Submerged Aquatic Vegetation in Selected Spring Run Streams in the Middle St. Johns River

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Blue Spring Working Group
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Spring Run Stream Aquatic Plants

**Algae**
- Diatoms
- Cyanobacteria ("blue green")
- *Chara* spp (Chlorophyta)
- Filamentous spp
- Red algae (Rhodophyta)

**Mosses**
- *Fontinalis* spp

**Vascular plants** (native)
- *Cabomba caroliniana*
- *Ceratophyllum demersum*
- *Najas* spp.
- *Sagittaria kurziana*
- *Vallisneria americana*
- *Potamogeton* spp
- *Myriophyllum* spp
- *Ludwigia repens*

**Vascular plants** (exotic)
- *Hydrilla verticillata*
- *Egeria densa*
- *Myriophyllum spicatum*
Spring Run Submerged Aquatic Vegetation

Sagittaria & Chara

Potamogeton pectinatus (Stuckenia pectinata)

Sagittaria kurziana

Vallisneria americana

Photos – R. Mattson and PBS&J 2003
Ecological Values of Spring Run Stream SAV

- Substrate for epiphytic production
- Stabilize sediments
- Habitat for aquatic fauna
- Direct food source (turtles, manatees)
- Energy flow, detritus production, nutrient cycling
- Indicator of overall “stream health”
Changes in SAV in springs

Weeki Wachee 1951

Weeki Wachee 2006

Source: Fla. State Archives

Source: A. Pinowska, Michigan State Univ.
STUDY OBJECTIVES

- Map distribution and acreage of SAV by species in six spring run stream systems
- Compare to prior mapping efforts
- Initiate field monitoring of SAV cover in five streams previously sampled for algal cover
Locations of study streams

- Silver Glen Spring Run
- Juniper Creek
- Alexander Spring Creek
- Volusia Blue Spring Run
- Rock Springs Run
- Wekiva River

Entire length of spring run mapped (headspring to confluence with ‘X’
Mapping Methodology
Dial, Cordy & Assoc.

“Map-in-the-field” technology
- Aerial photography not practical
- Relatively limited area to map
- Can map to species-level

Delineate base map (shoreline)

Map SAV cover
- Hi-resolution GPS receiver
- Linked to laptop with GIS software
- Delineate edge-of-bed
### Spring Run Plant Species

<table>
<thead>
<tr>
<th>Species</th>
<th>Alexander Spring Creek</th>
<th>Blue Spring Run</th>
<th>Juniper Creek</th>
<th>Rock Springs Run</th>
<th>Silver Glen Spring Run</th>
<th>Wekiva River</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ceratophyllum demersum</strong></td>
<td>XX</td>
<td></td>
<td></td>
<td>XX</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Chara sp.</strong></td>
<td>XX</td>
<td>XX</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Eleocharis sp.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>XX</td>
<td>XX</td>
</tr>
<tr>
<td><strong>Hydrilla verticillata</strong></td>
<td></td>
<td></td>
<td></td>
<td>XX</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Micranthemum sp.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>XX</td>
</tr>
<tr>
<td><strong>Najas guadalupensis</strong></td>
<td>XX</td>
<td>XX</td>
<td></td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
</tr>
<tr>
<td><strong>Potamogeton pectinatus</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>XX</td>
<td></td>
</tr>
<tr>
<td><strong>Ruppia maritima</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>XX</td>
</tr>
<tr>
<td><strong>Sagittaria subulata</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>XX</td>
</tr>
<tr>
<td><strong>Vallisneria americana</strong></td>
<td>XX</td>
<td>XX</td>
<td></td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
</tr>
<tr>
<td><strong>Zannichellia palustris</strong></td>
<td>XX</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>XX</td>
</tr>
<tr>
<td><strong>TOTAL TAXA</strong></td>
<td>5</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td>7</td>
<td>4</td>
</tr>
</tbody>
</table>
Alexander Spring Creek
Upstream CR445
Rock Springs Run
Headspring area
Silver Glen Run
Wekiva River
Downstream SR46
Relative cover by plant species

- Vallisneria
- Najas
- Potamogeton
- Other

<table>
<thead>
<tr>
<th>Location</th>
<th>Vallisneria</th>
<th>Najas</th>
<th>Potamogeton</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alexander Spring Creek</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>120</td>
</tr>
<tr>
<td>Blue Spring Run</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Juniper Creek</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Rock Springs Run</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Silver Glen Spring Run</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Wekiva River</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>120</td>
</tr>
</tbody>
</table>

St. Johns River Water Management District
Percent of stream bottom vegetated by SAV

- Ichetucknee River (2003) - 78.4%
- Rainbow River (2005) - 95.3%
2009 Field Study
In-house effort

Continuation of annual algal surveys down the length of each spring run, conducted in 2007-08

Include macrophytes in the survey (by species)
- Quantify SAV and algae cover in 0.25 m² quadrat
- Use Braun-Blanquet method to estimate cover
Braun-Blanquet Cover Method
Use 0.25 m² quadrat

- 5 – > 75% cover
- 4 – 50-75% cover
- 3 – 25-50% cover
- 2 – 5-25% cover
- 1 – < 5% cover
Historic Comparisons

Sampled aquatic plant biomass in selected spring run streams (1985-86) – Canfield and Hoyer 1988

# Plant Species Composition

1986=Canfield and Hoyer; 2008=This Study

<table>
<thead>
<tr>
<th>Plant Species</th>
<th>Alexander Spring Creek</th>
<th>Rock Springs Run</th>
<th>Wekiva River</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sagittaria kurziana</td>
<td></td>
<td></td>
<td>1986</td>
</tr>
<tr>
<td>Ceratophyllum demersum</td>
<td>1986/2008</td>
<td>2008</td>
<td>1986</td>
</tr>
<tr>
<td>Potamogeton diversifolius</td>
<td></td>
<td>1986</td>
<td></td>
</tr>
<tr>
<td>Egeria densa</td>
<td></td>
<td>1986</td>
<td>1986</td>
</tr>
<tr>
<td>Hydrilla verticillata</td>
<td></td>
<td>1986</td>
<td>1986/2008</td>
</tr>
<tr>
<td>Myriophyllum heterophyllum</td>
<td></td>
<td></td>
<td>1986</td>
</tr>
<tr>
<td>Zannichellia palustris</td>
<td></td>
<td></td>
<td>2008</td>
</tr>
<tr>
<td>Eleocharis sp.</td>
<td></td>
<td></td>
<td>2008</td>
</tr>
<tr>
<td>Chara sp.</td>
<td></td>
<td></td>
<td>2008</td>
</tr>
</tbody>
</table>
### Silver Glen Spring Run

<table>
<thead>
<tr>
<th>Plant Species</th>
<th>Pandion Systems 2003</th>
<th>This Study 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Vallisneria americana</em></td>
<td>10.02 acres</td>
<td>11.86 acres</td>
</tr>
<tr>
<td><em>Eleocharis sp.</em></td>
<td>0.04</td>
<td>0.10</td>
</tr>
<tr>
<td><em>Hydrilla verticillata</em></td>
<td>1.14</td>
<td>1.33</td>
</tr>
<tr>
<td><em>Myriophyllum spicatum</em></td>
<td>0.004</td>
<td>Not observed</td>
</tr>
<tr>
<td><em>Najas guadalupensis</em></td>
<td>Not observed</td>
<td>0.04</td>
</tr>
<tr>
<td><em>Ceratophyllum demersum</em></td>
<td>Present</td>
<td>Present</td>
</tr>
<tr>
<td><em>Sagittaria kurziana</em></td>
<td>Present</td>
<td>Not observed</td>
</tr>
<tr>
<td><em>Sagittaria subulata</em></td>
<td>Not observed</td>
<td>0.03</td>
</tr>
<tr>
<td><em>Micranthemum sp.</em></td>
<td>Not observed</td>
<td>0.95</td>
</tr>
<tr>
<td><em>Ruppia maritima</em></td>
<td>Not observed</td>
<td>0.05</td>
</tr>
<tr>
<td>Algae (loose and attached)</td>
<td>3.87</td>
<td>Not measured</td>
</tr>
<tr>
<td><strong>TOTAL VEGETATION</strong></td>
<td>15.074 acres</td>
<td>14.35 acres</td>
</tr>
<tr>
<td><strong>TOTAL SPRING &amp; RUN AREA</strong></td>
<td>21.88 ac (68.9% veg.)</td>
<td>23.66 ac (60.7% veg.)</td>
</tr>
</tbody>
</table>
Blue Spring Run

"The spring boil is nearly devoid of rooted vegetation, but the spring run has thick growths of aquatic plants throughout its course."

Fred Thompson, FLMNH, 1962
Conclusions

- SAV present in all spring runs but Blue Spring
- Acreage range 4-118.5; % area vegetated w/ SAV 8-61%; SAV is a substantial habitat component in spring run streams
- *Vallisneria* dominant plant (by acreage) in 4/5 spring runs (~50% in Juniper Creek)
- Many spring runs could not be sampled in the field in 2009 due to high water/no visibility
- SAV cover and composition similar in Silver Glen Run in 2003 & 2008