STREAM ECOSUMMARY

Unnamed Creek at Aubrey Avenue – A Tributary of the Ribault River

June 19, 2008

DEP conducted water quality and biological sampling at an unnamed creek at Aubrey Avenue in Duval County on June 19, 2008 to assess attainment of designated uses. This stream was one of many streams studied during the statewide nutrient criteria study (2008). This particular water body was selected because it is highly modified and the surrounding watershed is highly developed. Overall, the water quality and macroinvertebrate community data indicated that the stream did not meet 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. 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 Stream Condition Index (SCI) 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 SCI score.

Methods

This stream was sampled on June 19, 2008 by biologists from the DEP Northeast District Office. Surface water samples were collected for analysis of nutrients, chlorophyll-a, phaeophytin-a, color, total suspended solids (TSS), total organic carbon (TOC), and turbidity following DEP Standard Operating Procedures (SOPs, see http://www.dep.state.fl.us/water/sas/qa/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 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).

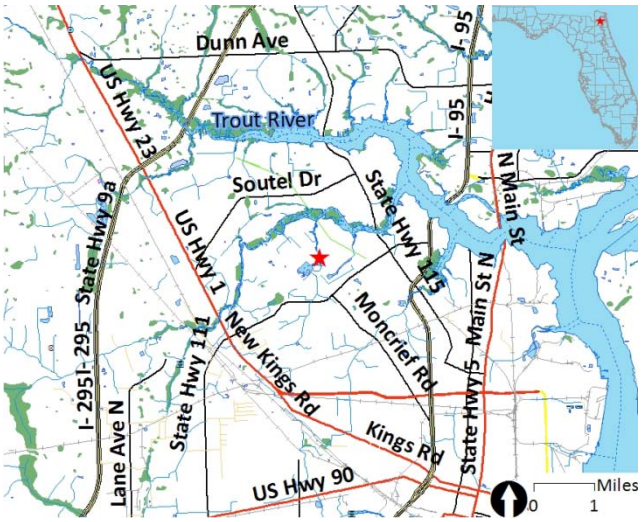


Figure 1. Location of unnamed tributary to Ribault River at Aubrey Avenue in Duval County.

Site Information

This tributary is approximately 4.5 km long, artificially channelized, with a sparse, narrow riparian buffer. The predominant land uses are residential and commercial property and roadways (Figures 1-3).

This creek is part of the approximately 9.71 mi^2 Ribault River system which is impaired for fecal coliform, an indicator organism used to determine sewage contamination. For the full report see: http://www.dep.state.fl.us/water/tmdl/docs/tmdls/final/gp2/tmdl_document2224.pdf

The location chosen for the SCI abutted a city park and a row of homes. This stream reach was chosen because the trees in the park provided some desirable habitat. The stream had significant amounts of trash including used oil containers, shopping carts, and plastic and paper products.

Results

Water Quality

The water quality samples did not comply with some water quality criteria (Table 1). The 2008 samples showed elevated levels of total phosphorus, and the dissolved oxygen concentration was below the Class III freshwater quality criteria of 5.0 mg/L.

Table 1. Water quality results from summer 2008 at unnamed tributary to Ribault River.

Analyte	Results	Applicable Class III Water Quality Criteria
Field Temperature (°C)	29.17	
Field pH (SU)	7.37	
Field Dissolved Oxygen (mg/L)	2.88	>5.00
Field Specific Conductance (µmhos/cm)	332	≤1275 or 50% above background
Turbidity (NTU)	0.1	≤ 29 above natural background
Color (PCU)	50 **A**	
Total Suspended solids (TSS)	4 **U**	
Total Phosphorus (mg/L)	0.15	≤ 0.12 *
Nitrate+Nitrite (mg/L)	0.079	
Ammonia (mg/L)	0.21	
Unionized ammonia mg/L	0.0045	≤ 0.02
Total Kejldahl Nitrogen (mg/L)	1.1	
Total Nitrogen (mg/L)	1.389	≤ 1.54 *

* Federally promulgated numeric nutrient criteria for the Peninsula nutrient region

A- arithmetic mean of 2 determinations.

U- compound was analyzed for but not detected.

Habitat Assessment

The stream and river habitat assessment score was 48, which is in the "marginal" range. It should be noted that all attempts were made to sample in the least impacted portion of this stream. Four aquatic habitats were identified: rock, aquatic plants, snags and leaf packs, but the total available habitat was approximately 6%. The stream was artificially channelized, most of the habitat was smothered with sediment, the water velocity was less than 0.1 m/sec, the banks were eroded, the vegetative buffer along the shoreline was mostly absent and what

vegetation remained was impacted by invasive species, namely wild taro (*Colocasia esculenta*).

Stream Condition Index

The SCI score for this site was 15 points, corresponding with a "Not Healthy" designation. Studies[1] have shown that with as little as 10% impervious structure in a basin, water quality and biological integrity can decline. This decline is largely due to reduced groundwater inputs, buffering and habitat, increased stormwater runoff and erosion, and unstable and smothered habitat. While the susceptibility of water bodies to human disturbance is high, these perturbations may be reduced by smarter urban planning that considers the environment as an asset. Reusing treated wastewater and stormwater for irrigation, relying less on groundwater, minimizing impervious surfaces and restoring /maintaining the riparian buffer along waterbodies are just a few ways to reverse stream degradation.

Periphyton

The algal community in the stream consisted of 21.31% cyanobacteria (blue-green algae), 10.16% green algae, and 68.52% 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. This periphyton survey did identify nuisance taxa including *Microcystis, Anabaena*, and *Lyngbya*, at low levels.

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.



Figure 2. Stream Condition Index site for the unnamed tributary to Ribault River is located near Aubrey Avenue in Jacksonville, FL.

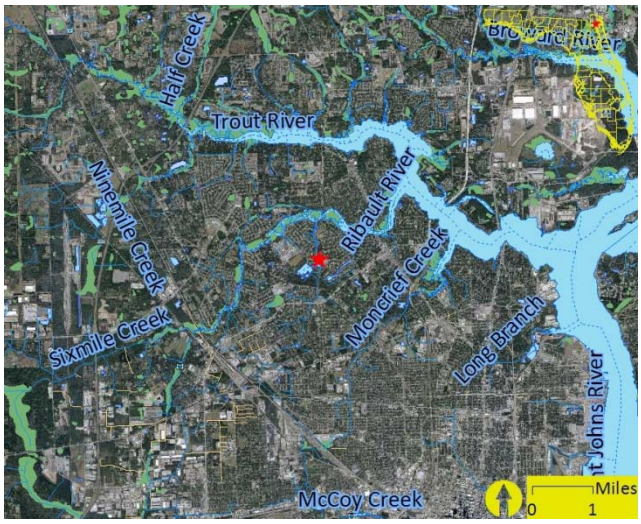


Figure 3. A 2009 aerial photo of the unnamed creek site showing intensive development in watershed.

Contact and resources for more information

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DEP biological assessment resources:
http://www.dep.state.fl.us/water/bioassess/index.htm

[1] Coastal Sprawl the Effects of Urban Design on Aquatic Ecosystems in the US. www.pewoceans.org.