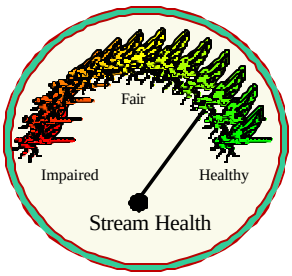


EcoSummary

Wakulla Springs Herbicide Application Study 04/04/02 and 05/06/02



Background

Wakulla Springs is a Floridan Aquifer-dominated system and is known for its recreational and aesthetic qualities. This spring is located within the boundaries of the Edward Ball Wakulla Springs State Park in Wakulla County, Florida; see Figure 1. The Wakulla River originates in the park from this first magnitude spring vent and then flows south into the St. Marks River.

With the accidental introduction of *Hydrilla verticillata* in 1997, the Wakulla Springs system has experienced problems from this exotic, highly invasive aquatic macrophyte. This nuisance plant displaces other native vegetation by readily absorbing the available sunlight and nutrients, thereby greatly decreasing the overall vegetative diversity in the system. Furthermore, *Hydrilla* can physically smother more suitable habitat and create organic silt build-up from its decomposition. As a result, the diversity of the benthic macroinvertebrate community is reduced. With the excess of nitrates currently being released from the spring vent, the *Hydrilla* becomes a prolific invader.

In an effort to increase the health of the spring biota, State Park and Bureau of Aquatic Plants officials administered a controlled release of the aquatic herbicide, Aquathol®. When used in low concentrations, Aquathol® can be used to selectively remove exotic weeds such as *Hydrilla*, leaving native species unaffected. Beginning on April 8, 2002, a dosage of 2 to 4 parts per million of Aquathol® was continuously fed into the headspring area for 48 hours.

Samples were collected on April 4, 2002, prior to the Aquathol® application to establish baseline or "pre-application" measurements. Post-application samples were collected approximately one month later on May 5, 2002. Water chemistry samples were taken for ammonia, nitrate-nitrite, total Kjeldahl nitrogen, total phosphorus, color, and turbidity; see Figure 2. Habitat assessment, qualitative periphyton sampling, and benthic macroinvertebrate stream condition index (SCI) sampling were also conducted.

Results

Nitrate-nitrite concentrations before the herbicide application and after (0.73 and 0.79 mg/L, respectively) were similar, but both were higher than those found in 90% of Florida streams (0.64 mg/L); see Figure 2. Ammonia and total Kjeldahl nitrogen concentrations were below quantitation limits for both before and after herbicide application (0.01 and 0.019 mg/L, and 0.06 and 0.06 mg/L, respectively). Total phosphorus concentrations were slightly higher after application (0.052 mg/L) compared to before (0.032 mg/L), yet were still less than the values found in roughly 80% of state streams. The habitat assessment score after application (130) was in the optimal range (120-160) and was somewhat higher than the 115 score before the application, which was in the suboptimal range. The stream condition index (SCI) score marginally improved from 19 (in the poor range) to 21 (bottom of the good range) after the herbicide application. The periphyton (attached algae) taxa found in the Wakulla River were indicative of eutrophic conditions, which was not surprising given the nutrient enrichment in Wakulla Springs.

In conclusion, SCI results indicate marginal improvements in the macroinvertebrate community in Wakulla Springs after the Aquathol® application. This is most likely due to an increase in quality of available habitat, as a result of reducing the *Hydrilla* population. Additional monitoring will be needed to determine how long these improvements may continue.

Figure 1: Overview Map of the Wakulla Springs Area

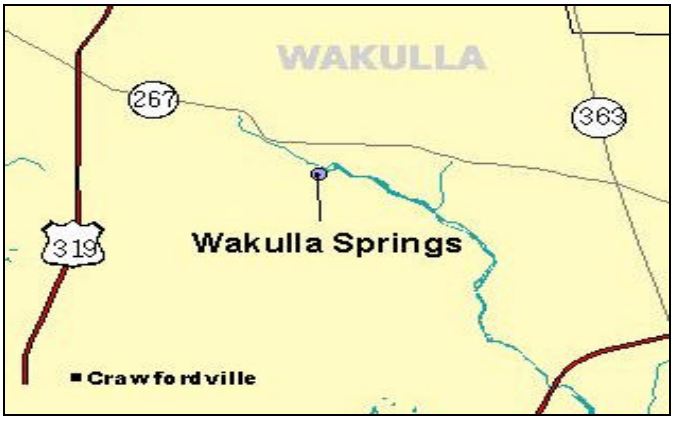


Figure 2: Data Table

Wakulla Springs Herbicide Study					
Station			Wakulla Springs		
STORET			STMARKSSTORET01		
Station Nickname			WAKULLA SP		
Sampling Date			04/04/02 and 05/06/02		
Macroinvertebrate Parameters	**4/4/2002**	**5/6/2002**	**Chemistry Data**	**4/4/2002**	**5/6/2002**
SCI	19	21	Ammonia (mg/L)	0.01 U	0.019 I
SCI Evaluation	Poor	Good	Nitrate-Nitrite (mg/L)	0.73	0.79 J
Number of Taxa	17	16	TKN (mg/L)	0.06 U	0.06 U
EPT Index	2	0	Total Phosphorus (mg/L)	0.032 I	0.052
FL Index	6	8	Color (PCU)	5 U	5 U
% Dominant Taxon	35.42	51.33	Turbidity	0.6	0.35
% Diptera	58.33	81.42	**Physical-Chemical Data**	**4/4/2002**	**5/6/2002**
Total number of Chironomidae	9	11	Habitat Assessment	115	130
% Filter-Feeders	26.04	31.86	cific Conductivity (umhos/c	320	316
Periphyton Parameters	**4/4/2002**	**5/6/2002**	Dissolved Oxygen (mg/L)	5	4.7
% Bacillariophyceae	90.7	89.63	pH (SU)	7.45	7.6
% Cyanophyceae	8.59	9.31	Temperature (deg C)	20.6	21.5
% Chlorophyceae	0.72	1.05			
Percent Dominant taxon	26.83	25.66			

"U"- Below Detection Limit; "J"- Estimated Value; "I"- Less Than the Quantitation Limiton Limit.

FOR MORE INFORMATION, CONTACT:
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