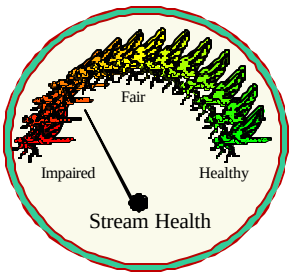


EcoSummary

Wakulla Springs

2000



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; see 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 February 28, May 22, August 22, and November 29, 2000. Water chemistry samples were taken for ammonia, nitrate-nitrite, total Kjeldahl nitrogen, total phosphorus, color, 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.

Results

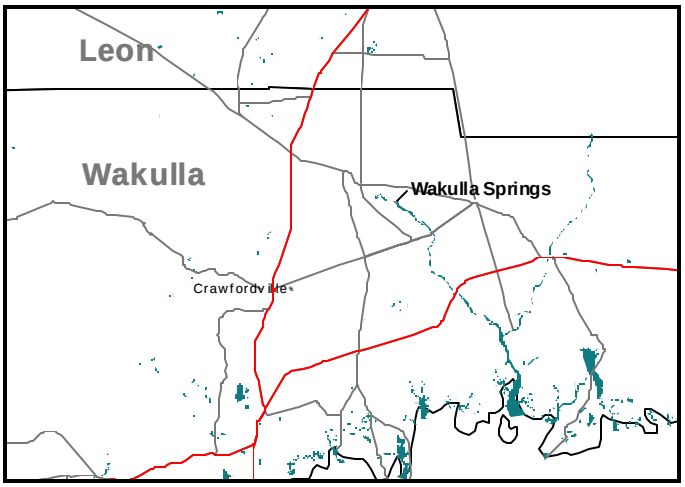
Nitrate-nitrite concentrations (ranging from 0.77-0.84 mg/L) at the sampling site were consistently higher than the values found in 90% of Florida streams (0.64 mg/L); see Figure 2. Elevated nitrate-nitrite levels in Wakulla Springs are related to nitrogen loading in the recharge basin (potentially from inorganic fertilizer use, animal wastes, or septic tanks). Ammonia, TKN and total phosphorus concentrations were low. 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 growths vegetation in the river. The overall habitat assessment scores (114-139) at Wakulla Springs below the tour boat turn-around ranged from optimal through August 2000 and dropped into the sub-optimal category by November 2000. 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 dissolved oxygen levels.
- Decomposition of *Hydrilla* causes extensive organic silt buildup, which also renders habitats inhospitable.

Enterococci concentrations were below the EPA single-sampling guideline value of 61 col/100 mL for designated beach areas for three of the four sampling events. In May 2000, the *Enterococci* concentration (240 col/100mL) exceeded the EPA guideline. *Escherichia coli* concentration (32 col/100 mL) was below the EPA single-sampling designated beach guideline value of 235 col/100 mL. Fecal and total coliform levels complied with Class III water quality standards for all four 2000 sampling events.

The stream condition index (SCI) ranked the site "very poor" once, "poor" twice, and at the lowest end of "good" category once; see Figure 2. The periphyton community in Wakulla Springs was dominated taxa tolerant of nutrient enriched conditions throughout 2000. In conclusion, the poor macroinvertebrate health was related to the habitat and dissolved oxygen problems caused by the *Hydrilla*, which in turn was due to the high nitrate levels. The periphyton community also reflected the substantial nutrient loading.

Figure 1: Overview Map



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Figure 2: Data Table

Macroinvertebrate Parameters				
Station	Wakulla at State Park			
STORET	STMARKSSTORET01			
Sampling Date	2/28/2000	5/22/2000	8/22/2000	11/29/2000
SCI Score	19	23	13	19
Panhandle East Evaluation	poor	good	severely degraded	poor
Number of Taxa	23	20	20	21
Number of Ephemeroptera	0	0	0	1
Number of Plecoptera	0	0	0	0
Number of Trichoptera	0	1	1	3
EPT Index	0	1	1	4
% Contribution Dominant Taxon	26.8	25.27	35.48	56.25
Florida Index	8	8	4	11
% Diptera	24.74	56.59	32.26	8.93
Number of Chironomidae	3	2	1	0
Number of Orthocladiinae	7	7	2	6
Total Number Chironomidae	10	9	3	6
% Filter-Feeders	1.03	22.80	2.9	2.68
Periphyton Parameters				
Number of Taxa	19	21	23	29
% Chlorophyceae	3.45	1.41	6.3	2.9
% Cyanophyceae	10.34	3.36	38.53	6.7
% Bacillariophyceae	86.21	95.23	55.17	90.22
% Contribution Dominant Taxon	28.97	25.8	19.64	49.82
Bacteria Parameters				
Enterococci (col/100 mL)	14 Q	240	60 Q	60
Eschericia coli (col/100 mL)	*not sampled*	*not sampled*	*not sampled*	30
Fecal Coliforms (col/100 mL)	18 Q	4	50 Q	32
Total Coliforms (col/100 mL)	100 Q	90	130 Q	150
Physical-Chemical Data				
Habitat Assessment	135	139	137	114
Sample Depth (m)	0.83	0.6	0.2	1
Specific Conductivity (umho/cm)	273	242	258	274
Dissolved Oxygen (mg/L)	8.55	9.8	9.2	6.6
pH (SU)	8.0	7.7	8.3	6.3
Temperature (deg. C)	21.04	22.2	23	19.9
Nutrient Data				
Ammonia (mg/L)	0.010 U	0.01 U	0.012 I	0.01 U
Nitrate-Nitrite (mg/L)	0.77	0.84	0.77	0.84 J
TKN (mg/L)	0.060 U	0.076	0.06 U	0.083 I
Total Phosphorus (mg/L)	0.032 I	0.015 U	0.037 I	0.037 I
Ortho-phosphate (mg/L)	*not sampled*	0.022	*not sampled*	0.026
Algal Growth Potential (mg dry wt/L)	0.1 U	0.105 I	0.1 A,U	0.1 U
TOC (mg/L)	2.0 U	*not sampled*	1 U	1 U
TSS (mg/L)	4 U	*not sampled*	4 U	4 U
Turbidity (NTU)	0.1	0.2	0.25 Q	0.2

"U'- Below Detection Limit; "I"- Below Quantation Limit; "Q"- Information Only

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