PANHANDLE SPRINGSWATCH MONITORING SUMMARY

September 2021 – December 2021

PREPARED FOR
FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION,
DIVISION OF RECREATION AND PARKS

Howard T. Odum
FLORIDA SPRINGS INSTITUTE
Volunteer and Staff Acknowledgments

This report was prepared by the Howard T. Odum Florida Springs Institute (FSI). Ecological monitoring was conducted by Florida SpringsWatch volunteers and FSI staff under the Florida Department of Environmental Protection Division of Recreation and Parks Research/Collection Permit Number 06232110. The establishment of the Panhandle SpringsWatch group was made possible by funds granted to the Florida Springs Institute by the Fish & Wildlife Foundation of Florida’s Protect Florida Springs Tag Grant program.

Our Panhandle SpringsWatch program would not be possible without the hard work of our group leader, Heather Zawahry, and her dedicated team of volunteers: Zac Zawahry, Ben Knowles, Margaret O’Neal, Uriah O’Neal, Amani Mwenda, Imani Mwenda, Joseph Mwenda, McKenna Mwenda, Moses Mwenda, Patricia Mwenda, and Adil Rasheed. Together they put in 38 volunteer hours over four monitoring sessions in 2021.

We would also like to thank FSI’s SpringsWatch Coordinator Jill Lingard and Environmental Scientist Hailey Hall for their contributions to this report, as well as the ongoing guidance of Executive Director Dr. Bob Knight. We also acknowledge the data entry efforts from our diligent FSI science interns: Addison Simmons, Annamarie Elliott, Arman Tabassian, Carmilla Derringer, Heather Hess, Michelle Huang, and Natalia Turkel.
Section 1.0 Introduction

Ponce de Leon Spring is a second magnitude spring located within Ponce De Leon Springs State Park. The spring discharges more than 14 million gallons of groundwater per day and is a favorite swimming hole for local residents. This state park is bisected by Sandy Creek, a blackwater creek that runs through the park.

FSI’s Panhandle SpringsWatch volunteer citizen-science program provide enhanced monitoring of the Ponce de Leon system’s ecological health. The resulting data are provided in annual reports and via the SpringsWatch website (floridaspringsinstitute.org/springswatch) to inform the state’s environmental agencies and educate the public about the springs and spring run health.

This report was prepared by the Howard T. Odum Florida Springs Institute (FSI) and is focused on ecological monitoring at Ponce de Leon Springs conducted in 2021 by SpringsWatch volunteers.

1.1 Monitoring Stations

During monthly sampling events, SpringsWatch volunteers collected data at a total of three stations (Figure 1). WPH-1 represents the station at Ponce De Leon headspring, and stations WPH-2 and WPH-3 are in the spring run.

![Figure 1. Panhandle SpringsWatch Monitoring Stations at Ponce de Leon Spring and Spring Run](image-url)
Section 2.0 Methods

Ecological monitoring was conducted on the Ponce de Leon spring and spring run from May to December 2021. Data collection included water quality field parameters, light attenuation, submerged aquatic vegetation surveys, and visual fish surveys.

2.1 Sampling Events

Table 1 summarizes the six sampling events conducted at Ponce de Leon spring and spring run in 2021 by SpringsWatch volunteers. Panhandle SpringsWatch monitoring events included the following:

- Water quality field parameters (temperature, dissolved oxygen, and specific conductivity)
- Vertical light attenuation (PAR)
- SAV photography
- Visual fish surveys

<table>
<thead>
<tr>
<th>Sampling Date</th>
<th>DO</th>
<th>Specific Conductance</th>
<th>Temperature</th>
<th>Light Attenuation</th>
<th>Vegetation Photos</th>
<th>Fish Surveys</th>
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<td>X</td>
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<tr>
<td>12/18/2021</td>
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<td>X</td>
<td>X</td>
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</tr>
</tbody>
</table>

2.2 Water Quality

Surface water data were collected monthly at Ponce de Leon spring and spring run with YSI water quality meters. Volunteers used handheld YSI ProODO and EcoSense EC300A meters at each of the three monitoring stations to collect measurements of dissolved oxygen, water temperature, and specific conductance. Horizontal Secchi disk readings were also taken at the headspring, station WPH-1 (Figure1) to measure water clarity. The SpringsWatch team leader maintained the meters and calibrated them before and after each sampling event according to factory instructions.

2.3 Light Measurements

Photosynthetically Active Radiation (PAR) underwater light transmission and attenuation coefficients were measured monthly at the three monitoring sites. Volunteers used an Apogee brand MQ-200 underwater quantum sensor 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 Apogee PAR meter.
2.4 Vegetation

Submerged aquatic vegetation (SAV) was monitored monthly at all three stations (Figure 1). SpringsWatch volunteers took two photographs at each station in two different locations, which they sent to FSI for vegetation identification.

2.5 Fish Surveys

SpringsWatch volunteers donned masks, snorkels, and fins to count fish visually in Ponce de Leon spring and identify them to the lowest taxonomic group. Average lengths were estimated for each observed fish species by the underwater observers following each survey.

Section 3.0 Results

This section summarizes field data collected by Panhandle SpringsWatch volunteers at Ponce de Leon spring and spring run from May to December 2021.

3.1 Water Quality

3.1.1 Dissolved Oxygen, Water Temperature, and Specific Conductance

Figures 3 through 10 present water quality field parameter results collected from the three stations at Ponce de Leon spring and spring run by Panhandle SpringsWatch volunteers from May to December 2021. Figure 3 and 4 present dissolved oxygen (DO) results measured in milligrams per liter (mg/L), or parts per million (ppm). Figures 5 and 6 show percent saturation measurements (DO%) for dissolved oxygen.

DO levels fluctuated between spring and river stations primarily due to ground water vs. surface water influence. Spring stations tend to exhibit lower DO values than river stations since emerging groundwater typically contains less free oxygen, depending on the duration of time the water has been underground before reaching a spring vent. Stations WPH-1 and WPH-2 are closest to the Ponce de Leon spring vent (Figure 1) and exhibited the lowest DO concentrations (Figure 3, Figure...
4). As water moves downstream its potential to receive oxygen from atmospheric diffusion increases, resulting in higher DO concentrations.

Figure 3. Seasonal Dissolved Oxygen Measurements (mg/L) for Ponce de Leon Spring and Run (May-December 2021)

Figure 4. Seasonal Dissolved Oxygen Measurements (mg/L) by Ponce de Leon Station (May-December 2021)
Figure 5. Seasonal Dissolved Oxygen Percent Saturation Measurements (DO %) for Ponce de Leon Spring and Run (May-December 2021)

Figure 6. Dissolved Oxygen Percent Saturation Measurements (DO %) by Ponce de Leon Station (May-December 2021)
Figures 7 and 8 show data for water temperature (°C) field measurements. Temperature in the Ponce De Leon Springs run ranged from 20.1-20.8°C in May through December. The water temperature of the run remains relatively constant throughout the year due to the consistent temperature of its groundwater sources.

Figure 7. Seasonal Water Temperature Measurements (°C) for Ponce de Leon Springs and Run (May-December 2021)

Figure 6. Seasonal Water Temperature Measurements (°C) by Ponce de Leon Station (May-December 2021)
Figure 9 and 10 present the results for specific conductance field measurements. Specific conductance can be influenced by naturally occurring ions present in spring water, but also from ions present due to higher levels of nitrate/nitrite, phosphorus, saltwater, and other pollutants. Higher specific conductance values suggest a higher concentration of these ions in the water.

Figure 9. Seasonal Specific Conductance Measurements (uS/cm) for Ponce de Leon Spring and Run (May-December 2021)

Figure 10. Specific Conductance Measurements (uS/cm) by Ponce de Leon Station (May-December 2021)
3.2 Light Measurements

Table 2 and Figure 11 display the diffuse attenuation coefficient (k) estimates collected by the Panhandle SpringsWatch volunteers in Ponce de Leon spring from May through December 2021. Table 3 and Figure 12 present the percent transmittance estimates for this period.

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. A higher value indicates greater water clarity. 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.

The lower water clarity at the headspring station (WPH-1) indicated by low percent transmittance value there compared to downstream stations is likely due to recreation impacts at headspring with settling of suspended solids downstream (Table 3, Figure 12).

<table>
<thead>
<tr>
<th>Station</th>
<th>Average</th>
<th>Maximum</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>WPH-1</td>
<td>0.515</td>
<td>1.156</td>
<td>0.179</td>
</tr>
<tr>
<td>WPH-2</td>
<td>0.283</td>
<td>0.630</td>
<td>0.000</td>
</tr>
<tr>
<td>WPH-3</td>
<td>0.321</td>
<td>0.509</td>
<td>0.217</td>
</tr>
</tbody>
</table>

Figure 11. Diffuse Attenuation Coefficient (k) for Ponce de Leon Spring and Run (May-December 2021)
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.

Pictured below are bottom photos taken by SpringsWatch volunteers in 2021 which feature the SAV (or lack thereof) of Ponce de Leon Spring and spring run. Nearly all of the spring and spring run bottom is bare sand and detritus.

Table 3. Average Percent Transmittance at one meter for Ponce de Leon Spring and Run (May-December 2021)

<table>
<thead>
<tr>
<th>Station</th>
<th>Average</th>
<th>Maximum</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>WPH-1</td>
<td>62.6</td>
<td>83.6</td>
<td>31.5</td>
</tr>
<tr>
<td>WPH-2</td>
<td>76.8</td>
<td>100.0</td>
<td>53.3</td>
</tr>
<tr>
<td>WPH-3</td>
<td>73.0</td>
<td>80.5</td>
<td>60.1</td>
</tr>
</tbody>
</table>

Figure 12. Average Percent Transmittance (1 m) for Ponce de Leon Spring and Run (May-December 2021)

3.3 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.

Pictured below are bottom photos taken by SpringsWatch volunteers in 2021 which feature the SAV (or lack thereof) of Ponce de Leon Spring and spring run. Nearly all of the spring and spring run bottom is bare sand and detritus.
3.4 Fish Surveys

SpringsWatch volunteers conducted visual fish counts monthly in Ponce de Leon Spring and spring run, about 0.33 acre of surface area. Table 4 presents a summary of fish observed, including the average number and length seen on monthly outings.
Pictured below are some of fish species frequently observed by Panhandle SpringsWatch volunteers during their monthly outings from September to December 2021.

Table 4. Fish Observed at Ponce de Leon Spring and Spring Run (September-December 2021)

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Avg Count</th>
<th>Avg Length (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lake Chubsucker</td>
<td><em>Erimyzon sugetta</em></td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Largemouth Bass</td>
<td><em>Micropterus salmoides</em></td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Minnows</td>
<td><em>Notropis sp.</em></td>
<td>123</td>
<td>1</td>
</tr>
<tr>
<td>Mosquitofish</td>
<td><em>Gambusia holbrooki</em></td>
<td>1</td>
<td>1</td>
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<tr>
<td>Redeye Chub</td>
<td><em>Pteronotropis harperi</em></td>
<td>1633</td>
<td>2</td>
</tr>
<tr>
<td>Sunfish</td>
<td><em>Lepomis sp.</em></td>
<td>50</td>
<td>5</td>
</tr>
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</table>
Section 4.0 References
