 cm, *Eleocharis* at 5 cm, *Chara* at 8 cm, and a fourth species, *Najas*, at 8 cm. ***Overall, comparative October/September conditions appear to show increased canopy height and species diversity from 2024-2025.***

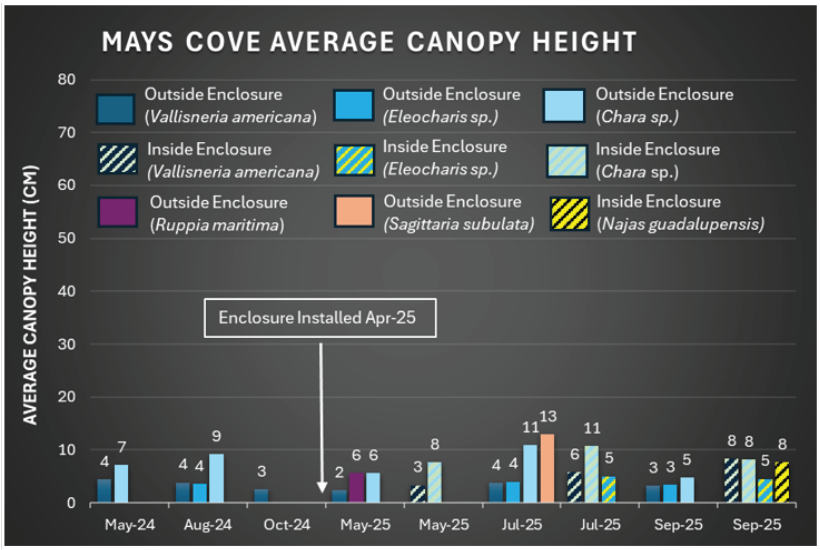


Figure 24: Mays Cove Average Canopy Height

Mays Cove – Percent Cover: 2024-2025

Percent cover at this site has generally remained high (52%-87%) outside the enclosure from 2024-2025, with minor fluctuations observed across sampling months and years. Coverage inside the enclosure reached its highest point in July 2025, but by September had decreased to 22%. Following the most recent sampling event, ***the overall trend appears to be stable both inside and outside the enclosure***.

May: May 2024's percent cover was substantially high at 72%. By May 2025, percent cover had decreased to 67% outside the enclosure and 44% inside the enclosure. Back to back hurricanes in September and October of 2024 could be a reason that SAV hadn't yet recovered by May 2025. May 2025 had 3 species outside the enclosure and 2 species inside the enclosure, so this likely explains why percent cover was higher outside. By the May 2025 field visit, the enclosure had only been in place for four weeks. It remains unknown why the third species was not present at the transect inside the enclosure. ***Overall, comparative May-May conditions appear to show decreased percent cover from 2024-2025.***

August & July: The relatively high percent cover from May of 2024 lessened somewhat by the August 2024 visit to 60%. In July 2025, the enclosure had been in place for approximately 2 months. Outside the enclosure, percent cover remained high at 87%, but inside coverage had reached 92%, the highest coverage seen since the SAV Expedition's inception. ***Overall, comparative August/July conditions appear to show increased percent cover both outside and inside the enclosure from 2024-2025.***

October & September: As previously mentioned, the 2024 hurricane season was underscored by back to back hurricanes. Unsurprisingly, the percent cover was reduced from 72% and 60% in May and August, respectively, to 34% in October. In September of 2025, percent cover had again decreased compared to 2 months prior. Outside the enclosure, coverage was reduced to 52%, and inside the enclosure was even less at 22%. This was somewhat surprising, as both species diversity and canopy heights were more improved inside the enclosure. This demonstrates the complex nature of enclosure dynamics and potential SAV stressors. ***Overall, comparative October/September conditions appear to show increased percent cover outside and decreased percent cover inside the enclosure from 2024-2025.***

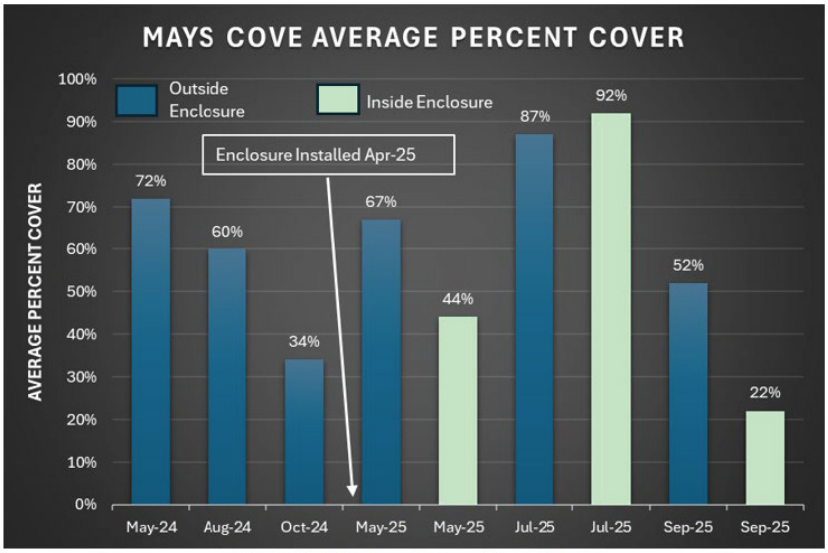


Figure 25: Mays Cove Average Percent Cover

Growing Season Trends: Canopy height, percent cover, and species diversity ***decreased*** from May - October 2024. Outside the enclosure, canopy height, percent cover, and species diversity ***remained stable*** from May - September 2025. Inside the enclosure, percent cover ***decreased*** but canopy height and species diversity ***increased*** from May - September 2025.

Mays Cove – Water Quality: 2024-2025

Overall, water quality parameters at this site remained consistent with comparative year-onyear conditions and were within SAV's optimum thresholds for growth, with the exception of **pH and turbidity**. During May of 2024 and 2025, pH exceeded the optimum range (6.5-8.0) at 9.3 and 8.7 for 2024 and 2025, respectively. May and October of 2024 had elevated turbidity at 11.9 and 37.4. The 37.4 spike is likely an outlier. Some general trends were observed as follows: Compared to previous sites, Chlorophyll a levels were elevated on all six field visits. Additionally, pH seems to be positively correlated with Dissolved Oxygen - DOs of higher than 100% have pHs above the 8.0 upper limit. These all correspond with visits in May/Aug of 2024, and May/July of 2025.

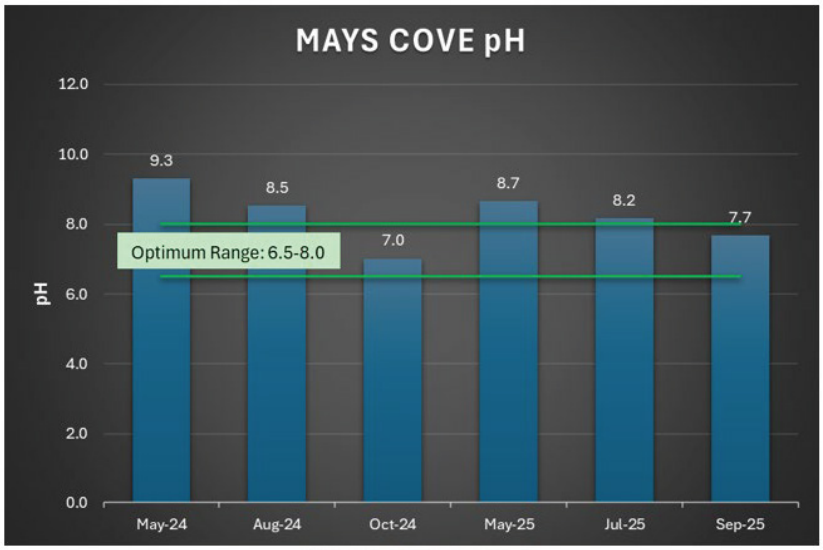


Figure 26: Mays Cove pH

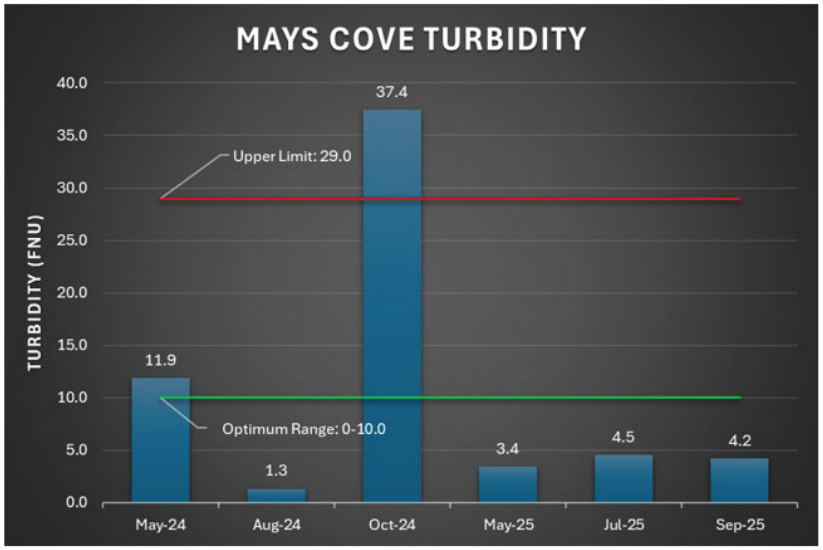


Figure 27: Mays Cove Turbidity

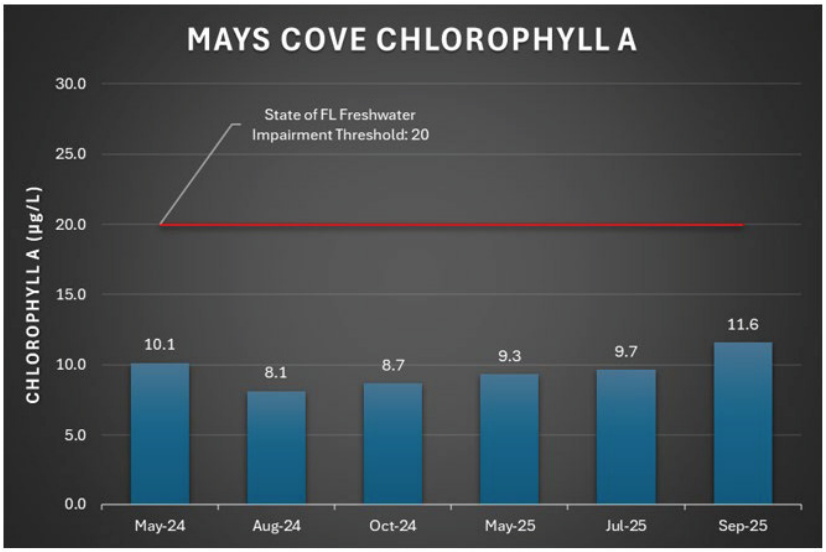
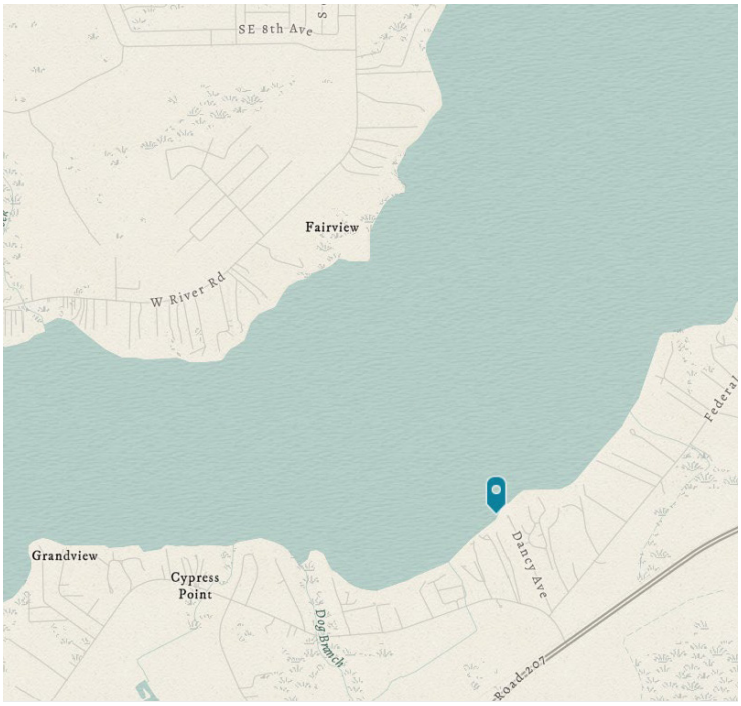


Figure 28: Mays Cove Chlorophyll A

SITE 6 - Dancy Point



Site 6 is located in Dancy Point in Putnam County, positioned along the eastern shoreline of the St. Johns River.

This site is ideal due to its proximity to freshwater inputs, its historical SAV abundance, and its position within a transitional zone where shifts in water quality and salinity gradients can strongly influence SAV resilience and recovery.

This site has a wooden bulkhead, with benthic substrate primarily composed of fine sand. It has an SAV enclosure installed by the owner, in partnership with Florida Fish and Wildlife Conservation, in 2023 approximately 2.6 acre in size. Sampling at this location is focused both outside and inside the enclosure.

WBID No.	Salinity Zone	Species Observed
2213L	Freshwater lacustrine	*Vallisneria americana* (Eelgrass, Tape grass) *Chara sp.* (Muskgrass)

Figure 29: Site Description Overview

Dancy Point - Canopy Height: 2023-2025

Canopy height and species diversity at this site have generally remained consistent over time, with the exception of canopy heights inside the enclosure, which averaged approximately 50 cm between October 2023 and August 2024. Following the most recent sampling event and the breach of the enclosure in September 2024, ***the overall trend appears to be stable***.

May: In May 2023, SAV was present but very stunted both outside and inside the enclosure. Outside the enclosure, *Vallisneria* was 1 cm and inside it was 2 cm. By May 2024, SAV had recovered immensely inside the enclosure to a stunning 54 cm. Outside the enclosure, species diversity had improved, but height remained short at 3 cm and 7 cm for *Vallisneria* and *Chara*, respectively. In September 2024, the enclosure was breached by wildlife, so the May 2025 field visit only assessed outside the enclosure. Species included *Vallisneria* at 4 cm and *Chara* at 6 cm. ***Overall, comparative May-May conditions appear to show increased canopy height inside the enclosure, improved species diversity outside, and similar stunted heights outside from 2023-2025.***

August & July: By August 2023, SAV had improved inside the enclosure to 6 cm, but remained stunted outside at 1 cm. August 2024 saw significantly higher *Vallisneria* inside the enclosure (50 cm) compared to outside (4 cm), evidencing the enclosure's successful protection from grazing pressure. July 2025's assessment could only be made outside the enclosure due to its breach, and sadly grasses were again stunted at 3 cm and 5 cm for *Vallisneria* and *Chara*, respectively. ***Overall, comparative August/July conditions appear to show increased canopy height from 2023-2024, increased species diversity into 2025, and decreased canopy height into 2025.***

October & September: October 2023's canopy height remained stunted outside the enclosure at a mere 2 cm (*Vallisneria*); inside the enclosure, however, canopy height had increased significantly to 46 cm. Unfortunately, the enclosure was breached in September 2024; therefore, during the October 2024 field visit canopy heights both outside and inside remained stunted at 3 cm. September 2025 showed equally short grass outside the enclosure (there was no assessment inside the enclosure, as it was not in a stable condition. ***Overall, comparative October/September conditions appear to show decreased canopy height and unchanged species diversity from 2023-2025.***

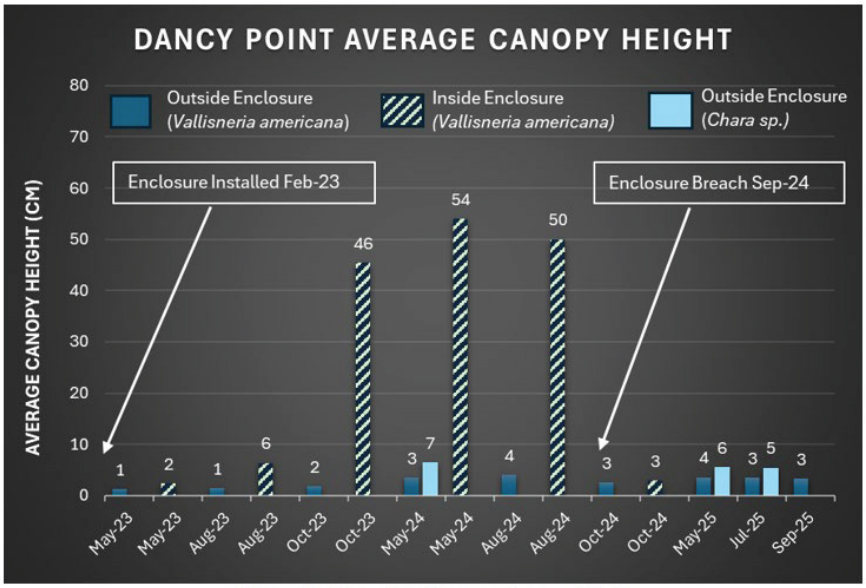


Figure 30: Dancy Point Average Canopy Height

Dancy Point - Percent Cover: 2023-2025

Percent cover at this site has fluctuated across sampling months and years, with coverage inside the enclosure nearly always higher than that outside the enclosure. After the enclosure breach in September 2024, coverage decreased substantially. Following the most recent sampling event, ***the overall trend appears to be worsening.***

May: In May 2023, percent cover was relatively low outside the enclosure at 19%. Inside the enclosure, coverage was slightly improved at 29%. By May 2024, coverage outside the enclosure remained similar to 2023 at 21%. Inside the enclosure, coverage had vastly increased to 66%, evidencing the enclosure's protective nature. As previously mentioned, the enclosure was breached in September 2024; by May 2025, SAV remained vulnerable without the enclosure's presence at 25%. ***Overall, comparative May-May conditions appear to show increased percent cover from 2023-2025.***

August & July: August 2023 had similar percent cover both outside and inside the enclosure at 57% and 63%, respectively. August 2024 showed a greater distinction; outside the enclosure, percent cover was low at 28%, while inside coverage was the highest it had been since the SAV Expedition began at 71%. July 2025 showed, again, low coverage at 28% without the protection of the enclosure. ***Overall, comparative August/July conditions appear to show decreased percent cover outside the enclosure, while increased percent cover inside the enclosure.***

October & September: Outside the enclosure, October 2023 coverage had decreased to 41% (from 57% in August). Inside the enclosure, coverage remained stable at 60%, compared to several months prior. October 2024 saw vastly decreased coverage; after the enclosure had been breached just 1 month prior to the field visit, coverage outside was 11% and inside was 5%, strong evidence that the grass had succumbed to grazing pressure. In September 2025, coverage was the lowest it had been since the Expedition began at a mere 2%. ***Overall, comparative October/September conditions show decreased percent cover both outside and inside the enclosure.***

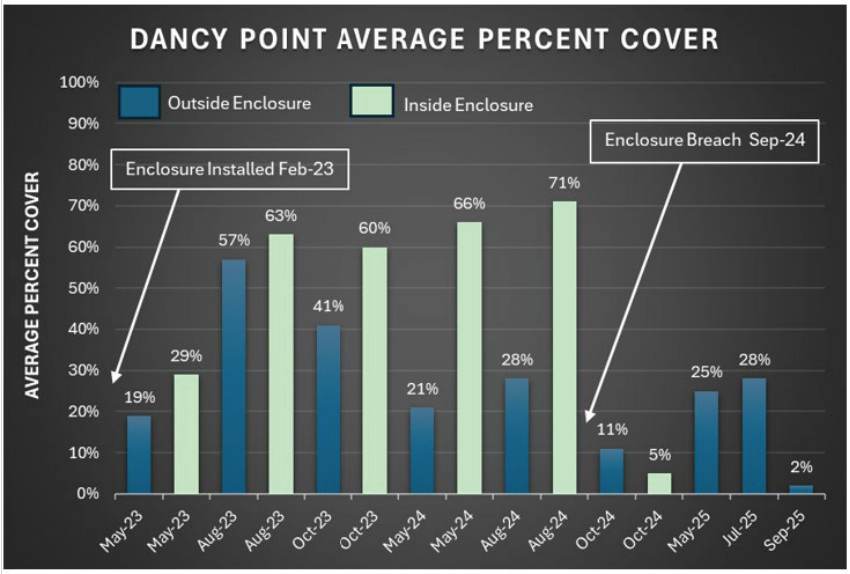


Figure 31: Dancy Point Average Percent Cover

Growing Season Trends: Canopy height and percent cover generally ***increased*** from May - October 2023, both outside and inside the enclosure. Canopy height, percent cover, and species diversity ***decreased*** from May - October 2024, both outside and inside the enclosure. Canopy height, percent cover, and species diversity ***decreased*** from May - September 2025.

Dancy Point - Water Quality: 2023-2025

Overall, water quality parameters at this site remained consistent with comparative year-onyear conditions and were within SAV's optimum thresholds for growth, with the exception of **pH and turbidity**. With the exception of October 2024 and September 2025, all field visits had pH elevated above the upper cap of the optimum range. May 2024 had elevated turbidity at 14.7; considering that all other turbidity levels for other field visits were substantially lower, this spike may be an outlier. Some general trends were observed as follows: Compared to previous sites, Chlorophyll a was elevated during the 2024 and 2025 field visits. pH seems to be positively correlated with Dissolved Oxygen - DOs of higher than 100% have pHs above the 8.0 upper limit. Additionally, DO was consistently above 100%, with the exception of October 2024.

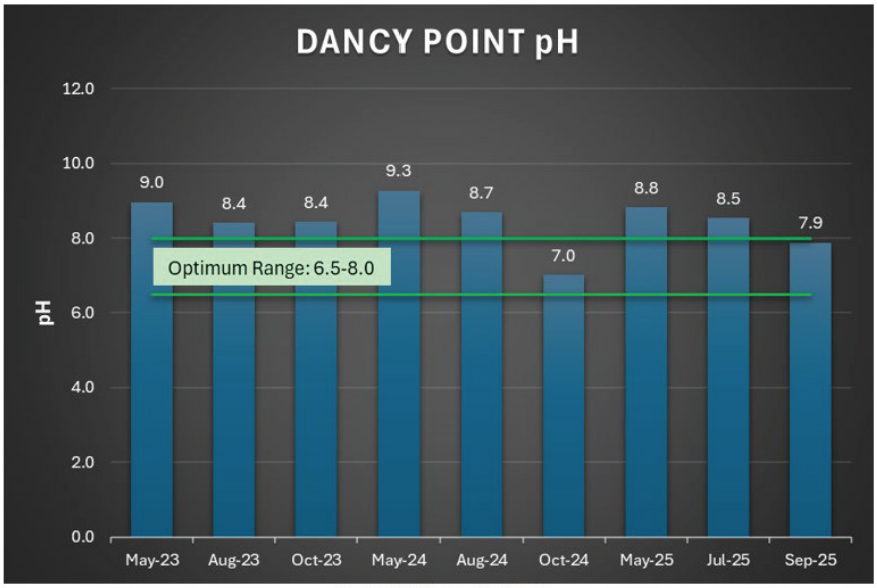


Figure 32: Dancy Point pH

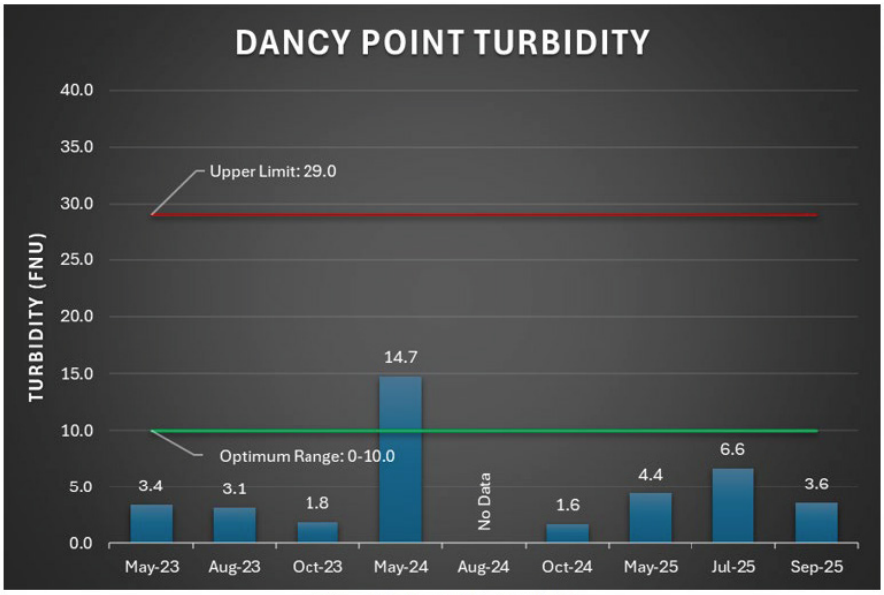


Figure 33: Dancy Point Turbidity

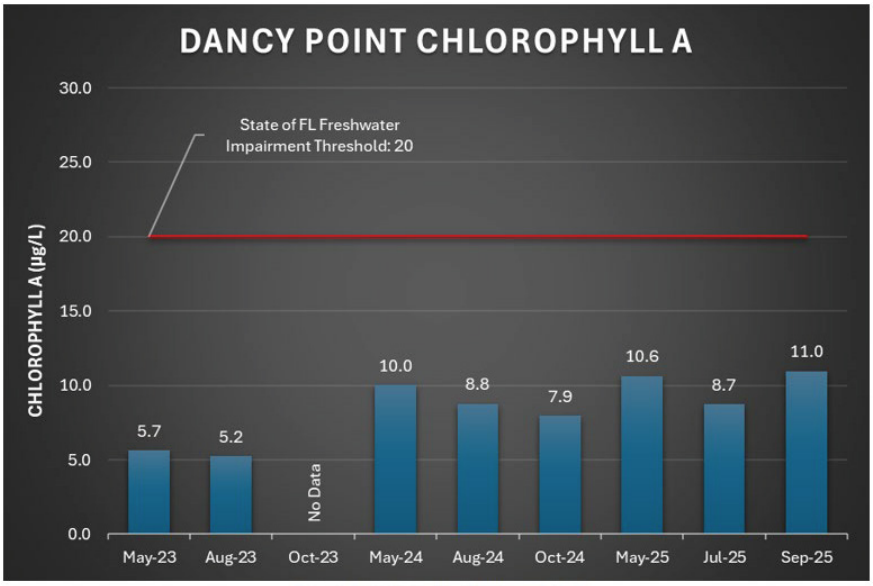
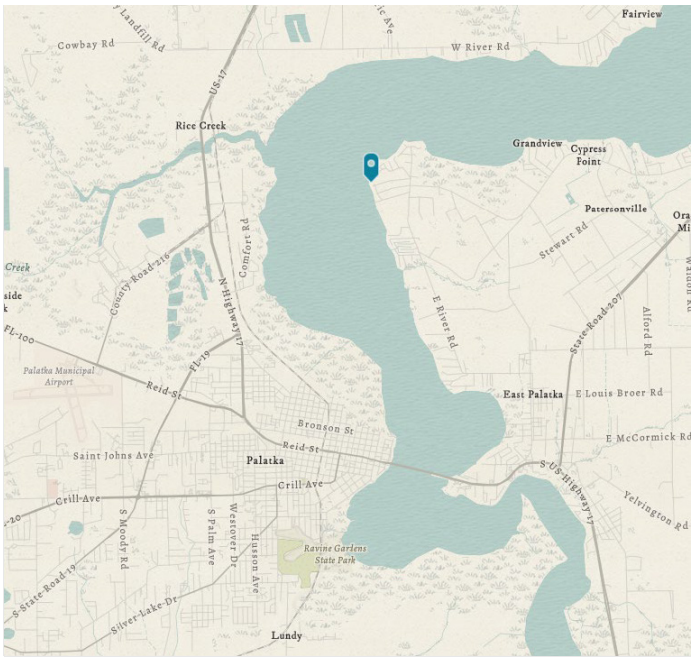


Figure 34: Dancy Point Chlorophyll A

SITE 7 - Forrester Point



Site 7 is located in Forrester Point, northeast of Palatka in Putnam County. It is positioned along the eastern shoreline of the St. Johns River.

Added in 2024, the site is ideal due to its proximity to freshwater inputs, its historical SAV abundance, and its position within a transitional zone where shifts in water quality and salinity gradients can strongly influence SAV resilience and recovery.

The site has a bulkhead, with bottom substrate primarily composed of mucky sand. This site has an SAV enclosure installed April 28, 2025 approximately 6,500 square feet in size. Sampling at this location is focused outside and inside the enclosure.

WBID No.	Salinity Zone	Species Observed
2213L	Freshwater lacustrine	*Vallisneria americana* (Eelgrass, Tape grass)

Figure 35: Site Description Overview

Forrester Point - Canopy Height: 2024-2025

Canopy height and species diversity at this site have generally remained consistent over time, with the exception of canopy heights inside the enclosure, which increased between May and September 2025. Following the most recent sampling event, ***the overall trend appears to be improving slightly both inside and outside the enclosure***.

May: In May 2024, no SAV survey was conducted due to high water levels. A protective enclosure was installed just four weeks prior to the May 2025 field visit; outside the enclosure, canopy height was 3 cm, while inside was only slightly higher at 4 cm. The only species present in 2025 was *Vallisneria*. ***No May-May comparison is possible, since a 2024 survey was not conducted.***

August & July: In August 2024, no SAV survey was conducted due to the presence of potentially toxic algae. July 2025 exhibited slightly improved height both outside and inside; SAV stood at 4 cm and 5 cm, respectively. *Vallisneria* remained the only species present. ***No August/July comparison is possible, since a 2024 survey was not conducted.***

October & September: In October 2024, no SAV survey was conducted due to high water levels. September 2025 saw improved canopy heights; outside the enclosure, *Vallisneria* height increased to 6 cm, while inside it was nearly twice as tall at 11 cm. ***No October/September comparison is possible, since a 2024 survey was not conducted.***

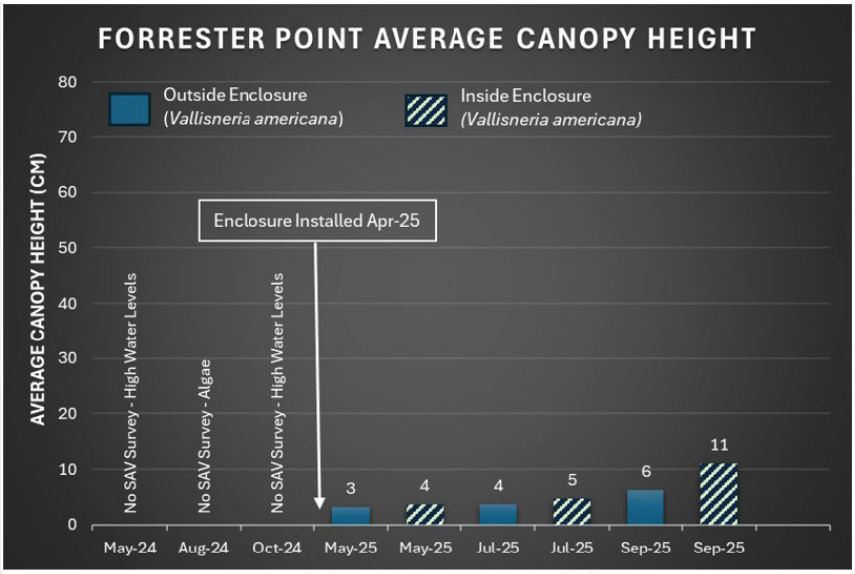


Figure 36: Forrester Point Average Canopy Height

Forrester Point – Percent Cover: 2024-2025

No SAV surveys took place in 2024, due to site inaccessibility for reasons more fully explained below. Percent cover at this site has fluctuated over 2025, decreasing outside the enclosure, but increasing inside the enclosure, from May - September 2025. Following the most recent sampling event, ***the overall trend appears to be stable***.

May: In May 2024, no SAV survey was conducted due to high water levels. May 2025 exhibited higher percent cover outside the enclosure at 21%, compared to inside the enclosure at 4%. This was slightly surprising since the enclosure had higher SAV.

August & July: In August 2024, no SAV survey was conducted due to the presence of potentially toxic algae. July of 2025 showed almost identical coverage both outside and inside the enclosure at 19% and 18%, respectively.

October & September: In October 2024, no SAV survey was conducted due to high water levels. Florida was hit with back to back hurricanes in September and October 2024, so these high water levels were not unprecedented. September 2025 showed substantially lower coverage outside the enclosure at 8%, compared to inside the enclosure at 22%, giving evidence of the enclosure's ability to protect SAV long enough to establish greater rhizome biomass.

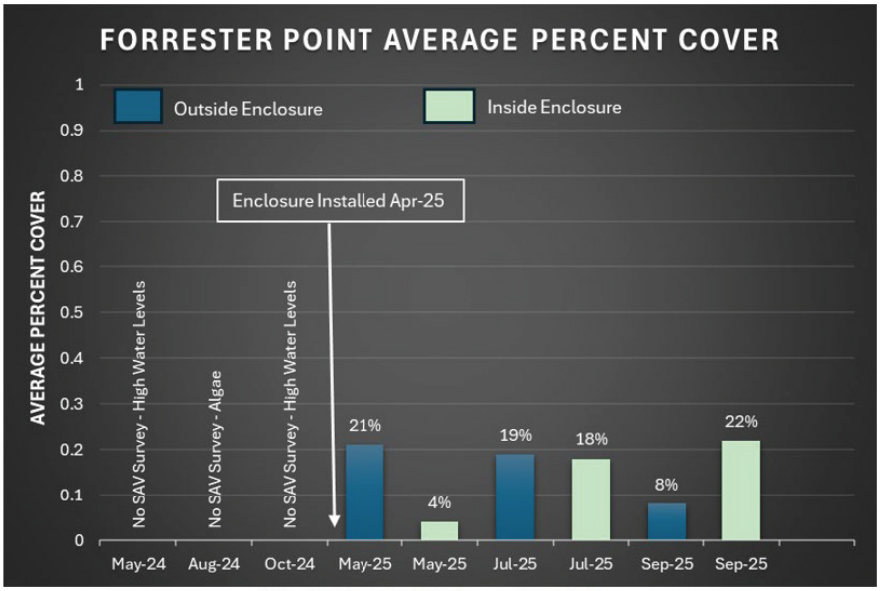


Figure 37: Forrester Point Average Percent Cover

Growing Season Trends: Canopy height and percent cover generally ***increased*** from May - September 2025; improvements inside the enclosure were more pronounced.

Forrester Point - Water Quality: 2024-2025

Overall, water quality parameters at this site remained consistent with comparative year-onyear conditions and were within SAV's optimum thresholds for growth, with the exception of **pH and turbidity**. With the exception of October 2024 and September 2025, pH was elevated above the optimum range (6.5-8.0) upper cap. July 2025 had elevated turbidity at 12.2, above the optimum range of 0-10. Some general trends were observed as follows: Compared to previous sites further north, Chlorophyll a levels were elevated on all six field visits. Additionally, pH seems to be positively correlated with Dissolved Oxygen - DOs of higher than 100% have pHs above the 8.0 upper limit. These all correspond with visits in May/August of 2024, and May/July of 2025.

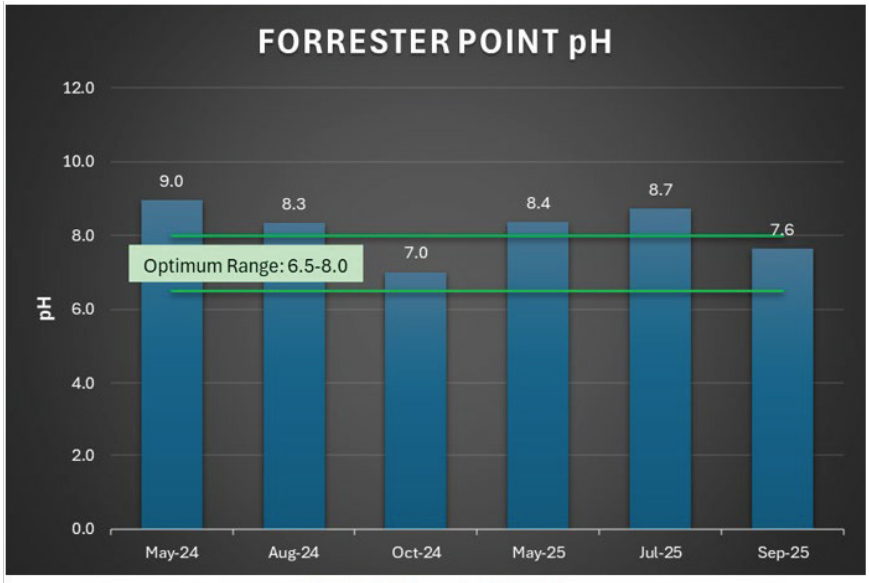


Figure 38: Forrester Point pH

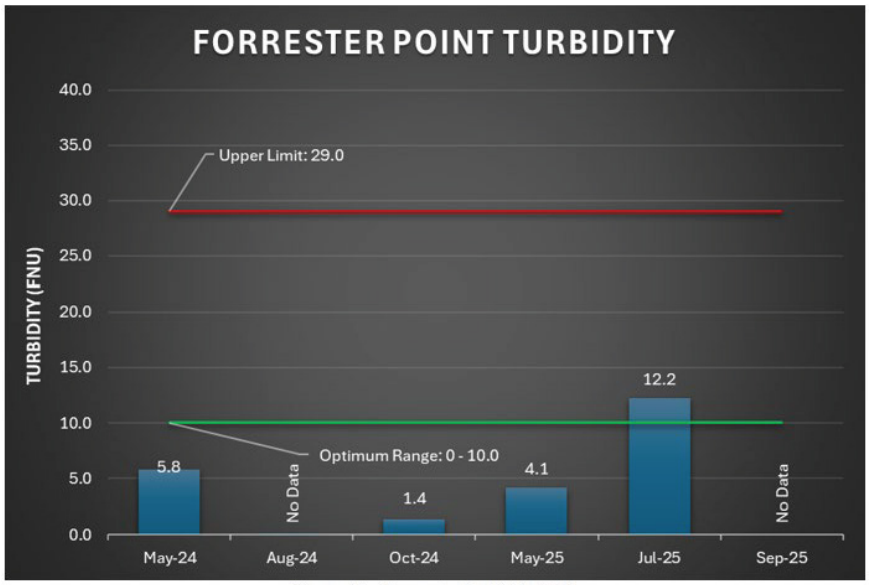


Figure 39: Forrester Point Turbidity

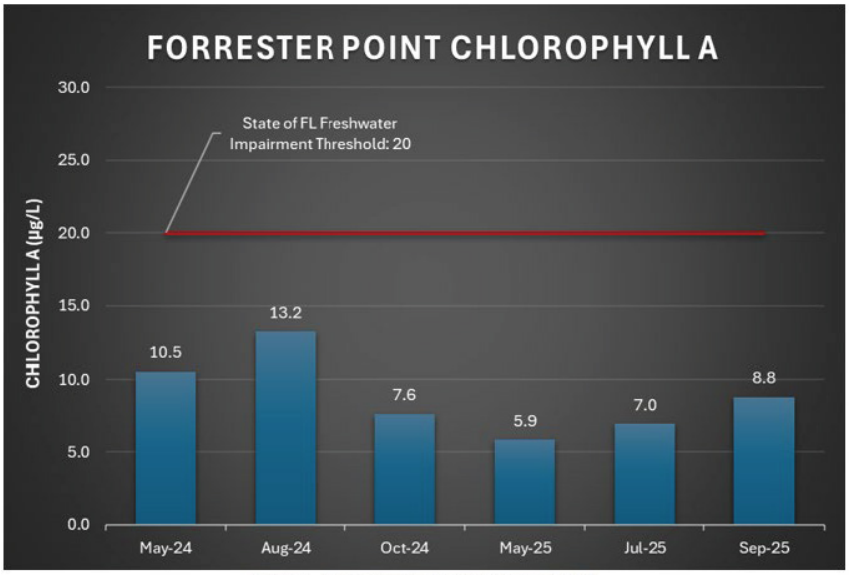
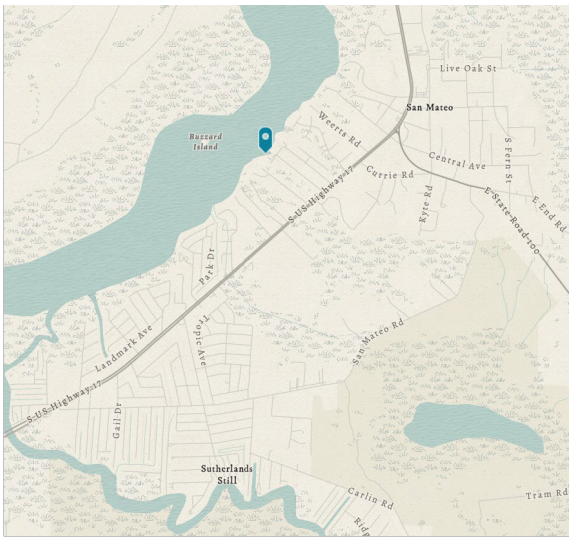


Figure 40: Forrester Point Chlorophyll A



SITE 8 - San Mateo

Site 8 is located in San Mateo, an unincorporated community in Putnam County, positioned southeast of Palatka along the eastern shoreline of the St. Johns River. This stretch of the river extends from Buzzard Island to the confluence with Dunn's Creek, with Site 8 situated directly across from Buzzard Island.

Site 8 is ideal due to its proximity to freshwater inputs, its historical SAV abundance, and its position within a transitional zone where shifts in water quality and salinity gradients can strongly influence SAV resilience and recovery.

This site is bulkheaded, with bottom substrate primarily composed of soft organic sediment and fine sand. An SAV enclosure was installed here in March 2022, similar in size and design to the Forrester Point enclosure. Field sampling at this location is focused within the enclosure, as water depths outside of the structure are considerably deeper, limiting access and making standardized SAV sampling outside the enclosure impractical.

WBID No.	Salinity Zone	Species Observed
2213M	Freshwater lacustrine	*Vallisneria americana* (Eelgrass, Tape grass)

Figure 41: Site Description Overview

San Mateo - Canopy Height: 2023-2025

Canopy heights at this site have generally increased over time, with minor fluctuations observed across sampling months and years. Following the most recent sampling event, ***the overall trend appears to be improving.***

May: In 2023, the average canopy height at this site was approximately 2 cm. By May 2024, canopy height had increased to 13 cm and remained relatively stable, with an average height of 12 cm observed in 2025. ***Overall, comparative May-May conditions appear to show increased canopy height from 2023-2025.***

August & July: By August 2023, the average canopy height had increased to 5 cm (compared to 2 cm a couple of months prior), reflecting early-season growth. Unfortunately, no SAV survey could be conducted in August 2024 due to a harmful algal bloom. By July 2025, canopy height had grown substantially to a striking 37 cm, indicating significant recovery. ***Overall, comparative August/July conditions appear to show increased canopy height from 2023-2025.***

October & September: October 2023 showed continued improvement in SAV canopy height, averaging 16 cm. In October 2024, canopy height was slightly lower at 11 cm, thoughstill within a comparable range. By September 2025, canopy height reached a record 43 cm, approaching historic eelgrass levels for the site. ***Overall, comparative October/September conditions appear to show increased canopy height from 2023-2025.***

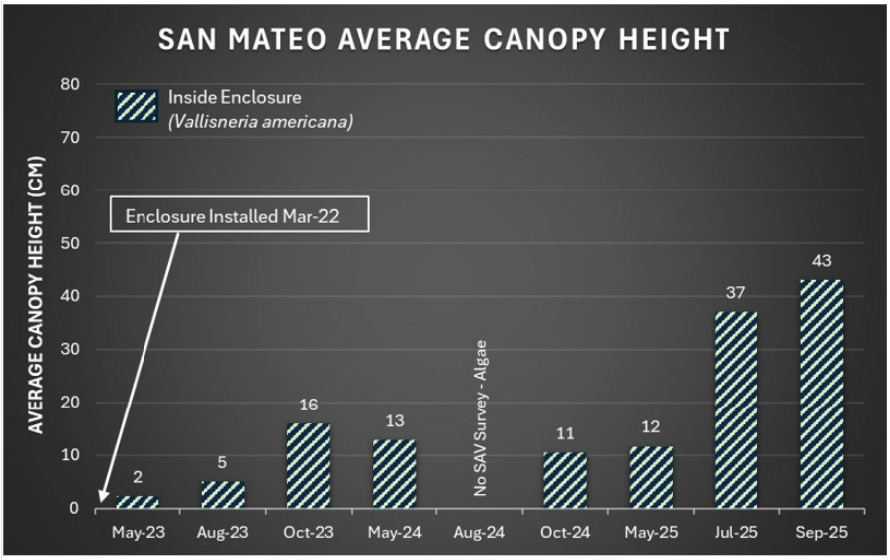


Figure 42: San Mateo Average Canopy Height

San Mateo – Percent Cover: 2023-2025

While canopy heights at this site showed a consistent improving trend, the same was not observed for average percent cover. Instead, ***percent cover declined over time, indicating a worsening trend despite increases in canopy height.***

May: While the average canopy height was only 2 cm in May 2023, the average percent cover at that time was relatively high at 51%. Percent cover increased to 78% by May 2024, reflecting strong seasonal growth. However, by May 2025, percent cover declined sharply to an average of just 35%, a nearly 30% decrease, indicating a notable reduction in SAV distribution despite increasing canopy height. ***Overall, comparative May-May conditions appear to indicate a worsening trend for percent cover from 2023-2025.***

August & July: In August 2023, percent cover remained consistent with measurements from May 2023, holding steady at 51%. As noted previously, sampling could not be conducted in August 2024 due to a persistent algal bloom. By July 2025, however, percent cover experienced a dramatic decline, dropping to just 9%. ***Overall, comparative August/July conditions appear to show a worsening trend for percent cover from 2023-2025.***

October & September: In October 2023, percent cover showed a modest increase from the August survey, rising to 55%. By October 2024, percent cover continued to improve, reaching 67%, though still 11% lower than the May 2024 value. In September 2025, percent cover declined sharply to an average of 20%, the lowest value recorded for this time of year, though still a slight improvement compared to the July 2025 low of 9%. While September 2025 showed a slight improvement from July 2025, the ***overall comparative October/September conditions appear to indicate a worsening trend.***

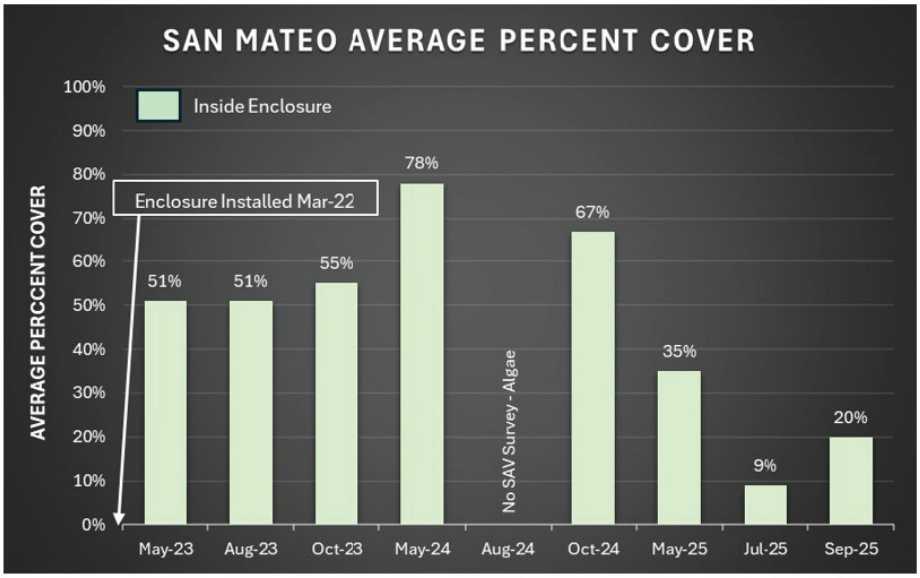


Figure 43: San Mateo Average Percent Cover

Growing Season Trend: While canopy heights appear to improve within the protective enclosure—particularly since the last survey—percent cover declined in July before increasing again by September. Although percent cover has not yet reached the levels observed in 2024, the combination of high canopy height and this recovery trend suggests relative stability. Interestingly, the peak in canopy height coincided with unusually high water levels. Average water depth reached 73 cm in October 2024 and an unprecedented 98 cm in September 2025, whereas typical depths in this area range from approximately 20-65 cm depending on the season. However, these elevated water levels may have corresponded with the gradual decline observed in average percent cover during this period.

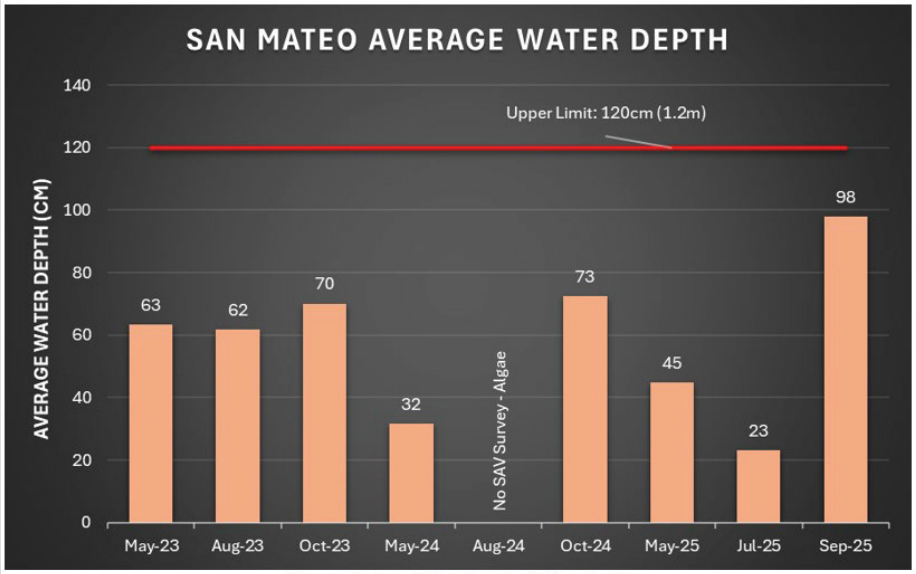


Figure 44: San Mateo Average Water Depth

San Mateo – Water Quality: 2023-2025

Overall, water quality parameters at this site remained generally consistent with year-to year conditions and largely within optimal thresholds for SAV growth, with the exception of **water temperature pH, and turbidity**. Dissolved oxygen and chlorophyll-a exhibited variability across sampling months.

Water temperatures at the site were consistently above the optimum range but generally remained below the upper thermal limit, with exceptions in October 2023, October 2024, and September 2025. Dissolved oxygen (DO) levels were typically above 100% saturation, although lower levels were recorded in October 2023, August and October 2024, and September 2025. pH appeared positively correlated with DO; DO values exceeding 100% were generally associated with pH above the upper limit of 8.0. While higher water temperatures were sometimes linked to increased DO, this pattern was not consistent. For example, in August 2024, water temperatures reached 94°F, but DO was only 65%, which may reflect the effects of a flourishing algal bloom that subsequently senesced and depleted oxygen levels.

Chlorophyll a concentrations were elevated during all sampling expeditions from 2024 to 2025, (but below 20 µg/L), with the highest value recorded in May 2024 at 10.0 µg/L. Turbidity was notably elevated in July 2025, measuring 20.2 FNU, exceeding the 10.0 FNU optimum range.

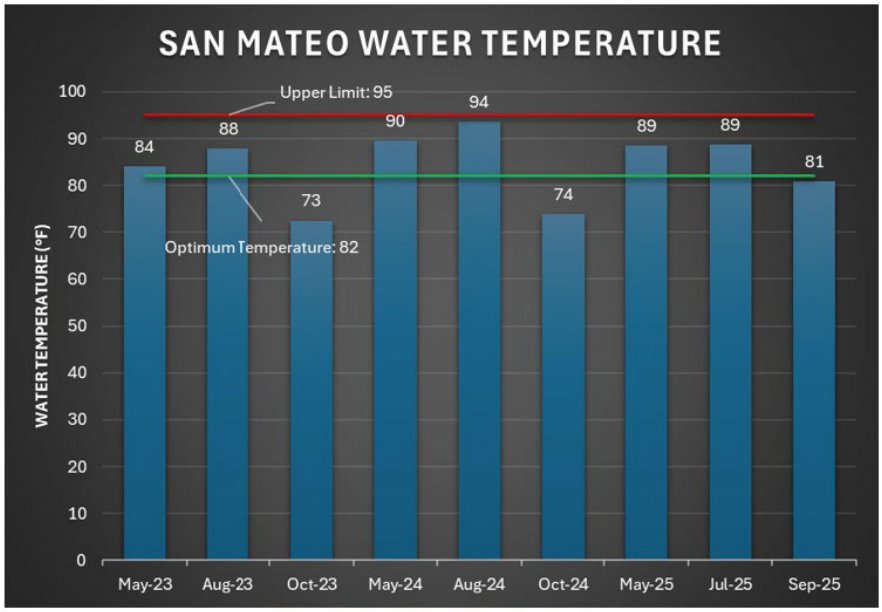


Figure 45: San Mateo Water Temperature

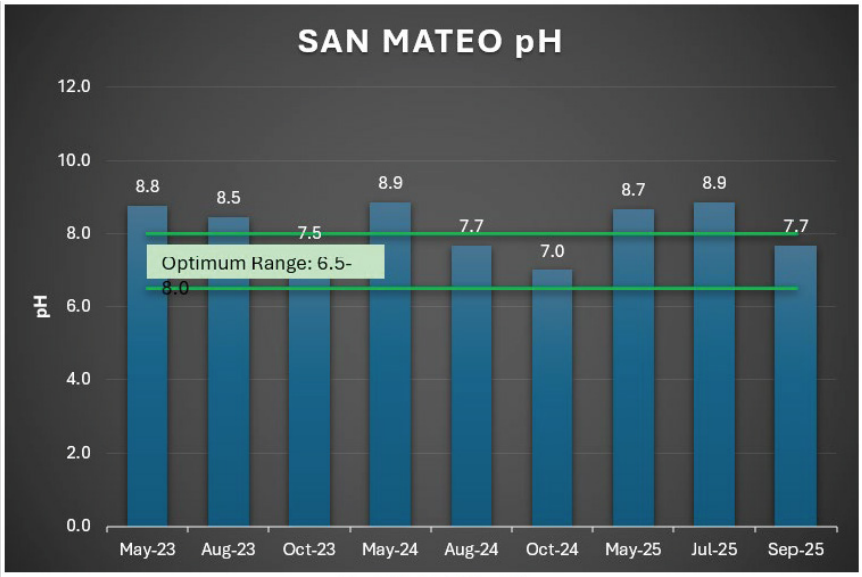


Figure 46: San Mateo pH

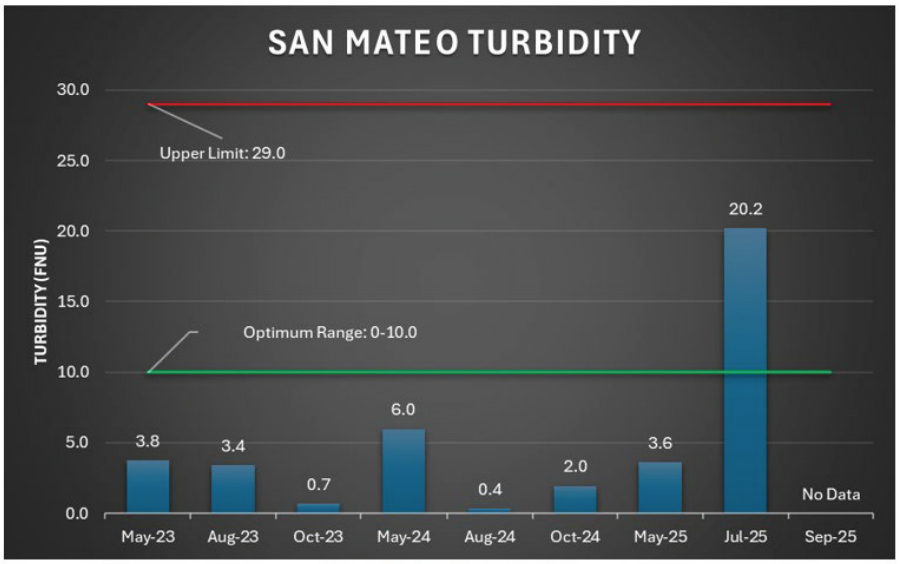


Figure 47: San Mateo Turbidity

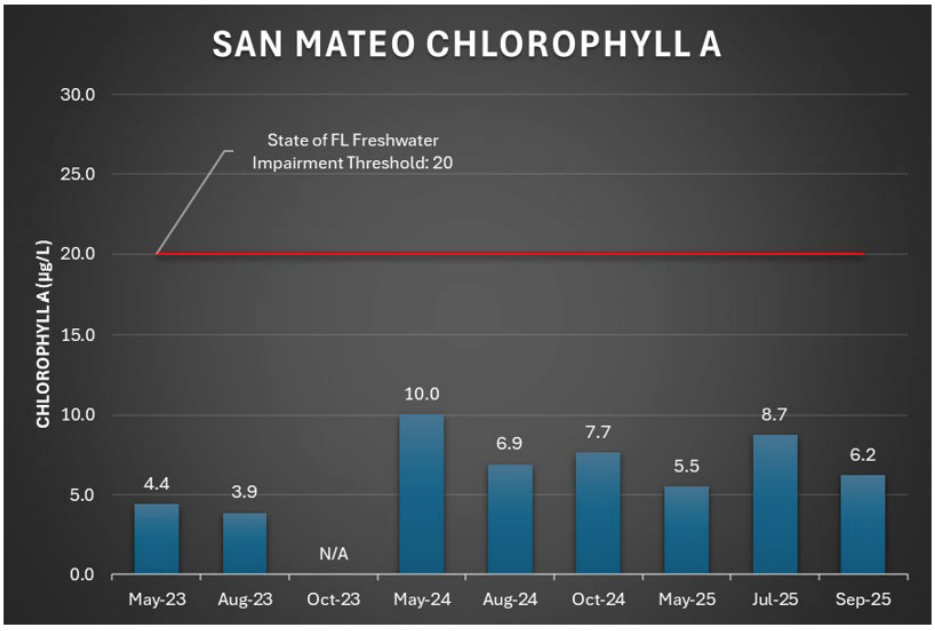
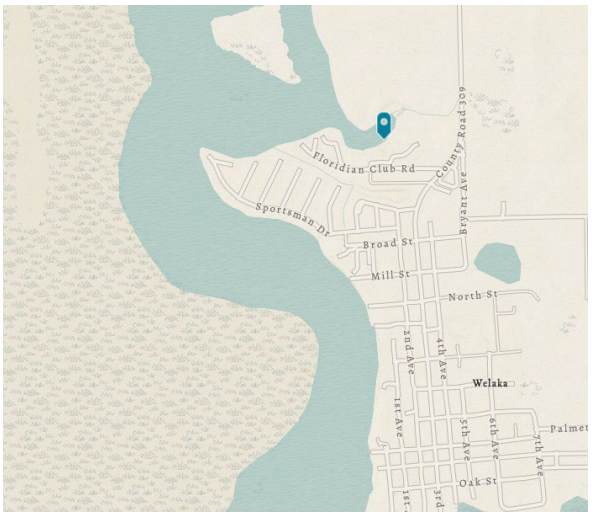


Figure 48: San Mateo Chlorophyll A



SITE 9 - The Floridian Club

Site 9 is located at The Floridian Sports Club Fish Camp in Welaka, a small town in Putnam County in northeast Florida. Geographically, Welaka sits along the eastern bank of the St. Johns River. The town lies roughly midway between Palatka to the north and Lake George to the south within the river's watershed.

This site remains an important monitoring location as it sits within a dynamic stretch of the St. Johns River where ecological conditions can shift significantly due to both natural processes and upstream influences. This section of the river represents a transition zone between the freshwater reaches upstream and the more variable, seasonally brackish conditions influenced by Lake George to the south.

The Floridian Club was acquired more than 40 years ago by Johnny Morris, founder of Bass Pro Shops and is recognized for its notable natural landscapes, historical significance, and high-quality fishing opportunities. Today it remains a prominent destination for bass anglers and continues to play an influential role in the broader bass fishing community.

The site features a predominantly natural shoreline, and the benthic substrate is composed primarily of mucky sand.

WBID No.	Salinity Zone	Species Observed
2213N	Freshwater lacustrine	*Vallisneria americana* (Eelgrass, Tape grass) *Najas guadalupensis* (Water naiad, southern naiad, guppy grass) *Chara sp.* (Muskgrass)

Figure 49: Site Description Overview

The Floridian Club – Canopy Height: 2024-2025

This site has only been sampled twice (May 2024 and May 2025) due to the frequent presence of algal blooms, ***preventing the development of a reliable trend.***

May: The two sampling events that were completed occurred in May 2024 and May 2025. During the 2024 survey, both *Vallisneria* and *Najas* were observed; however, by May 2025, only *Chara* was present. This shift suggests a decline in species diversity and potentially deteriorating habitat conditions at the site.

August & July: No comparative analysis could be conducted for these months due to algal blooms, which prevented the completion of SAV surveys.

October & September: No comparative analysis could be conducted for these months due to algal blooms in October 2024 and no finding of SAV in September 2025.

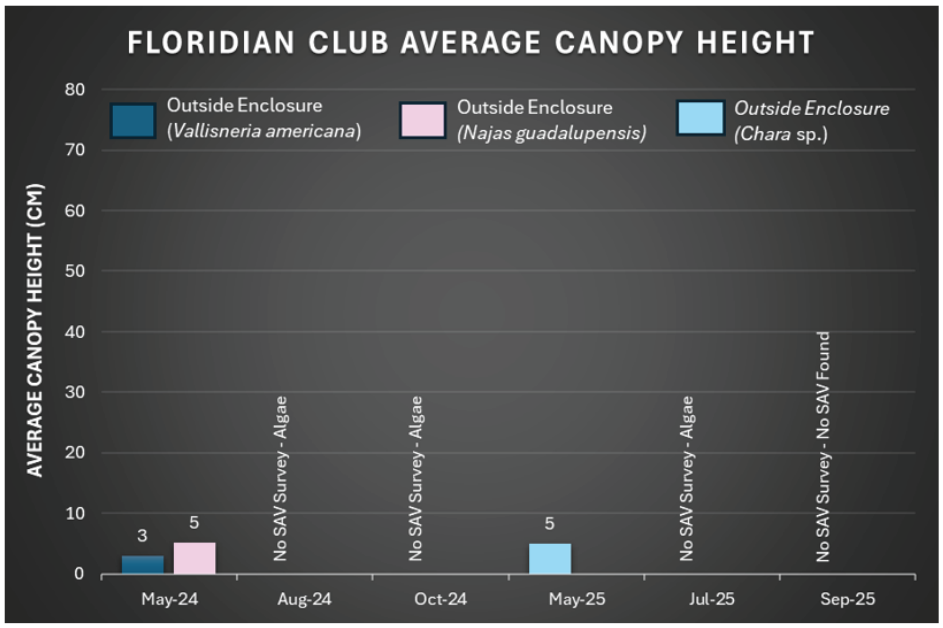


Figure 50: Floridian Club Average Canopy Height

The Floridian Club – Percent Cover: 2024-2025

This site has only been surveyed twice due to the frequent presence of algal blooms, ***preventing the development of a reliable trend for percent cover.***

May: The two completed sampling events occurred in May 2024 and May 2025. Overall SAV percent cover declined from 16% in May 2024 to 4% in May 2025, ***indicating a pronounced decrease in vegetation density over this period.***

August & July: No comparative analysis could be conducted for these months due to algal blooms, which prevented the completion of SAV surveys.

October & September: No comparative analysis could be conducted for these months due to algal blooms in October 2024 and no finding of SAV in September 2025.

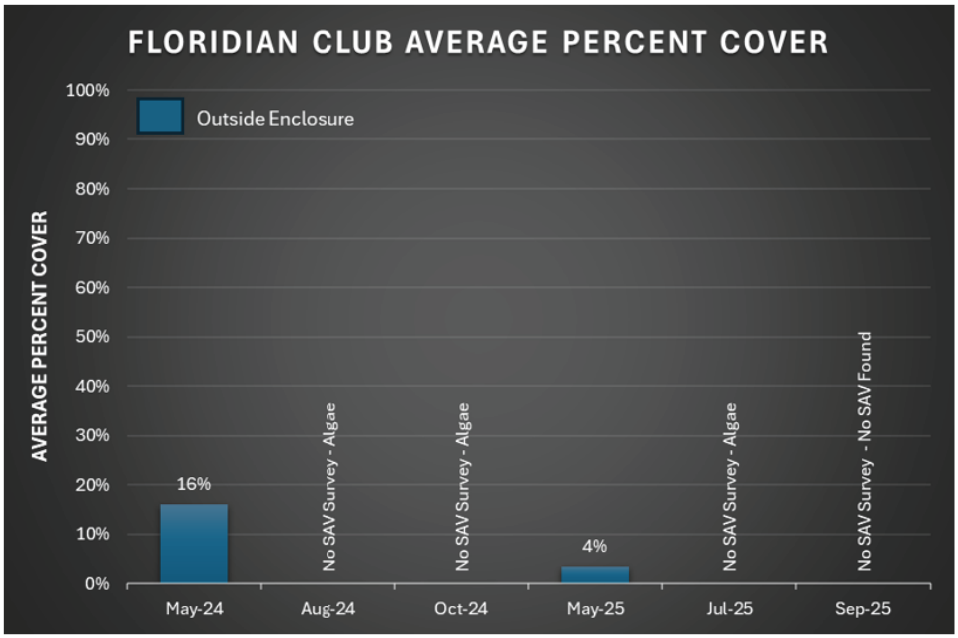


Figure 51: Floridian Club Average Percent Cover

Growing Season Trends: Trends could not be formally established for this monitoring site due to limited survey data. However, based on the two months with available SAV observations and the absence of SAV documented in September 2025, the overall outlook for SAV at this site appears unfavorable.

The Floridian Club – Water Quality: 2024-2025

Overall, water quality parameters at this site remained generally consistent with year-toyear conditions and largely within optimal thresholds for SAV growth, with the exception of **water temperature and pH**. Chlorophyll a exhibited variability across sampling months. Turbidity and dissolved oxygen also fluctuated, approaching exceeding the optimum range.

Water temperatures were consistently above the optimum range but remained below the upper thermal limit, with the exception of October 2024. Although elevated, temperatures at this site were generally lower than those recorded at other monitoring locations. Differences may partially reflect the time of day at which sampling occurred. Dissolved oxygen (DO) levels were relatively low during May and August 2024, measuring 58% and 45% saturation, respectively. The only instance of supersaturation (>100%) occurred in July 2025. pH appeared to show a positive correlation with DO, with DO values exceeding 100% corresponding to pH readings above the upper limit of 8.0. One notable exception was recorded in May 2024, when a low DO level of 58% coincided with an elevated pH of 8.7, the second-highest pH value among all six sampling dates and the only such anomaly observed across all sites. Although higher water temperatures can be associated with increased DO under certain conditions (e.g., photosynthetically active periods), this pattern was not consistently observed at this location. Turbidity was higher in July 2025 compared to other sampling dates but remained within the 10.0 FNU optimum range. Chlorophyll-a concentrations were elevated only once, in October 2024, but remained below 20 µg/L.

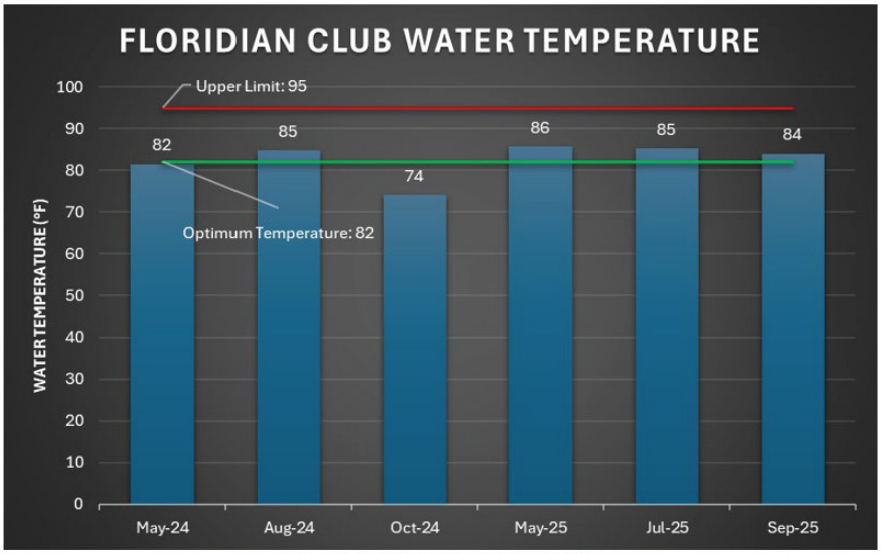


Figure 52: Floridian Club Water Temperature

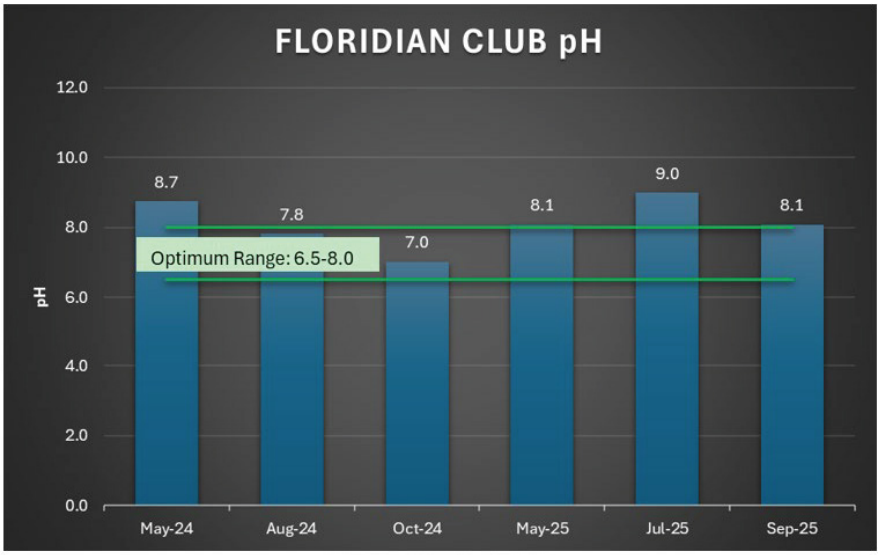


Figure 53: Floridian Club pH

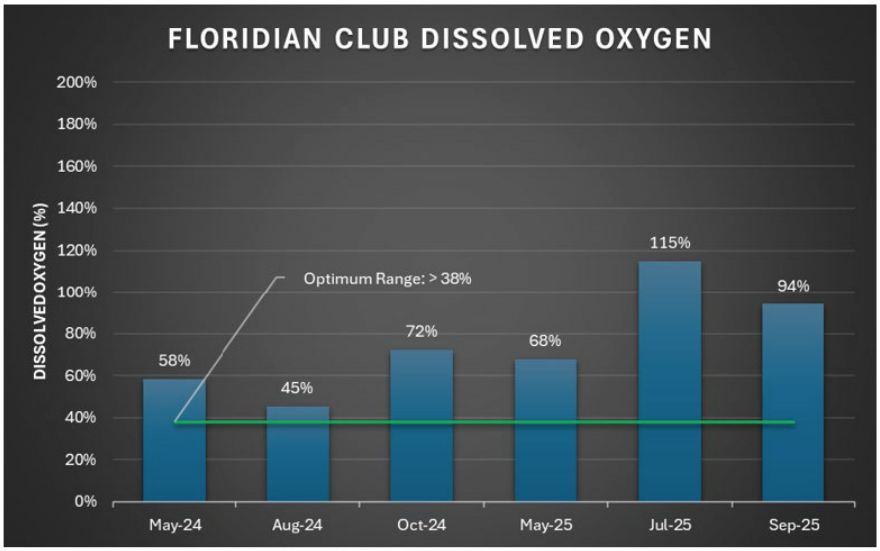
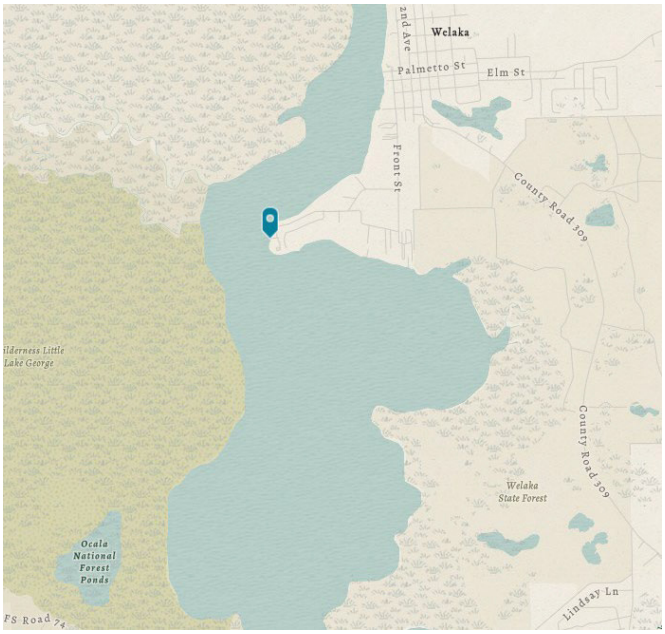


Figure 54: Floridian Club Dissolved Oxygen



SITE 10 - Beechers Point

Site 10 is located at Beechers Point in Welaka. The location is situated at the River Bend Condominiums on the east bank of the St. Johns River, across from the confluence with the Ocklawaha River.

Located just south of the Floridian Club, this site remains an important monitoring location for many of the same reasons: it lies within a highly dynamic stretch of the St. Johns River where environmental conditions can shift quickly due to natural processes, upstream inputs, and seasonal variability. Its position within this transitional zone provides valuable insight into changes in water quality, salinity, and SAV distribution.

This site is bulkheaded, and the benthic substrate is primarily composed of fine sandy material.

WBID No.	Salinity Zone	Species Observed
2213O	Freshwater lacustrine	*Vallisneria americana* (Eelgrass, Tape grass) *Chara sp.* (Muskgrass)

Figure 55: Site Description Overview

Beechers Point - Canopy Height: 2023-2025

Similar to site 9, the Floridian Club, this site has only been surveyed twice due to various factors, ***preventing the development of a reliable trend for canopy height.***

May: The only May survey completed at this site occurred in May 2024, during which *Chara* and *Vallisneria* were observed. Average canopy heights measured 4 cm for *Vallisneria* and 5 cm for *Chara*. Because this was the only May survey conducted, ***no comparative trend could be established.***

August & July: The only August/July survey completed at this site occurred in August 2023, during which only *Chara* was observed, with an average canopy height of 14 cm. However, with no additional surveys during this period, ***no comparative analysis could be conducted.***

October & September: No comparative analysis could be conducted for these months due to elevated water levels in October 2023 and October 2024, which prevented SAV surveys. A brief survey was completed in September 2025; however, no SAV was observed during that event.

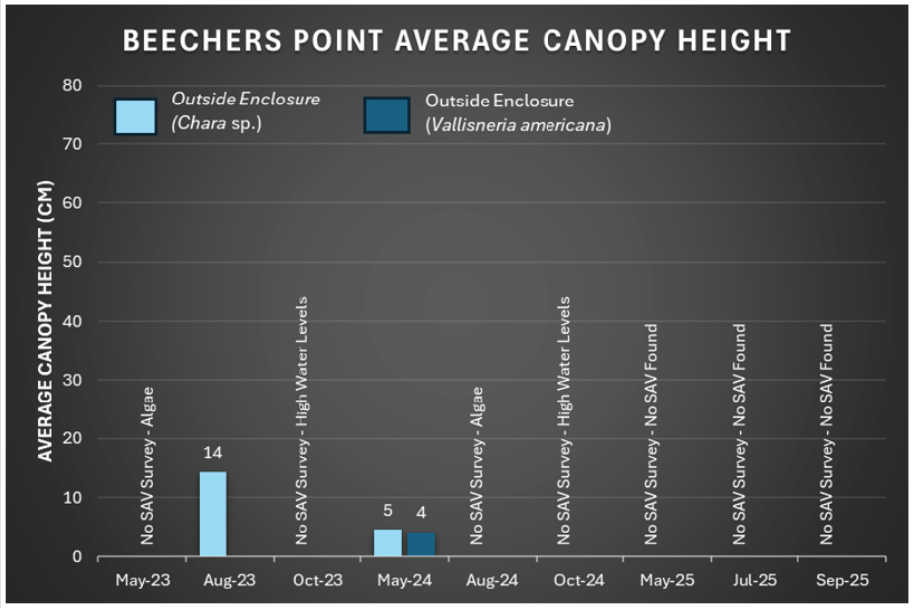


Figure 56: Beechers Point Average Canopy Height

Beechers Point – Percent Cover: 2023-2025

This site has only been surveyed twice due to the frequent presence of algal blooms, ***preventing the development of a reliable trend for percent cover.***

May: The only May sampling event occurred in May 2024, during which the average SAV percent cover was measured at just 2%.

August & July: The only July/August survey conducted at this site occurred in August 2023, during which the average SAV percent cover was 58%, representing a stark contrast to the 2% observed during the May 2024 survey.

October & September: Comparative analysis for these months could not be conducted due to elevated water levels in October 2023 and October 2024, which prevented SAV surveys. A brief survey in September 2025 detected no SAV at the site.

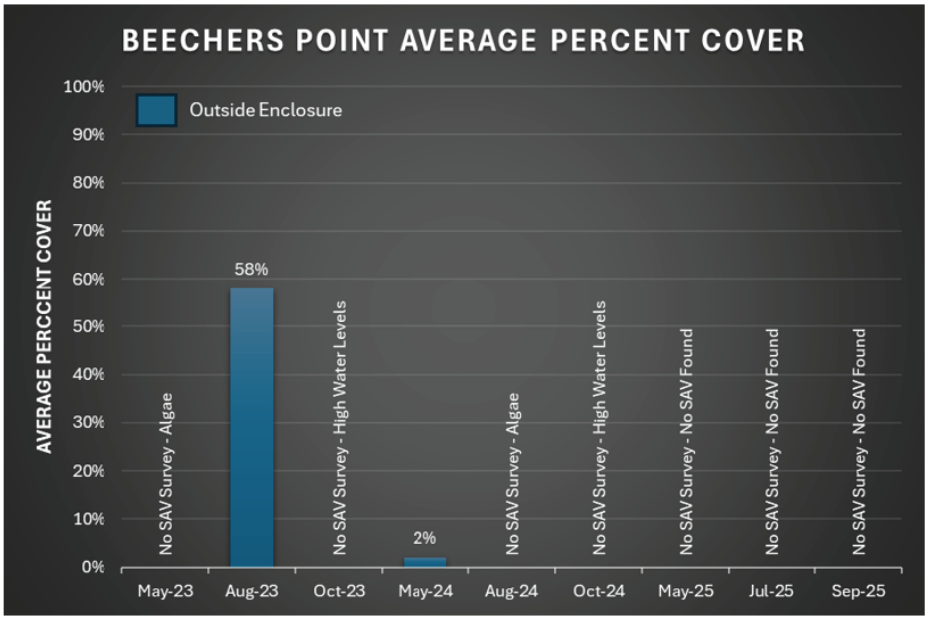


Figure 57: Beechers Point Average Percent Cover

Growing Season Trends: Trends could not be formally established for this monitoring site due to limited survey data. However, based on the two months with available SAV observations and the absence of SAV documented in September 2025, the overall outlook for SAV at this site appears unfavorable.

Beechers Point – Water Quality: 2023-2025

Overall, water quality parameters at this site remained generally consistent with year-to-year conditions and largely within optimal thresholds for SAV growth, with the exception of **water temperature and pH**. Dissolved oxygen and chlorophyll a exhibited variability across sampling months. Turbidity also fluctuated, nearly exceeding the optimum range.

Water temperatures at the site were consistently above the optimum range but generally remained below the upper thermal limit, with the exceptions of October 2023 and October 2024.

Dissolved oxygen (DO) levels were typically above 100% saturation, although lower levels were observed in August and October 2024, as well as in May and September 2025. pH values appeared to be positively correlated with DO, with sites exhibiting DO above 100% often exceeding the upper pH limit of 8.0. Higher water temperatures were sometimes associated with increased DO, although this relationship was not consistent across all sampling events. Turbidity was higher in July 2025 relative to other sampling dates but remained within the 10.0 FNU optimum range. Chlorophyll a concentrations were elevated (but below 20 µg/L) during all expeditions in 2024 and again in July 2025.

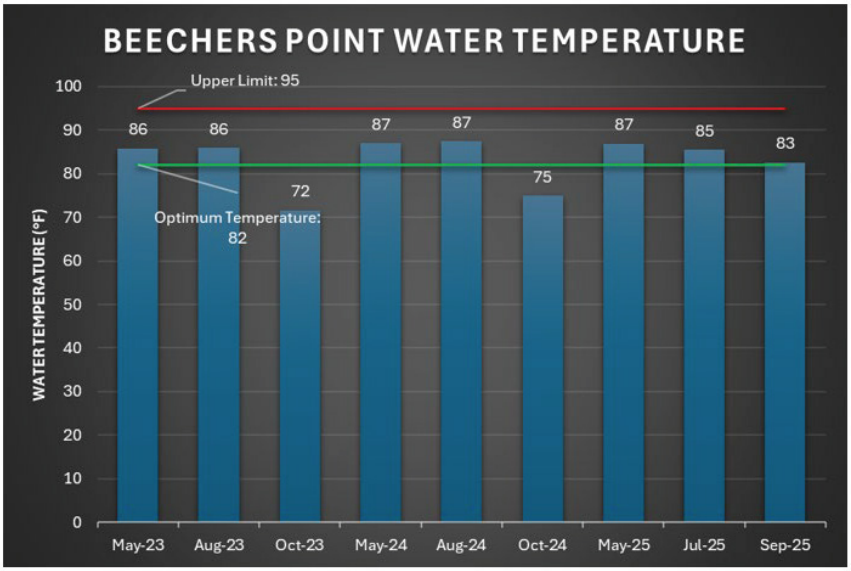


Figure 58: Beechers Point Water Temperature

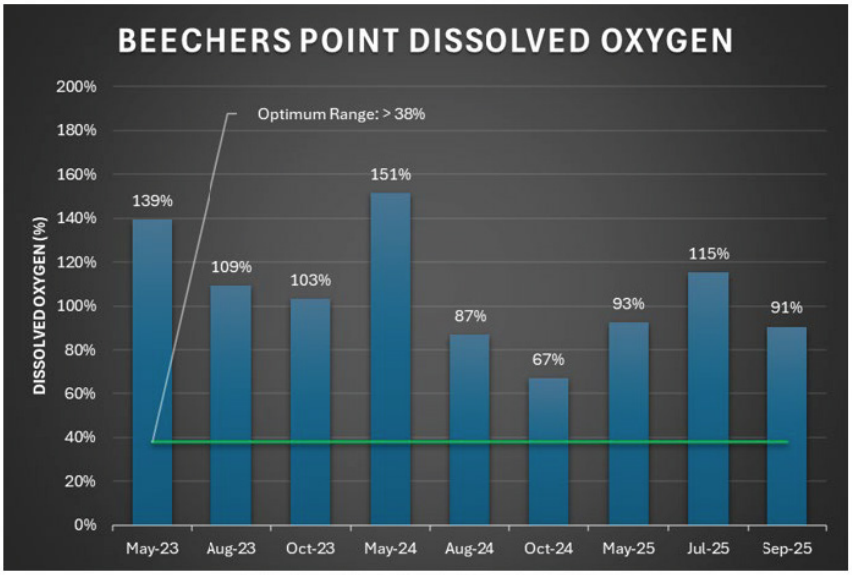


Figure 59: Beechers Point Dissolved Oxygen

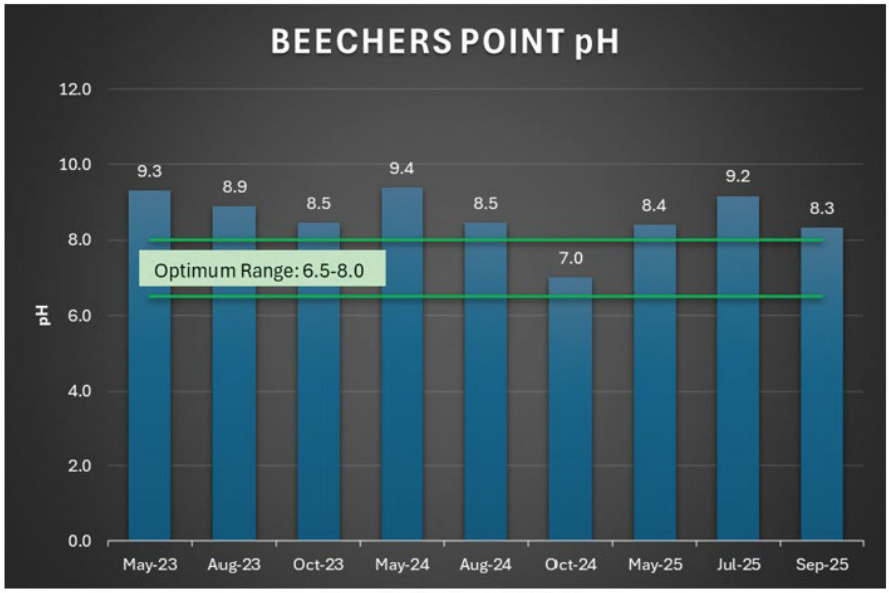


Figure 60: Beechers Point pH

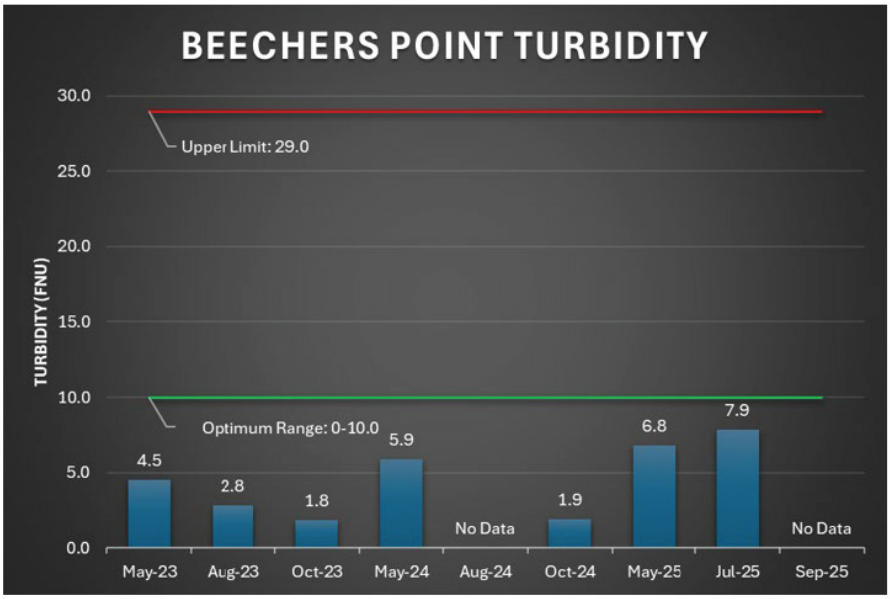


Figure 61: Beechers Point Turbidity

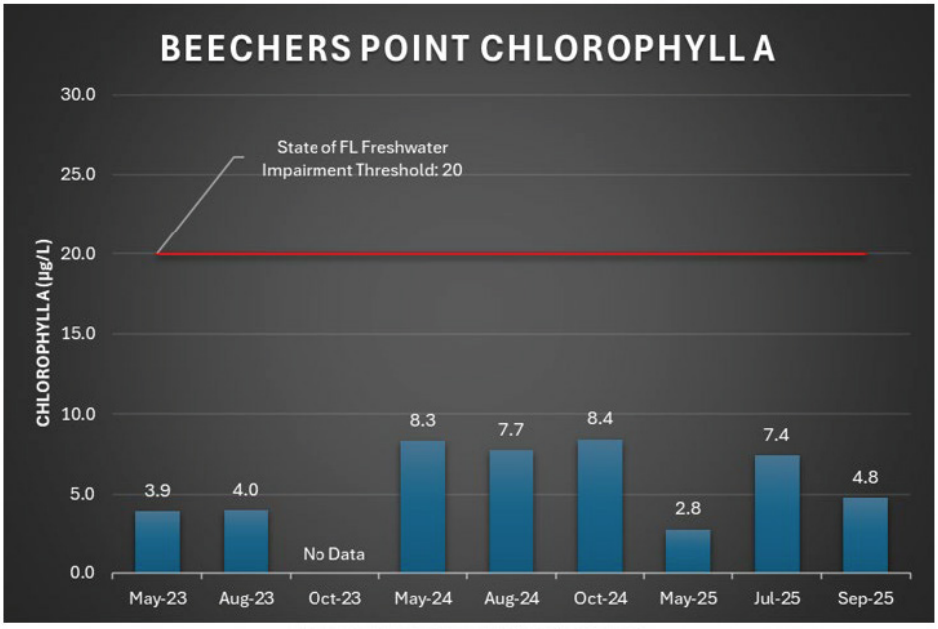
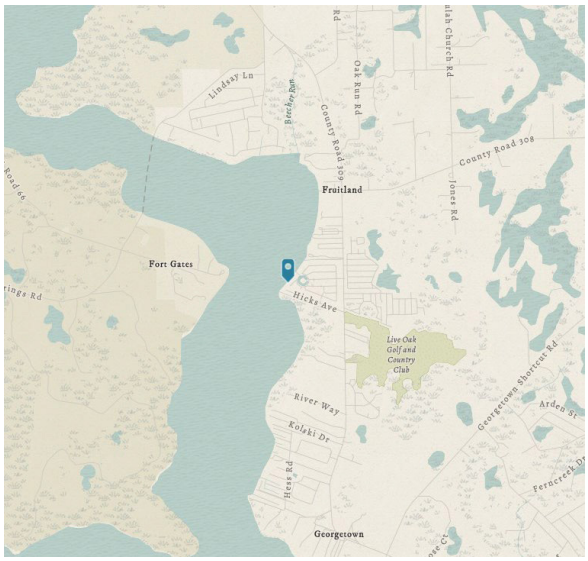


Figure 62: Beechers Point Chlorophyll A



SITE 11 - Jenerson Point

Site 11 is located at Jenerson Point in Putnam County. The monitoring location is situated just south of Fruitland Cove and north of the southern tip of Drayton Island.

This site represents an important monitoring location for SAV because it lies within a dynamic reach of the St. Johns River influenced by upstream freshwater inputs, tidal exchange, and seasonal fluctuations in water levels and salinity.

This site is partially bulkheaded and also contains a natural shoreline, with a benthic substrate primarily composed of fine sandy material. It encompasses two private properties that agreed to the installation of an SAV protective enclosure on April 28, 2025. The enclosure covers an area of approximately 6,500 square feet.

It should be noted that a minor breach in the northwest corner of the enclosure was observed during the July survey; this issue was resolved by the September survey and may have influenced results collected within the enclosure.

WBID No.	Salinity Zone	Species Observed
2213O	Freshwater lacustrine	*Vallisneria americana* (Eelgrass, Tape grass) *Chara sp.* (Muskgrass)

Figure 63: Site Description Overview

Jenerson Point - Canopy Height: 2024-2025

Canopy height at this site has exhibited temporal variability, while species diversity has declined over the monitoring period. During the latter months of monitoring, SAV surveys were restricted to areas within the protective enclosure due to prevailing environmental constraints. ***The overall trend at this site is uncertain.***

May: In May 2024, both Vallisneria and Chara were present at this site; however, canopy heights for both species were notably stunted, with each averaging approximately 3 cm. By May 2025, surveys indicated that only Chara remained present both inside and outside of the protective enclosure. Despite the reduced species diversity, canopy height showed improvement, averaging 12 cm within the enclosure and 7 cm outside. ***Overall, comparative May-May conditions appear to show increased canopy height, but worsened species diversity.***

August & July: In August 2024, only Vallisneria was observed at the site, with an average canopy height of approximately 2 cm. By July 2025, although no outside-enclosure comparison could be conducted due to HABs, surveys within the enclosure documented only Chara, with an average canopy height of 12 cm, consistent with measurements recorded in May 2025. Because July and August conditions were not directly comparable across years or sampling areas, ***the overall seasonal trend for these months remains uncertain.***

October & September: No SAV surveys could be conducted in October 2024 due to elevated water levels. In September 2025, surveying was limited to within the protective enclosure because of high water levels and animal activity outside the enclosure. Within the enclosure, Chara exhibited an average canopy height of 23 cm. Because October and September conditions were not directly comparable across years or sampling areas, ***the overall seasonal trend for these months remains uncertain.***

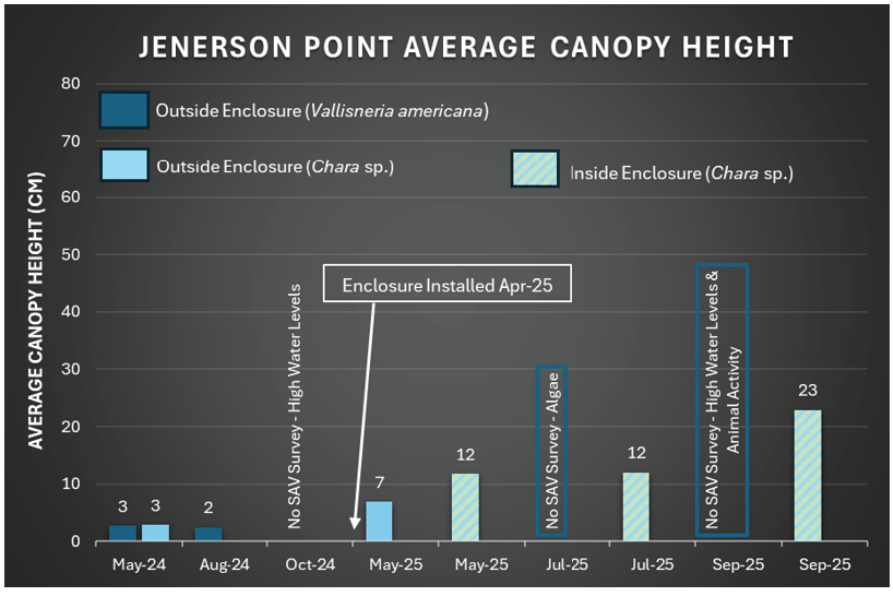


Figure 64: Jenerson Point Average Canopy Height

Jenerson Point - Percent Cover: 2024-2025

May: In May 2024, the average SAV percent cover was 16%, declining to 12% by May 2025 outside the enclosure. In contrast, percent cover within the enclosure increased substantially to 52% in 2025. ***Overall, comparative May-to-May conditions indicate a decline in SAV percent cover outside the enclosure, while percent cover increased markedly within the protected area.***

August & July: In August 2024, the average SAV percent cover declined to 7%, representing a further decrease from May conditions. In July 2025, no survey could be conducted outside the enclosure due to a harmful algal bloom (HAB); however, within the enclosure, average percent cover was measured at 65%. ***Because July and August conditions were not directly comparable across years or sampling areas, the overall seasonal trend for these months remains uncertain, but the data suggest that SAV percent cover may be improving inside the enclosure when compared to the May 2025 survey results within the protected area.***

October & September: No SAV surveys could be conducted in October 2024 due to elevated water levels. In September 2025, surveying was restricted to the protective enclosure because of high water levels and animal activity outside the enclosure. Within the enclosure, average SAV percent cover was 53%. ***Because October and September conditions were not directly comparable across years or sampling areas, the overall seasonal trend for these months remains uncertain, but the data suggest that SAV percent cover may be declining inside the enclosure when compared to measurements from July 2025 within the protected area.***

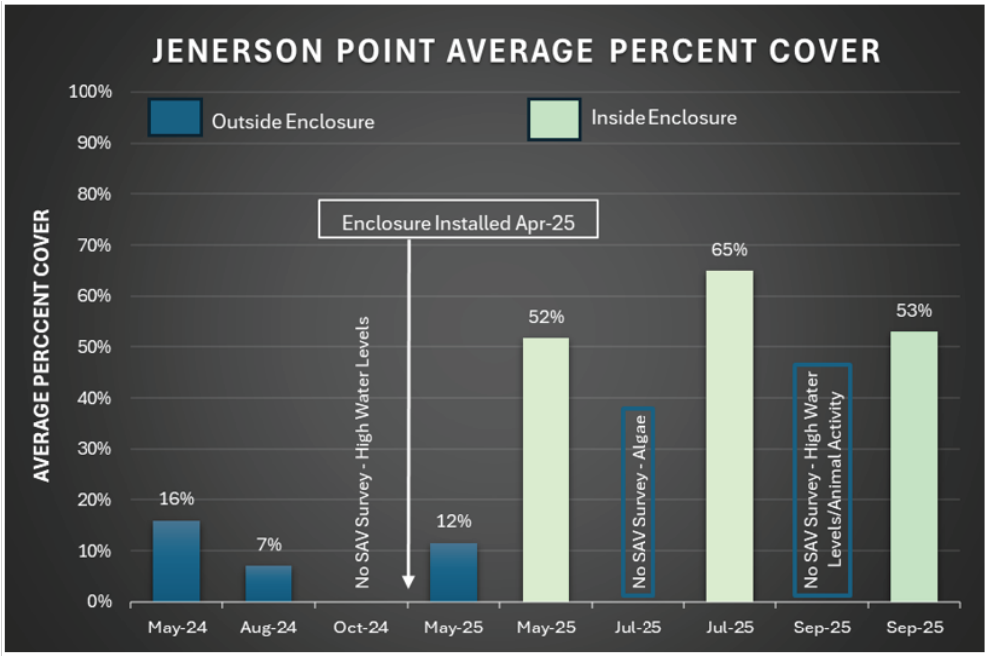


Figure 65: Jenerson Point Average Percent Cover

Growing Season Trends: Canopy heights and average percent cover could only be directly compared for May-to-May surveys. Overall, these comparisons indicate an increase in canopy height but a decline in species diversity. Other months could not be compared side by side due to environmental factors limiting sampling outside the enclosure in July and September 2025. Within the enclosure, Chara canopy height increased over the course of the monitoring period; however, with Vallisneria no longer present, species diversity declined. Average SAV cover inside the enclosure rose from 52% in May 2025 to 65% in July 2025 but then decreased slightly to 53% in September 2025. ***Consequently, the overall trend for the growing season remains uncertain.***

Jenerson Point - Water Quality: 2024-2025

Overall, water quality parameters at this site remained generally consistent with year-to-year conditions and largely within optimal thresholds for SAV growth, with the exception of **water temperature and pH**. Dissolved oxygen and chlorophyll a exhibited temporal variability across sampling months. Turbidity also fluctuated, nearly exceeding the optimum range.

Water temperatures at the site were consistently above the optimum range but generally remained below the upper thermal limit, with the exception of October 2024. Dissolved oxygen (DO) levels were consistently at or above 100% saturation, except in October 2024. pH appeared positively correlated with DO, with sites exhibiting DO greater than 100% typically showing pH values above the upper limit of 8.0. While higher water temperatures were occasionally associated with increased DO, this relationship was not consistent across all sampling events.

Turbidity was elevated in July 2025 compared to other sampling dates, although it remained within the 10.0 FNU optimum range. Chlorophyll-a concentrations were elevated during nearly all sampling expeditions year over year (but below 20 µg/L), with the exception of May 2025, which was lower at 2.7 µg/L.

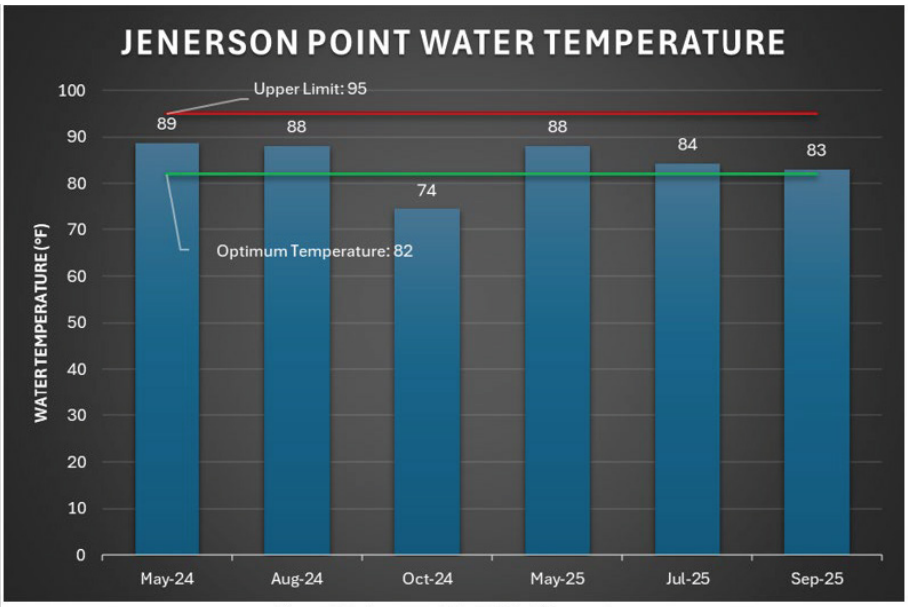


Figure 66: Jenerson Point Water Temperature

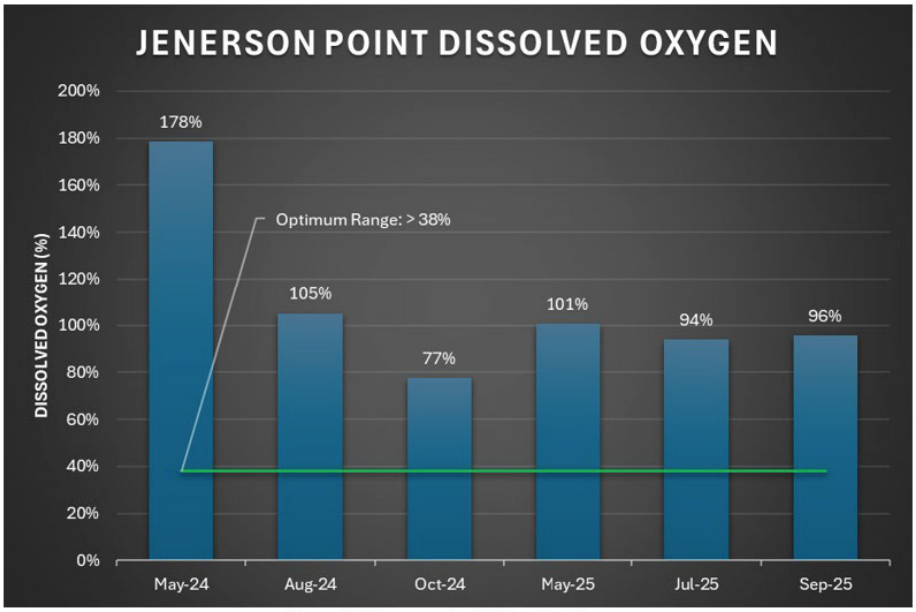


Figure 67: Jenerson Point Dissolved Oxygen

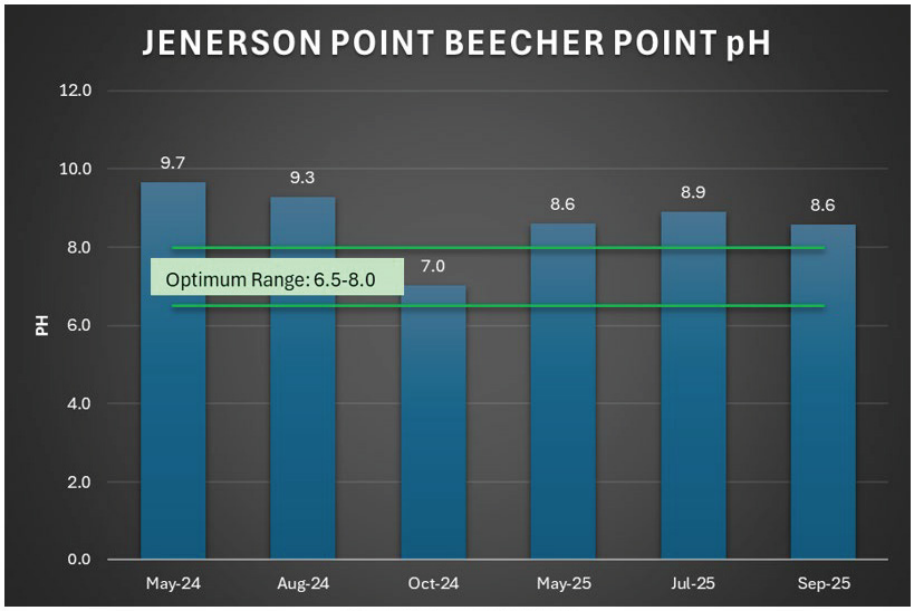


Figure 68: Jenerson Point pH

SITE 12 - Drayton Island

Site 12 is located at the northeast tip of Drayton Island. Drayton Island is located in the middle St. Johns River in Putnam County, Florida, north of Welaka and south of Lake George. The largely forested island lies within a dynamic freshwater system, with surrounding shallow waters supporting submerged aquatic vegetation and important aquatic wildlife habitat.

This site has an enclosure that was installed on May 15, 2025 encompassing approximately 3,500 square feet. The site features a natural shoreline, and the benthic substrate is composed primarily of mucky sand.

WBID No.	Salinity Zone	Species Observed
2893A5	Freshwater lacustrine	*Chara sp.* (Muskgrass)

Figure 69: Site Description Overview

Drayton Island - Canopy Height: 2023-2025

This site has only been sampled once due to the frequent presence of algal blooms and high water levels, ***preventing the development of a reliable trend.***

May: The only full SAV survey at this site was conducted in May 2025, encompassing both inside and outside the protective enclosure. In May 2023 and May 2024, only Chara was present, so a complete survey was not performed. Although May 2025 also recorded only Chara, a survey was conducted to assess growth rates in relation to the enclosure. Average canopy height measured 14 cm inside the enclosure and 9 cm outside.

August & July: No comparative analysis could be conducted for these months due to algal blooms, which prevented the completion of SAV surveys.

October & September: No comparative analysis could be conducted for these months due to elevated water levels in October 2023 and October 2024, as well as the absence of SAV outside the enclosure in September 2025. Additionally, inaccessibility of the enclosure during September 2025 prevented a survey from being conducted within the protected area.

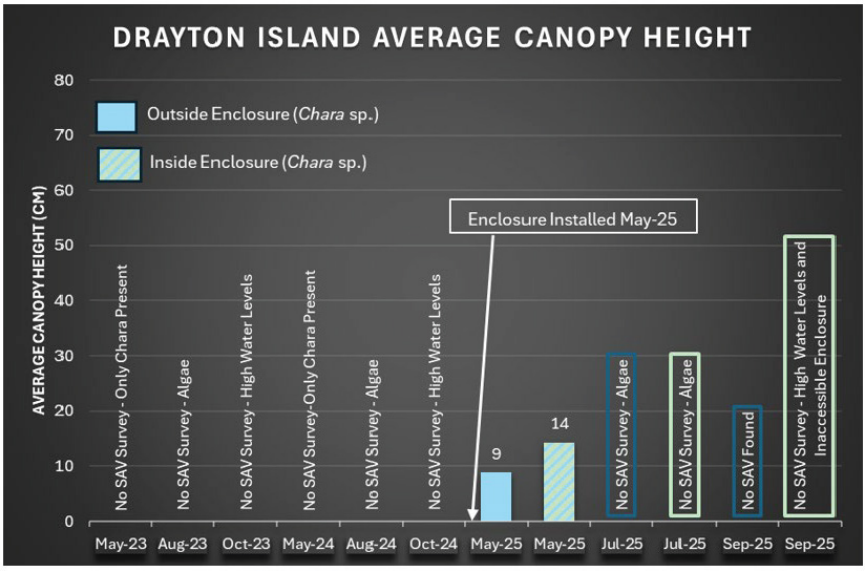


Figure 70: Drayton Island Average Canopy Height

Drayton Island – Percent Cover: 2024-2025

This site has only been sampled once due to the frequent presence of algal blooms and high water levels, ***preventing the development of a reliable trend.***

May: The only full SAV survey at this site was conducted in May 2025, encompassing both inside and outside the protective enclosure. In May 2023 and May 2024, only Chara was present, so a complete survey was not performed. Although May 2025 also recorded only Chara, a survey was conducted to assess percent cover rates in relation to the enclosure. Average percent cover showed 19% outside of the enclosure and 67% inside.

August & July: No comparative analysis could be conducted for these months due to algal blooms, which prevented the completion of SAV surveys.

October & September: No comparative analysis could be conducted for these months due to elevated water levels in October 2023 and October 2024, as well as the absence of SAV outside the enclosure in September 2025. Additionally, inaccessibility of the enclosure during September 2025 prevented a survey from being conducted within the protected area.

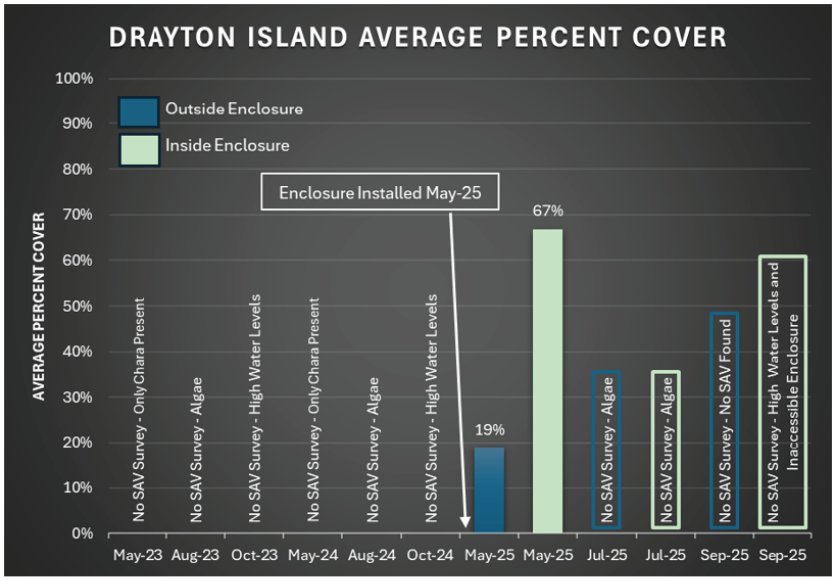


Figure 71: Drayton Island Average Percent Cover

Growing Season Trends: Trends could not be formally established for this monitoring site due to limited survey data. However, based on the single month with available SAV observations, persistently low species diversity (only Chara present), and the absence of SAV documented in September 2025, the overall outlook for SAV at this site appears unfavorable.

Drayton Island – Water Quality: 2024-2025

Overall, water quality parameters at this site remained generally consistent with year-to-year conditions and largely within optimal thresholds for SAV growth, with the exception of **water temperature, pH, and turbidity**. Dissolved oxygen and chlorophyll-a exhibited temporal variability across sampling months.

Water temperatures at the site were consistently above the optimum range but remained below the upper thermal limit, with the exceptions of October 2023 and October 2024. Dissolved oxygen (DO) levels were consistently at or above 100% saturation, with the exception of October 2024; this same exception was also observed at Jenerson Point. pH appeared to be positively correlated with DO, with measurements exceeding 100% saturation typically corresponding to pH values above the upper limit of 8.0. Although higher water temperatures were sometimes associated with elevated DO, this relationship was not consistent. For example, in October 2023, water temperature measured 73˚F while DO was elevated at 111% saturation.

Chlorophyll a concentrations were elevated during every expedition in 2024, as well as in July and September 2025 (but below 23 µg/L). It should be noted that this site's Chlorophyll a threshold is different from the 20 µg/L Numeric Nutrient Criteria established for freshwater in Florida; the Lake George TMDL established a threshold of 23 µg/L. Turbidity exceeded the optimum range in July 2025, measuring 16.1 FNU, which is above the 10.0 FNU optimum threshold.

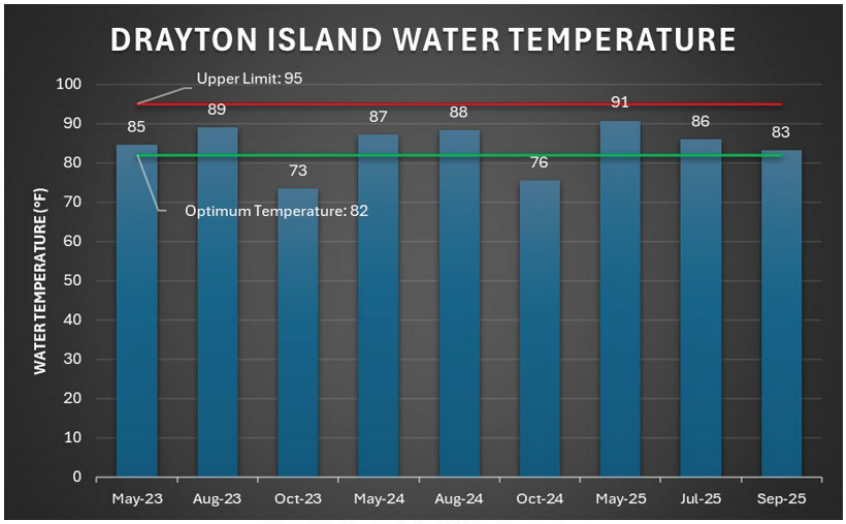


Figure 72: Drayton Island Water Temperature

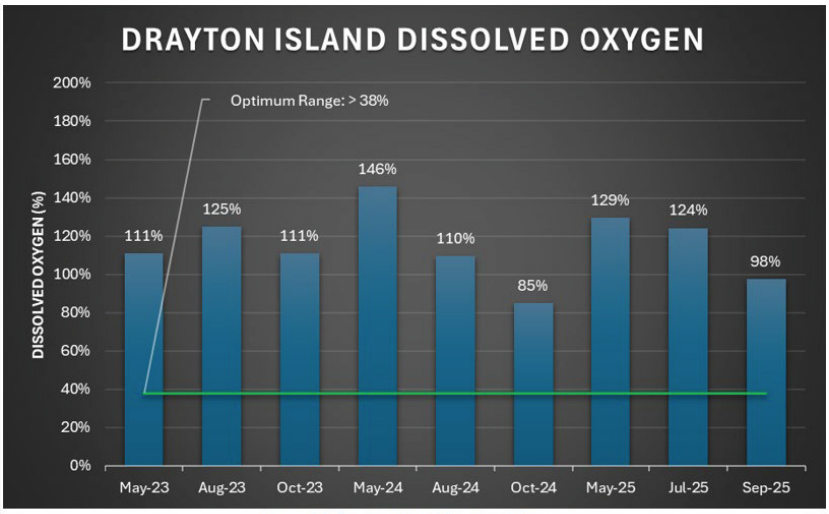


Figure 73: Drayton Island Dissolved Oxygen

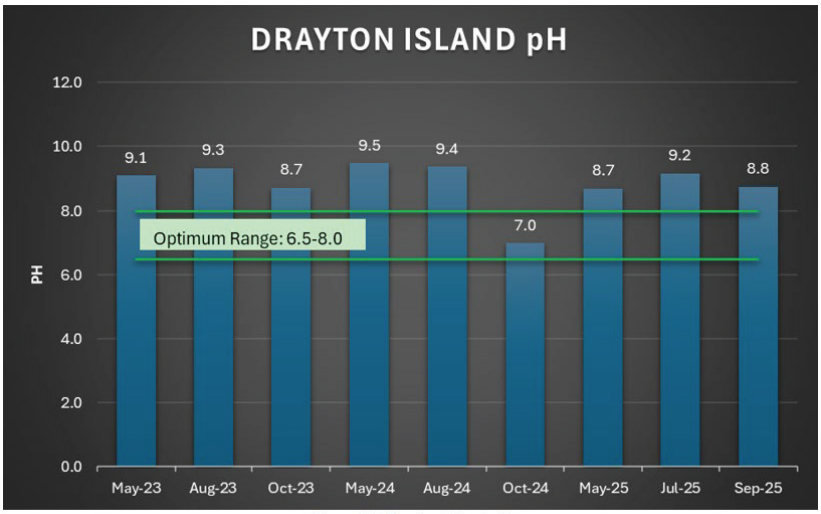


Figure 74: Drayton Island pH

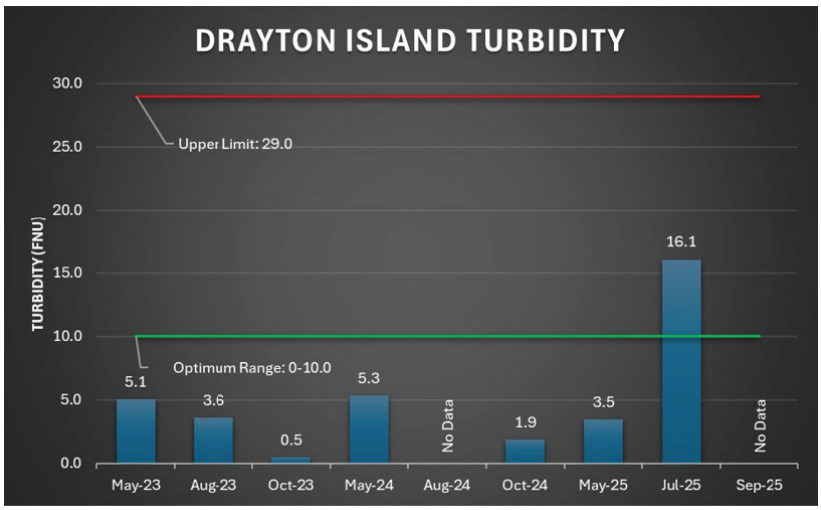


Figure 75: Drayton Island Turbidity

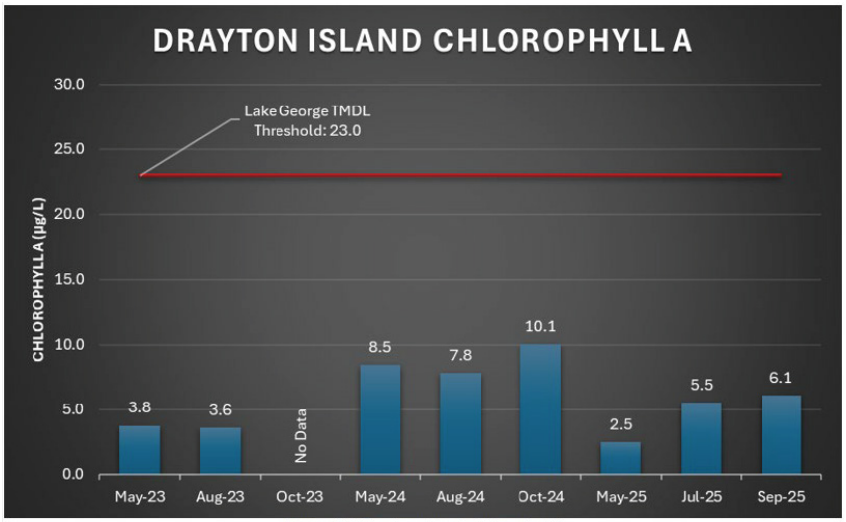
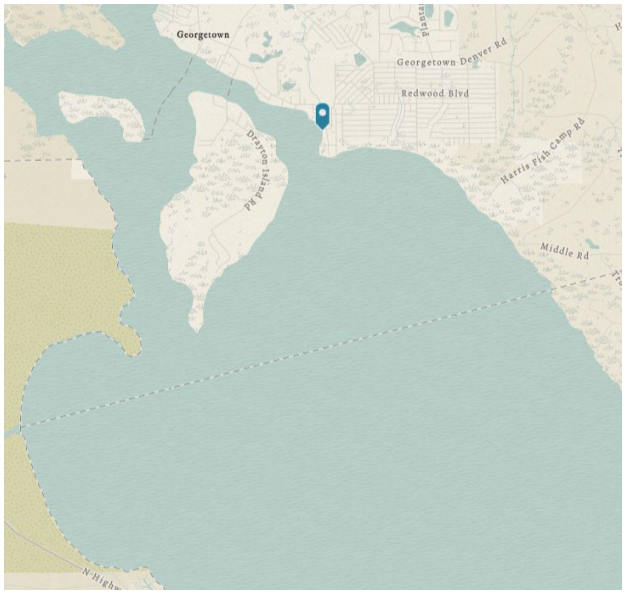


Figure 76: Drayton Island Chlorophyll A



SITE 13 – Georgetown North

Site 13 is located in Georgetown in Putnam County and is one of two monitoring sites within the Georgetown area. The site is situated directly across the St. Johns River from Drayton Island and immediately north of Lake George. This location represents an important monitoring site for SAV because it lies within a hydrologically dynamic transition zone influenced by riverine flow, lake-driven wind mixing, and seasonal water-level fluctuations. These conditions strongly affect SAV distribution, light availability, and species composition, making the site a valuable indicator of ecological change and water-quality conditions in this stretch of the St. Johns River.

This site is bulkheaded, with a benthic substrate primarily composed of fine sandy material. It encompasses three private properties that consented to the installation of an SAV protective enclosure on April 29, 2025. The enclosure covers approximately 15,050 square feet, making it the largest enclosure within the monitoring program.

WBID No.	Salinity Zone	Species Observed
2893A5	Freshwater lacustrine	*Vallisneria americana* (Eelgrass, Tape grass) *Chara sp.* (Muskgrass)

Figure 77: Site Description Overview

Georgetown North – Canopy Height: 2024-2025

This site has been surveyed only once to characterize pre-enclosure conditions outside the protected area and twice within the enclosure. Frequent algal blooms and elevated water levels limited additional sampling, ***preventing the establishment of a reliable trend for canopy height.***

May: In May 2024, prior to the installation of the protective enclosure, surveys documented Vallisneria with an average canopy height of 3 cm and Chara averaging 6 cm. In May 2025, SAV surveys were conducted only within the enclosure, where Chara averaged 12 cm and Vallisneria averaged 7 cm. Although canopy height appears to have improved within the enclosure relative to pre-installation conditions, the absence of comparable outside data in 2025 precludes a formal comparative analysis.

August & July: No comparative analysis could be conducted for these months due to algal blooms, which prevented the completion of SAV surveys.

October & September: No comparative analysis could be conducted for these months due to elevated water levels in October 2024 and limited access outside the enclosure in September 2025. However, a survey conducted within the enclosure in September 2025 documented substantial SAV growth, with average canopy heights of 47 cm for Vallisneria and 26 cm for Chara.

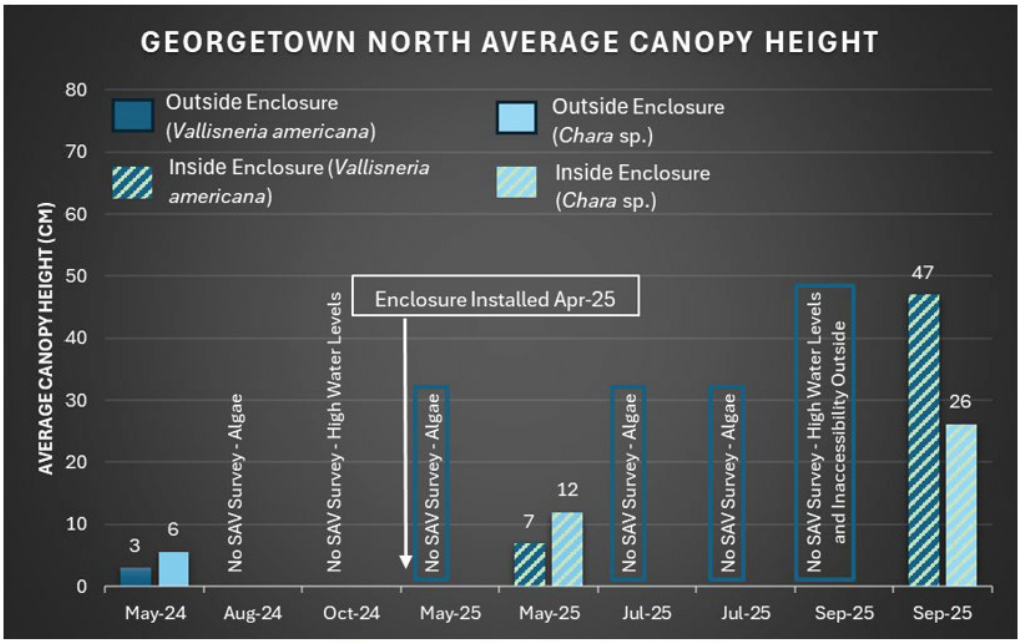


Figure 78: Georgetown North Average Canopy Height

Georgetown North – Percent Cover: 2024-2025

This site has been surveyed only once to characterize pre-enclosure conditions outside the protected area and twice within the enclosure. Frequent algal blooms and elevated water levels limited additional sampling, preventing the establishment of a reliable trend for percent cover.

May: In May 2024, prior to the installation of the protective enclosure, surveys documented an average of 43%. In May 2025, SAV surveys were conducted only within the enclosure, where the average percent cover was 46%. Although percent cover appears to have slightly improved within the enclosure relative to pre-installation conditions, the absence of comparable outside data in 2025 precludes a formal comparative analysis.

August & July: No comparative analysis could be conducted for these months due to algal blooms, which prevented the completion of SAV surveys.

October & September: No comparative analysis could be conducted for these months due to elevated water levels in October 2024 and limited access outside the enclosure in September 2025. However, a survey conducted within the enclosure in September 2025 documented substantial SAV growth, with an average percent cover of 76%.

Growing Season Trends: Although average canopy height and percent cover appear to be improving within the enclosure, direct comparative analysis across months is limited, and recent surveys do not provide information on conditions outside the enclosure. ***Consequently, the overall trend for the growing season remains uncertain.***

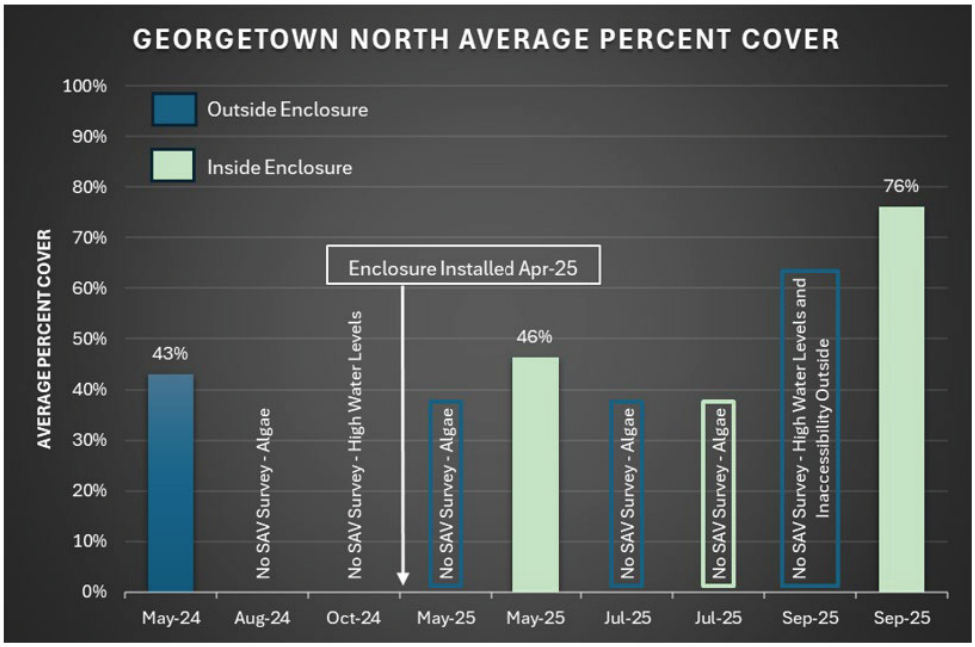


Figure 79: Georgetown North Average Percent Cover

Georgetown North – Water Quality: 2024-2025

Overall, water quality parameters at this site remained generally consistent with year-to-year conditions and largely within optimal thresholds for SAV growth, with the exception of **water temperature, pH, and turbidity**. Dissolved oxygen and chlorophyll-a exhibited temporal variability across sampling months.

Water temperatures at the site were consistently above the optimum range but remained below the upper thermal limit, with the exception of October 2024. Also, pH exceeded the upper limit of 8.0 in five of six sampling events. While higher water temperatures were sometimes associated with increased DO, this relationship was not consistent across all surveys.

Turbidity exceeded the optimum range in May 2025 and July 2025, measuring 13.9 FNU and 14.5 FNU, respectively, which is above the 10.0 FNU optimum. Chlorophyll-a concentrations were elevated during every expedition in 2024, as well as in July and September 2025 (but below 23 µg/L). It should be noted that this site's Chlorophyll a threshold is different from the 20 µg/L Numeric Nutrient Criteria established for freshwater in Florida; the Lake George TMDL established a threshold of 23 µg/L.

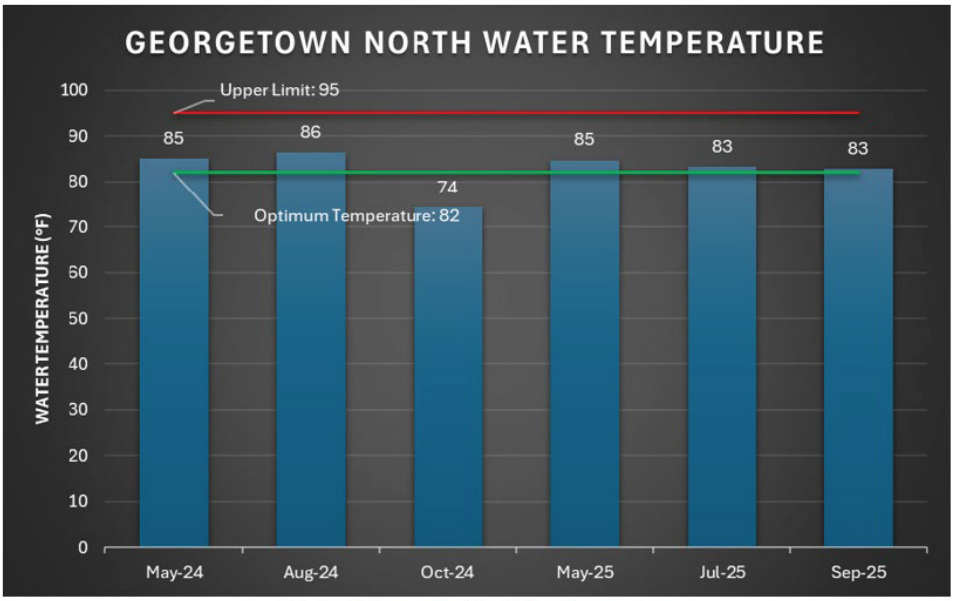


Figure 80: Georgetown North Water Temperature

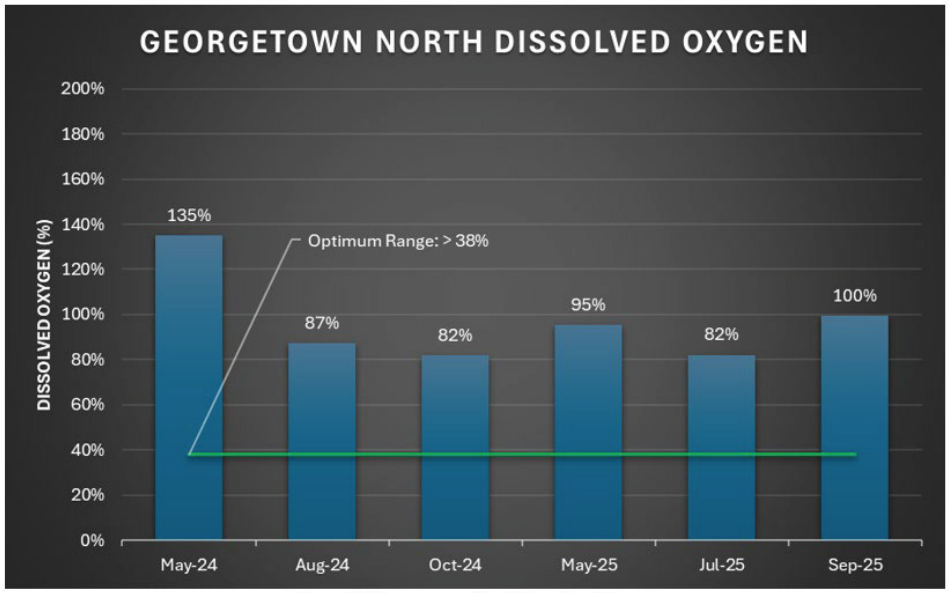


Figure 81: Georgetown North Dissolved Oxygen

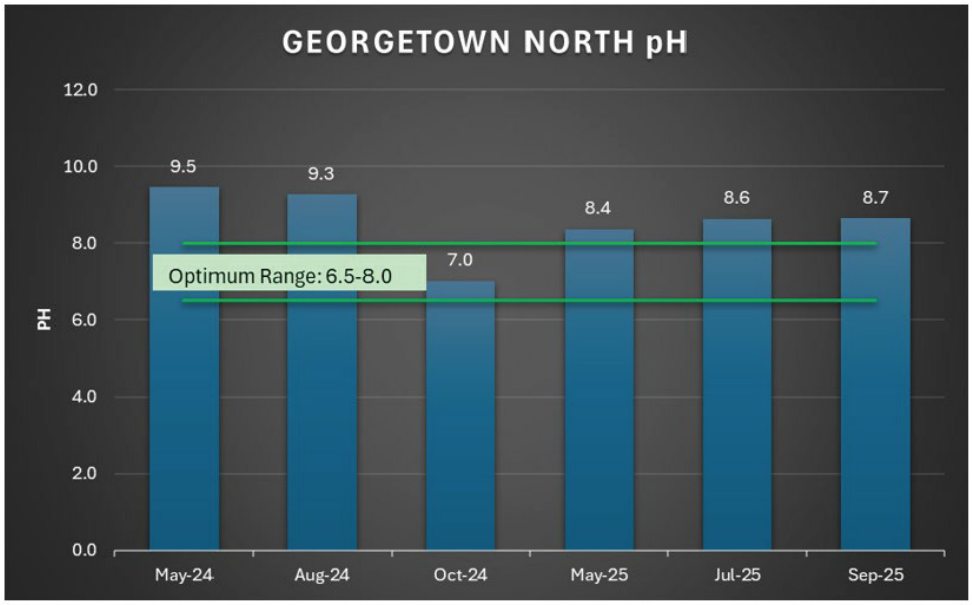


Figure 82: Georgetown North pH

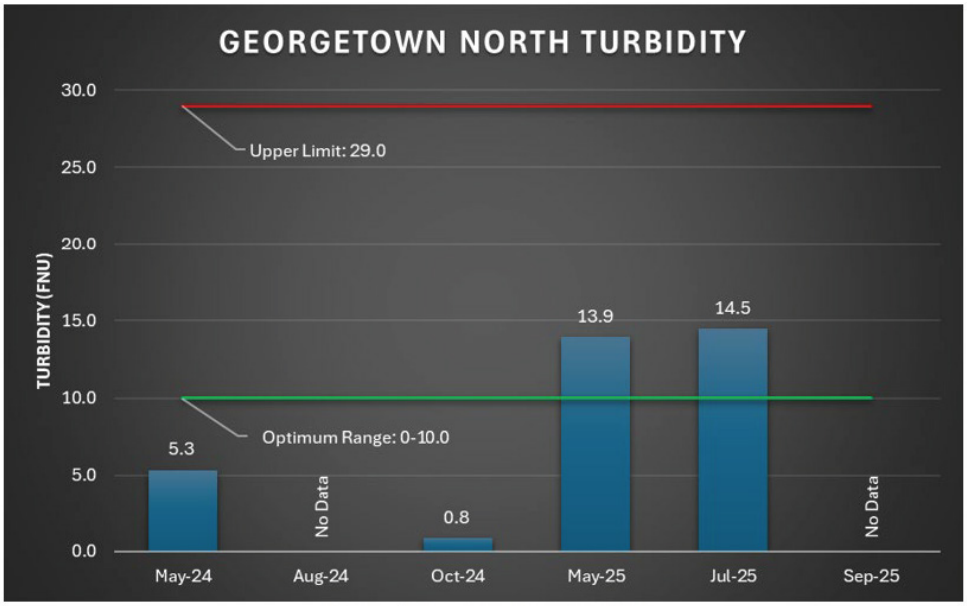


Figure 83: Georgetown North Turbidity

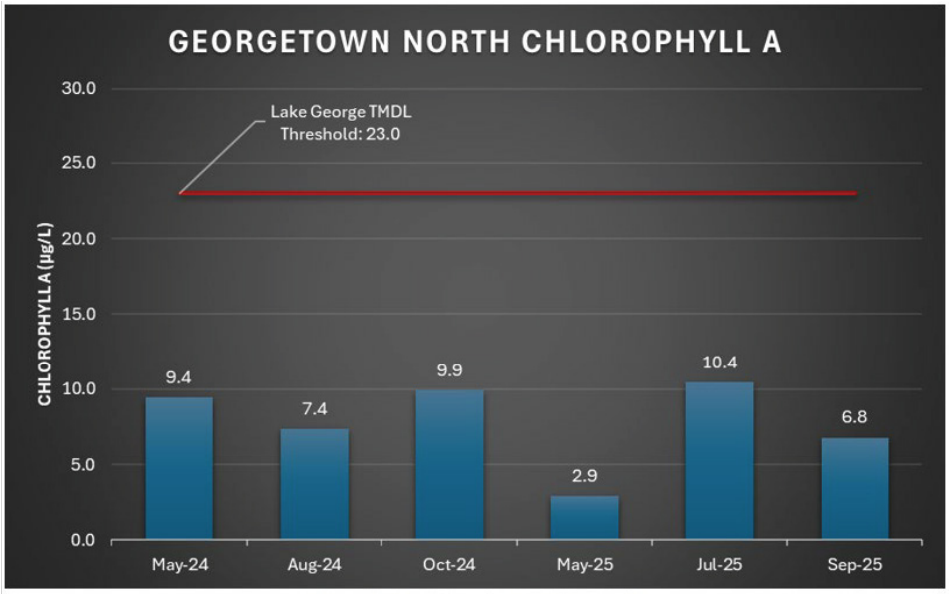
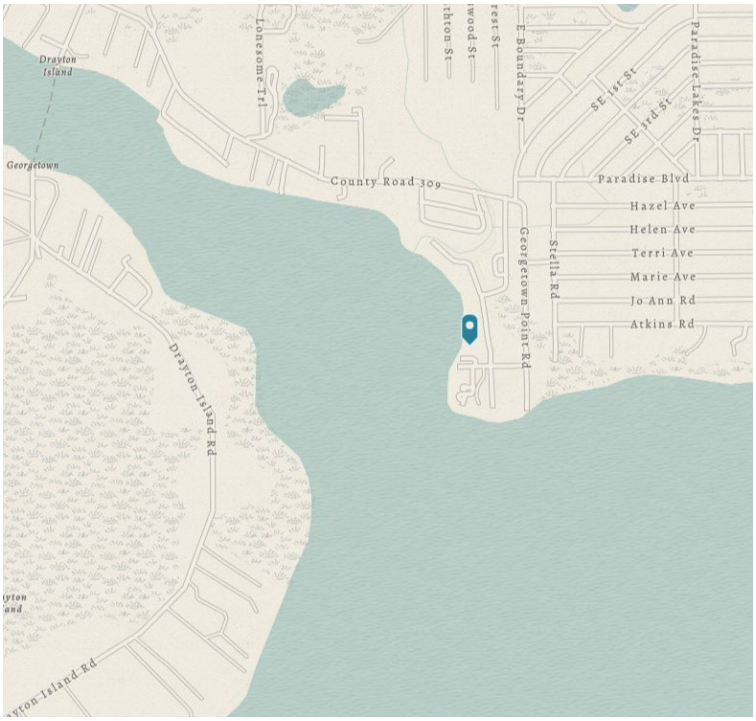


Figure 84: Georgetown North Chlorophyll A

SITE 14 - Georgetown South



Site 14 is located in Georgetown, Putnam County, and is one of two monitoring sites within the Georgetown area, positioned south of the Georgetown North site. The site lies directly across the St. Johns River from Drayton Island and immediately north of Lake George. This location represents an important monitoring site for SAV because it lies within a hydrologically dynamic transition zone influenced by riverine flow, lake-driven wind mixing, and seasonal water-level fluctuations. These conditions strongly affect SAV distribution, light availability, and species composition, making the site a valuable indicator of ecological change and water-quality conditions in this stretch of the St. Johns River.

This site has a natural shoreline, with a benthic substrate primarily composed of fine sandy material. It encompasses three private properties that consented to the installation of an SAV protective enclosure on April 29, 2025. The enclosure covers approximately 9,450 square feet, making it the second largest enclosure within the monitoring program.

WBID No.	Salinity Zone	Species Observed
2893A5	Freshwater lacustrine	*Chara sp.* (Muskgrass) *Ruppia maritima* (Widgeon grass)

Figure 85: Site Description Overview

Georgetown South - Canopy Height: 2024-2025

This site has only been sampled once due to the frequent presence of algal blooms and high water levels, ***preventing the development of a reliable trend.***

May: The only completed sampling event at this site occurred in May 2025 within the enclosure, as algal blooms prevented surveying outside the protected area. Similarly, algal blooms in May 2024 prevented a survey. During the May 2025 survey, Chara exhibited an average canopy height of 12 cm, while Ruppia averaged 28 cm within the enclosure.

August & July: No comparative analysis could be conducted for these months due to algal blooms, which prevented the completion of SAV surveys.

October & September: No comparative analysis could be conducted for these months due to high water levels in October 2024 and no finding of SAV in September 2025.

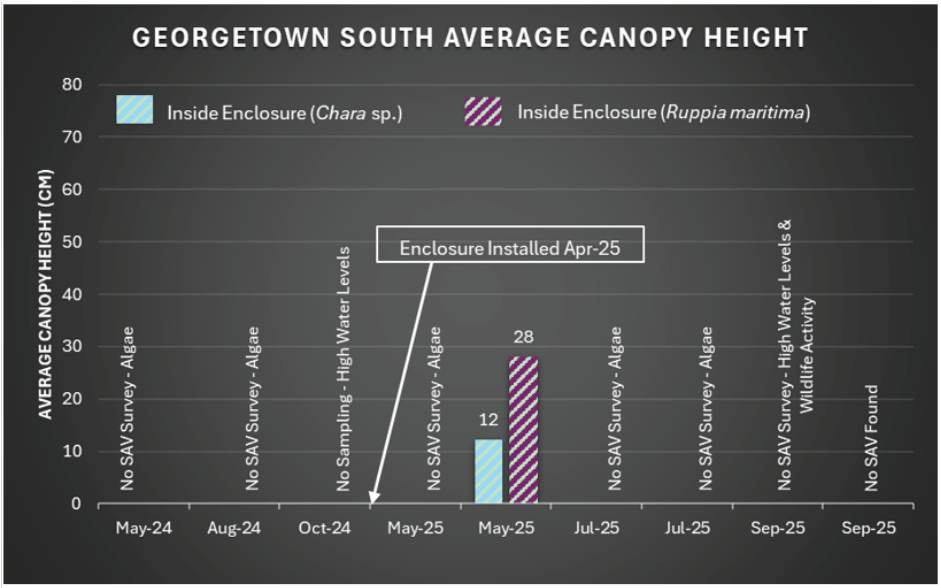


Figure 86: Georgetown South Average Canopy Height

Georgetown South – Percent Cover: 2024-2025

This site has only been sampled once due to the frequent presence of algal blooms and high water levels, ***preventing the development of a reliable trend.***

May: The only completed sampling event at this site occurred in May 2025 within the enclosure, as algal blooms prevented surveying outside the protected area. Similarly, algal blooms in May 2024 prevented a survey. During the May 2025 survey, average percent cover was documented at 75%.

August & July: No comparative analysis could be conducted for these months due to algal blooms, which prevented the completion of SAV surveys.

October & September: No comparative analysis could be conducted for these months due to high water levels in October 2024 and no finding of SAV in September 2025.

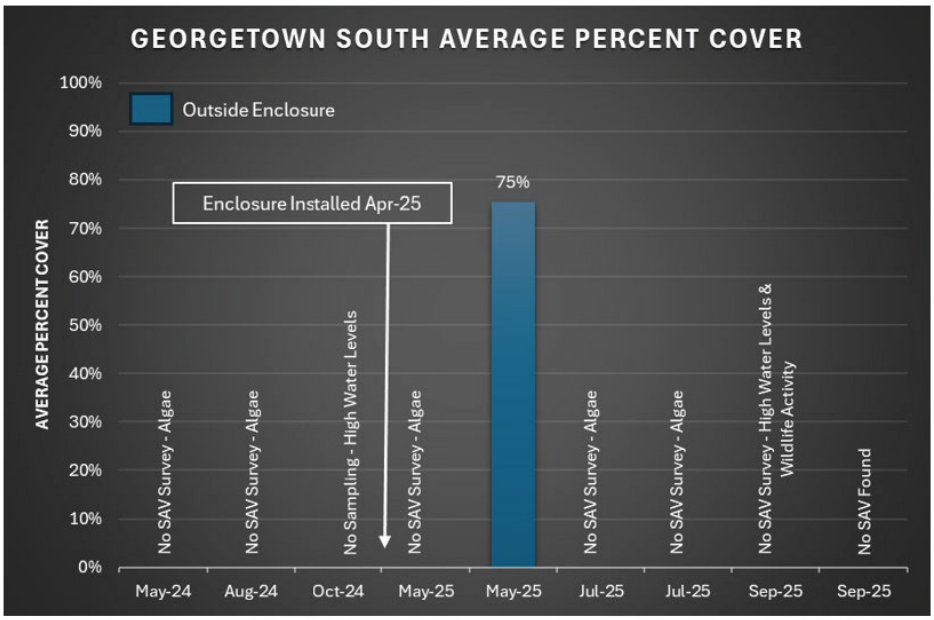


Figure 87: Georgetown South Average Percent Cover

Growing Season Trends: Trends could not be formally established for this monitoring site due to limited survey data. However, based on the one month with available SAV observations and the absence of SAV documented in September 2025, the overall outlook for SAV at this site appears unfavorable.

Georgetown South – Water Quality: 2024-2025

Overall, water quality parameters at this site remained generally consistent with year-to-year conditions and largely within optimal thresholds for SAV growth, with the exception of **water temperature and pH**. Dissolved oxygen and chlorophyll-a exhibited temporal variability across sampling months. Turbidity also fluctuated, nearly exceeding the optimum range.

Water temperatures at the site were consistently above the optimum range but remained below the upper thermal limit, with the exception of October 2024. Despite frequently low DO, pH exceeded the upper limit of 8.0 in four of five sampling events. While higher water temperatures were sometimes associated with increased DO, this pattern was not consistent across all surveys.

Turbidity exceeded the optimum range in May 2025 and July 2025, measuring 13.9 FNU and 14.5 FNU, respectively, which is above the 10.0 FNU optimum. Chlorophyll a concentrations were elevated during every expedition in 2024, as well as in July and September 2025 (but below 23 µg/L). It should be noted that this site's Chlorophyll a threshold is different from the 20 µg/L Numeric Nutrient Criteria established for freshwater in Florida; the Lake George TMDL established a threshold of 23 µg/L.

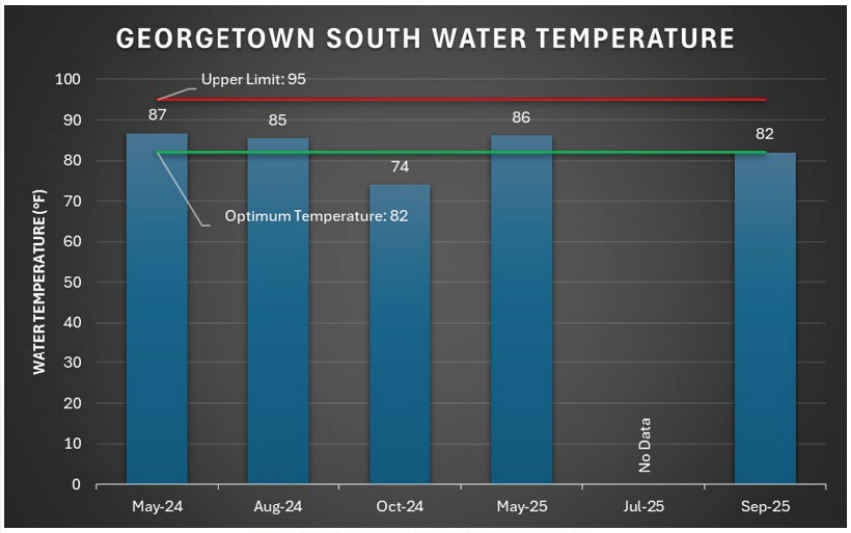


Figure 88: Georgetown South Water Temperature

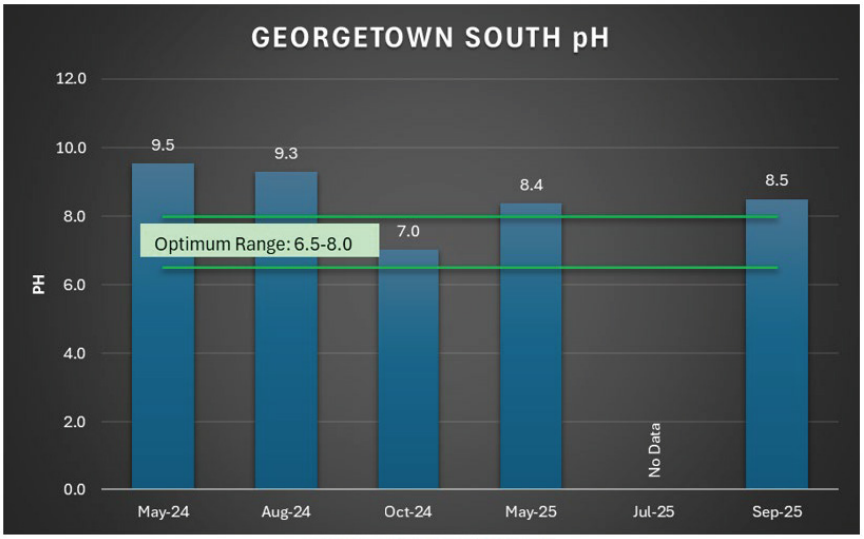


Figure 89: Georgetown South pH

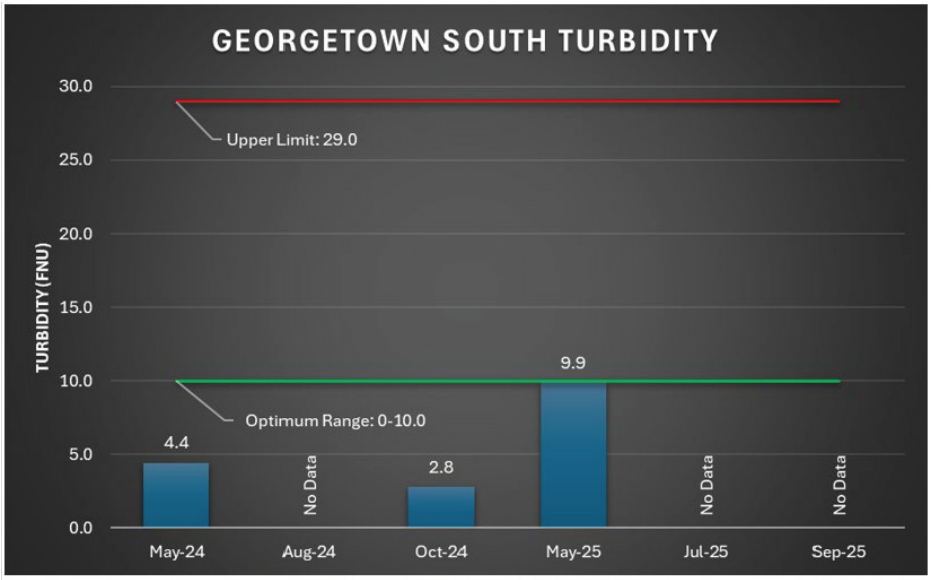


Figure 90: Georgetown South Turbidity

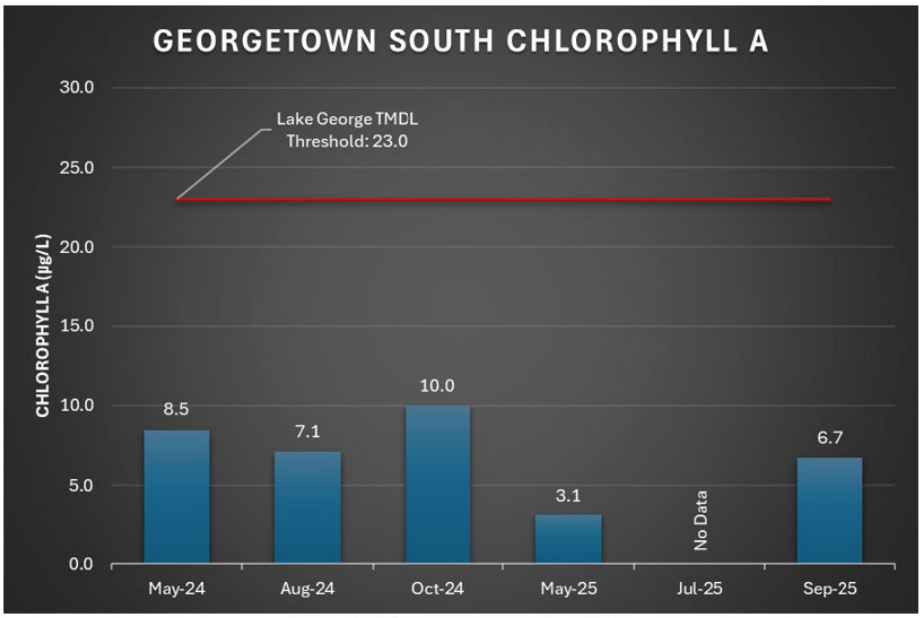


Figure 91: Georgetown South Chlorophyll A

Summary of Algal Toxin Reports (2023-25)

Algal blooms have occurred relatively frequently at several SAV sites, which is not uncommon for the entirety of the St. Johns River. This is especially true in recent years as warmer temperatures and nutrient pollution continue to plague the watershed. Below is a summary of the toxin reports from algal blooms observed across SAV sites from 2023-2025.

Year 1 - 2023

- **May:** 3 out of 11 sites - San Mateo, Drayton Island, and Lake George - tested positive for potentially toxic (PTOX) cyanobacteria. Further analysis showed low levels of toxins, below the EPA's recreational guidance thresholds for surface waters.
- **August:** 2 out of 11 sites - Tocoi (2023 Site Only) & Colee Cove - tested positive for PTOX cyanobacteria.
- **October:** 1 out of 11 sites - Colee Cove - had HABs, but no water sample collected.

Year 2 - 2024

- **May:** No algae observed
- **August:** 6 out of 14 sites had PTOX cyanobacteria present. Floridian Club: had HABs but no water sample collected.
- **October:** 1 out of 14 sites - Floridian Club - site was inaccessible because of the presence of HABs, but no water sample collected.

Year 3 - 2025

- **May:** 3 out of 14 sites - Drayton Island, Georgetown North, and Georgetown South - tested positive for PTOX cyanobacteria.
- **July:** 5 out of 14 sites - Georgetown North and South - tested positive for PTOX cyanobacteria. Georgetown North had low concentrations of cyanotoxins, but Georgetown South had elevated concentrations above the U.S. EPA's recreational guidance thresholds for surface waters (8 µg/L for microcystins and 15 µg/L for cylindrospermopsin). Floridian Club, Jenerson Point, and Drayton Island had HABs present but no water sample collected.
- **September:** 2 out of 14 sites - Buffalo Bluff and Jenerson Point - tested positive for PTOX cyanobacteria. Further analysis showed low levels of toxins, below the EPA's recreational guidance thresholds for surface waters.

Story Map

For an interactive exploration of all our 2025 findings, please refer to our **2025 SAVe Our River's Grasses Story Map**. This resource provides detailed maps, data visualizations, and comprehensive summaries of the year's efforts and results, offering an engaging way to learn about our progress and impact.

Hover over the QR Code with your phone's camera:

Strategies to SAVe Our Grasses

Relief for our St. Johns is urgently needed. A holistic approach with restorative and protective measures to ensure long-term sustainability.

While there is not a silver bullet solution that will SAVe Our River's Grasses, **there are actions that can reduce stress sooner than later. Strategies that will:**

- Increase Light Availability
- Stabilize the St. Johns River Estuary's Critical Salt/Freshwater Balance
- Improve Water Quality
- Increase the Resilience of the St. Johns River
- Expand SAV Biomass to Reduce Grazing Pressure

We must also ask important questions and work collaboratively to find answers:

- Are river sediment conditions supportive of SAV growth?
- Are frequent harmful algae blooms preventing healthy SAV growth?
- Are pesticides, herbicides and aggressive invasive plant management undermining SAV presence?
- How do we make our river more resilient to extreme climate events?
- Are there other factors undermining SAV health that are not on our radar?

Not one of the following strategies will SAVe our river's grasses in isolation, but if we work diligently to achieve the following protective measures, we will give our river a fighting chance.

Protect the St. Johns River Headwaters (Upper Basin)

In May 2016, the St. Johns River Water Management District (SJRWMD) and the U.S. Army Corps of Engineers (USACE) completed the Upper Basin Restoration Project, one of the largest flood control and wetland restoration projects in the world.

This $250 million dollar project has been sullied by Florida's inequitable, harmful biosolids policy.

For more than a decade, South Florida has been dumping their sewage sludge (AKA Class B biosolids) on ranch land in the Upper Basin after this dangerous practice was outlawed in the Everglades watershed. As a result, water quality in the St. Johns River Headwaters was drastically diminished including increases in nitrogen and phosphorus triggering harmful algal blooms downstream that block much-needed sunlight that SAV needs to outpace wildlife grazing pressure. The Upper St. Johns contributes 80% of the nutrient pollution downstream.

Fortunately, the Florida Legislature delivered a huge win for the St. Johns during the 2026 Session, with **the most significant sewage sludge (aka biosolids) reform package in nearly 20 years.**

To protect farm and ranch families from land/crop/cattle contamination, the Department of Agriculture's 2026 Farm Bill **banned the land disposal of Class B biosolids by 2028**. Class B consists of sewage sludge that has been treated to reduce, but not eliminate, pathogens and toxic chemicals. **Legislation (HB 1285/ SB 1474) was also passed to provide regulatory guardrails for Class AA biosolids,** a higher quality treated sewage sludge, to ensure that increased production does not result in increased nutrient pollution runoff and bulk disposal and offset gains from the Class B ban.

Reunite the Rivers – Restoring the Natural Connection of Silver Springs, the Ocklawaha and the St. Johns Rivers

Restoring this natural connection will provide one of the most significant boosts to the river's natural ability to support healthy SAV. By breaching the Rodman dam, 7,500 acres of forested floodplain will be restored, twenty springs will flow freely again, migratory fish will repopulate the river from the Atlantic Ocean to Silver Springs, and the natural flow of fresher, clearer water will return to the Ocklawaha and Lower St. Johns. This restored flow will:

- Add clearer, cooler water that will help SAV growth
- Offset saltwater intrusion
- Maintain salt/freshwater balance
- Provide an eelgrass/SAV seed source
- Improve the delivery of critical nutrients for beneficial algae vs. harmful algal blooms
- Reduce herbicide use
- Increase biofiltration
- Migration enhancement of eel & fish like shad, striped bass, channel catfish, & mullet

Unfortunately, legislation that paired restoration with locally-informed state investments in outdoor recreation and the economy to maximize benefits to people, rivers, springs, fish and wildlife died during the 2026 Legislative Session after receiving historic bipartisan support with a 107-3 win in the Florida House and successful passage through three Senate Committees with only one "no" vote. While we are disappointed that such a widely supported bill was not allowed a final vote, **the progress made was extraordinary.** Support for restoring the Ocklawaha River continues to grow across Florida.

Prioritize Water Conservation & Springs Protection

Clean, fresh water is the lifeblood of the St. Johns River, its springs and tributaries. Our wetlands, forests, riparian zones, and SAV provide the habitat and food sources that sustain healthy plant, fish, and wildlife populations. The St. Johns also sustains nearly 5 million people who live within its watershed. It is our collective duty to protect this natural treasure. Unfortunately, Floridians still use 50% of our drinking water to irrigate our lawns. This unsustainable use of water is undermining our springs, rivers and future. We must live within our water means and not rely on harmful water withdrawals from the St. Johns.

- Stimulate Sustainable Growth, Not Unbridled Growth at our river and our springs' expense. Plan for Florida's population growth to better protect natural lands, promote livable communities, and save taxpayer dollars. Protective growth standards should be based on available water supply and protection of clean water for human consumption and natural systems.

- Prioritize Water Conservation, efficiency, and reuse strategies instead of expensive, harmful water withdrawals. Florida's water conservation strategies are wholly insufficient and exclude even the most obvious and cost-effective water conservation measures in favor of unsustainable, expensive, unnecessary, and damaging surface water projects.
- Protect the St. Johns River and Florida Springs from the inevitable harmful impacts of overuse of our Aquifer and surface water withdrawals. A holistic approach with safeguards must be in place to protect our aquifer, our springs and our river and to provide safe drinking water for Florida's future.

Adopt Protective Freshwater Reservations for the Lower St. Johns to Protect & Restore its Critical Salt/Freshwater Balance

The St. Johns River Estuary is a 100-mile stretch of water from the river's confluence with the Ocklawaha River to where the St. Johns joins the Atlantic Ocean at Mayport. It's a transition zone between freshwater and saltwater ecosystems and is home to many recreational and commercial fisheries. It's a critical ecosystem that provides food, water, and shelter for plants and animals.

SAV requires more light in a higher salinity environment due to increased metabolic demands (Dobberfuhl 2007).

However, there is no regulatory target for salinity in the St. Johns even though this protection is available under Florida Law.

A water reservation is a legal mechanism, authorized by Section 373.223(4), Florida Statutes, to set aside water from consumptive uses for the protection of fish and wildlife or public health and safety.

When a water reservation rule is in place, the volume and timing of water at specific locations is protected for the natural system. Unfortunately, water reservations are currently only used in South Florida. The St. Johns River Estuary must be equally protected.

More Research: SAV Protective Enclosure Initiative

In 2025, SJRK installed ten (10) protective enclosures, designed to shield the submerged plants from herbivore grazing to foster SAV growth.

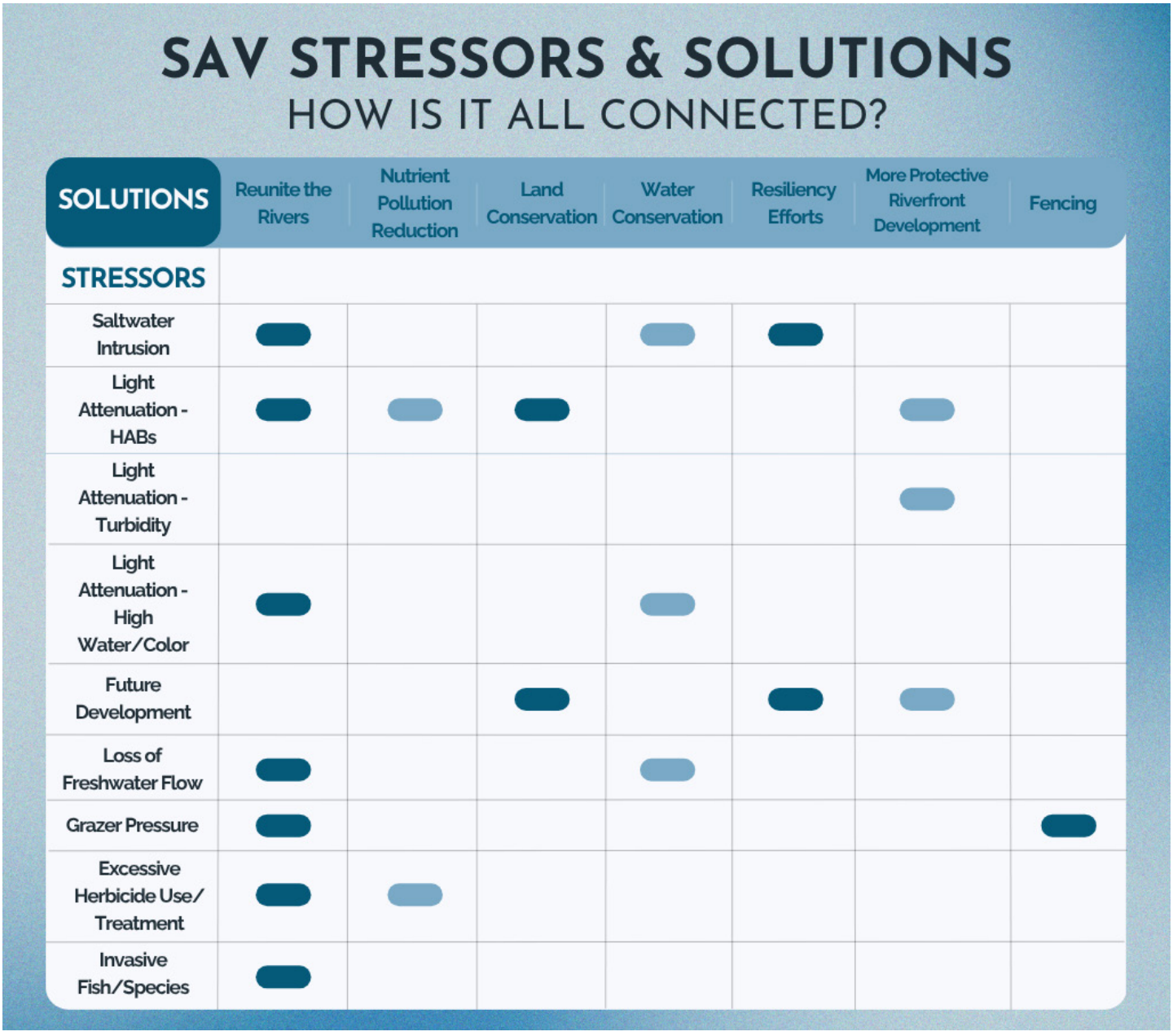
Modeled after research by the Florida Fish and Wildlife Conservation Commission (FWC) Biological Scientist, Dan Kolterman, and St. Johns River Water Management District (SJRWMD) Environmental Scientist Riley Timbs, this effort has demonstrated a significant, positive effect on the growth and recovery of eelgrass in the Lower St. Johns River. Research and field observations demonstrate that herbivory—primarily from manatees and other aquatic grazers—can severely limit the recovery and expansion of grass beds.

When grazing pressure is removed, eelgrass biomass not only recovers but also thrives without requiring supplemental interventions like transplants or seeding.

By allowing natural processes such as rhizome extension and self-seeding to take place within protected areas, restoration projects can leverage the plant's inherent regenerative capabilities to achieve sustainable growth and improve habitat resilience.

These enclosures serve as a method to mitigate the immediate impacts of herbivory, especially as increasing populations of species like tilapia present growing challenges for river ecosystems.

While fence enclosures show promise in promoting vegetation recovery, it is not a solution. Further research is necessary to fully understand their long-term effects on SAV and their role in broader conservation strategies. Investigating the behavior and impact of herbivores like tilapia will also be critical to developing effective, sustainable solutions for preserving native habitats (Timbs & Kolterman, 2023).



Continuing our Expedition

The SAVe the River's Grasses Expedition will continue in 2026 - 2027 during SAV's peak growing season (March-October). St. Johns **RIVERKEEPER®** will collect more data and expand our conversation with stakeholders to better understand our river and its significance to our communities, our economy and our lives.

In 2026, SJRK's 4th year of monitoring SAV and water quality will continue and expand to include sediment, harmful algal blooms and nutrient analysis to address insufficient data and to further our understanding of SAV stressors and solutions.

SJRK thanks Coastal Conservation Association (CCA), volunteers, and all participating site homeowners for helping make our SAV research possible. Their commitment to protecting and restoring fish habitat directly supports our mission and enhances the impact of our collective efforts to SAVe Our River's Grasses.

We ask for your support in advocating for swift, decisive action to restore SAV and the vital ecosystem services it provides—helping to SAVe the St. Johns for today and for future generations.

If you would like to get more involved, please visit StJohnsRiverkeeper.org and explore our various opportunities to advocate for solutions, "Get Your Feet Wet," participate in volunteer cleanup projects, join our young professionals group Rising Tides, or report violations related to pollution, marine debris, animal sightings, and more. SJRK has also created a survey for waterfront homeowners and would greatly appreciate your input on the condition of grasses behind your home. To report an algal bloom, hazardous material/marine spill, wetland violation, illegal discharge, construction site runoff, solid waste concerns, etc., please contact **report@sjrk.org**.

This effort would not be possible without the support of hosting riverfront residents and their neighbors, advising scientists, community leaders, anglers, and all those who care for the river.

They are instrumental in the success of this effort and in our ongoing partnership to SAVe our River's Grasses.

Together, we are making a difference.

For The River. For Us All.

Our Team

This Expedition would not be possible without the dedicated team responsible for conducting fieldwork, managing data entry, and compiling detailed reports that drive this research forward.

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St. Johns Riverkeeper

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