STREAM ECOSUMMARY

Sweetwater Creek below Burned Bridge Road, March 28, 2012

FDEP conducted biological and water quality sampling at Sweetwater Creek in Santa Rosa County (Figure 1) on March 28, 2012 to assess attainment of designated uses. This location (Figure 2) was chosen as an "Exceptional" Stream Condition Index (SCI) candidate site because of its forested watershed in the Blackwater River State Forest.

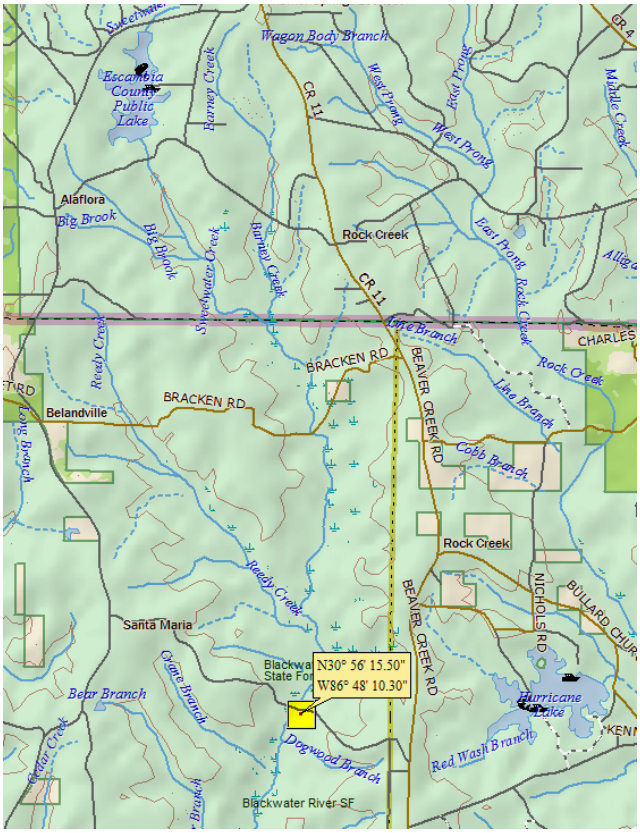


Figure 1. Location of Sweetwater Creek in Santa Rosa County.



Overall, the macroinvertebrate community and water quality data indicated that the stream met expectations for a "Healthy" stream, falling 12 points short of attaining the "Exceptional" category.



Figure 2. Stream Condition Index site for Sweetwater Creek below Burned Bridge Road on March 28, 2012

Background

Although healthy, 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. FDEP 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. FDEP 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 Stream Condition Index (SCI) assesses how closely the macroinvertebrate community (*e.g.*, aquatic insects, 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 March 28, 2012 by the FDEP Northwest District Office following FDEP 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.FDEP.state.fl.us/water/sas/qa/index.htm).The Stream Condition Index (SCI) was sampled per FDEP SOP FS7420 and calculated per FDEP 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 FDEP 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 FDEP 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

This site (STORET # 33030305) is located (Figure 3) in the Blackwater River State Forest (BRSF) 6.5 miles northeast of Munson (Lat/Long N30° 56′ 15.5″ W-86° 48′ 10.3″). Sweetwater Creek at this location is a 3rd order stream and drains the Southern Pine Plains and Hills ecoregion (65f). Its headwaters originate in Alabama just above the Escambia Public impoundment in the Conecuh National Forest. Sweetwater Creek flows to Pensacola Bay via Big Juniper Creek, Blackwater River, and Blackwater and East Bay. The stream channel appears to been dredged and straightened for historical log transport above Burned Bridge Road to Bracken Road

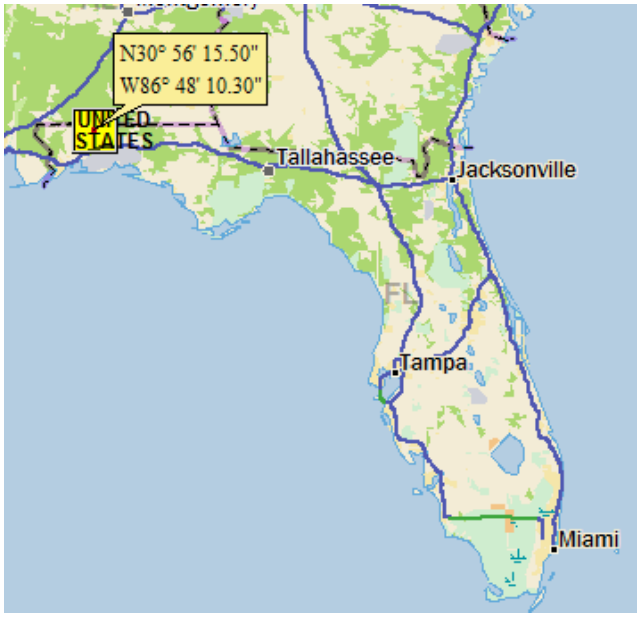


Figure 3. Location of Sweetwater Creek in Santa Rosa County.

near the Alabama line. A wood log flume was observed in the late 1990's built over the dredged channel above Bracken Road. The original sinuous stream channel was stagnant at a higher elevation east of the dredged log transport channel.



Figure 4. Sweetwater Creek west bank burning.

BRSF staff was observed burning the riparian forest along Sweetwater Creek at Bracken Road at that time in the late 1990's. During this 2012 SCI sample, the BRSF staff was burning the forest including the riparian zone along Sweetwater Creek at Burned Bridge Road. The fire, which is expected to mimic the natural stress of historic lightning-induced fires, burned the riparian forest to the waters edge on the west bank (Figure 4). Portions of the riparian wetland forest along the east bank, downstream of the sample



Figure 5. Burned east bank below sample reach.

site had been burned the previous day (Figure 5). Rainfall had been much below normal during 2011 and 2012 according to the official gauge at Whiting Field. This allowed normally wet areas to burn during prescribed fire management operations.

Results

Water Quality

The water quality samples complied with Class III water quality criteria (Table 1). The total nitrogen and total phosphorus were very low. typical of background conditions for forested panhandle watersheds. Dissolved oxygen was 83 % saturation, higher than the proposed minimum 67% for western Panhandle streams.. Total Organic Carbon (6.8 mg/l) was higher than the typical 1-3 mg/l range, possibly from forest fire smoke settling in the water (note Figures 4 & 5). Historic dredging of the upstream channel was observed, which may have altered the natural hydraulic conditions, by reducing riffle reaches.

Table 1. Water quality results from March 28, 2012 at Sweetwater Creek.

Analyte	Result	Remark	Applicable Class III Water Quality Criteria
Field Temperature (°C)	18.07		
Field pH (SU)	5.78		
Field Dissolved Oxygen (mg/L)	7.88		≥5.0
% Dissolved Oxygen Saturation	83		
Specific Conductance (µmhos/cm)	22		Not to exceed 50% of background or 1275 µmhos/cm
Alkalinity (mg $CaCO_3$/L)	0.65	U	
Turbidity	3.4		Not to exceed 29 over background
TDS (mg/l)	33		
TSS (mg/l)	5	I	
Color (PCU)	43		
Chloride (mg/l)	3.4		
Fluoride	0.035	U	
Calcium (mg/l)	0.77		
Magnesium (mg/l)	0.42		
Potassium (mg/l)	0.30	U	
Sodium (mg/l)	1.8	I	
Sulfate (mg/l)	1.3		
Chlorophyll a (µg/L)	1.2	I	
Total Phosphorus (mg/L)	0.007	I	* ≥0.06 mg/L
Nitrate+Nitrite (mg/L)	0.015		
Ammonia (mg/L)	0.010	U	
Total Kejldahl Nitrogen (mg/L)	0.18	I	
Total Nitrogen (mg/L)	0.195		* ≥0.67 mg/L
Organic Carbon (mg/L)	6.8		

I – Result was between the method detection limit (MDL) and the practical quantitation limit (PQL)
U – Compound was analyzed for but not detected
* F.A.C. Chapter 62-302 Surface Water Quality Standards. Criteria are applicable to the annual geometric means. - DRAFT

Habitat Assessment

The stream and river habitat assessment score was 143, scoring in the "Optimal" range. This site was chosen because of the excellent habitat reach and sinuosity compared to channelized streambeds observed at other reaches. All habitat parameters rated "Optimal" (Substrate Diversity, Substrate Availability, Water Velocity, Habitat Smothering, Artificial Channelization, Bank Stability, and Riparian Buffer Zone Width) except for a "Suboptimal" Riparian Zone Vegetation Quality rating because recent burning temporarily eliminated shrub habitat. Although prescribed fire is an appropriate management practice in the forest overall, it typically would not reach the stream bank except during very dry conditions. In this case, it is likely that the fire represents a natural stressor that area streams would be occasionally subjected to, and that reduction of riparian shrubs is a temporary condition. Atlantic white cedar was not observed here or in the upper reaches of Sweetwater Creek.

Stream Condition Index

The SCI score for this site was 56 out of a possible 100 points, corresponding with a "Healthy" Class 2 designation. The sample was dominated (59%) by short-lived true flies (Diptera). “Exceptional” Class 1 panhandle stream communities may have 50% of SCI samples consisting of the more sensitive and long-lived EPT (mayflies, stoneflies, & caddisflies). The total community consisted of 26% EPT in this sample. Stoneflies, the most sensitive species, had 2 species present, comprising 3% of the sample. Habitat conditions in this 100-meter sample reach are expected to support stoneflies, with stream velocity over 0.5 meters per second, 19% large wood habitat, 5% ironstone rock, 6% gravel, and 2% leaf pack. However, it is hypothesized that hydrological alterations from historical dredging (for log transport) may have resulted in conditions where larger species, such as stoneflies, are washed downstream during floods. It is possible that this system could score in the “Exceptional” SCI category if natural hydrologic conditions above this site are restored.

Periphyton

Attached algae were common and consisted of diatoms, filamentous green algae *Cladophora*, and the red filamentous algae *Batrachospermum*, which grow in low nutrient conditions. 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.

Fish (darters and shiners) were common as were liverworts and mosses on rocks and stream banks.

Thank you for your interest in conserving 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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FDEP biological assessment resources:
http://www.dep.state.fl.us/water/bioassess/index.htm