2025 WEEKI WACHEE RIVER SPRINGSWATCH MONITORING SUMMARY



Prepared for Florida Department of Environmental Protection

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Volunteer and Staff Acknowledgements

This report was prepared by the Howard T. Odum Florida Springs Institute (FSI). Ecological monitoring was conducted by FSI staff and Florida SpringsWatch volunteers under the Florida Department of Environmental Protection (FDEP) Division of Recreation and Parks Research/Collection Permit Number 10102510.

The Weeki Wachee SpringsWatch group would not have been possible without all the hard work from group leads Brooklyn Wilhelm and Jenna Molloy. These two were assisted by a group of our wonderful volunteers including Jill Lingard, Andy McGovern, Meaghan McGovern, and Scott Jantz.

We would also like to acknowledge FSI's Programs Coordinator Michael Garvey who wrote this report; as well as Senior Environmental Scientist Bill Hawthrone and Environmental Scientist TJ Comer for their continued support, working under the supervision of Executive Director Haley Moody. Special acknowledgement should be given to Outreach Assistant Ada Nesbit and TJ Comer for assistance with data entry and figure development. Finally, we are thankful for the ongoing guidance and vision of FSI founder, Dr. Robert Knight, as well as our board of directors including Tedd Greenwald, Bob Palmer, Steve Walsh, Karen Lenese, Jacqui Sulek, and Melissa Perkins



Figure 1: Our Amazing Weeki Wachee Volunteers

Executive Summary

In 2025, the Weeki Wachee River SpringsWatch group collected data on three 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 spring:

- **Water Quality** in the Weeki Wachee River is changing
    - **Temperature** decreased as stations moved further down from the headspring, likely due to intrusion of saltwater from the gulf.
    - **Dissolved Oxygen** increased as stations moved further from the main headspring. This is likely due to primary production and water surface diffusion with the air
    - **Specific Conductivity** was relatively stable across stations WW-1 through WW-13. The final two stations exhibited much higher conductivity values, likely due to tidal influence from the Gulf.
    - **Water clarity** decreased as stations moved further from the headspring. This is likely due to surface run off and increased influence from tidal influxes.
    - **Light** measurements collected were highly across all stations
- **Biology** of the Weeki Wachee River is diverse and somewhat healthy
    - **Submerged Aquatic Vegetation** is much healthier upstream than downstream. Closer to the headspring, eelgrass dominates the system but further down river it becomes algae dominated.
    - **Fish** are quite diverse in the Weeki Wachee River. At least 7 different species of fish were seen during fish surveys, including several marine invaders such as Sheepshead and Atlantic Needlefish
    - **Birds** are very diverse across the Weeki Wachee System. In total, 21 different species were seen. The most commonly seen birds were White Ibis.
    - **Other Large Animals** were also seen in the Weeki Wachee River including West Indian Manatees**.** Their presence indicates the Weeki Wachee River could be important habitat for this imperiled species.

Introduction

1.1 Site Overview

Weeki Wachee Springs and River are located in western Hernando County and is a focal point for outdoor recreation in the region. Rainbow, Crystal River/Kings Bay, Homosassa, Chassahowitzka, and Weeki Wachee springs systems comprise the Springs Coast (Figure 2). The headspring that feeds the Weeki Wachee River is in Weeki Wachee Springs State Park. The Weeki Wachee River flows approximately 7.5 miles from its headspring to the Gulf of Mexico.

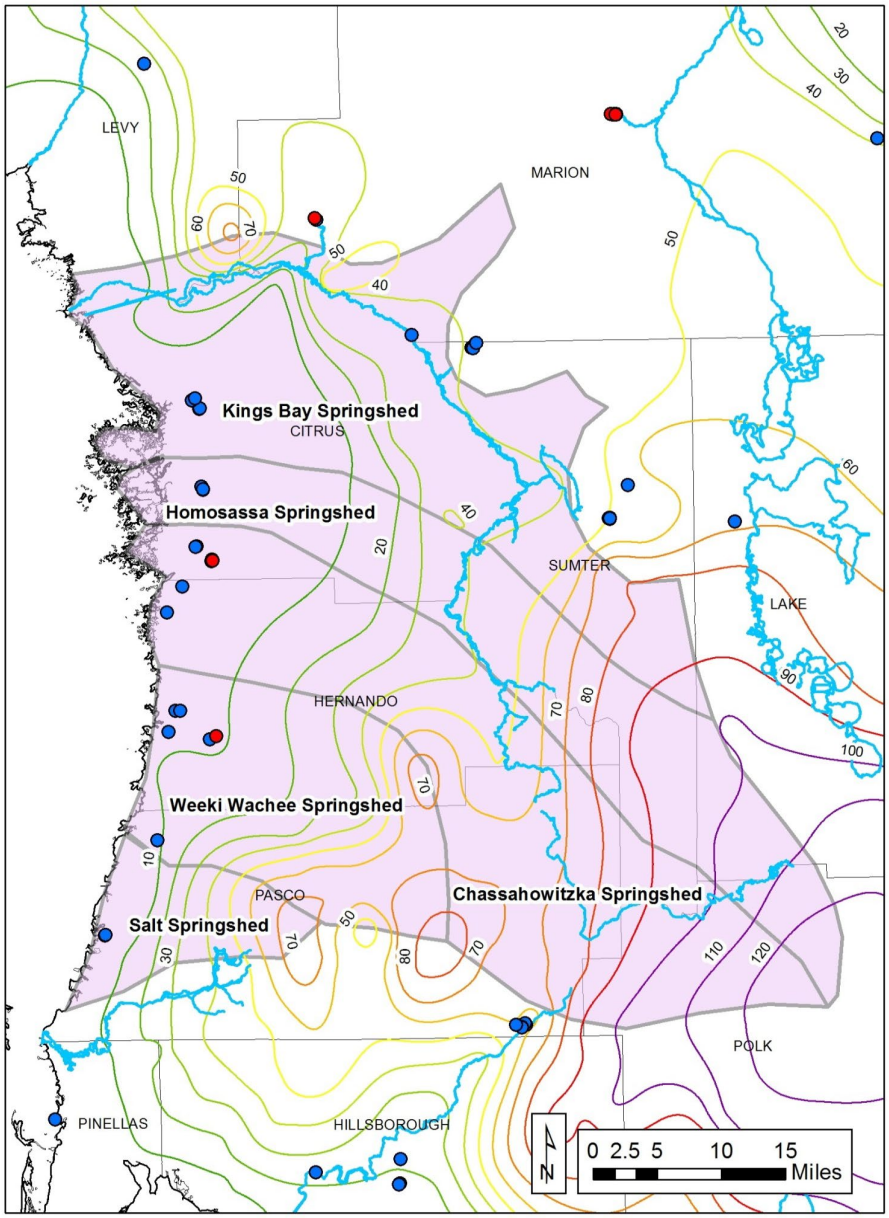


Figure 2: Florida's Springs Coast and the location of springsheds in the region (FSI 2016).

The Weeki Wachee 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 currently considered "impaired".

Since 2018, the Florida SpringsWatch citizen science program has provided enhanced monitoring of the Weeki Wachee River's ecological health through monthly sampling sessions. 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 to educate the public about the springs and river health.

This report was prepared by the Howard T. Odum Florida Springs Institute (FSI) and is focused on ecological monitoring conducted along the Weeki Wachee River in 2025 by SpringsWatch volunteers.

1.2 Monitoring Stations

Each month, SpringsWatch volunteers collected data at fixed stations along the Weeki Wachee River in 2024 from Weeki Wachee Springs State Park to Rogers County Park (Figure 3). WW-1 is closest to the headspring at the top of the river; WW-15 is at Rogers Park (Table 1). The upper three stations are situated within state park boundaries where regulations prohibit boaters from exiting their watercraft. A summary of all historic sampling sites, their station names, latitude, and longitude used within the Weeki Wachee SpringsWatch groups can be viewed in Table 1.

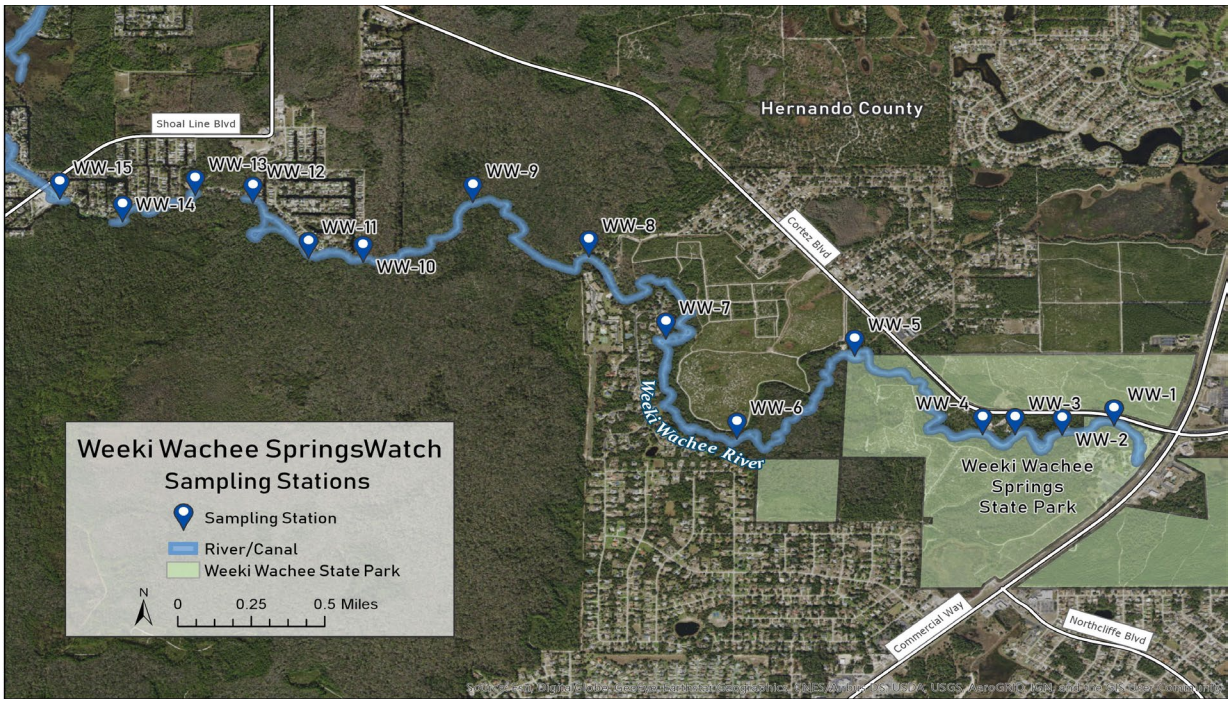


Figure 3: Weeki Wachee River SpringsWatch monitoring stations.

Table 1. Coordinates for Weeki Wachee SpringsWatch monitoring stations.

Station Code	Station Name	Latitude	Longitude
WW-1	WW-1	28.5192419	-82.57445487
WW-2	WW-2	28.5187531	-82.57704755
WW-3	WW-3	28.5186982	-82.57932464
WW-4	WW-4	28.5187548	-82.58093536
WW-5	WW-5	28.5232797	-82.58725682
WW-6	WW-6	28.5184252	-82.59301927
WW-7	WW-7	28.5240176	-82.59652464
WW-8	WW-8	28.5285541	-82.60035219
WW-9	WW-9	28.5316321	-82.60586972
WW-10	WW-10	28.5284143	-82.61145073
WW-11	WW-11	28.5286762	-82.61397443
WW-12	WW-12	28.5316101	-82.61688609
WW-13	WW-13	28.5320059	-82.61974219
WW-14	WW-14	28.5305465	-82.62331682
WW-15	WW-15	28.5317965	-82.62639073

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 perform 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.

1.3.5. Horizontal Secchi Disk Visibility

The Secchi disk is a tool for measuring water clarity in aquatic ecosystems. It is a disk with alternating black and white quadrants that is lowered into the water until it is no longer visible. The depth at which the disk disappears is known as the Secchi depth and is used as an indicator of water quality. The longer the Secchi depth, the clearer the water is. Secchi length can be used to monitor changes in water clarity over time and can be used to identify problems such as algal blooms or pollution.

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.

1.3.6. Fish Surveys

Fish are one of the most commonly seen groups of aquatic organisms seen in springs. They play important roles in nearly every trophic level of these systems and their distribution is often dictated by a number of biotic and abiotic factors (Work et al., 2010). Similar to plants, Florida houses a number of invasive fish species that can outcompete native species. It is important to monitor fish communities in springs to document how they change and ensure no further introduction of invasive species.

1.3.7. Large Animal Surveys

Large animals such as reptiles and mammals play critical roles in maintaining healthy ecosystems in springs. Herbivores such as West Indian Manatees graze on aquatic plants and large predators such as American Alligators act as apex predators and keep fish populations in check. It is important to monitor these groups to understand how changes in the spring could be impacting larger species that depend on these critical habitats.

Materials & Methods

SpringsWatch volunteers typically conducted monthly ecological monitoring on the Weeki Wachee River from January to December 2025. Historic monitoring stations were between WW-1 and WW-15 (Table 1). Data collection included water quality field parameters, water clarity, light attenuation, aquatic vegetation cover, and fish counts. During 2025, ten of the original fifteen stations were sampled due to logistics. The stations sampled in 2025 were: WW-1, WW-4, WW-5, WW-6, WW-7, WW-9, WW-10, WW-13, WW-14, and WW-15.

2.1 Sampling Events

Table 2 summarizes the 3 sampling events conducted along the Weeki Wachee River in 2025 by SpringsWatch volunteers.

Table 2: A summary of the data collected across the 3 sampling days

Month	Temp	DO	SpC	PAR	Secchi	SAV	Fish	Bird
Jan.	x	x	x	x	x	x	x	x
Feb.	x	x	x	x	x			
Oct.	x	x	x	x	x			x

Volunteers collected the following data during each monitoring session:

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

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 Weeki Wachee Spring System to collect monthly measurements of water temperature and dissolved oxygen at each of the 10 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 Weeki Wachee Spring System to collect monthly specific conductivity readings at each of the 10 stations along the Weeki Wachee 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.

2.3 Water Clarity

2.3.1 Diffuse Attenuation Coefficient (k) and Percent Transmittance

Photosynthetically Active Radiation (PAR) underwater light transmission and attenuation coefficients were measured monthly at the 10 monitoring sites. Volunteers used a LI-COR brand LI-250A underwater quantum photometer to measure PAR energy reaching the water surface and at depth intervals of one foot and two feet of depth. Figure 3 provides an image of the LI-COR PAR light sensor. Figures and results are from collections where percent transmittance is greater than 10% and less than 100% due to near-zero or above 100 values; all other values were flagged and omitted from this report and analyses.

2.3.2. Secchi Disk

SpringsWatch volunteers took horizontal Secchi disk measurements at stations WW-1, WW-9, WW-14, and WW-15 throughout the sampling period. Vertical Secchi disk measurements were taken at station WW-14.

2.4 Vegetation

Submerged aquatic vegetation (SAV) was photographed monthly at all 10 stations monitored in 2025 (Figure 2). SpringsWatch volunteers took two underwater photographs at each station in two separate locations, which they sent to FSI for analysis.

2.5 Wildlife Counts

2.5.1 Fish Surveys

SpringsWatch volunteers donned masks, snorkels, and fins to conduct visual fish counts and identify them to the lowest taxonomic group for a 0.3-mile stretch of river between WW-2 and WW-3 (Figure 2). Following each survey, underwater observers estimated the average lengths for each fish species they saw.

2.5.2 Bird Surveys

Weeki Wachee SpringsWatch volunteers recorded visual monthly observations of birds between stations WW-1 and WW-15 and then identified them to the lowest taxonomic group.

2.5.3 Large Animal Surveys

SpringsWatch volunteers recorded visual monthly observations of large animals such as turtles, alligators, and manatees across all stations and then identified them to the lowest taxonomic group.

Results & Discussion

This section summarizes field data collected by SpringsWatch volunteers along the Weeki Wachee River from January to December 2025.

3.1 Water Quality

Figure 4 through 11 present 2025 water quality data collected from 10 stations along the Weeki Wachee River.

3.1.1 Dissolved Oxygen

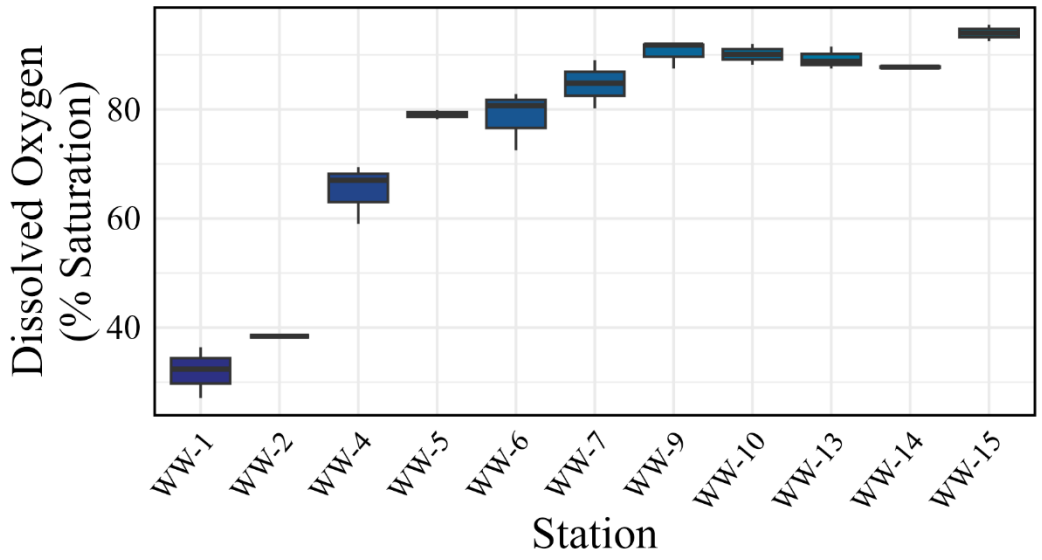


Figure 4: Percent Dissolved Oxygen Measurements across Weeki Wachee SW Stations

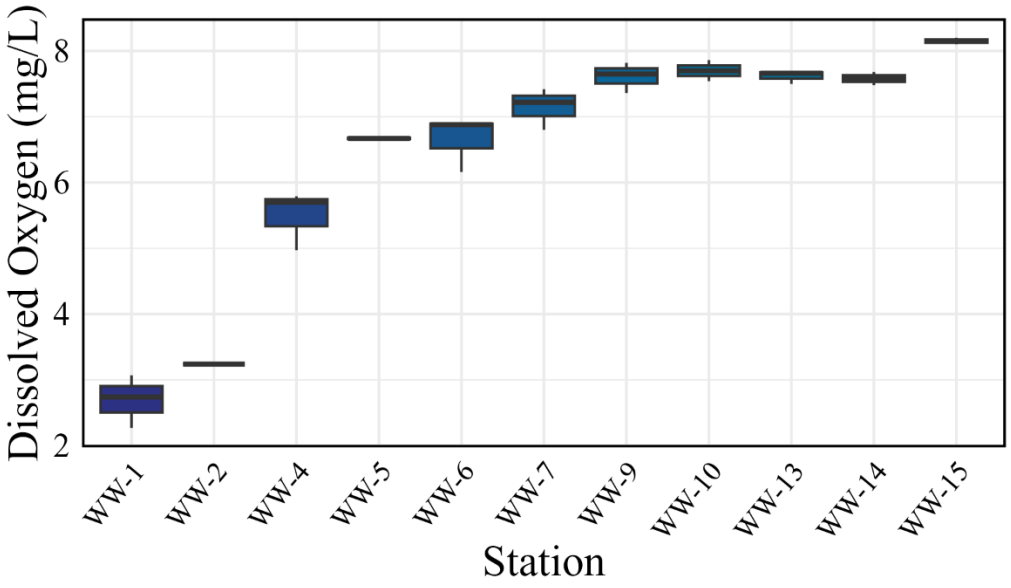


Figure 5: Dissolved Oxygen (mg/L) Measurements across Weeki Wachee SW Stations

Figures 5 and 6 show Dissolved Oxygen measurements across our two sampling stations. In 2025, measurements showed the lowest DO was measured at the headspring and as water moved down the spring run it had more opportunities to uptake oxygen via primary production of plants and diffusion between the water's surface and air.

3.1.2 Temperature

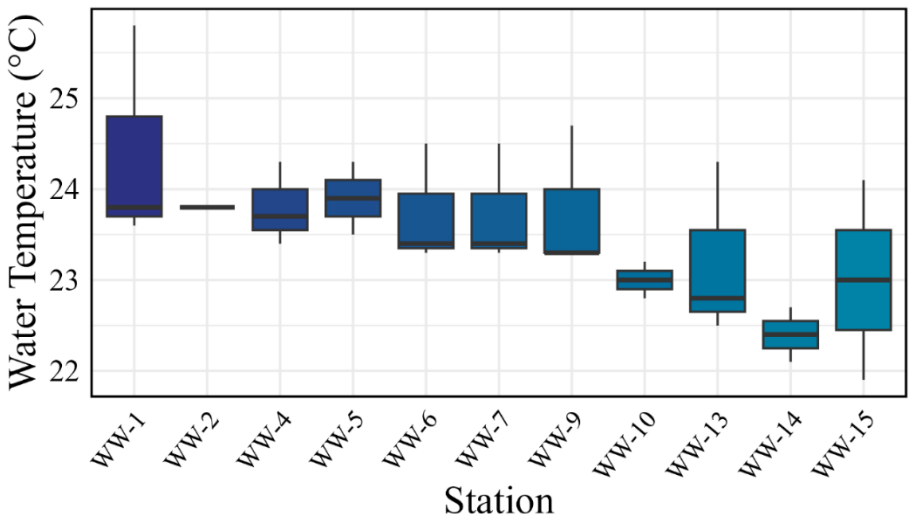


Figure 6: Temperature Measurements across Weeki Wachee SW Stations

Figure 7 shows that as stations moved further down the spring run, average water temperature decreased. As stations get further away from the headspring, they are under more influence of saltwater intrusion from the gulf which could explain the drop in temperature.

3.1.3 Specific Conductance

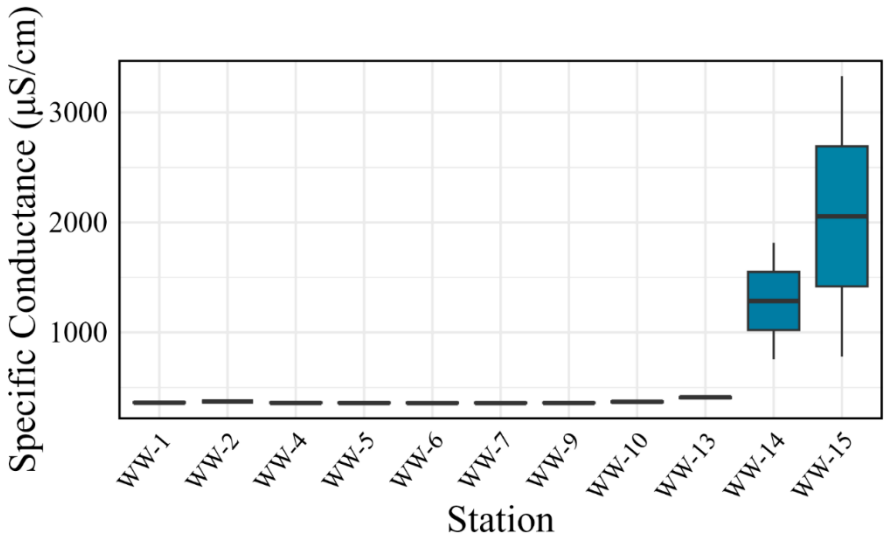


Figure 7: Specific Conductivity Measurements across Weeki Wachee SW Stations

Figure 8 shows Specific Conductivity measurements taken across the ten sampling stations. Measurements taken in 2025 showed relatively constant values until reaching stations WW-14 and WW-15. These two stations are under influence of tidal activity from the Gulf resulting in their elevated specific conductivity values.

3.2 Clarity and Light Measurements

3.2.1 Secchi Disk Visibility

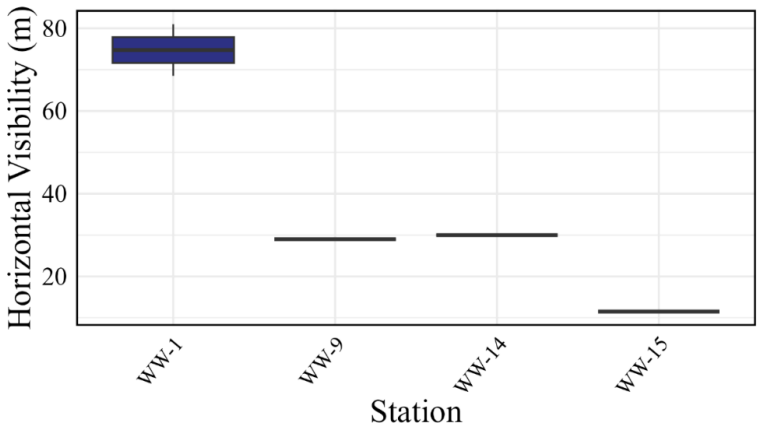


Figure 8: Secchi Disk Horizontal Water Clarity Measurements at WW-1, WW-9, WW-14, and WW-15

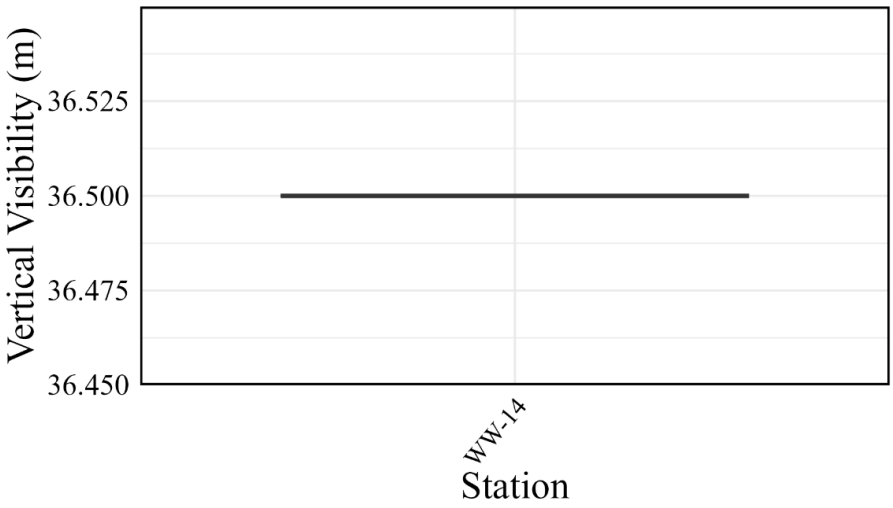


Figure 9: Secchi Disk Vertical Water Clarity Measurements at WW-14

Figure 9 shows horizontal water clarity measurements collected with a Secchi disk across stations WW-1, WW-9, WW-14, and WW-15. Figure 10 shows vertical water clarity measurements taken at WW-14. The measurements collected in 2025 have very high variability suggesting high variability in the clarity of water being pumped out the headspring.

3.2.2 Light Measurements

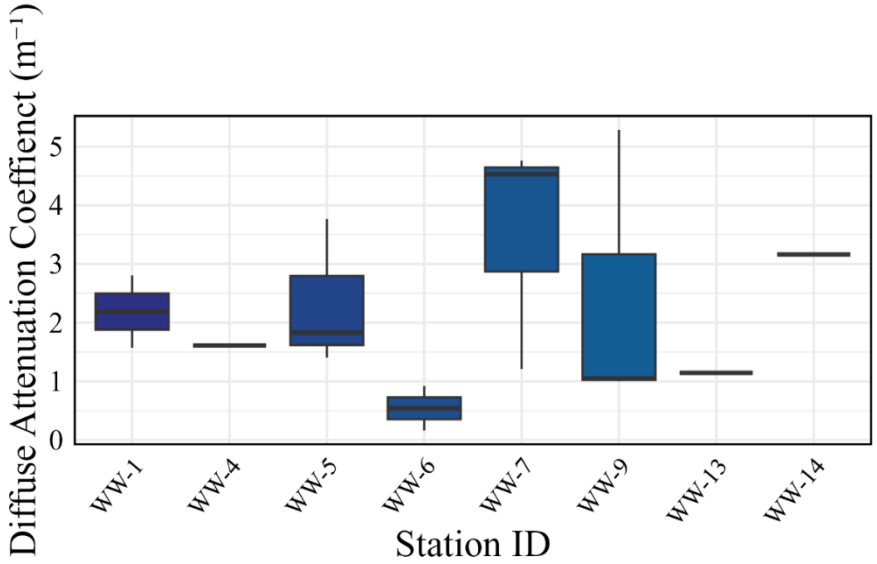


Figure 10: Diffuse Light Attenuation Coefficient Measurements across Weeki Wachee SW Stations

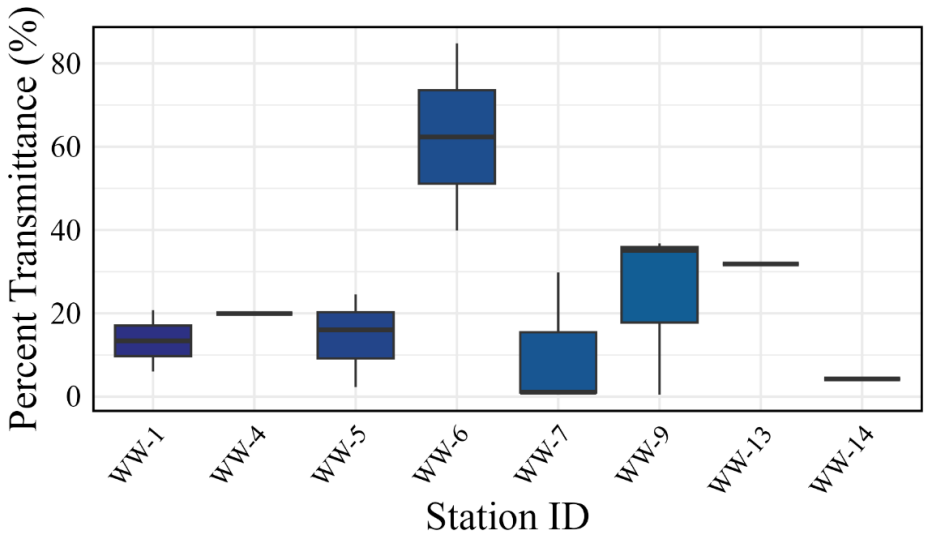


Figure 11: Percent Light Transmittance across Weeki Wachee SW Stations

Figures 10 and 11 represent the Diffuse Light Attenuation Coefficient (k) and Percent Transmittance measurements collected with PAR meters.

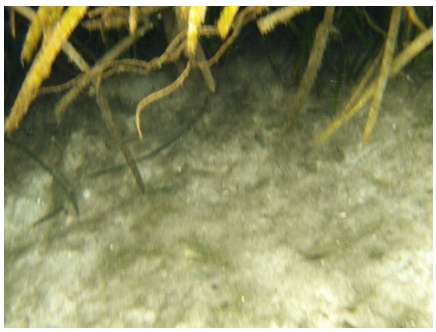
Percent transmittance refers to the amount of light that is able to pass through the water column to a depth of 1 meter below the surface. The diffuse attenuation coefficient (k) is calculated via the Lambert-Beer equation (Wetzel 2001) to measure how readily light dissipates throughout the water column. 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 inhabit 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.

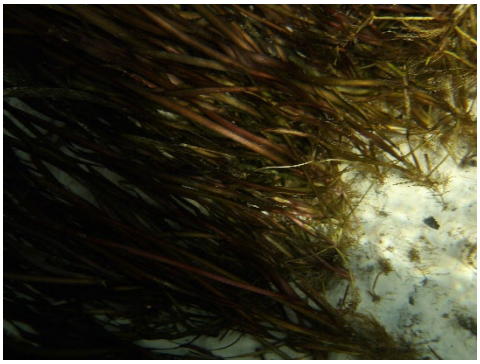
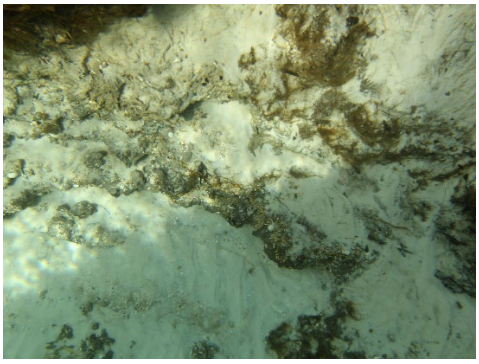
3.3 Submerged Aquatic Vegetation Survey

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

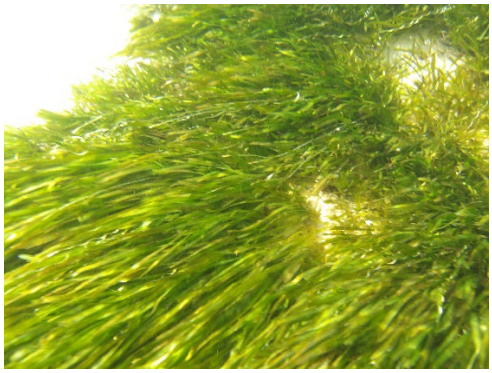
comparison to future evaluations of the ecological health of the Weeki Wachee River system. Pictured below are river bottom photos taken by SpringsWatch volunteers in 2025 at all 10 sampling stations.



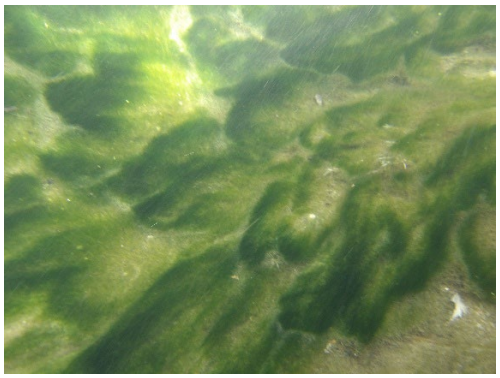
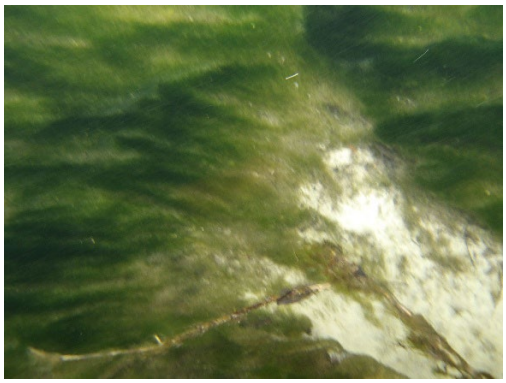

WW-1 – Beds of mixed eelgrass growing over sand

WW-4 Sagittaria and filamentous algae growing over rock and sand

WW-5 – Beds of Sagittaria and Vallisneria

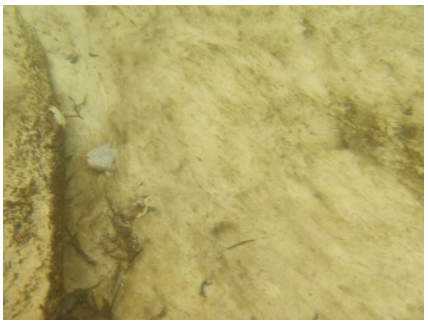
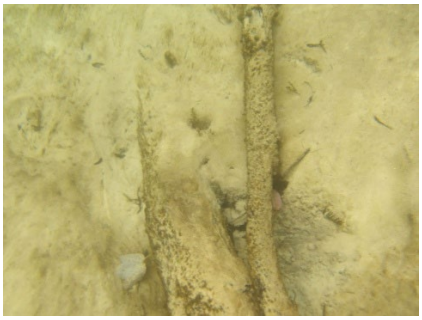
WW-6 – Large clumps of green filamentous algae



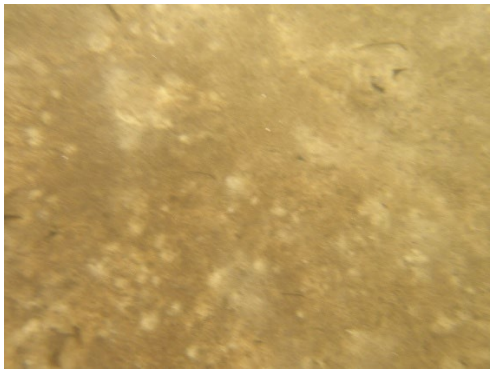
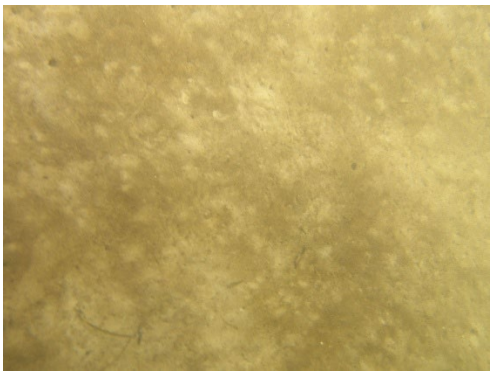

WW-7 – Bare sand with woody and shell debris



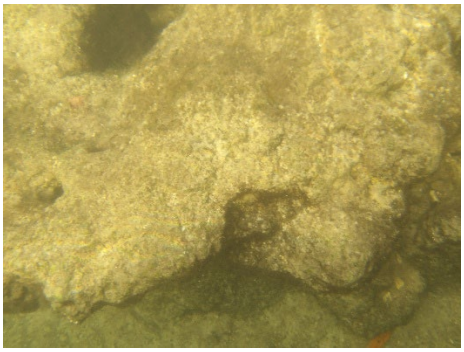

WW-9 – Woody debris over bare sand

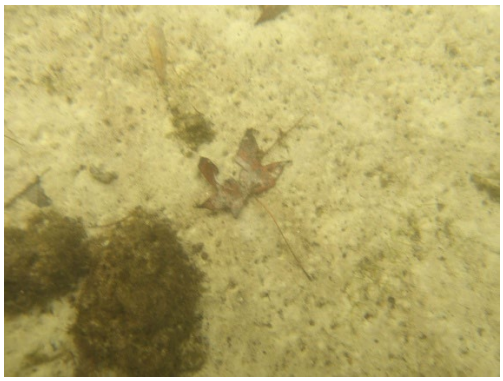
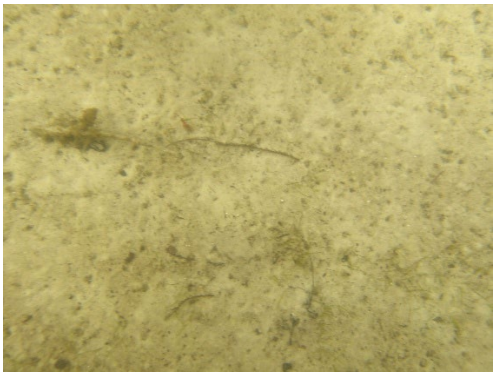
WW-10 – Brown filamentous algae and periphyton growing over sand

WW-13 – Periphyton growing over sand

WW-14 – Brown filamentous algae and periphyton growing over sand

WW-15 – Plant debris and periphyton on sand

It should be noted that as stations moved further away from the headspring there was a clear decline in SAV communities. The first few stations show healthy populations of eelgrass such as Vallisneria and Sagittaria while later stations are dominated by sand and periphyton algae.

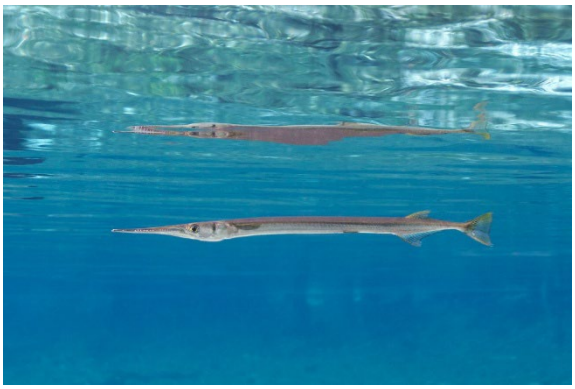
3.4 Fish Survey

Table 2: Diversity of Fish seen during 2025 surveys

Common Name	Scientific Name	Total Count
Striped Mullet	*Mugil cephalus*	71
Sunfish sp.	*Lepomis sp.*	65
Bass sp.	*Salmoides sp.*	21
Redeye Chub	*Pteronotropis harperi*	170
Atlantic Needlefish	*Strongylura marina*	100
Minnow sp.	*Notropis sp.*	440
Sheepshead	*Archosargus probatocephalus*	7

SpringsWatch volunteers conducted fish surveys at one of the sampling dates in 2025. Show in table 2, in total they saw at least 7 different species of fish. It is likely that more species may have been seen but blanket classifications like Sunfish sp. and Minnow sp. allow for volunteers to identify difficult groups

that contain similar looking species. Unlike other spring systems in Florida, Weeki Wachee Spring is under the influence of tidal activity from the Gulf allowing for fish more common to brackish and marine systems to enter the spring run. Species such as Atlantic Needlefish and Sheepshead are commonly found in marine systems and likely enter the spring system to exploit potential food sources or breed. Pictured below are some of the fish seen during the Weeki Wachee survey.



Atlantic Needlefish



Redeye Chub



Sheepshead



Striped Mullet



Spotted Sunfish



Florida Bass

3.5 Bird Survey

Table 3: Diversity of Birds seen during 2025 Surveys

Common Name	Scientific Name	Average Count
Anhinga	*Anhinga anhinga*	1.5
Black Vulture	*Coragyps atratus*	9
Laughing Gull	*Leucophaeus atricilla*	3
Great Blue Heron	*Ardea herodias*	1
Little Blue Heron	*Egretta caerulea*	3
Great Egret	*Ardea alba*	0.5
Carolina Wren	*Thryothorus ludovicianus*	3.5
White Ibis	*Eudocimus albus*	15
Fish Crow	*Corvus ossifragus*	1
Wood Stork	*Mycteria americana*	3
Red Shouldered Hawk	*Buteo lineatus*	1
Tricolored Heron	*Egretta tricolor*	1.5
Blue Jay	*Cyanocitta cristata*	0.5
Gray Catbird	*Dumetella carolinensis*	1.5
Blue gray Gnatcatcher	*Polioptila caerulea*	0.5
Red Bellied Woodpecker	*Melanerpes carolinus*	0.5
Tufted Titmouse	*Baeolophus bicolor*	0.5
Common Grackle	*Quiscalus quiscula*	1.5
White Eyed Vireo	*Vireo griseus*	0.5
Eastern Phoebe	*Sayornis phoebe*	0.5
Wild Turkey	*Meleagris gallopavo*	6

Table 3 shows the diversity of birds seen during 2025 SpringsWatch surveys in the Weeki Wachee River. In total, volunteers saw 21 different species of bird. The most commonly seen White Ibis, followed by Black Vultures and Wild Turkeys. A caveat of these surveys is that there was only two performed across the entire year so this may not represent the full avian community found in the Weeki Wachee system. Below are pictures of some of the birds seen during surveys.



White Ibis



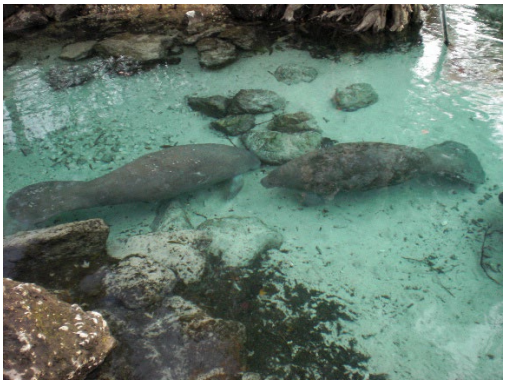
Black Vulture

3.6 Large Animal Survey

Table 4: Diversity of Other Large Animals seen during 2025 survey

Common Name	Scientific Name	Total Count
Turtle sp.	*Pseudemys sp.*	1
West Indian Manatee	*Trichechus manatus*	15
North American River Otter	*Lontra canadensis*	3
Eastern Gray Squirrel	*Sciurus carolinensis*	4

Table 4 shows other species of large animal that were seen during bird and fish surveys through 2025. The presence of West Indian Manatees could indicate that the Weeki Wachee Spring system is an important feeding ground and wintering spot for this imperiled species.



West Indian Manatees

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