EcoSummary

Stream Condition Index Report

Big Coldwater Creek above County Road 191
January 30, 2012

DEP staff from the Northwest District Office conducted water quality and Stream Condition Index (SCI) sampling at Big Coldwater Creek (Figure 1, STORET# 21461), above County Road 191 in Santa Rosa County, on January 30, 2012, to assess attainment of the waterbody's designated use. This location is considered a "SCI Benchmark Site" due to its stable SCI scores (Table 1) and easy access for auditing biologists within and outside the Department.



Figure 1. Big Coldwater Creek Stream Condition Index site, January 30, 2012.

Table 1. Stream Condition Index and Habitat Assessment scores for Big Coldwater Creek.

Sample Date	SCI Score	Category Name
9/20/2006	65	Category 2 ("healthy")
9/27/2007	77	Category 1 ("exceptional")
9/23/2008	75	Category 1 ("exceptional")
6/17/2009	68	Category 1 ("exceptional")
4/28/2010	76	Category 1 ("exceptional")
3/16/2011	89	Category 1 ("exceptional")
10/18/2011	92	Category 1 ("exceptional")
1/30/2012	96	Category 1 ("exceptional")



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, 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 January 30, 2012, by the DEP 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 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) 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 6.5 miles northeast of the City of Milton, 5.1 miles north of U.S. Highway 90 in Santa Rosa County (Figure 2, N30° 42' 35.09", W86° 58'19.8").

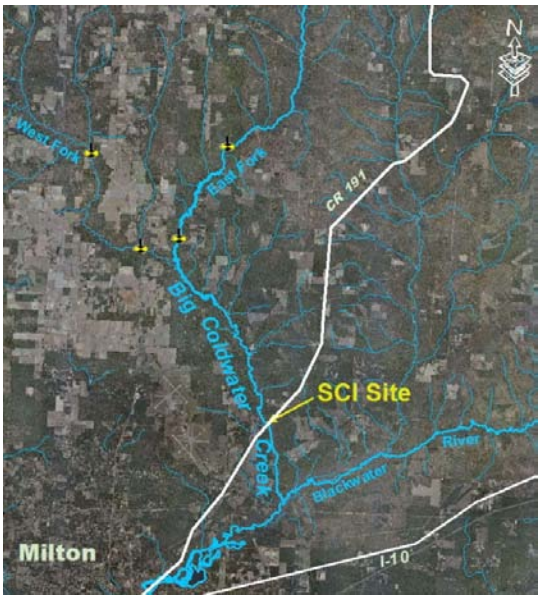


Figure 2. Location of the SCI site on Big Coldwater Creek in Santa Rosa County. Upstream sampling locations.

A private canoe livery is located upstream along the west bank of the assessment site. It is a slightly tannic, sand/gravel stream at this location. This large 4th order stream drains approximately 273 square miles, with its headwaters reaching into lower Alabama. Big Coldwater Creek flows directly into the Blackwater River (Figure 2).

Results

Water Chemistry

The water quality results complied with water quality criteria, with the exception of total nitrogen which measured 1.07 mg/L, more than 1.5 times the proposed state criteria (Table 2). Nitrate/Nitrite (0.95 mg/L) contributed to the elevated TN value, potentially associated with groundwater inputs from agricultural areas. Note that compliance with the TN criteria is based on an annual geometric mean.

Table 2. Water quality results from Big Coldwater Creek, January 30, 2012.

Analyte	Result	Remark	Applicable Class III Water Quality Criteria
Field Temperature (°C) Field pH (SU)	12.73 6.51		
Field Dissolved Oxygen (mg/L)	10.07		≥5.0
Field Dissolved Oxygen (% Saturation)	95		
Field Specific Conductance (µmhos/cm)	35		Shall not be increased more than 50% above background or to 1275, whichever is greater.
Alkalinity (mg $CaCO_3$/L)	1.6	I	
Color (PCU)	15		
Chlorophyll a (µg/L)	0.55	U	
Total Phosphorus (mg/L)	0.004	U	* ≤ 0.06
Nitrate+Nitrite (mg/L)	0.95		
Ammonia (mg/L)	0.010	U	
Total Kejldahl Nitrogen (mg/L)	0.11	U	
Total Nitrogen (mg/L)	1.07		* ≤ 0.67
Fluoride (mg F/L)	0.035	U	≤ 10.0
Sulfate (mg SO4/L)	1.2		
Calcium (mg/L)	1.46		
Magnesium (mg/L)	1.17		
Potassium (mg/L)	0.47	I	
Sodium (mg/L)	2.0		
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 brief review of upstream sampling locations for nitrates of the *West Fork* and *East Fork* branches was conducted (Figure 2). From 2000 to 2012, *West Fork* nitrates measured 0.19 – 10.0 mg/L for an average of 1.9 mg/L and *East Fork* nitrate samples measured 0.048 – 0.85 mg/L for an average of 0.21 mg/L. *West Fork* branch drains mainly agricultural fields while *East Fork* branch drains mostly silviculture and natural forests.

Habitat Assessment

The stream habitat assessment score was 98 which scores in the mid-Suboptimal range. Typical velocity measured 0.33 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 in this case the dissolved oxygen measured 95% saturation. The average width within the assessment stretch was 26m and the average depth was less than 1m. The riparian zone quality for both banks scored in the suboptimal category due to the disturbed plant community observed. Severe erosion was also noted on the left bank (Figure 3). Two productive habitats, snags/woody debris and aquatic vegetation (*Myriophyllum*, *Ludwigia and Juncus*, Figure 4), were noted along its banks, totaling only 2.7% habitat, which yielded a marginal score for Substrate Diversity and a fairly low rating for Substrate Availability. Fish and aquatic macroinvertebrates use various substrates for habitat, cover and protection from predators. Habitat Smothering scored in the marginal category as there were no stable pools observed greater than 2m deep.



Figure 3. Bank erosion on left bank of Big Coldwater Creek, January 30, 2012.

Stream Condition Index

The SCI sample scored a 96 out of a possible 100, which corresponds with an "Exceptional" designation. A total of 6 species of stoneflies were collected, one of the many sensitive taxa collected in the sample. The Mayflies, Stoneflies and Caddisflies or Ephemeraptera, Plecoptera and Trichoptera (EPT) totaled 23 species and more than 40% of the total taxa collected. These biological results indicate that habitat and water quality conditions supported a biological community of exceptional quality.



Figure 4. Submerged aquatic macrophytes at Big Coldwater Cr above CR 191.

Conclusion

Overall, the macroinvertebrate community data indicated an extremely healthy, well-balanced system. Although large woody comprised only 1.3% available habitat, the current SCI score is among one of the highest SCI scores at this location. Limiting or eliminating streamside and riparian buffer zone disturbances ensures bank stability, thus protecting delicate macroinvertebrate and fish habitats.

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