STREAM ECOSUMMARY

Kelley Branch below Removed Dam
June 21, 2012

FDEP conducted biological and water quality sampling at Kelley Branch (Figure 1) in Liberty County on June 21, 2012, to assess attainment of designated uses requested by Florida's TMDL monitoring program. This biomonitoring also was continued support of a partnership with The Nature Conservancy (TNC), the United States Fish and Wildlife Service (USFWS), and the Florida Fish and Wildlife Conservation Commission (FWC) for a Kelley Branch Watershed Restoration Project. TNC and FWC co-managed a FWC grant to remove the dam and culvert and reconnect the stream to the Apalachicola River. Furthermore, this sampling assisted a Florida A&M University grant studying area steephead streams.



Figure 1. Stream Condition Index site for Kelley Branch on June 21, 2012.

Overall, the macroinvertebrate community and water quality data indicated that the stream met expectations for a healthy, well-balanced stream.

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 June 21, 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.dep.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: (68-100) 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 (Lat/Long N30° 27′ 28.2″ W-84° 58′ 55.8″) is located less than 1 mile north of Bristol and Highway 20 in Liberty County (Figure 2). Kelley Branch is a third order stream at this site. The stream originates from steepheads on the bluffs of the Apalachicola River and drains to Apalachicola Bay. This site (STORET station 31010242) is in the Tifton Uplands/ Tallahassee Hills ecoregion/subregion (65h). This 2012 sample reach was moved 50 meters downstream to avoid interfering with the FAMU monitoring site. Previously FDEP bioassessments (BioRecon) with Ecosummary reports documented the TNC dam removal and stream restoration project during 2006, 2007, 2008, and 2009. The BioRecon scores at this site were 4 out of 10 with a "Fail" rating in 2006 before dam removal and improved to a "Pass" rating of 7 in 2007 after lake draw-down, and lowered to a "Fail" rating of 5 in 2008 after sediment impacts from dam removal, and had an improved "Pass" rating of 8 in 2009 after a year of recovery.

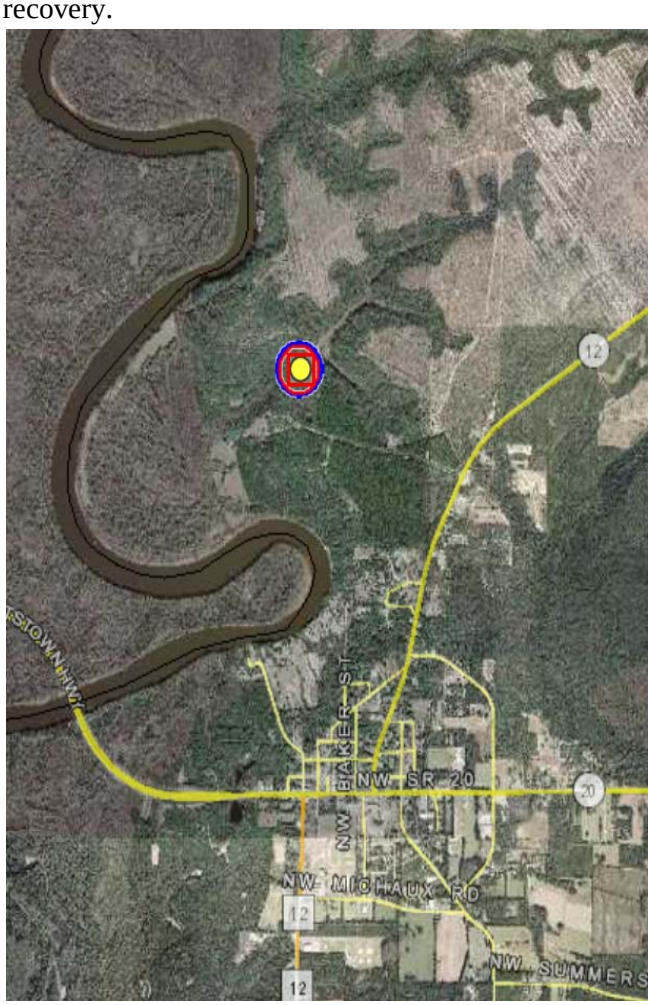


Figure 2. Kelley Branch location in Liberty County.

Results

Water Quality

The water quality was excellent and samples complied with water quality criteria (Table 1). All water quality parameters were typical of steephead springs not exposed to anthropogenic nutrient input. The 99 percent dissolved oxygen saturation supported a healthy macroinvertebrate community of over 49% EPT with the 2 taxa of sensitive stoneflies collected in this summer SCI sample.

Table 1. Water quality results from June 21, 2012 at Kelley Branch.

Analyte	Result	Remark	Applicable Class III Water Quality Criteria
Field Temperature (°C)	25.24		
Field pH (SU)	5.04		
Field Dissolved Oxygen (mg/L)	8.13		≥5.0
% Dissolved Oxygen Saturation	98.8		
Specific Conductance (µmhos/cm)	15		Not to exceed 50% of background or 1275 µmhos/cm
Alkalinity (mg $CaCO_3$/L)	0.68	I	
Turbidity	1.9		Not to exceed 29 over background
TDS (mg/l)	15	U	
TSS (mg/l)	4	I	
Color (PCU)	17		
Chloride (mg/l)	2		
Fluoride	0.035	U	
Sulfate (mg/l)	2.1		
Chlorophyll a (µg/L)	1.7		
Total Phosphorus (mg/L)	0.017		* ≤0.06 mg/L
Nitrate+Nitrite (mg/L)	0.005	I	
Ammonia (mg/L)	0.013	I	
Total Kejldahl Nitrogen (mg/L)	0.17	I	
Total Nitrogen (mg/L)	0.175		* ≤0.67 mg/L
Organic Carbon (mg/L	1.9	I	
Biochemical Oxygen Demand 5Day mg/l	0.49	U	

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 120, at the bottom of the "Optimal" range. Water Velocity, Artificial Channelization, Bank Stability, Riparian Zone Buffer Width, Riparian Vegetation Quality (Beech/magnolia Forest ~75 years old), scored optimal. Substrate Diversity (lacking leaf pack/mat because upstream riparian forest eliminated by former impoundment), Substrate Availability (13%) and Habitat Smothering (moderate sand, slight silt) were marginal.

Stream Condition Index

The SCI score for this site was 75 out of a possible 100 points, corresponding with an "Exceptional" designation. The dominant species included a caddisfly, *Hydropsyche* (19%) and a riffle beetle *Microcylloepus pusillus* (16%). The EPT, mayflies (Ephemeroptera), stoneflies (Plecoptera), and caddisflies (Trichoptera) made up 49.48 % of the sample. The EPT are the more sensitive orders of the stream community. They may comprise up to 50% of the aquatic macroinvertebrate in the healthiest Panhandle streams. The stoneflies are the most sensitive to pollution. They were represented by the leaf shredder *Leuctra*, usually dominant in clean low order streams during the fall, and *Perlesta*, a common spring predator.

Periphyton

The attached algal community was rare in the stream consisted of mainly diatoms on submerged roots and wood along with liverworts and mosses. This was expected with the very low nutrient and shade from the beech/magnolia forest canopy.

Conclusions

The biological community of this stream reach has shown significant recovery from the "Fail" rating in 2006 before dam removal. The dam interfered with stream water quality, habitat, hydrology, and fish migration. Although habitat availability was a slightly limiting factor, the SCI score (75) was exceptional. Sand input from dam and culvert removal and prescribed burning of steephead hillsides has decreased the amount of stable pools and buried some riffle habitat. . The burned beech forest resulted in bare soil which led to bank sloughing in the headwaters. This site could benefit from the addition of large woody material, which would restore more riffle/pool habitat vital for fish and wildlife diversity and productivity.

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