STREAM ECOSUMMARY

Big Escambia Creek below the Fannie Road Diversion Structure
March 25, 2010

DEP conducted BioRecon biological sampling at Big Escambia Creek below Fannie Road in Escambia County on March 25, 2010 (Figure 1). This monitoring was conducted as a post-construction assessment of a $6.39 million United States Army Corps of Engineers Section 206 Ecosystem Restoration Project http://www.docstoc.com/docs/24633515/Big-Escambia-Creek-Aquatic-Ecosystem-Restoration-Project.

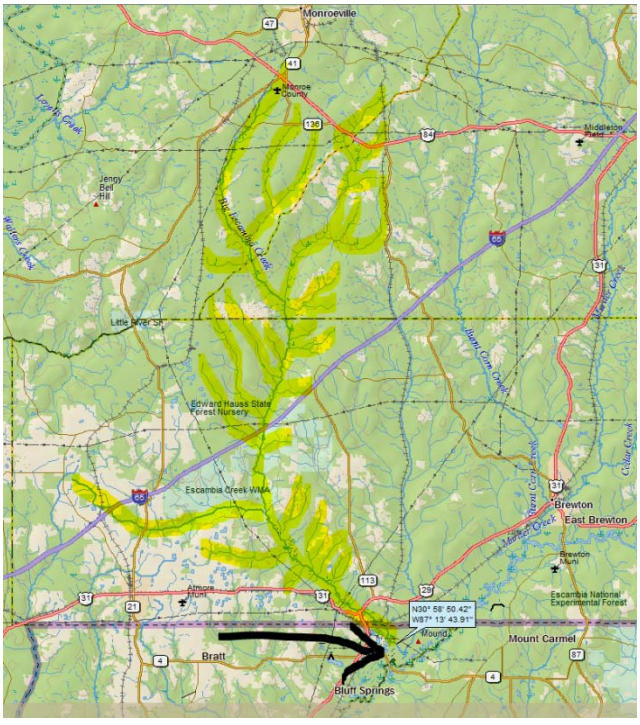


Figure 1. Big Escambia Creek watershed.

The biomonitoring was a request by the United States Fish and Wildlife Service (USFWS) and the Florida Fish and Wildlife Conservation Commission (FWCC). Historical accounts indicate that gravel mining and clear cutting the riparian zone forest led to re-routing of the creek channel from Fannie Road to the Escambia River. The macro-invertebrate community and water quality data indicated that the stream met expectations for a healthy, well-balanced stream.


Figure 2. Big Escambia Creek BioRecon site below Fannie Road diversion structure in Escambia County.

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. 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 Biological Reconnaissance (BioRecon) 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 BioRecon score.

Methods

This stream was sampled on March 25, 2010 by the DEP Northwest District Office. Surface water measurements were taken for analysis of dissolved oxygen, % dissolved oxygen saturation, water temperature, specific conductance, and Secchi depth following DEP Standard Operating Procedures (SOPs, see http://www.dep.state.fl.us/water/sas/sop/index.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 BioRecon was sampled per DEP SOP FS7410 and calculated per DEP SOP LT7100. Biological Reconnaissance (BioRecon) is a rapid community based biological assessment of stream health using benthic macroinvertebrates sampled via four sweeps of a D-frame dip net, with organisms (excluding worms, midges, and mites) identified to the lowest practical taxonomic level. The BioRecon is composed of six metrics that decrease in response to human disturbance. These metrics include Total # of taxa, # of Ephemeroptera taxa, # of Trichoptera taxa, # of Long-lived taxa, # of Clinger taxa, and # of Sensitive taxa. According to DEP SOP LT 7000, the BioRecon score ranges and categories are: (7-10) Category 1; (4-7) Category 2; and (0-3) Category 3. 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

This BioRecon documents the benthic invertebrate community's condition in Big Escambia Creek's re-constructed stream channel below the U.S. Army Corp of Engineer diversion structure built five years earlier. The BioRecon sample reach (Latitude 30°58'50.4"N, Longitude -87°13'43.9"W, Figure 2) was moved slightly downstream to include the first gravel bar, an important habitat for rare species in the stream channel below the diversion structure (Figure 3). The structure was constructed on the south bank to direct Big Escambia Creek back into its original channel. A prior BioRecon was conducted in July 1998 before construction http://water.dep.state.fl.us/eswizard/esdata/pdfs/377.pdf and then one year after construction in January 2006 (See Table 2 for comparisons). ftp://ftp.dep.state.fl.us/pub/labs/lds/reports/10342.pdf.

Results

Water Quality

Table 1 shows the results of the in situ meter parameters.

Table 1. Water quality results from March 25, 2010 at Big Escambia Creek below Fannie Road.

Analyte	Result	Remark	Applicable Class III Water Quality Criteria
Field Temperature (°C)	13.7		
% Dissolved Oxygen Saturation	86		
Dissolved Oxygen (mg/L)	9.0		≥5.0
Specific Conductance (µmhos/cm)	50		Not to exceed 50% of background or 1275 µmhos/cm

Habitat Assessment

The stream and river habitat assessment scored 79 in the "Marginal" range. Substrate Availability scored poor with only 2% productive habitat; scores for left bank stability, riparian zone buffer and vegetation quality were also poor. The habitat score declined to 79 points from 93 points (maximum score was 160 points) in 1998 due to soil erosion associated with the construction of the diversion structure and unauthorized cypress logging before project start date. After the removal of riparian zone vegetation, shorelines eroded. This allowed silt and sand runoff to smother gravel bars, making it difficult for trees to become established on the compacted fill material. The gravel bar riffles are habitat for rare fauna http://www.riversofalabama.org/Conecuh/CON_Species_

Diversity.htm. These include mussels, dragonflies, and stoneflies such as *Alloperla prognoides* (as *furcula*) http://www2.pms-lj.si/illiesia/papers/Illiesia06-19.pdf. Foreign invasive plants such as Chinese tallow, Chinese privet, and Japanese climbing fern were recent colonizers in areas cleared by the project along the Big Escambia Creek riparian zone.

BioRecon Index

The 2010 BioRecon scored a 9 out of 10 points for this site, corresponding with a "Category 1" designation, slightly lower than the 2006 BioRecon (10 of 10). Additional time was spent on the 2010 sampling to sample gravel riffles to a depth of 0.5 meters to find the stonefly *Alloperla prognoides* listed as rare (as *furcula*) by the state of Alabama in the Conecuh/Escambia watershed (see Rivers of Alabama.org website above). Below are comparisons of a July 1998 BioRecon before construction and a January 2006 BioRecon one year after construction was completed (Table 2).

Table 2. BioRecon metric results for Big Escambia Creek below Fannie Rd. pre-and post-construction.

Biometrics & Physical Parameters	1998 Summer	2006 Winter	2010 Winter
Taxa Richness	48	50	51
Florida Index (FI)	33	49	40
EPT	22	30	25
DO (mg/L)	6.5	9.47	10.5
DO (% saturation)	77	91	86
Water Temperature	25.2	14.1	13.7
Stream Velocity (m/s)	0.24	0.6	0.8

Note the FI and EPT increased during cooler winter months with lower water temperatures, and an increase in flow/stream velocity, which resulted in higher dissolved oxygen concentrations.

Two native mussel species (*Elliptio pullata* & *Lampsilis straminea*) were found on a stream bank gravel bed were new records for Big Escambia and vouchered in the Florida Museum of Natural History mollusc collections by Dr. Jim Williams of the FWCC. However, the Big Escambia Creek biological metrics were somewhat lower than several near-by systems including Yellow River near Milligan (Taxa 81, Florida Index 50, and EPT 40), Alaqua Creek near Portland (Taxa 69, Florida Index 50, and EPT 41), Chipola River SW of Altha (Taxa 76, Florida Index 40, and EPT 46), Perdido River Hwy. 184 (Taxa 71, Florida Index 53, and EPT 38), and Pond Creek near Milton (Taxa 74, Florida Index 49, and EPT 37), suggesting that further recovery should be expected.

Periphyton

Attached algae were rare in the stream. The periphyton community consisted of diatoms and the red algae *Batrachospermum*, which indicated a low nutrient concentration.



Figure 3. Big Escambia Creek gravel bar within sample reach.

Although this site passed all biometrics, habitat smothering reduced major substrate availability (woody material, roots) to only 2% coverage. The flood control/restoration project construction activities that exposed acres of riparian soils were a major contributor of sediment loading.

Thank you for your interest in conserving the water quality of Florida's streams and rivers. Please 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