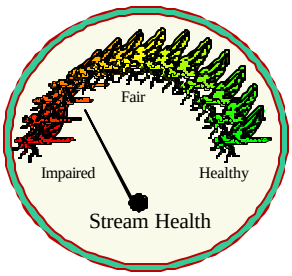


EcoSummary

Wakulla Springs

6/6/2001, 9/18/2001, & 11/27/2001



Background

Florida DEP has been conducting quarterly sampling in the St. Mark's River Basin in conjunction with the Northwest Florida Water Management District. One of the sampling sites in that project is the Wakulla River within the boundaries of Wakulla Springs State Park, just below the tour boat turn-around area. Data from these efforts will be used for documenting conditions within the basin and for making resource protection decisions. Wakulla Springs State Park is located in Wakulla County, Florida (Figure 1). The Wakulla River begins in the park, flows south, and joins the St. Mark's River before flowing into the Gulf of Mexico. Wakulla Springs is a Floridan Aquifer-dominated system and is known for its recreational and aesthetic qualities.

Wakulla Springs was sampled on June 6, September 18, and November 27, 2001. Water samples were taken for ammonia, nitrate-nitrite, total Kjeldahl nitrogen (TKN), total phosphorus, ortho-phosphate, algal growth potential (AGP), total organic carbon (TOC), total suspended solids (TSS), turbidity, *Enterococci*, *Escherichia coli*, fecal coliform, and total coliform analysis; see Figure 2. Habitat assessment, qualitative periphyton sampling, and benthic invertebrate stream condition index (SCI) sampling were conducted (Figures 2 and 3).

Results

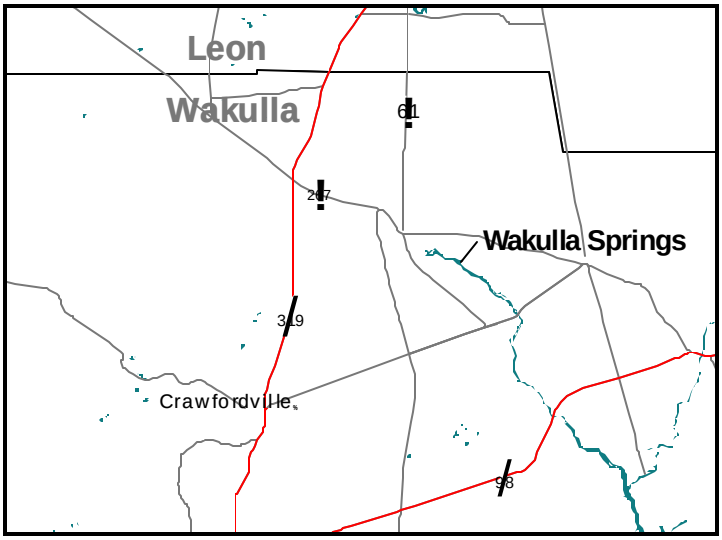
Nitrate-nitrite concentrations (ranging from 0.51-0.66 mg/L) at the sampling site were consistently higher than the values found in 80% of other Florida streams (Figure 2). Elevated nitrate-nitrite levels in Wakulla Springs are related to nitrogen loading in the recharge basin. Ammonia, TKN, and total phosphorus concentrations were all below practical quantitation limits. Note that the sampling site is approximately a mile downstream from the spring boil, and nutrients there are expected to be lower than those at the boil due to uptake by the copious growth of vegetation in the river. The overall habitat assessment scores (118-140) at Wakulla Springs below the tour boat turn-around ranged from sub-optimal (80-119) to optimal (120-160). Suboptimal habitat is largely due to the overwhelming dominance of the invasive exotic submerged plant *Hydrilla*. The explosive *Hydrilla* growth, fueled by the high nitrate concentrations, degrades the river in several ways:

- Physical smothering of habitat.
- Decomposition of dead *Hydrilla* tissue and nighttime respiration of live *Hydrilla* leads to very low or extreme cycles of dissolved oxygen levels.
- Decomposition of *Hydrilla* causes extensive organic silt buildup, which also renders habitats inhospitable to invertebrates.

Enterococci concentrations were below the EPA single-sampling guideline value of 61cfu/100 mL for designated beach areas for all three sampling events (Figure 20. *Escherichia coli* concentrations were well below the EPA single-sampling designated beach guideline value of 235 cfu/100 mL. Fecal and total coliform levels complied with Class III water quality standards.

The stream condition index (SCI) ranked the site in the "poor" category for all three of these sampling events (Figure 2). This is consistent with the range of SCI scores seen at Wakulla Springs over two years of sampling (Figure 3). The poor macroinvertebrate community health was related to habitat degradation (caused by *Hydrilla* growth and decomposition), which in turn was associated with the high nitrate levels.

Figure 1. Overview Map of the Wakulla Springs Area



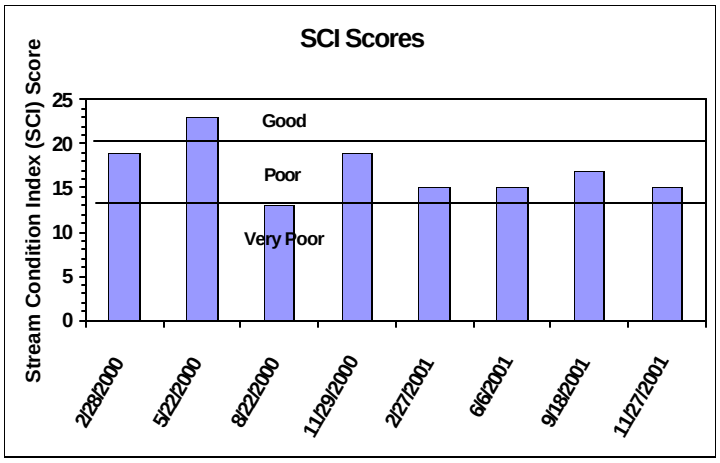
FOR MORE INFORMATION, CONTACT:
Amy Wheeler, FDEP Environmental Assessment Section
2600 Blair Stone Road MS#6511 Tallahassee, FL 32399-2400 (850) 245-8070 Amy.Wheeler@dep.state.fl.us

Figure 2. Data Table

Macroinvertebrate Parameters	Wakulla Springs		
Station	Wakulla at State Park		
STORET	STMARKSSTORET01		
Sampling Date	6/6/2001	9/18/2001	11/27/2001
SCI Score	15	17	15
Panhandle East Evaluation	Poor	Poor	Poor
Periphyton Parameters			
% Chlorophyceae	0.1	1.61	0.17
% Cyanophyceae	1.36	16.21	0
% Bacillariophyceae	98.54	82.18	99.83
% Contribution Dominant Taxon	33.92	22.47	29.88
Bacteria Parameters			
Enterococci (col/100 mL)	20	16	16
Eschericia coli (col/100 mL)	22	16	38
Fecal Coliforms (col/100 mL)	28	24	44
Total Coliforms (col/100 mL)	400	370	300
Physical-Chemical Data			
Habitat Assessment Total Score	140	118	123
Specific Conductance (umho/cm)	300	272	318
Dissolved Oxygen (mg/L)	6.5	9.1	6.6
pH (SU)	7.5	7.1	7.3
Temperature (deg. C)	21.6	21.8	21.2
Nutrient Data			
Ammonia (mg/L)	0.01 U	0.01 U	0.012 I
Nitrate-Nitrite (mg/L)	0.66	0.62	0.51 J
TKN (mg/L)	0.081 I	0.096 I	0.078 I
Total Phosphorus (mg/L)	0.024 I	0.036 I	0.039 I
Ortho-phosphate (mg/L)	0.037 J	0.022	0.036
Algal Growth Potential (mg dry wt/L)	0.11 I,J	7.22 A,J	4.25 A,J
TOC (mg/L)	1 U	1.2 I	1.5 I
TSS (mg/L)	4 U	4 U	4 U
Turbidity (NTU)	0.2	0.5	0.17

"A"-Average of Two or More Determinations; "U"- Below Detection Limit; "I"-Below Quantitation Limit; "J"-Estimated Value

Figure 3. SCI Scores over Time



FOR MORE INFORMATION, CONTACT:
Amy Wheeler, FDEP Environmental Assessment Section
2600 Blair Stone Road MS#6511 Tallahassee, FL 32399-2400 (850) 245-8070 Amy.Wheeler@dep.state.fl.us