



# Water Quality and Biological Monitoring



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# **Springs Protection and Management (WARN)**

- **Forms basis for**
  - **Consumptive use permitting**
  - **Water supply projects**
  - **Water shortage management**
  - **Watershed planning and management projects**
  - **Environmental restoration and protection**

# **Springs Protection and Management (WARN)**

- **Forms basis for (cont.):**
  - **MFL development**
  - **Improved flood forecasts and warnings by NWS**
  - **Improved public access to flood information**
  - **Implementation of no-wake zones**

# **Springs Protection and Management (WARN)**

- **Data requests**
  - **General public**
  - **Universities**
  - **Local, federal, and state agencies**
- **[www.mysuwanneeriver.com](http://www.mysuwanneeriver.com)**
- **Approximately 50-75 data requests per month**

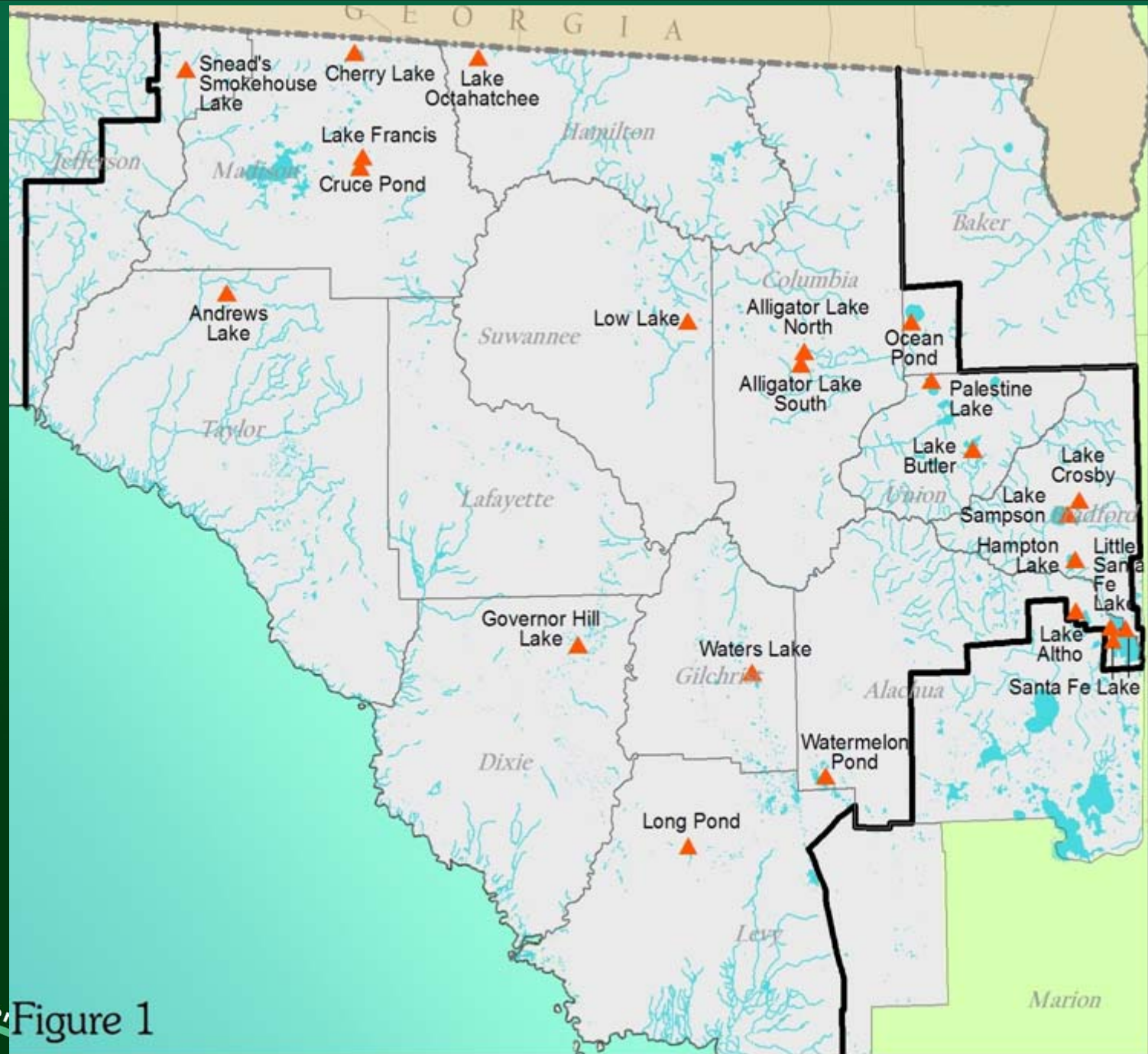


# Surfacewater Monitoring Networks

# Lake Levels

- 21 lakes monitored daily, weekly, or monthly
- Conducted by observers or District
- Continuous recorders and staff gages
- Many sites monitored for 30+ years

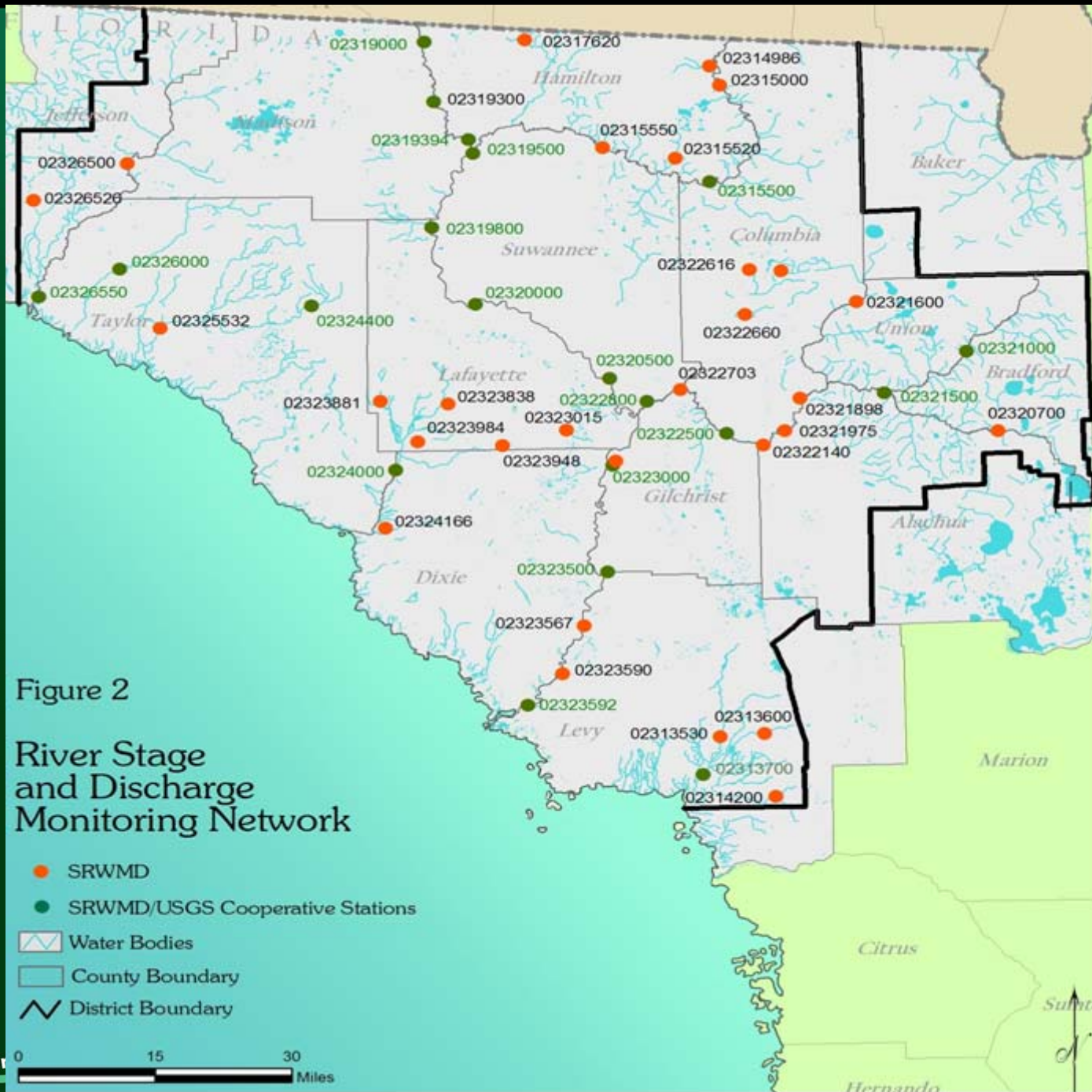
# SUWANNEE RIVER WATER MANAGEMENT DISTRICT



# River Levels

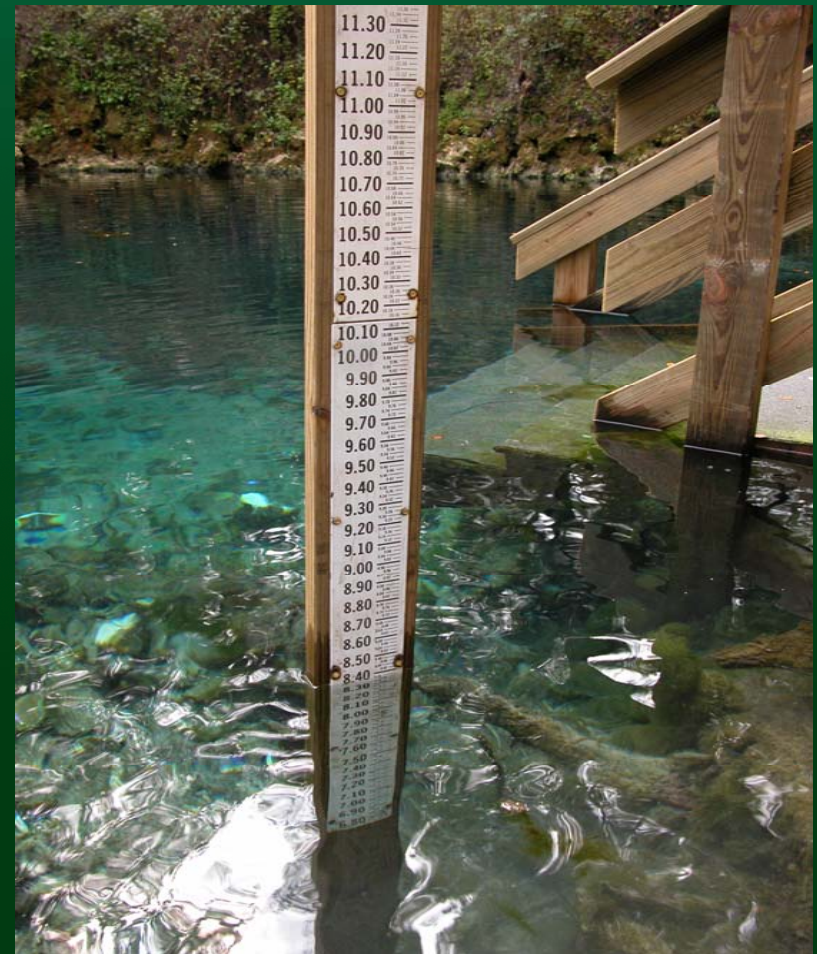
- 46 sites at varying frequencies
- USGS collects 18 in FL; 3 in GA in cooperation with District
- Continuous recorders, staff gages, and wire weight gages
- Real time data
  - for 27 sites
  - telephone (District stations)
  - satellite telemetry (USGS)

# SUWANNEE RIVER WATER MANAGEMENT DISTRICT



# River Levels

- **Flood warning network**
  - 25 automated river gages
  - Posted on website
  - Sent electronically to NWS/SERFC
  - 24 hour voice recording



# SUWANNEE RIVER WATER MANAGEMENT DISTRICT

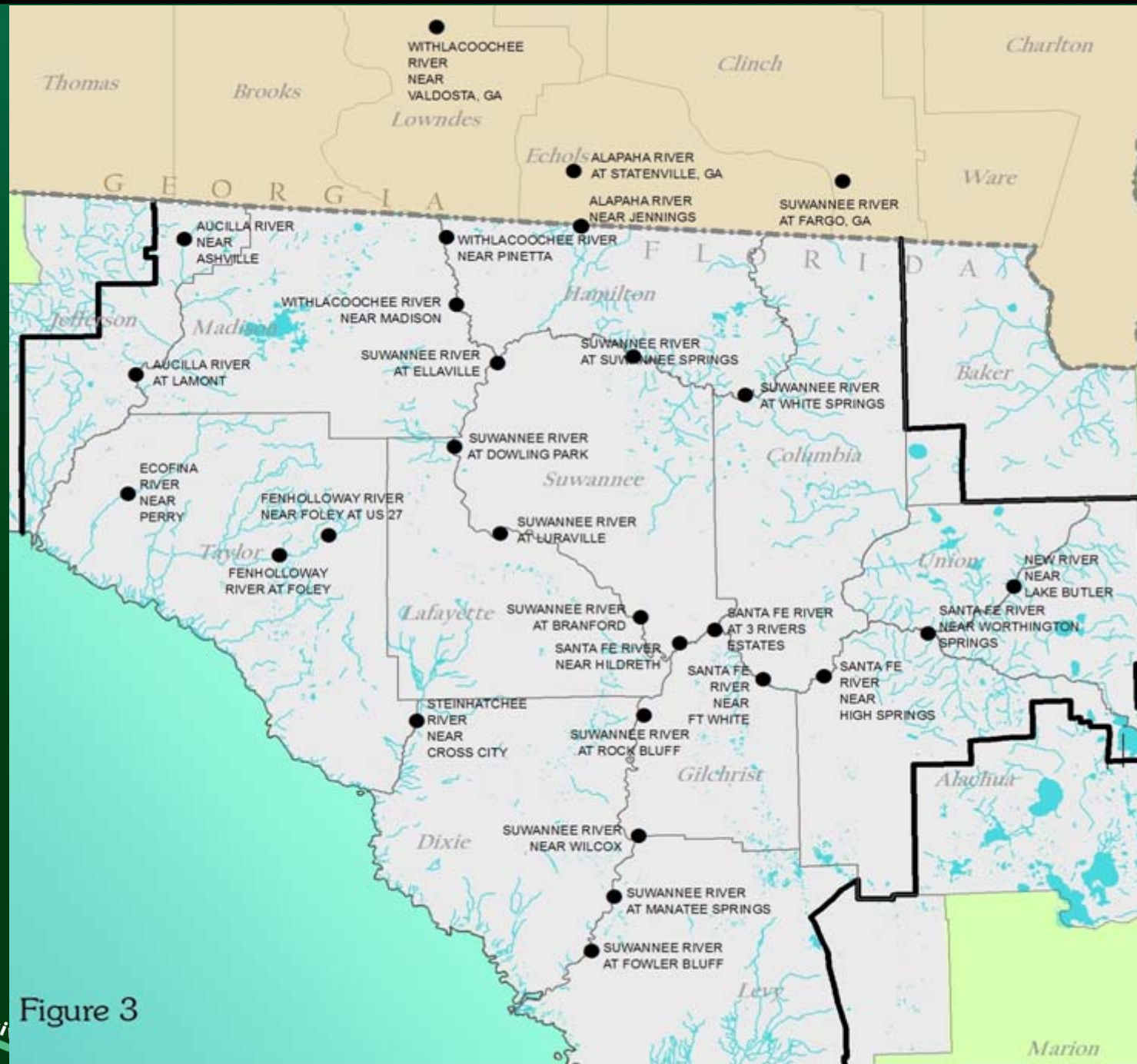


Figure 3

# River Discharges

- **Cooperative agreement with USGS for 21 stations**
- **Includes both Georgia and Florida**
- **The District measures additional 19 sites**
- **District and USGS also measure springs during flooding and drought**

# Rainfall

- **Observer network**
  - contains 15 monthly rainfall stations
    - 3 at Florida Park Service
    - 12 are private stations
- **Automated network**
  - Tipping bucket rain gages
  - Data accessed in near-real-time
  - Website and NWS for flood forecasting

# SUWANNEE RIVER WATER MANAGEMENT DISTRICT

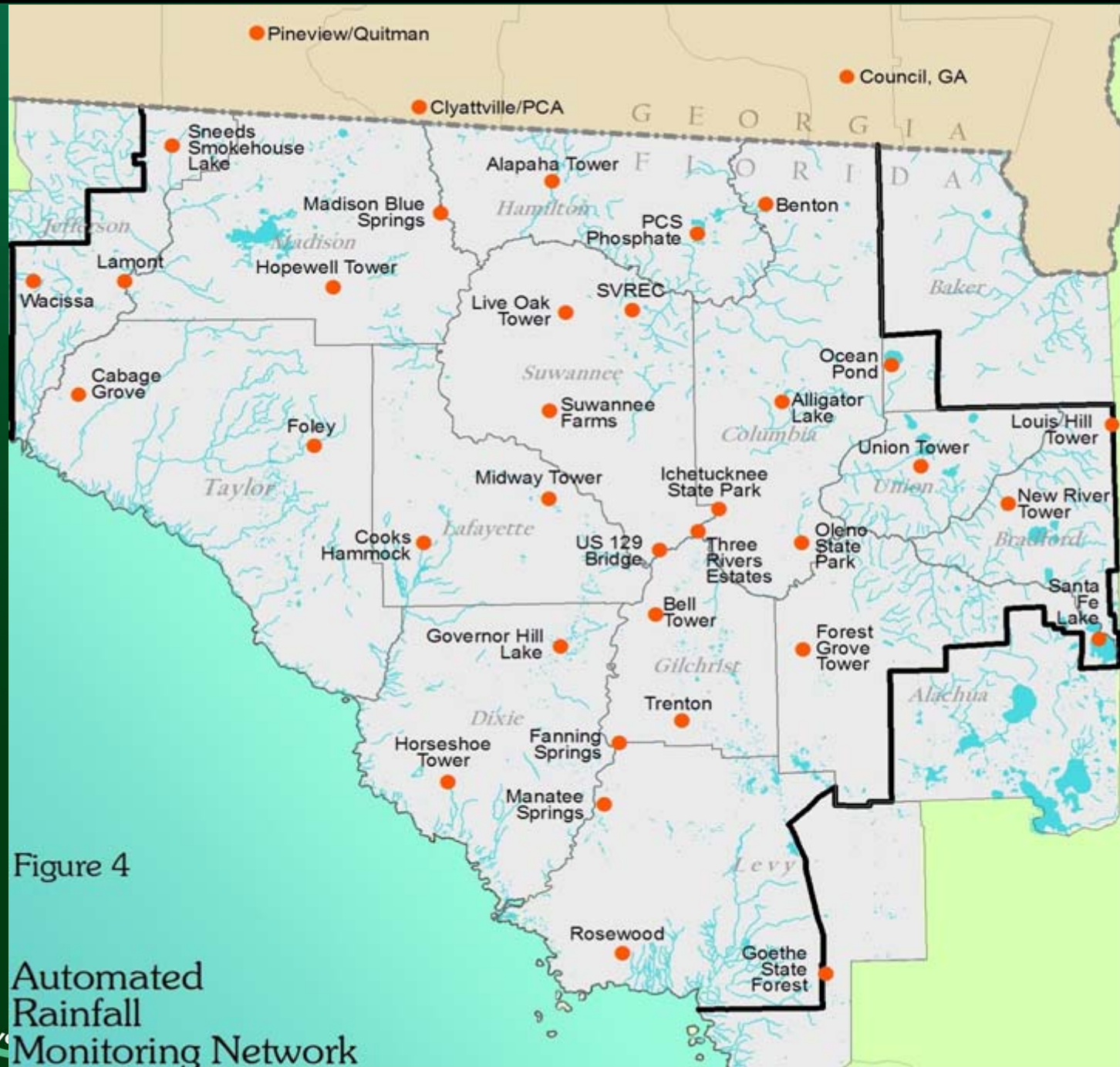


Figure 4

Automated  
Rainfall  
Monitoring Network



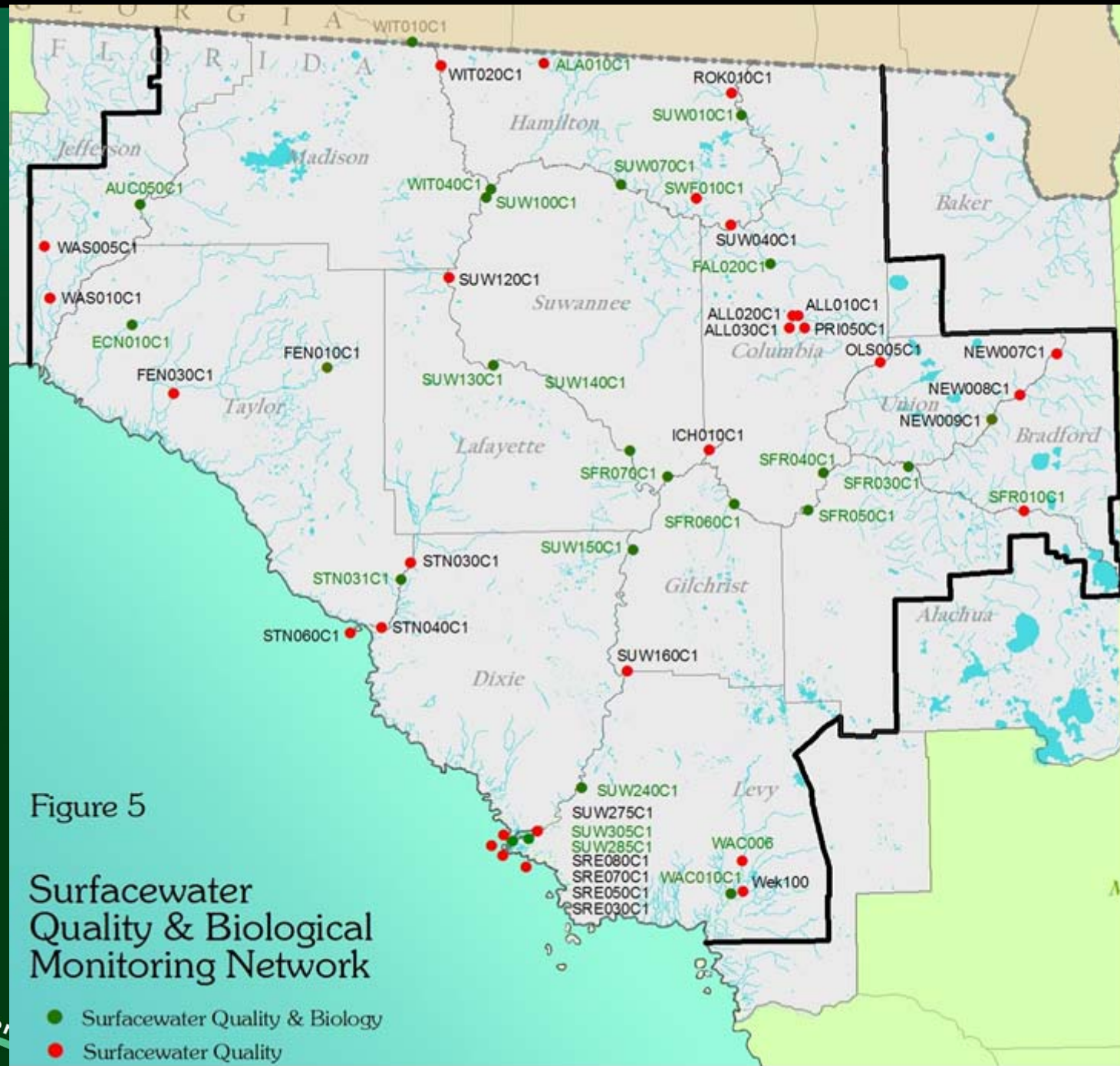
# Surfacewater Quality Network



# Surfacewater Quality Network

- **76 sites collected**
  - monthly,
  - bimonthly,
  - every 6 weeks,
  - quarterly
- **22 sites are springs (14 monitored monthly; 8 monitored 3 times per year)**
- **Data stored in District's Oracle database**

# SUWANNEE RIVER WATER MANAGEMENT DISTRICT



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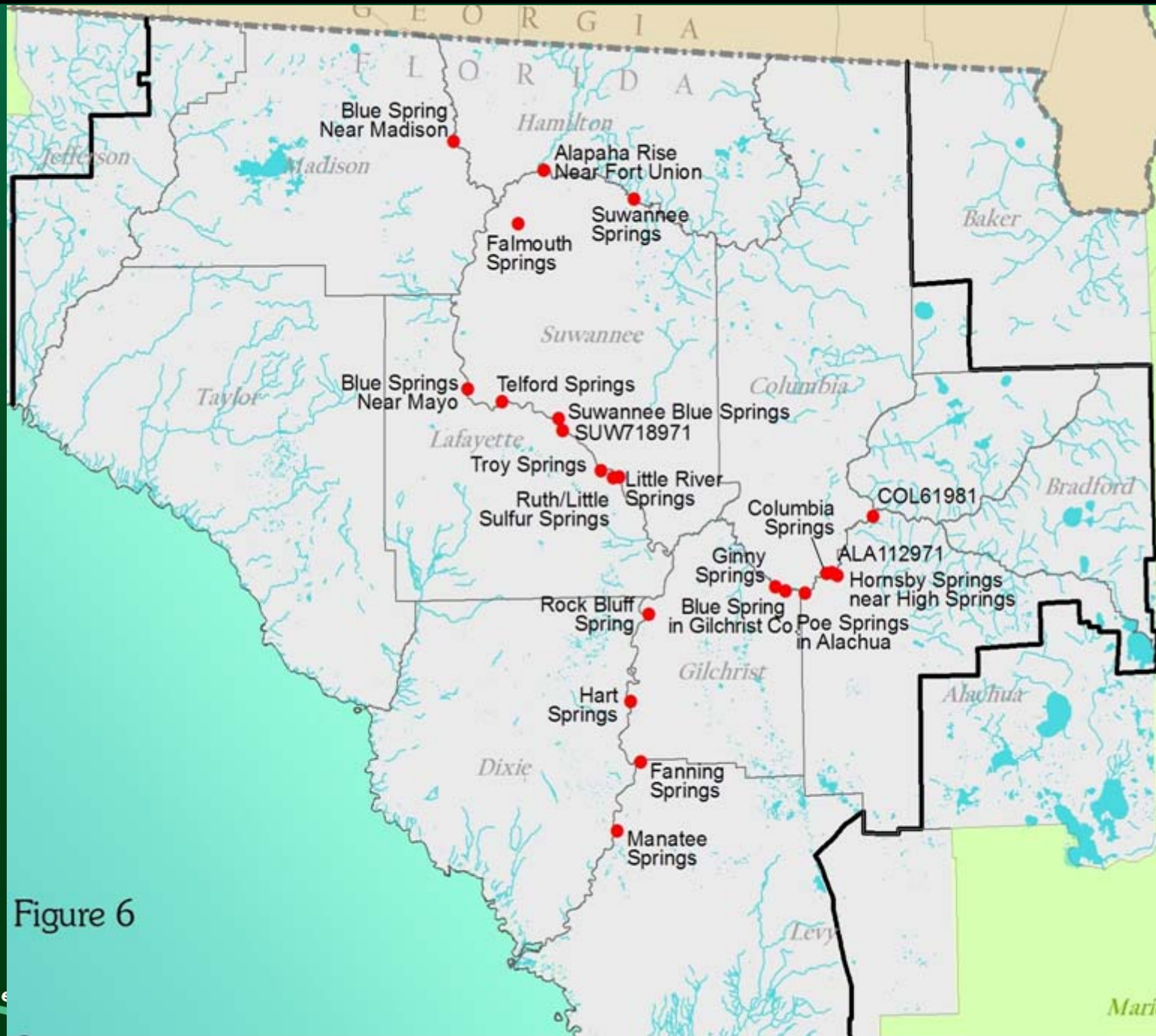


Figure 6

# SUWANNEE RIVER WATER MANAGEMENT DISTRICT

| PARAMETERS                         | UNITS                  | METHOD    |
|------------------------------------|------------------------|-----------|
| <b>Field Measurements</b>          |                        |           |
| Sample Depth                       | meters                 |           |
| Total Depth                        | meters                 |           |
| Water Temperature                  | °C                     | 170.1 EPA |
| pH                                 | SU                     | 150.1 EPA |
| Dissolved Oxygen--Probe            | mg L <sup>-1</sup>     | 360.1 EPA |
| Conductivity Field                 | µmho cm <sup>-1</sup>  | 120.1 EPA |
| Conductivity at 25C                | µmhos cm <sup>-1</sup> | 120.1 EPA |
| River Stage                        | ft, NGVD               |           |
| Discharge                          | cfs                    |           |
| Secchi Disk                        | meters                 |           |
| Salinity                           | ppt                    | 120.1 EPA |
| <b>Physical/Biological Samples</b> |                        |           |
| Color                              | PCU                    | 110.2 EPA |
| Turbidity                          | NTU                    | 180.1 EPA |
| TDS                                | mg L <sup>-1</sup>     | 160.1 EPA |
| Alkalinity                         | mg L <sup>-1</sup>     | 310.2 EPA |
| TOC                                | mg L <sup>-1</sup>     | 415.1 EPA |
| DOC                                | mg L <sup>-1</sup>     | 5310B SM  |
| Chlorophyll a                      | µg L <sup>-1</sup>     | 10200H SM |
| <b>Major Ions</b>                  |                        |           |
| Potassium                          | mg L <sup>-1</sup>     | 6010EPA   |
| Sodium                             | mg L <sup>-1</sup>     | 6010EPA   |
| Magnesium                          | mg L <sup>-1</sup>     | 6010EPA   |
| Calcium                            | mg L <sup>-1</sup>     | 6010EPA   |
| Chloride                           | mg L <sup>-1</sup>     | 300EPA    |
| Fluoride                           | mg L <sup>-1</sup>     | 300 EPA   |
| Sulfate                            | mg L <sup>-1</sup>     | 300 EPA   |
| Silica (Total Silicon)             | mg L <sup>-1</sup>     | 200.7 EPA |
| <b>Nutrients</b>                   |                        |           |
| Nitrate+nitrite-nitrogen           | mg L <sup>-1</sup>     | 353.2 EPA |
| TKN                                | mg L <sup>-1</sup>     | 351.2 EPA |
| Ammonia Nitrogen                   | mg L <sup>-1</sup>     | 350.1 EPA |
| Total Phosphorus                   | mg L <sup>-1</sup>     | 365.1 EPA |
| Orthophosphate                     | mg L <sup>-1</sup>     | 365.1 EPA |

# Biological Sampling

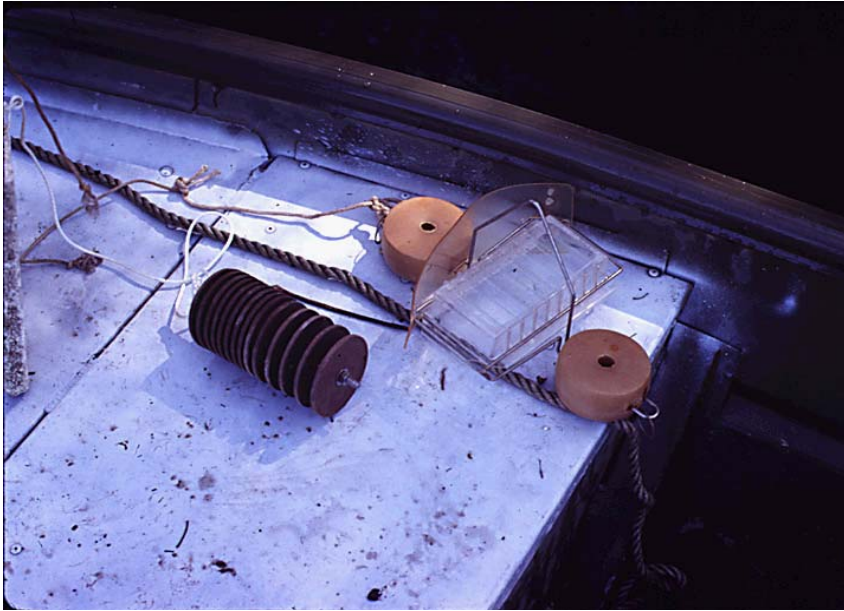


- **Macroinvertebrate samples**
- **Periphyton samples**
- **Phytoplankton samples**

# Biological Monitoring

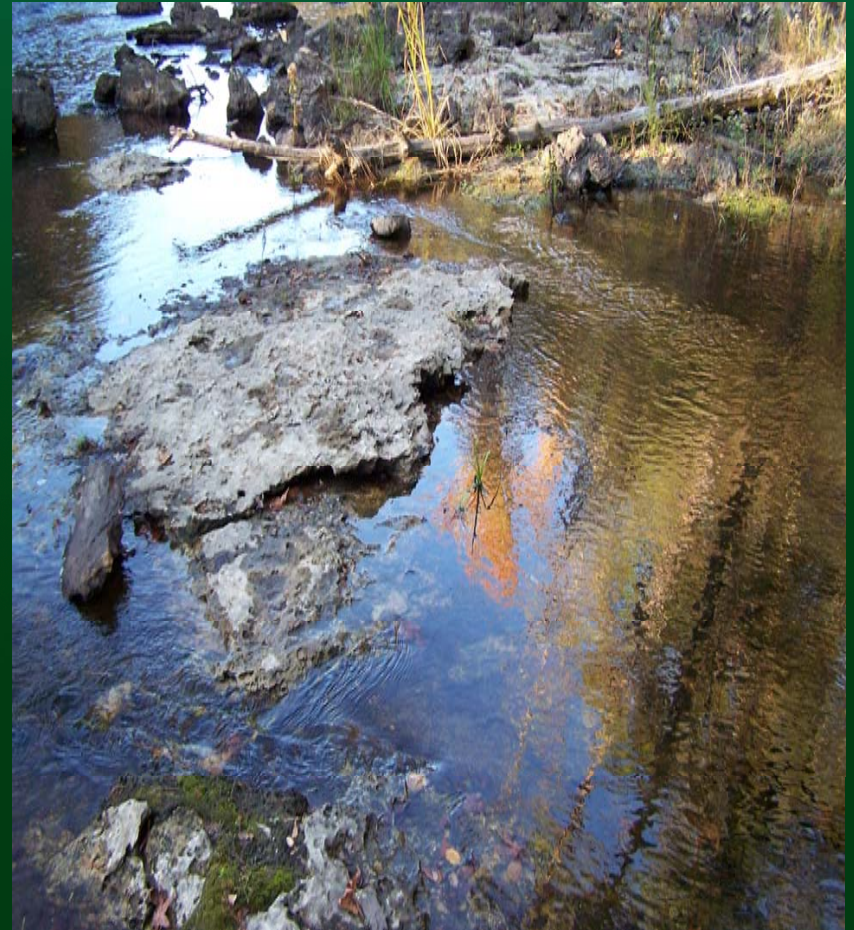
- **Macroinvertebrates**
  - Hester-Dendy multiplate samplers
  - D-Frame dip net samples
  - Petite Ponar grabs
- **Periphyton**
  - Periphytometers
- **Phytoplankton**
  - Phytoplankton nets

# SUWANNEE RIVER WATER MANAGEMENT DISTRICT

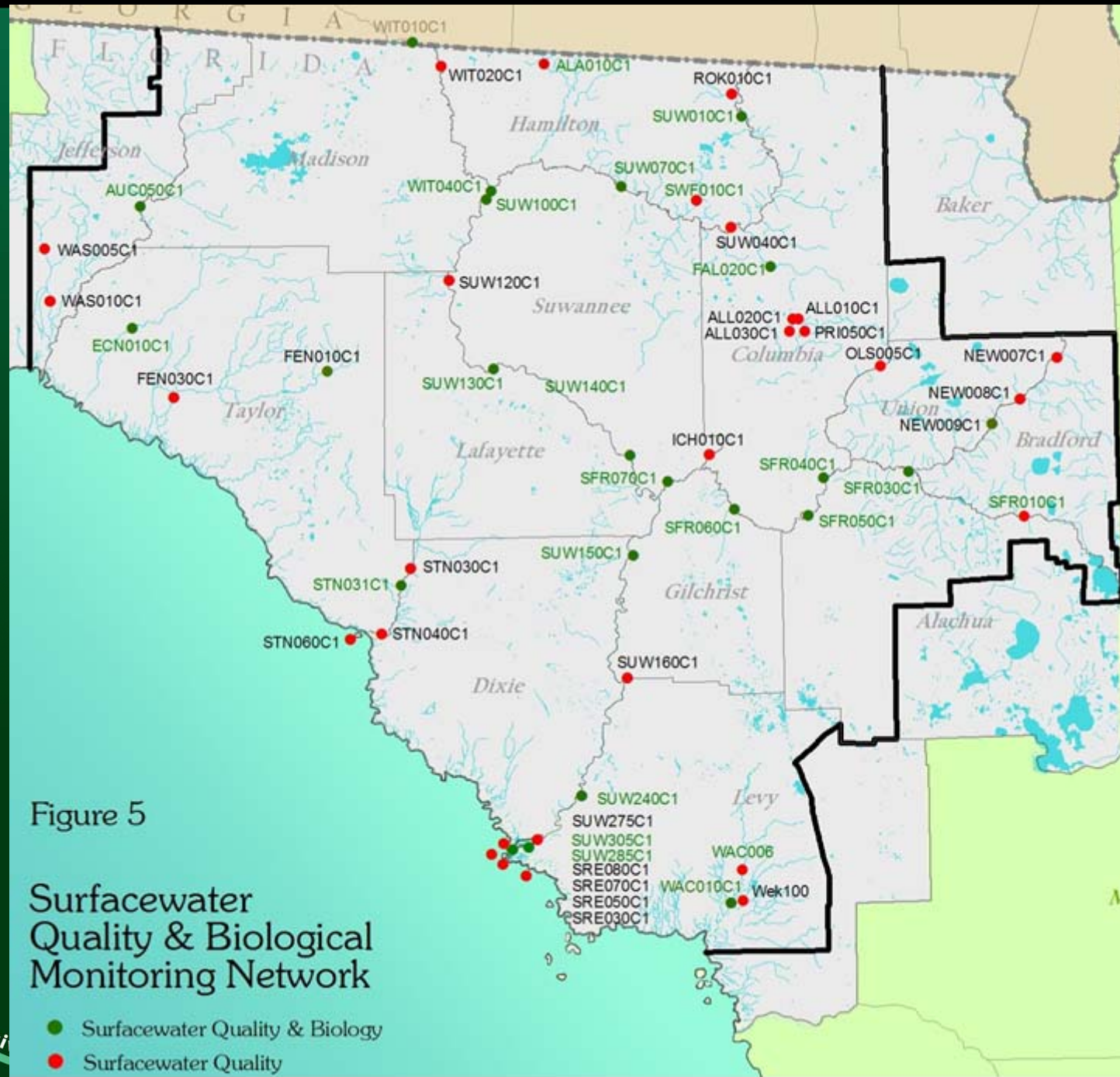


# Sampled Habitats

- Submerged aquatic vegetation
- Submerged wood (snags, cypress knees)
- Benthic Sediments
- Rock outcrops (shoals, dams)
- Leaf packs and natural debris dams
- Root mats
- Algal mats



# SUWANNEE RIVER WATER MANAGEMENT DISTRICT



# Data Analysis

- Taxa richness
- Diversity of taxa (Shannon-Weaver Diversity Index)
- Evenness (Modified Hill's Ratio)
- EPT taxa score
- Macroinvertebrates, Periphyton, and Phytoplankton each analyzed



# Groundwater Monitoring Networks



# Groundwater Levels Network

- **GWL records available for 1,082 wells**
- **181 measured monthly in GWL network**
- **77 of these have continuous recorders**

# Groundwater Quality Networks

- **GWQ networks include:**
  - **Trend Network**
    - 90 Floridan aquifer wells
    - Sampled quarterly
  - **Status Network**
    - Randomly sampled wells
    - Sampled once per year for 5 years
    - Re-randomized after 5 years of sampling

# SUWANNEE RIVER WATER MANAGEMENT DISTRICT

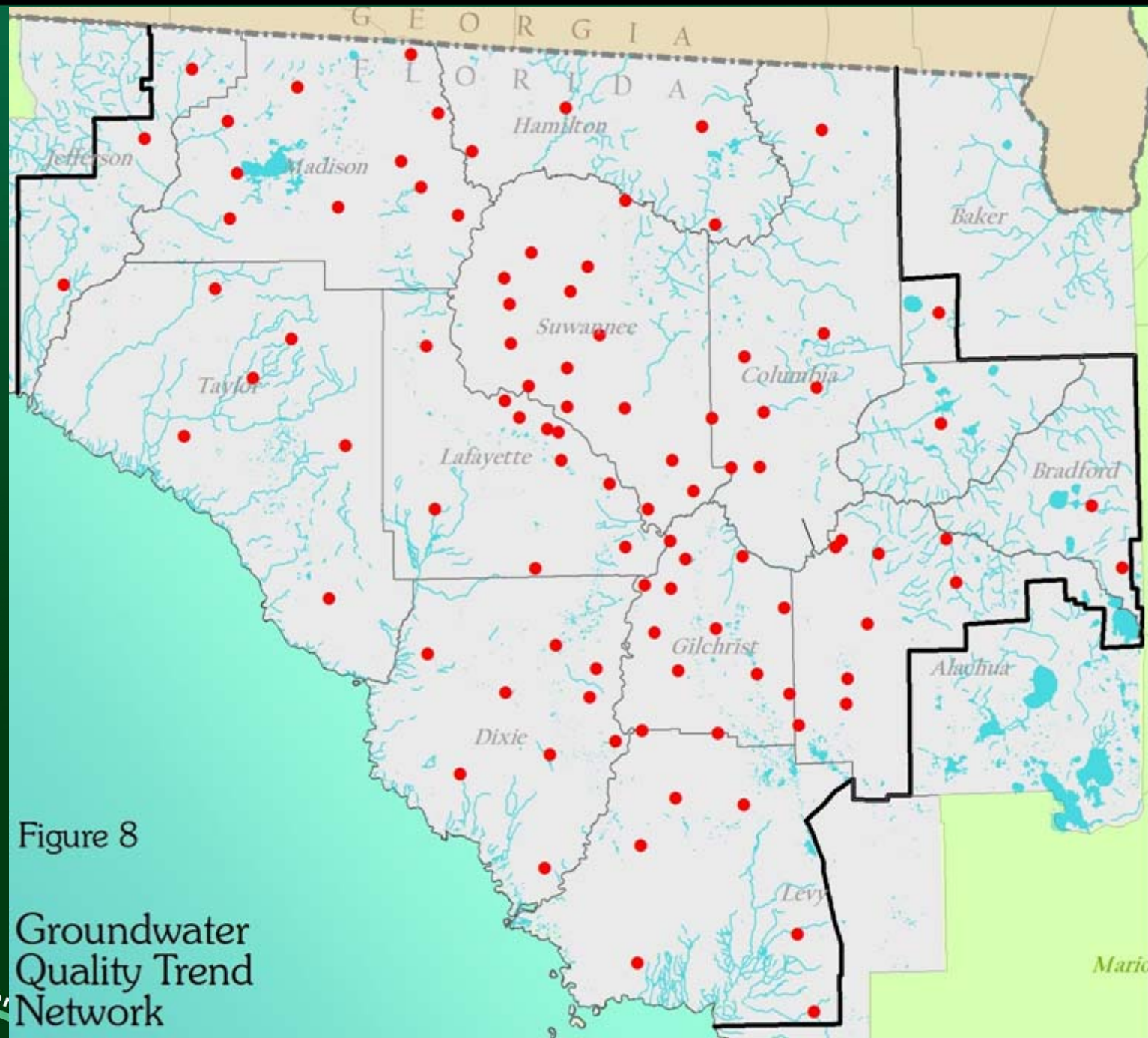


Figure 8

Groundwater  
Quality Trend  
Network

# Databases

- **Databases**
  - **Data stored in Hydstra**
  - **Select records stored in Oracle database**
  - **Data from USGS sites stored in ADAPS database and available at [www.usgs.gov](http://www.usgs.gov)**

# QUESTIONS?

Steinhatchee Falls

Photo by Megan Wetherington