EcoSummary

Stream Condition Index Report

Wolfe Creek above Springhill Road
February 9, 2012



Figure 1. Stream Condition Index site for Wolfe Creek on February 9, 2012

DEP conducted water quality and biological sampling at Wolfe Creek (STORET# 33030189), above Springhill Road in Santa Rosa County, on February 9, 2012 to assess attainment of the waterbody's designated use. The purpose of the study was to locate and document minimally disturbed streams to identify waterbodies that score in the upper range of Exceptional - Category 1 using the Stream Condition Index (SCI) method. A duplicate sample was collected for the variability exercise to ensure samplers are maintaining consistent sampling techniques.

Background

Although healthy and well-balanced stream and river communities may be maintained with some level of human activity, such activities may result in waterbody degradation. Human stressors may include increased inputs of nutrients, sediments, and/or pesticides from watershed runoff, adverse hydrologic alterations, undesirable removal of habitat or riparian buffer vegetation, and introduction of nuisance (generally exotic) plants and animals. DEP has methods to evaluate if human activities have resulted in the condition where a particular waterbody has exceeded water quality criteria (Chapter 62-302, Florida Administrative Code), including whether adverse impacts to biological communities have occurred. DEP water quality standards are designed to protect designated uses of the waters of the state (*e.g.,* recreation, aquatic life support), and exceedances of these standards is associated with interference with the designated use. The SCI assesses how closely the macroinvertebrate community (*e.g.,* aquatic insects, clams, and crayfish) of a stream resembles the macroinvertebrate community of an undisturbed or "reference" condition. The stream and river habitat assessment evaluates the availability and quality of habitat for macroinvertebrates, and can help diagnose the cause of a low SCI score.

Methods

This stream was sampled on February 9, 2012 by the DEP's Northwest District Office. Surface water samples were collected for analysis of nutrients, chlorophyll *a*, color, and metals following DEP Standard Operating Procedures (SOPs, see http://www.dep.state.fl.us/water/sas/sop/sops.htm for details). Sampling and analyses met FDEP quality assurance/ quality control standards (see http://www.dep.state.fl.us/water/sas/qa/index.htm)

The SCI was sampled per DEP SOP FS7420 and calculated per DEP SOP LT7200. The SCI consists of collecting macroinvertebrates via 20 D-frame dipnet sweeps (0.5 m in length) in the most productive habitats in a 100 m reach of a stream. The organisms are sub-sampled, and identified to the lowest practical taxonomic level. The SCI is composed of ten

metrics, eight of which decrease in response to human disturbance, with two metrics (% very tolerant and % dominant) increasing in response to human disturbance. According to DEP SOP LT 7000, the SCI score ranges and categories are: (68-111) Exceptional; (35-67) Healthy; and (0-34) Impaired. Proposed biological health assessment criteria state that a site is considered to meet designated uses if the average of the two most recent SCI scores is 40 or higher and neither of those scores is less than 35. The Stream and River Habitat Assessment was conducted per DEP SOP FT 3100. The Habitat Assessment is a rapid field method in which a sampler scores eight in-stream and riparian components to estimate the influence of habitat factors on the resident aquatic organisms. Habitat Assessment scores range from 11-160 and overall habitat quality is assigned to one of four categories: Optimal (120-160 points), Suboptimal (80-119 points), Marginal (40-79 points), and Poor (11-39 points).

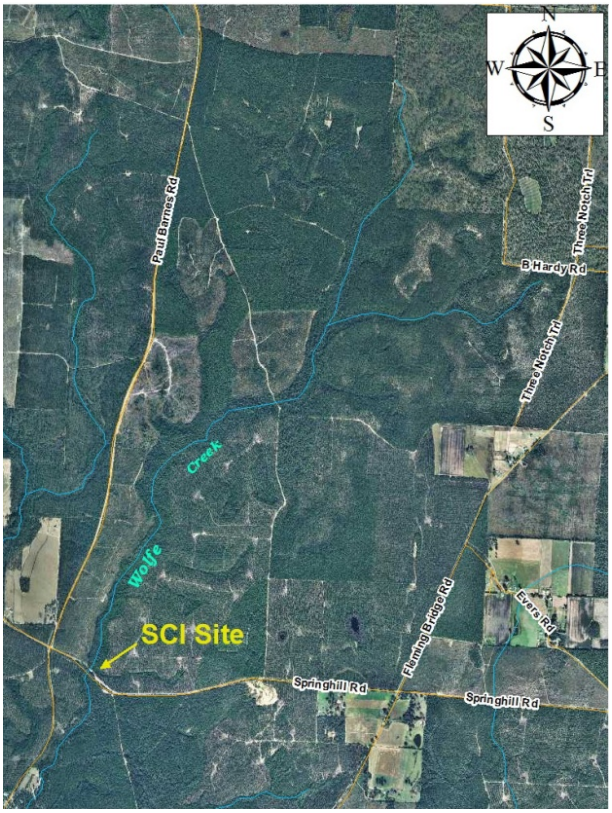


Figure 2. Location of Wolfe Creek in Santa Rosa County.

Site Information

The SCI site is located 3.3 miles northeast of Allentown, 8.4 miles south of Hwy. 4 in Santa Rosa County (N 30° 46' 25.64", W -86° 59" 17.89"). It is a clear sand/gravel 3rd order stream at this location. The Wolfe Creek watershed drains approximately 7.0 square miles and is located in the Southern Pine Plains and Hills Ecoregion (65f).

Results

Water Quality

The water quality samples complied with water quality criteria (Table 1). The elevated nitrogen levels, although below the threshold for the region are possibly due to agricultural activities in the upper watershed.

Table 1. Water quality results from February 9, 2012 at Wolfe Creek.

Analyte	Result	Remark	Applicable Class III Fresh water Quality Criteria
Field Temperature (°C)	15.9		
Field pH (SU)	5.99		
Field Dissolved Oxygen (mg/L)	9.41		≥5.0
Field Dissolved Oxygen (% Saturation)	93.7		
Field Specific Conductance (µmhos/cm)	19		
Alkalinity (mg $CaCO_3$/L)	0.73		
Color (PCU)	11		
Chlorophyll a (µg/L)	0.55	U	
Total Phosphorus (mg/L)	0.004	U	* 0.06
Nitrate+Nitrite (mg/L)	0.34		
Ammonia (mg/L)	0.014		
Total Kjeldahl Nitrogen (mg/L)	0.080	U	
Total Nitrogen (mg/L)	0.434		* 0.67
Fluoride (mg F/L)	0.035	U	< 10.0
Sulfate (mg SO4/L)	0.38	I	
Calcium (mg/L)	0.40		
Magnesium (mg/L)	0.47		
Potassium (mg/L)	0.30	U	
Sodium (mg/L)	1.9	I	
Zinc (mg/L)	5.0	U	

* Federally promulgated numeric nutrient criteria for Panhandle West nutrient region. **U** – Analyzed for but not detected. **I** – Reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.

Habitat Assessment

The stream habitat assessment score was 142 which is in the optimal range. Aerial imagery (2010 National Agriculture Imagery Program Aerial Flight Data) revealed adequate riparian buffer zones throughout most of the stream's drainage basin (Figure 2). Wide riparian zones (> 18m) limit sedimentation in streams. Average velocity measured 0.3 m/s giving it a perfect score for flow. Fish and aquatic insects require sufficient water velocity to maintain high dissolved oxygen concentrations in the stream. The highest percent productive habitat was woody debris (snags) comprising 6.1%. Snags provide cover for fish and substrate for aquatic insects. Some partially buried logs were also observed. Habitat smothering from sand and silt led to a marginal score for substrate availability most likely resulted from historical logging and silviculture activities. Although substrate availability was only 15.1% there were four productive habitats present which included snags, leaf packs, roots and aquatic vegetation (*Juncus* sp. and *Scirpus* sp.). Habitat diversity is the key to a more diverse macroinvertebrate assemblage.

Stream Condition Index

The SCI scores for this site were 84 and 87 for the QA duplicate sample out of a possible 100. The score for both samples correspond with an "Exceptional" or Category 1 designation. Sensitive taxa totaled 14 for each sample including five species of stoneflies as well as a high diversity of total taxa of more than 40. Stoneflies are an important indicator of good water quality. Pollution-tolerant macroinvertebrates were absent in both samples.

Periphyton

The attached algal community in the stream consisted of the red algae *Batrachospermum* and diatoms. Some growth of algae (typically diatoms) is expected in a fully functioning stream, but an over abundance of algae (especially filamentous algae) may reduce habitat quality (from smothering) and lead to excess organic matter production and decomposition, which can harm fish and invertebrates. Although there were some mats of *Batrachospermum* throughout the 100 meter reach, it appeared it had little effect on habitat availability. Some species of *Batrachospermum* are known to be seasonal, dying back when summer water temperatures and photosynthesis period increase (Figure 3).



Figure 3. Wolf Creek Rapid Periphyton Survey April 19, 2012 showing the red algae *Batrachospermum* on a snag to the right.

Conclusion

Overall, the water quality and macroinvertebrate community data indicated that the stream met expectations for a healthy, well-balanced stream. Historical biological information from this site is limited as this is the first bioassessment conducted in this watershed. Adjacent watersheds, however, had comparable results. A follow up investigation is planned for summer 2012. The duplicate sample was similar indicating the sampling team's techniques were consistent.

Thank you for your interest in maintaining the water quality of Florida's streams and rivers. Please feel free to contact us if you have any questions.

Contact and resources for more information

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DEP biological assessment resources:
http://www.dep.state.fl.us/water/bioassess/index.htm