

2021 Annual Report

Since 1998, Florida Oceanographic Society’s Citizen Science Water Quality Monitoring Program has recorded water temperature, salinity, dissolved oxygen, pH, and water clarity on a weekly basis. We now have over 19,000 data sets in our database.

In 2021, our team of 47 volunteer water quality testers sampled sites throughout the Southern Indian River Lagoon (IRL) and St. Lucie Estuary (SLE) over 1,550 times. We added 15 sites to our program, growing from 30 to 45 sites across ten zones of the river, estuary and lagoon system (Fig. 1).

Weekly water quality data gathered by our volunteers is used to calculate report grades, and then each zone is assigned a habitat health grade (Table 1). Grades are published weekly alongside data from South Florida Water Management District (SFWMD) and Florida Department of Environmental Protection (FDEP) to give a snapshot of current conditions in the IRL and SLE. This data can provide valuable insight to the current health of the estuary and the suitability of this habitat for key indicator species.

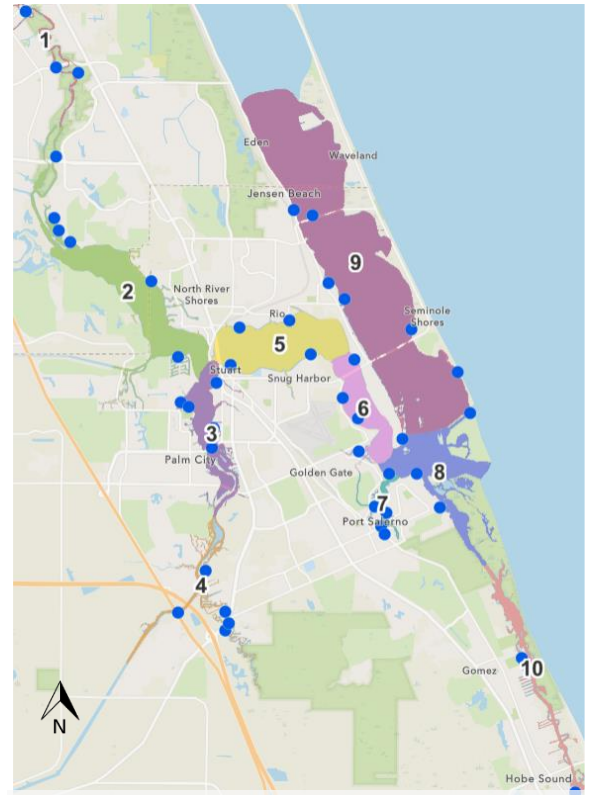


Figure 1: 45 active water quality testing sites (blue dots) across 10 zones in the IRL and SLE.

Table 1: FOS habitat health grading scale categories and colors.

IDEAL A (90 - 100)	GOOD B (80 - 89)	SATISFACTORY C (70 - 79)	POOR D (60 - 69)	DESTRUCTIVE F (50 - 59)
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The average grade in 2021 (81.7%) was higher than that of 2020 (74.9%), with a high of 93% (*Ideal*) and a low of 66% (*Poor*). Summer and winter grades were notably higher in 2021 than in 2020 (Fig. 2). The 52 reports published this year were shared with over 20,000 people through newsletter subscribers and social media platforms, helping to increase awareness of local water quality issues.

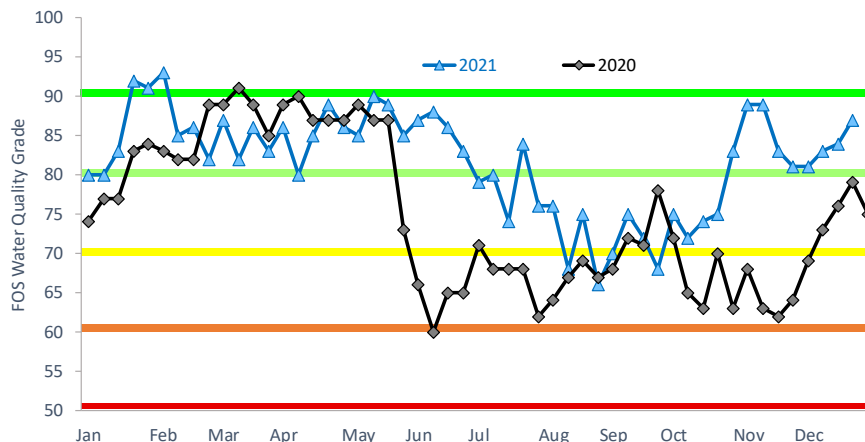


Figure 2: Florida Oceanographic Society weekly water quality report grades from 2021 (blue) and 2020 (black). See Table 1 for grading categories and colors definitions.

2021 Water Quality Trends

From the analysis of our 2021 data, water clarity and salinity are the two parameters which have the greatest impact on our water quality grade.

- Water clarity is a measure of suspended particles in the water column. These particles have many sources including stormwater runoff, algal blooms, and unstable bottom sediments. Increased particulates in the water column reduce the amount of sunlight capable of penetrating to the bottom. This reduction in light availability hinders seagrass photosynthesis, which is required for seagrass growth.
- Salinity is the concentration of dissolved salts within water. Plant and animal species in the IRL and SLE have adapted to survive within salinity ranges, doing best in brackish water environments. During a rainstorm event and canal discharges, fresh water inflows will lower salinities across the IRL and SLE, which can affect species health and modify aquatic organism distribution, including local bivalve and seagrass populations.

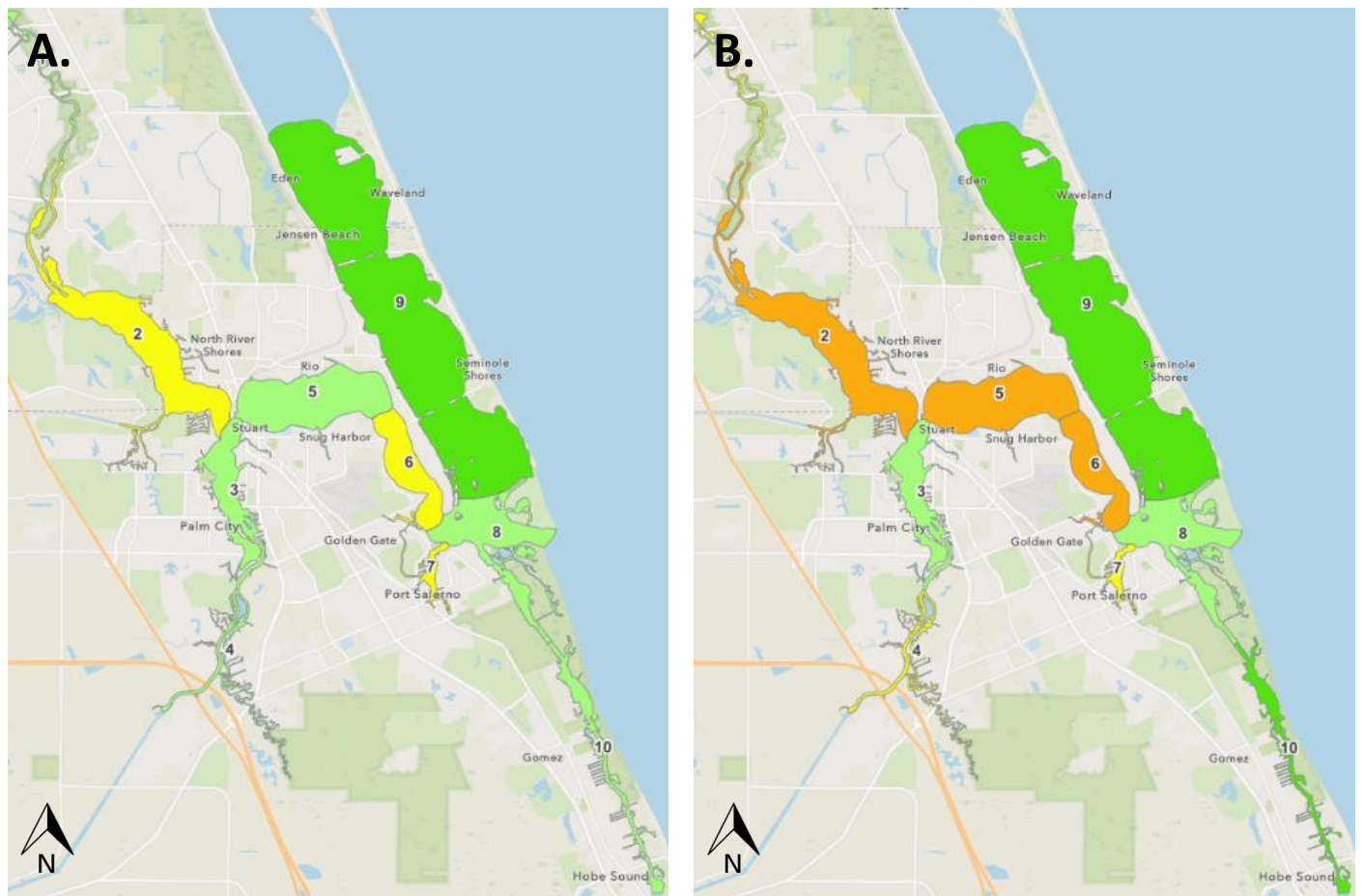


Figure 3: (A) Dry season and (B) wet season average zone grades in 2021. Average monthly precipitation was 4.3 cm in the dry season and 18.1 cm in the wet season. See Table 1 for grading categories and colors.

Modifications to the natural environment have resulted in the upland watershed and stormwater being redirected into the estuary. This diverted fresh water carries with it increased sediments, toxic pollutants, pesticides and fertilizers, which enter our waterways, fueling algal blooms and negatively impacting ecosystem structure and function. For example, in 2021 average monthly precipitation in Stuart, FL was 4.3 cm in the dry season (Oct. 23 – May 23) and 18.1 cm in the wet season (May 23 – Oct. 23) (NOAA National Weather Service, 2021). Fresh water diversion is a major contributor to lowering the water quality in the IRL and SLE, as can be seen by comparing 2021 average zone grades between wet and dry seasons (Fig. 3).

2021 Water Quality Trends

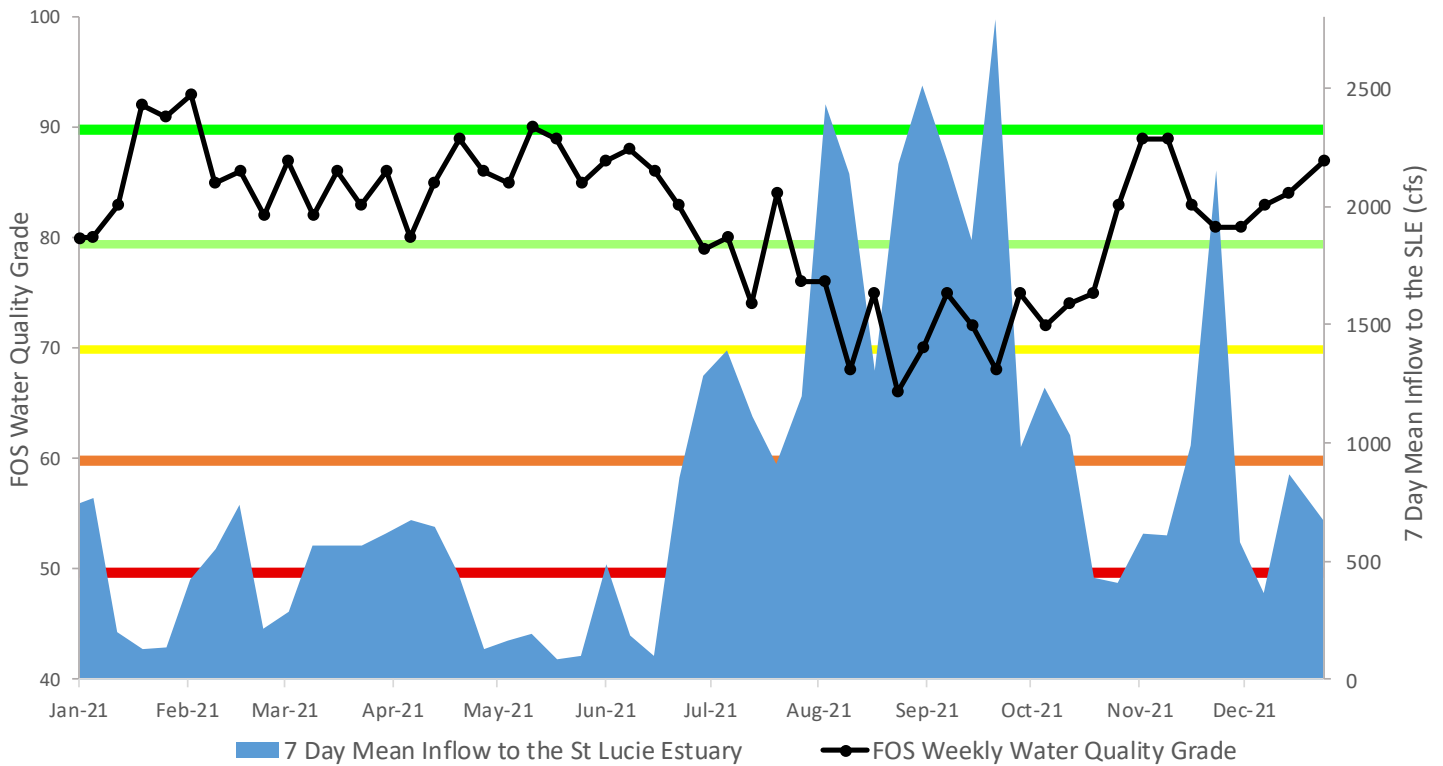


Figure 4: Mean weekly inflow of water to the SLE from Lake Okeechobee (S-308) and runoff from the C-44 (S-80), C-23 (S-97), C-24 (S-49), Ten Mile Creek and Tidal Basins (blue line) and weekly FOS water quality grades (black line). Flow data adapted from [SFWMD ecological conditions report](#).

During times of high precipitation, the water in Lake Okeechobee rises and fresh water is released into the estuary once water levels reach certain elevations in the lake. This is determined by a Lake Okeechobee Regulation Schedule managed by the United States Army Corp of Engineers ([USACE](#)). Figure 4 shows the impact of weekly average mean inflow to the SLE on water quality grades. Weekly mean inflow data from SFWMD can be categorized into performance metrics (*stressful*, *damaging* or *optimal*) using the Restoration, Coordination, and Verification ([RECOVER](#)) Northern Estuaries flow envelopes. These flow envelopes are established rates of flow (cubic feet per seconds; cfs) which will impact the salinities crucial to seagrass and oyster habitats. In 2021, flows to the SLE were in the *damaging* flow envelope (>1700 cfs) for 56 days, or 15% of the year.

Spikes in inflow as seen in August, September and October correlated with the lowest recorded FOS water quality grades (Fig. 4). The relationship between fresh water inflow and water quality grades highlights the need to stop the discharges from Lake Okeechobee and additional artificial inflows into the SLE.

Looking into 2022, Florida Oceanographic will continue to expand the water quality network to assess the health of our local ecosystems. We will use the resulting data to raise public awareness of the water quality issues currently being faced. The Florida Oceanographic water quality program is a crucial tool in promoting improved waterways and to advocate for zero discharges from Lake Okeechobee.

Visit www.floridaocean.org/water-quality to sign up for our weekly report.

Thank you citizen scientists!

2021 ended with 47 active water quality citizen scientists. We could not produce our weekly water quality reports without their hard work and dedication. Thank you to all of our water quality testers for their stewardship and time. Help us make 2022 a continued success by visiting www.floridaocean.org/water-quality to learn about becoming a water tester!

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Shirley Almeida

Jerry Appell

Rob Berretta

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Mark Kenworthy

Casey Darling Kniffin

Dick Landrum

Paul Laura

Alice Leliukas

Kerry Marinos

Lori Maxwell

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Deb McKone

Willis J. Milner

Joseph Pisano

Russell Rothfeld

Don Sampson

Rich Schoenborn

Fred Speaker

Eric Spoelstra

Cary Vocolka

Don Wilson

Sam and Sheree Young

And other testers who prefer to remain anonymous



*In loving memory of a dedicated volunteer

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