EcoSummary

Stream Condition Index Report

Alligator Creek above Pleasant Home Road
February 9, 2012



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

DEP conducted water quality and biological sampling at Alligator Creek (STORET# 33030188), above Pleasant Home 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 QA 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.*, stoneflies, caddisflies, clams, 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 Northwest District Office. Surface water samples were collected for analysis of nutrients, chlorophyll a, color, 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 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).

Site Information

The SCI site is located 3.9 miles southeast of the Town of Spring Hill, 3.7 miles east of County Road 191 in Santa Rosa County (N30° 44' 39.4", W86° 52" 52.9"). It is a slightly tannic sand/gravel 3rd order stream at this location. The Alligator Creek watershed drains approximately 12.0 square miles, located in the Southern Pine Plains and Hills Ecoregion (65f). Alligator Creek flows into the Blackwater River via Juniper Creek (Fig. 2).



Figure 2. Location of the SCI site on Alligator Creek in Santa Rosa County.

Results

The water quality samples analyzed complied with water quality criteria (Table 1). Field parameters measured were in normal ranges for the area.

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

Analyte	Result	Code	Applicable Class III Water Quality Criteria
Field Temperature (°C)	14.44		
Field pH (SU)	6.35		
Field Dissolved Oxygen (mg/L)	9.67		≥5.0
Field Dissolved Oxygen (% Saturation)	94.7		
Field Specific Conductance (µmhos/cm)	16		Shall not be increased more than 50% above background or to 1275, whichever is greater.
Alkalinity (mg $CaCO_3$/L)	0.65	U	
Color (PCU)	24		
Chlorophyll a (µg/L)	0.68	I	
Total Phosphorus (mg/L)	0.004	U	* ≤ 0.06
Nitrate+Nitrite (mg/L)	0.063		
Ammonia (mg/L)	0.010	U	≤ 0.02
Total Kejldahl Nitrogen (mg/L)	0.12	I	
Total Nitrogen (mg/L)	0.193		* ≤ 0.67
Fluoride (mg F/L)	0.035	U	≤ 10.0
Sulfate (mg SO4/L)	0.52	I	
Calcium (mg/L)	0.27		
Magnesium (mg/L)	0.35	A	
Potassium (mg/L)	0.30	U	
Sodium (mg/L)	1.8	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. **A** – Mean of two or more determinations.

The stream habitat assessment score was 137 which scores in the mid-optimal range. Field observations and Aerial imagery (2010 National Agriculture Imagery Program Aerial Flight Data) revealed adequate riparian buffer zones (> 18m) throughout most of the stream's drainage basin achieving a perfect score for Riparian Buffer Zone Width. The riparian forest consists of Atlantic White Cedar (*Chamaecyparis thyoides*), Water Oak (*Quercus nigra*) and other native hardwoods. However, aerial imagery also revealed silviculture operations which would explain some sand smothering within the 100m reach as buried logs were observed in several areas despite the adequate buffer zones. The average width and depth were 4.6 and 0.6 m, respectively. Typical velocity measured 0.6 m/s giving it a perfect score for stream flow. Fish and aquatic insects require sufficient water velocity to maintain high

dissolved oxygen concentrations in the stream. The most abundant productive habitat was roots/undercut banks, comprising 13%, followed by woody debris (snags) with 12%. Fine roots provide surface area for small aquatic insects such as caddisflies and juvenile fish, while snags provide cover and substrate.

The SCI sample score for this site was 78 (designated as Initial Sample for clarity) and the QA Duplicate Sample score was 92 out of 100; both samples correspond with an "Exceptional" designation. The QA Duplicate Sample scored better in nine of the ten metrics calculated. The Ephemeraptera or mayfly and Very Tolerant taxa counts were identical (Table 2).

Table 2. QA Duplicate Sample comparison.

Metric	Initial Sample	Duplicate Sample
***Clinger Taxa**	13	14
***Dominant %**	19.32	11.1
Ephemeraptera Taxa	8	8
***Filter Feeder %**	20.5	27.8
***Long-Lived %**	2	3.5
***Sensitive Taxa**	15	17
***Tanytarsini %**	2	3
***Total Taxa**	36	42
Tricoptera Taxa	11	17
Very Tolerant Taxa	0	0

Note: *Calculated from the average of 2 replicate scores.

A total of six additional taxa were collected in the duplicate sample. Among them were the hellgrammite, *Corydalus cornutus* and the stonefly, *Helopicus bogaloosa*, both known to inhabit snags in fast flowing waters in healthy streams. In addition, six different species of caddisflies were not collected in the Initial Sample. Caddisflies inhabit a wide range of habitats from snags and roots in undercut banks to scraping algae on rocks and gravel.

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 patches 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 photo period increase.

Conclusion

The difference in scores between the Initial and QA Duplicate SCI samples can be the result of many factors. Factors include but are not limited to unequal habitat selection or sampling technique. Although steps are taken to ensure that equal habitat types are available to each sampler , unique habitats can be missed due to lack of experience. For example, the Spongillafly, *Climacia areolaris*, and some species of the caddisfly, *Ceraclea*, are found on sponges (Spongillidae) a common occurrence in clean streams. If the sponge was mistaken for an algal mat and not sampled, these two organisms might not be collected. This exercise provides important information for improving sampling techniques.

Overall, the water quality and macroinvertebrate community data indicated that the stream met expectations for a healthy, well-balanced stream. Limiting or eliminating streamside and riparian buffer zone disturbances ensures bank stability, thus protecting delicate macroinvertebrate and fish habitats. 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 sampling event is planned for summer 2012.

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