

2025 WEKIVA RIVER SPRINGSWATCH MONITORING SUMMARY



Prepared for Florida Department of
Environmental Protection



Howard T. Odum
**FLORIDA
SPRINGS
INSTITUTE**

Volunteer and Staff Acknowledgments

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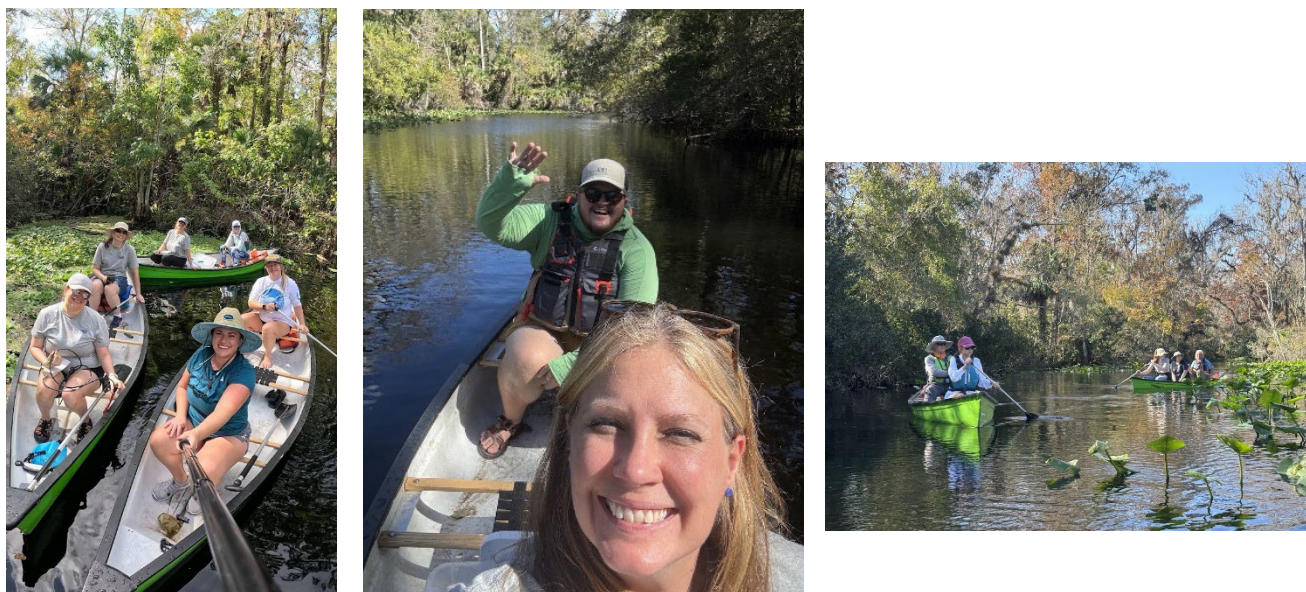


Figure 1: Our Amazing Wekiva SpringsWatch Volunteers

Executive Summary

In 2025, the Wekiva River SpringsWatch group collected data on twelve separate sampling days throughout the year to analyze the health and productivity of the spring. SpringsWatch volunteers collected data on a number of water quality parameters and ecological indices to examine both abiotic and biotic factors that drive the health of the river. The following is a summary:

- **Water Quality** in the Wekiva River is changing
 - **Temperature** averages were relatively constant across all stations but after the Rock Spring Run, stations exhibited much wider temperature ranges.
 - **Dissolved Oxygen** from the headspring towards Rock Spring Run. At the Rock Spring Run, DO peaked and decreased as stations moved further downstream of the run.
 - **Specific Conductivity** was highest at the stations closest to the headspring. It then dropped at Rock Spring run and gradually increased as stations moved further downstream
 - **Light** Measurements collected were highly variable across all stations
- **Biology** of the Wekiva River is diverse and somewhat healthy
 - **Submerged Aquatic Vegetation** appears to be growing successfully in this spring shed. The most commonly seen plants were species of eel grass and emergent spatterdock.
 - **Birds** are extremely diverse across the Wekiva River System. In total, 48 different species were seen, the most of any SpringsWatch group in 2025. The most commonly seen birds were Wood Ducks.

Introduction

1.1 Site Overview

Located seventeen miles north of Orlando, the Wekiva River is a major tributary to the St. Johns River, receiving over half of its flow from more than thirty artesian springs. The Wekiva River begins its flow at Wekiwa Spring, a second magnitude spring discharging over forty-three million gallons per day. The Wekiva River is also fed by input from Rock Spring Run, which flows roughly 8.5 miles before meeting with the Wekiva River. Because of its natural beauty and cool waters, the Wekiva River is a popular place for recreation such as kayaking, canoeing, paddle boarding, swimming, and other water-related activities.

The Wekiva Springs Group was designated as an Outstanding Florida Spring when the Florida Springs and Aquifer Protection Act was passed in 2016. It is currently one of twenty-six Outstanding Florida Springs or Springs Groups that is considered “impaired”.

FSI’s SpringsWatch volunteer citizen-science program has provided enhanced monitoring of the Wekiva River and springs since 2019. The resulting data are provided in annual reports and via FSI’s SpringsWatch website (floridaspringsinstitute.org/springswatch) to inform the state’s environmental agencies and educate the public about the river and springs’ health.

This report was prepared by the Howard T. Odum Florida Springs Institute and is focused on the ecological monitoring of the Wekiva River and springs conducted by SpringsWatch volunteers in 2025.

1.2 Monitoring Stations

Figure 1 shows the eight SpringsWatch monitoring stations along the Wekiva River. These stations included the Wekiwa Head Spring (WEK-HS), six stations along the Wekiva River (WEK-2 through WEK-7), and its confluence with Rock Spring Run (RS-1). A summary of all sampling sites, their station names, latitude, and longitude used within the Wekiva SpringsWatch groups can be viewed in Table 1.



Figure 2: A map of Wekiva SpringsWatch Monitoring Stations

Table 1. Coordinates for Wekiva SpringsWatch monitoring sites.

Station Code	Station Name	Latitude	Longitude
WEK-HS	Wekiwa Headspring	28.7126389	-81.46
WEK-2	WEK-2	28.7133056	-81.459166
WEK-3	WEK-3	28.7146891	-81.450108
RS-1	Rock Spring Run	28.7154167	-81.44972222
WEK-4	WEK-4	28.715	-81.447222
WEK-5	WEK-5	28.7136944	-81.446111
WEK-6	WEK-6	28.7144167	-81.443888
WEK-7	WEK-7	28.7147778	-81.441944

1.3 Monitoring Parameters

1.3.1. Temperature

Water Temperature is an extremely important metric in terms of water quality. It is measured in degrees Celsius using a thermometer. Water temperature is relatively constant in Florida springs. However, heavy rain, runoff from land, river flooding, and spring reversals (when surface water flows back into the spring) can disrupt this stability and cause the temperature to fluctuate along the spring run. In Florida, the average temperature from the spring vent is determined by the annual average air temperature and depth of the groundwater source. Temperature directly affects how much dissolved oxygen the water can hold and the metabolism of plants and animals use (Gillooly et al., 2001; Short et al., 2016). The purpose of monitoring water temperature is to indicate any significant changes that may have large effects on other biological and chemical processes in the spring system.

1.3.2. Dissolved Oxygen

Dissolved Oxygen is another very important water quality parameter. Dissolved Oxygen is measured in both percent saturation and milligrams per liter. Healthy aquatic ecosystems typically have higher DO values due to atmospheric diffusion and photosynthesis from aquatic plants and algae. This oxygen in the water can in turn be consumed by fish and other aquatic organisms. Groundwater stored in the aquifer typically has lower DO values which can vary depending on how long it takes for the water to exit out a spring vent. By monitoring DO values, we can get insight into how much oxygen is available for organisms to use inside spring systems.

1.3.2. Specific Conductance

Specific Conductance is a water quality parameter similar to salinity in saltwater. Specific conductance values are influenced by the amount of ions present in the water. These ions can be naturally occurring or may be present from nitrate/nitrite, saltwater, and a number of other compounds. In general, ecoregions dominated by karst limestone typically have higher conductivity values compared to ecoregions

dominated by different geological makeup (Griffith, 2014). Monitoring specific conductivity is important to examine how springs are influenced by the addition or decrease of ions in these aquatic systems.

1.3.4. Photosynthetically Active Radiation

Photosynthetically Active Radiation refers to the specific wavelengths of light that can actually be used by plants to preform photosynthesis. This parameter is extremely important in terms of springs health because aquatic plants create the base of the food webs in these systems and also provide things like oxygen as well as refugia for smaller springs organisms. PAR is measured to estimate how light percolates through the water column depending on depth and water clarity. This parameter is very important to monitor to examine any changes in light availability that could impact submerged aquatic vegetation.

1.3.3. Nitrate-nitrite Nitrogen

Nitrate and nitrite are forms of nitrogen that move easily through water and are the most common types of nitrogen pollution found in the Floridan Aquifer and many of Florida's springs (Cohen, 2007; Cohen, 2008; Brown et al., 2008). This pollution mainly comes from human activities, with the largest sources being fertilizer used in agriculture and landscaping, wastewater from septic systems and treated sewage released into the ground, and animal waste that has not been properly managed (Eller and Katz, 2014; Mattson et al., 2006). High levels of nitrate can negatively impact spring ecosystems in several ways. It has been shown to affect the reproduction of mosquitofish (*Gambusia holbrooki*) (Edwards, 2006; Edwards et al., 2007), increase the growth of phytoplankton and algae (Cattaneo and Kalf, 1978), worsen the effects of invasive aquatic plants (Wahl et al., 2021), and may contribute to the decline of amphibian populations (Rouse et al., 1999). Because of these risks, FDEP set a springs impairment level of 0.35mg/L in springs vents; suggesting that concentrations above that level may be harmful to the ecosystem (Brown et al., 2008). It is important to monitor nitrate-nitrite nitrogen because increased concentrations of these pollutants can impact several biotic and abiotic factors vital to springs health.

1.3.6. Submerged Aquatic Vegetation Surveys

As mentioned in the section on Photosynthetically Active Radiation, Submerged Aquatic Vegetation (SAV) is an extremely important indicator of spring health. SAV acts as a food source for many springs animals, provides dissolved oxygen into the water column, and provides housing refugia for a number of small springs organisms. In addition to its benefits, Florida is also home to several species of invasive aquatic vegetation which can be known to outcompete native species (Evans, 2008). It is important to monitor vegetation communities in springs in order to document changes of species composition or density which can have major impacts on other aspects of springs ecology.

1.3.7. Bird Surveys

Birds are a common sight throughout all Florida Springs and use them in a number of different ways including feeding grounds, nesting areas, and critical stopovers during migration. Birds occupy a wide array of biological niches in spring systems and their presence helps to maintain balance in springs food webs. It is important to monitor bird communities to examine potential changes in community density and diversity which could have compounding consequences on the rest of the spring community.

Materials & Methods

SpringsWatch volunteers conducted ecological monitoring on the Wekiva River from January to December 2025. Monitoring stations were between WEK-HS and WEK-7 (Table 1). Data collection included water quality field parameters, light measurements, bird surveys, nitrate+nitrite nitrogen measurements, and SAV photographs.

2.1 Sampling Events

Table 1 summarizes the eleven sampling events along the Wekiva River. With assistance from FSI, SpringsWatch volunteers conducted twelve sampling sessions in 2025.

Volunteers collected the following data during monitoring sessions:

- Water quality field parameters (temperature, dissolved oxygen, conductivity, nitrate+nitrite)
- Vertical light attenuation (PAR)
- Submerged aquatic vegetation.
- Bird survey

Table 1: Wekiva River SpringsWatch 2025 Sampling events

Month	Temp	DO	SpC	PAR	NO _x -N	SAV	Birds
Jan.	x	x	x	x		x	x
Feb.	x	x	x	x		x	x
Mar.	x	x	x	x		x	x
Apr.	x	x	x	x		x	x
May	x	x	x	x		x	x
Jun.	x	x	x	x	x	x	x
Jul.	x	x	x	x		x	x
Aug.	x	x	x	x		x	x
Sep.	x	x	x	x		x	x
Oct.	x	x	x	x		x	x
Nov.	x	x	x	x		x	x
Dec.	x	x	x	x			x

2.2 Water Quality

2.2.1 Dissolved Oxygen and Temperature

SpringsWatch volunteers used a handheld YSI ProODO meter at each of the monitoring stations in the Wekiva Springs System to collect monthly measurements of water temperature and dissolved oxygen at each of the eight monitoring stations. Lead volunteers calibrated and maintained water quality meters according to manufacturer instructions and Florida Department of Environmental Protection Standard Operating Procedures (FDEP, 2017). If either the initial or post-sampling calibration failed, the associated data were excluded from this report and subsequent analyses.

2.2.2 Specific Conductance

SpringsWatch volunteers used a handheld YSI EcoSense EC300A meter at each of the monitoring stations in the Wekiva Springs System to collect monthly specific conductivity readings at each of the eight stations

along the Wekiva River. Team leaders calibrated and maintained water quality meters according to manufacturer instructions and Florida Department of Environmental Protection Standard Operating Procedures (FDEP, 2017). If either the initial or post-sampling calibration failed, the associated data were excluded from this report and subsequent analyses.

2.2.1. Nitrate-Nitrite Nitrogen

FSI staff collected nitrogen as nitrate + nitrite (NO_x-N) samples at stations WEK-HS (Figure 1). Water samples were sent to a state-accredited laboratory (McGlynn Laboratories Inc.) for NO_x-N analysis. Preparation, storage, and analysis all followed FDEP Standard Operating Procedures. Samples were hand collected from approximately 0.1m depth. Sample bottles were re-capped and sealed before being acidified with approximately 0.25mL of 50% sulfuric acid (H₂SO₄) and then stored on ice prior to transport. Water samples were held in a refrigerator for <21 days before being sent to a state-accredited laboratory (McGlynn Laboratories Inc.) for NO_x-N analysis. All analyses were conducted within a standard holding time of 28 days from sample collection.

2.3 Light Measurements

Photosynthetically Active Radiation (PAR) underwater light transmission and attenuation coefficients were measured monthly at the eight monitoring stations. Volunteers used a LI-COR brand LI-192 underwater quantum photometer to measure PAR energy reaching the water surface and at depth intervals of one foot and two feet. Figure 2 provides an image of the LI-COR photometer. Figures and results are from collections where percent transmittance is greater than 10% and less than 100% due to near-zero or above one hundred values; all other values were flagged and omitted from this report and analyses.

2.4 Submerged Aquatic Vegetation Survey

Submerged aquatic vegetation (SAV) was monitored monthly at each of the eight Wekiva SpringsWatch stations. Volunteers took two underwater photographs at each station in two different locations, which they sent to FSI for analysis.

2.5 Bird Survey

Wekiva SpringsWatch volunteers recorded visual monthly observations of birds between stations WEK-HS and WEK-7 and then identified them to the lowest taxonomic group.

Results & Discussion

This section summarizes field data along the Wekiva River and springs collected from January to December 2025 by SpringsWatch volunteers.

3.1 Water Quality

Figure 3 through Figure 7 present water quality results collected by Wekiva SpringsWatch volunteers in 2025.

3.1.1. Dissolved Oxygen

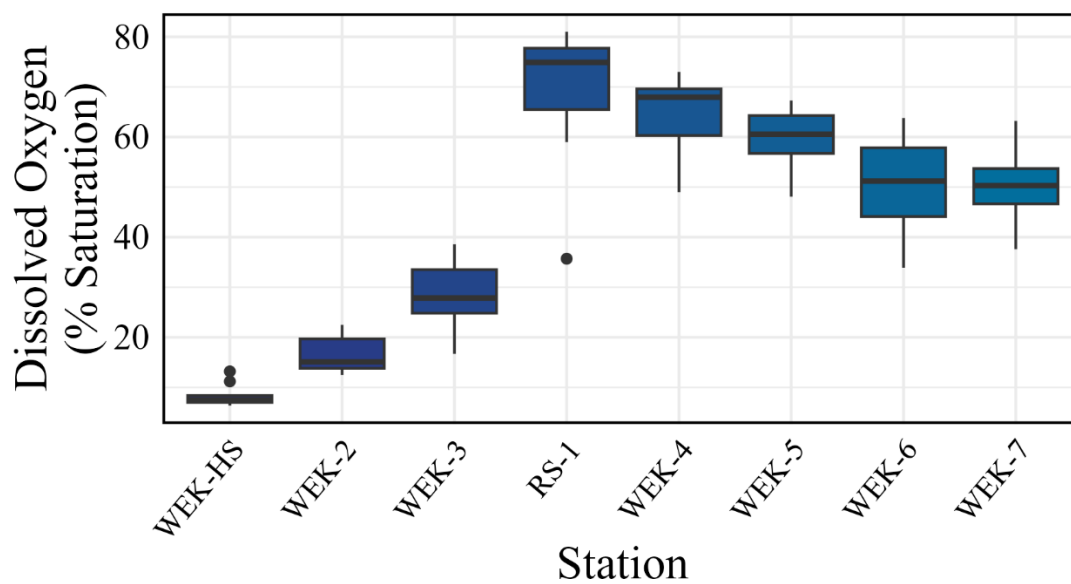


Figure 3: Percent Dissolved Oxygen Measurements across Wekiva SW Stations

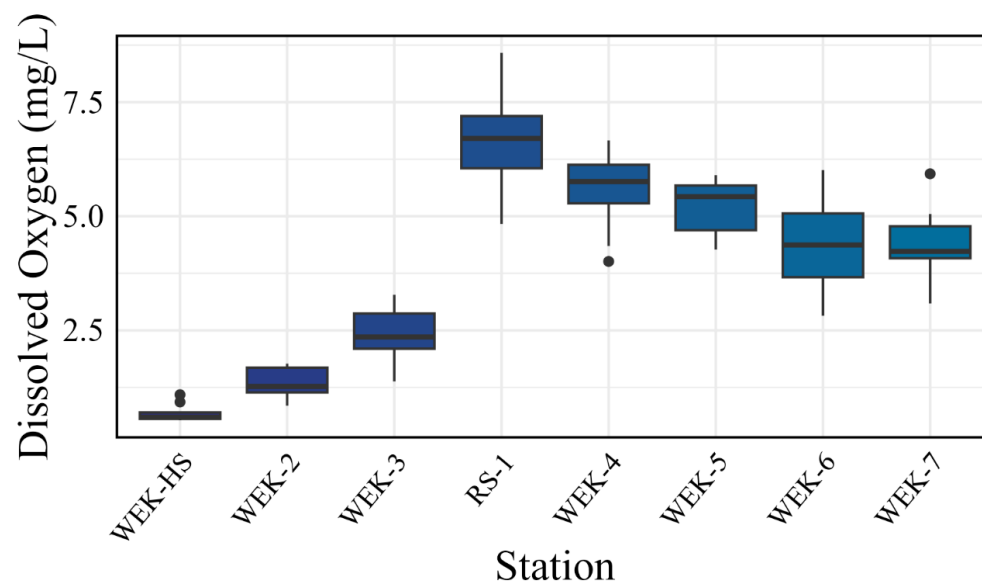


Figure 4: Dissolved Oxygen (mg/L) Measurements across Wekiva SW Stations

Figures 3 and 4 show Dissolved Oxygen measurements across our eight sampling stations. The lowest DO results were found at the Wekiwa headspring station (WEK-HS) with DO concentrations increasing downstream from the spring. DO increases as the water accumulates more free oxygen from the atmosphere as well as photosynthesizing submerged aquatic vegetation. Rock Springs run (RS-1) flows 8.5 miles before meeting with the Wekiva River and exhibits a much higher DO concentration. Input from RS-1 increased the overall DO concentration of the Wekiva River from WEK-4 to WEK-7.

3.1.2 Temperature

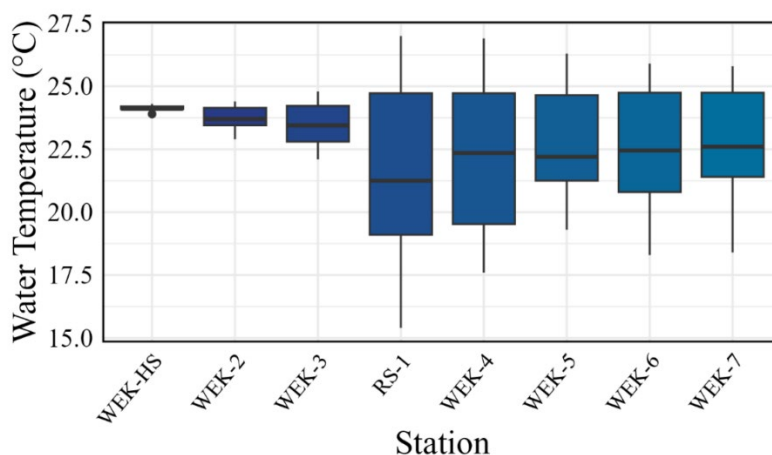


Figure 5: Temperature Measurements across Wekiva SW Stations

In 2025, average temperatures fluctuated between 21-25 degrees Celsius. In general, the stations after the Rock Spring run had much wider temperature ranges compared to those closer to the headspring. The Rock Spring run showed the widest range of all stations.

3.1.3 Specific Conductance

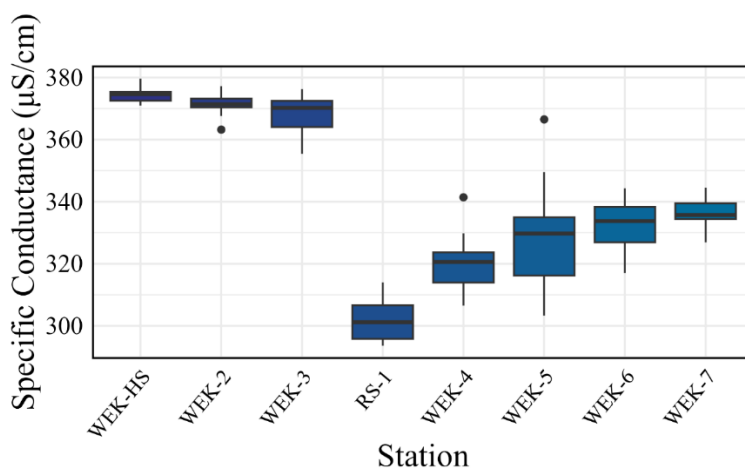


Figure 6: Specific Conductivity Measurements across Wekiva SW Stations

Figure 6 shows Specific Conductivity measurements taken across the eight sampling stations. In 2025, the highest specific conductivity values were measured near the headspring while stations after Rock Springs Run had decreased values. This may indicate that the water feeding Rock Spring has lower concentration of dissolved ions compared to the water feeding Wekiva headspring.

3.1.4. Nitrate-Nitrite

Figure 7 shows a comparison of NO_x-N levels collected at several SpringsWatch groups across Florida. All stations are represented by their station code with BG, FP1, FP2, MB, TM, and XMAS representing the Silver River; HOM-1 representing Homosassa; RSR-1 representing the Rainbow River; WEK-HS and RS-1 representing the Wekiva River and Rock Spring Run; SF-2,3,7,8 and 9 representing the Santa Fe River; and WAK-HS representing the Wakulla River.

In 2025, the average concentration measured across Wekiva was 0.935, more than two and a half times the accepted FDEP level of impairment. The concentration at the Wekiva headspring was 1.19 mg/L while the concentration at the Rock Spring Run was 0.68 mg/L. Both measurements indicate that the Wekiva River is at risk of the cascading effects of nutrient pollution.

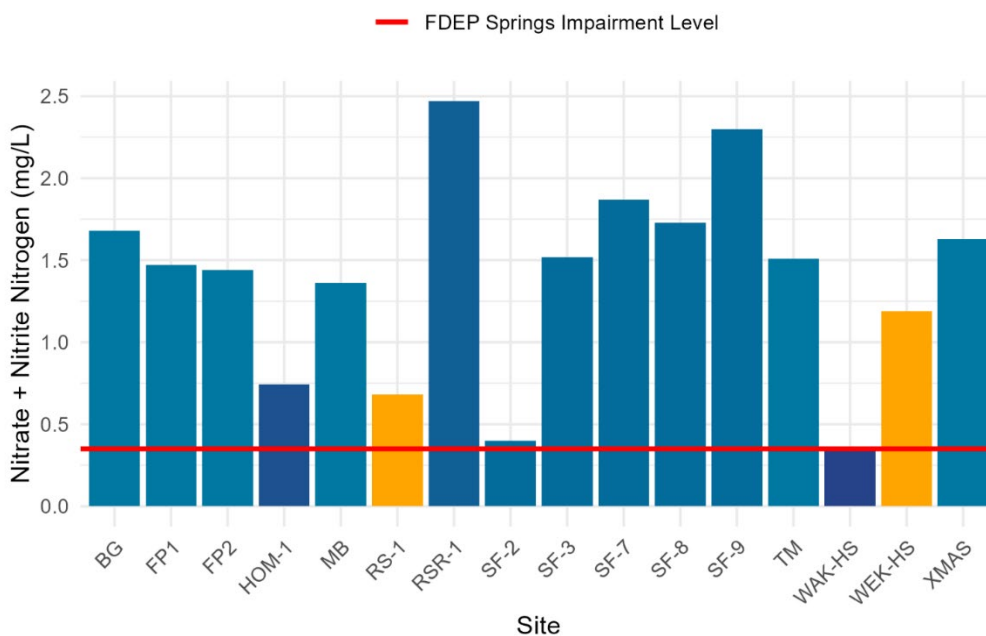


Figure 7: A Comparison of NO_x-N Measurements taken across SW Groups

3.2 Light Measurement

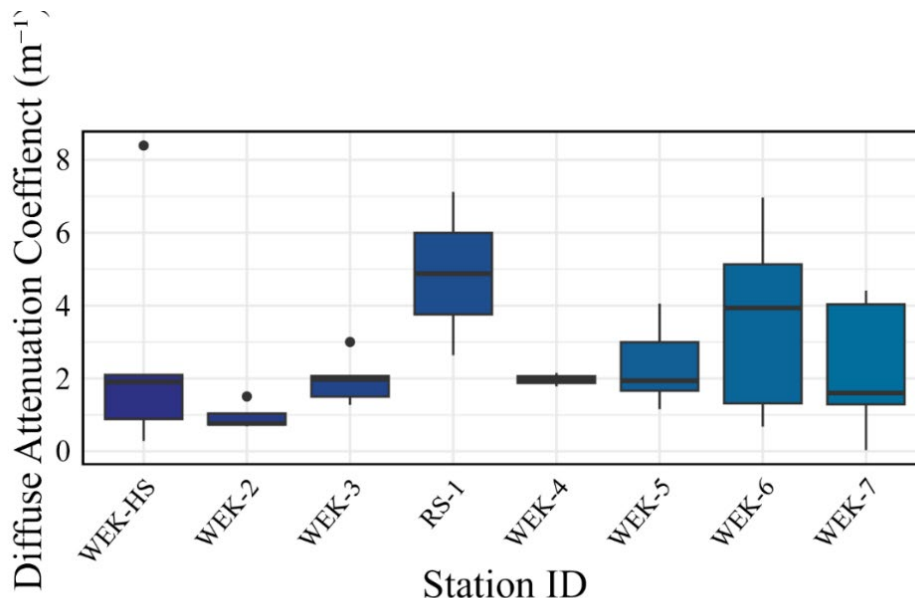


Figure 8: Diffuse Light Attenuation Coefficient Measurements across Wekiva SW Stations

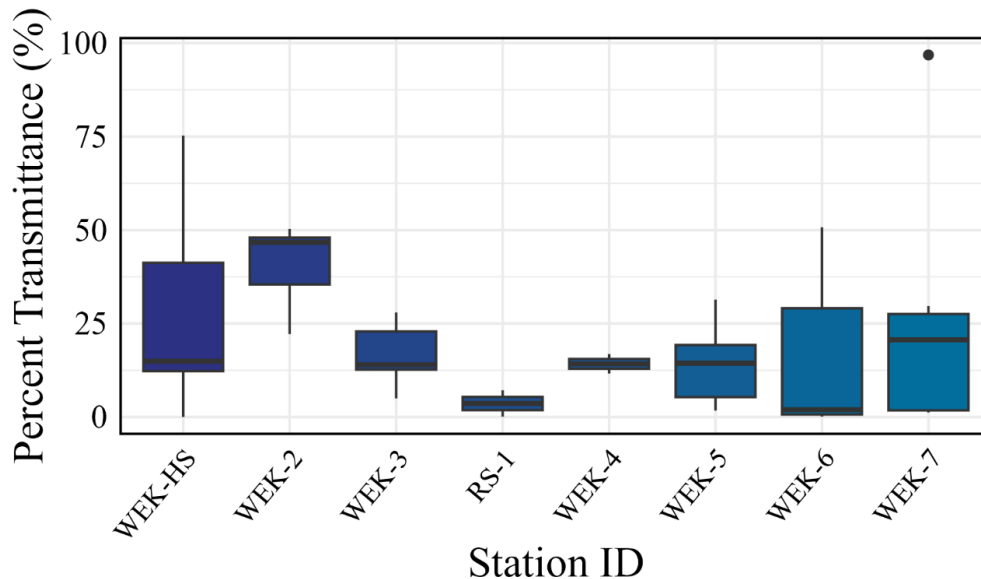


Figure 9: Percent Light Transmittance Measurements across Wekiva SW Stations

Figures 8 and 9 represent the Diffuse Light Attenuation Coefficient (k) and Percent Transmittance measurements collected with PAR meters.

Percent transmittance refers to the amount of light that is able to pass through the water column to a depth of 1 meter below the surface. The diffuse attenuation coefficient (k) is calculated via the Lambert-Beer

equation (Wetzel 2001) to measure how readily light dissipates throughout the water column. Higher attenuation values correspond to less water clarity. Higher values of percent transmittance tend to correspond with lower values of coefficient k . Higher k values, or lower percent transmittance values, can indicate poor water clarity since light cannot pass as easily through the water column, often due to increases in dissolved substances such as tannins (color) and suspended solids (turbidity) in the water.

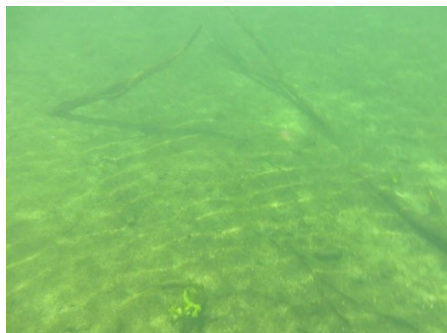
In aquatic ecosystems, the diffusion attenuation coefficient can have a significant impact on the biota that inhabits the water. For example, in shallow, clear water with a low diffusion attenuation coefficient and high percent transmittance, light can easily reach the bottom of the water column, enabling the growth of aquatic plants and phytoplankton. This, in turn, can support the entire food web, from primary producers to top predators. On the other hand, in deep, turbid water with a high diffusion attenuation coefficient and low percent transmittance, light is unable to penetrate as far, limiting the growth of aquatic plants and phytoplankton. This can have cascading effects on the entire ecosystem, potentially reducing the population size and diversity of biota that depend on these primary producers. Thus, the diffusion attenuation coefficient is an important factor to consider when evaluating the health and productivity of aquatic ecosystems.

3.3 Submerged Aquatic Vegetation Survey

Submerged aquatic vegetation plays an important ecological role within a springs system. It provides habitat and food for fish and other wildlife, increases water clarity, affects nutrient cycles, and stabilizes shorelines and sediments. This data presents an ongoing record of conditions in the spring and will be useful for comparison to future evaluations of the ecological health of the Wekiva River system. Pictured below are river bottom photos taken by SpringsWatch volunteers in 2025 at all 8 sampling stations. The most commonly seen species of SAV were members of *Nuphar* sp. Commonly known as Spatterdock.



WEK-HS – Sprouting Spatterdock growing over sand



WEK-2 – Small patches of spatterdock growing over silt and sand





WEK-3 – Spatterdock growing in dense beds of filamentous algae



WEK-4 – Vallisneria covered with periphyton algae



WEK-5 – Large spatterdock stalks



WEK-6 – Newly sprouting spatterdock leaves



WEK-7 – Spatterdock growing over detritus

3.4 Bird Survey

Table 2: Diversity of Birds seen during Wekiva SpringsWatch Outings

Common Name	Scientific Name	Average Count
Limpkin	<i>Aramus guarauna</i>	0.33
Northern Parula	<i>Setophaga americana</i>	0.92
Downy Woodpecker	<i>Dryobates pubescens</i>	0.33
Blue Gray Gnatcatcher	<i>Poliophtila caerulea</i>	0.83
Wood Stork	<i>Mycteria americana</i>	0.25
Osprey	<i>Pandion haliaetus</i>	0.33
White Ibis	<i>Eudocimus albus</i>	2.25

Great Egret	<i>Ardea alba</i>	1
Swallow-tailed Kite	<i>Elanoides forficatus</i>	0.83
Turkey Vulture	<i>Cathartes aura</i>	1.41
Common Grackle	<i>Quiscalus quiscula</i>	2
Yellow throated Vireo	<i>Vireo flavifrons</i>	0.08
Ruby Crowned Kinglet	<i>Corthylio calendula</i>	0.33
Northern Cardinal	<i>Cardinalis cardinalis</i>	1.33
Cedar Waxwing	<i>Bombycilla cedrorum</i>	0.83
Barred Owl	<i>Strix varia</i>	0.08
Mottled Duck	<i>Anas fulvigula</i>	0.25
American Crow	<i>Corvus brachyrhynchos</i>	0.58
Western Cattle Egret	<i>Ardea ibis</i>	0.08
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	0.08
Wild Turkey	<i>Meleagris gallopavo</i>	0.08
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	0.08
White-eyed Vireo	<i>Vireo griseus</i>	0.17
Palm Warbler	<i>Setophaga palmarum</i>	0.17
Eastern Bluebird	<i>Sialia sialis</i>	0.08
Anhinga	<i>Anhinga anhinga</i>	2.25
Black Crowned Night Heron	<i>Nycticorax nycticorax</i>	0.25
Tricolored Heron	<i>Egretta tricolor</i>	0.58
Little Blue Heron	<i>Egretta caerulea</i>	2.5
Green Heron	<i>Butorides virescens</i>	2.67
Great Blue Heron	<i>Ardea herodias</i>	0.92
Red Shouldered Hawk	<i>Buteo lineatus</i>	0.33

Belted Kingfisher	Megaceryle alcyon	0.42
Red Bellied Woodpecker	Melanerpes carolinus	1.83
Pileated Woodpecker	Dryocopus pileatus	1.58
Eastern Phoebe	Sayornis phoebe	1.5
Tufted Titmouse	Baeolophus bicolor	0.67
Carolina Wren	Thryothorus ludovicianus	0.92
Gray Catbird	Dumetella carolinensis	1.58
American Robin	Turdus migratorius	0.5
Common Yellowthroat	Geothlypis trichas	0.08
Yellow-rumped Warbler	Setophaga coronata	1.75
Pied Billed Grebe	Podilymbus podiceps	0.42
Fish Crow	Corvus ossifragus	0.58
Black Vulture	Coragyps atratus	1.42
Wood Duck	Aix sponsa	2.83
Snowy Egret	Egretta thula	0.08
Black and White Warbler	Mniotilta varia	0.08

Table 2 represents the diversity of birds seen during 2025 Wekiva SpringsWatch surveys. Surveys were conducted all 12 months of the year. In total 48 species were seen, the most of any SpringsWatch group this year! The most commonly seen species were Wood Ducks, followed by Green Herons and White Ibis. Pictured below are several of the species seen by volunteers during Wekiva surveys.



Green Heron



Turkey Vulture



Wood Duck



White Ibis

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