STREAM ECOSUMMARY

Ates Creek, 4/13/2010

DEP conducted water quality and biological sampling at Ates Creek where it crosses C.R. 315 in Clay County on 4/13/2010 to assess attainment of designated uses. Ates Creek was sampled as part of a state wide Dissolved Oxygen study. Overall, the water quality and macroinvertebrate community 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. 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 exceedences 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 4/13/2010 by biologists from the DEP Northeast District Office. Surface water samples were collected for analysis nutrients, chlorophyll-*a*, phaeophytin-*a*, color, turbidity, alkalinity; 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: (68-100) 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 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).

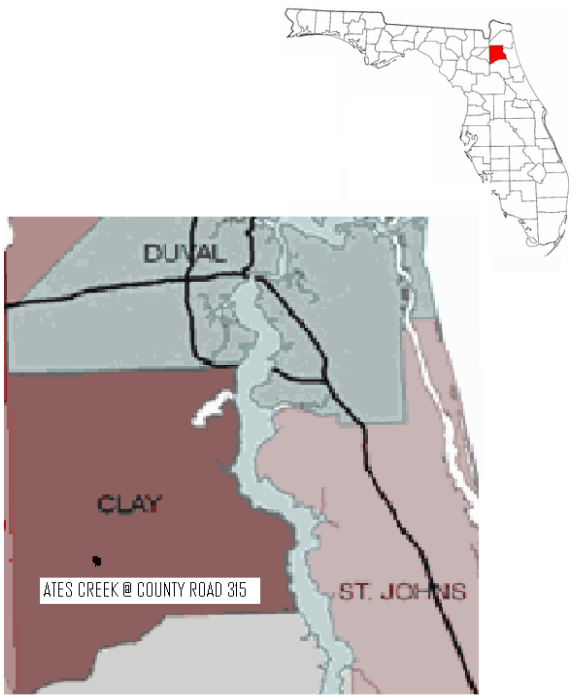


Figure 1. Location of Ates Creek in Clay County.

Site Information

A significant portion of Ates Creek drainage basin is located within Belmore State Forest. The landscape Development Index score was 1.3, with scores of <2 considered minimally disturbed by humans. There are no permitted point sources and only minimal non-point sources in the watershed.

Ates Creek was sampled upstream of the bridge on County Road 315 (See Figure 1). At this location the steam was approximately 4 meters wide with an average depth of 0.6 meters. The stream bottom consisted mainly of sand with no notable areas of silt or muck. Very little periphyton was observed throughout the stream reach. The riparian surfaces consisted of normal, expected plant community for the given sunlight and habitat conditions. No invasive plant species were noted.

This creek was selected for the Dissolved Oxygen (DO) study because historical data (64 samples) reveals that despite the minimal affects of humans, the stream does not meet the state water quality standard for dissolved oxygen (≥5.0 mg/L) in 20% of the samples. The lowest DO measured in Ates Creek was 1.43 mg/L. Additionally, 65% of all samples (64) the field pH was measured below 6.0 SU with the lowest measurement at 3.5 SU (very acidic).



Figure 2. Stream Condition Index site for Ates Creek at County Road 315.

Results

Water Quality

During this sampling event the water quality samples complied with water quality criteria. The dissolved oxygen, pH, alkalinity, total nitrogen, and total phosphorus values meet the water quality standards outlined in Chapter 62-302, F.A.C. (See Table 1).

Table 1. Water quality results from 4/13/2010 and 4/27/2010 at Ates Creek.

Analyte	Result 4/13/2010 (1)	Result 7/27/2010 (2)	Remark	Applicable Class III Water Quality Criteria
Field Temperature (°C)	16.9	25.5		
Field pH (SU)	5.05	4.88		Within Range
Field Dissolved Oxygen (mg/L)	7.41	6.1		≥ 5.0 (mg/L)
Field Specific Conductance	49	35		

(µmhos/cm)				
Alkalinity (mg $CaCO_3$/L)	0.65	0.65	U(1) U(2)	*Shall not be depressed below 20 mg $CaCO_3$/L*
Color (PCU)	160	100		
Chlorophyll a (µg/L)	1.2	0.55	U(2)	
Total Phosphorus (mg/L)	0.25	0.36		*≤ 0.12 mg/L* *
Nitrate+Nitrite (mg/L)	0.004	0.025	U(1)	
Ammonia (mg/L)	0.017	0.013		
Total Kejldahl Nitrogen (mg/L)0	0.54	0.36		
Total Nitrogen (mg/L)	0.54	0.39		*≤ 1.54 mg/L* *

* *F.A.C. Chapter 62-302 Surface Water Quality Standards* - DRAFT

U - Indicates that the compound was analyzed for but not detected.

Habitat Assessment

The stream and river habitat assessment score was 125, which is in the optimal range. Three productive habitats were found (snag, leaf, and roots). The substrate availability scored in the marginal range and the water velocity scored at optimal. Greater than 25% of habitats were affected by sand smothering. The stream did not appear to be channelized, had suboptimal bank stability and had adequate riparian buffer with optimal vegetative quality.

Stream Condition Index

The SCI score for this site was 92 out of a possible 100 points, corresponding with a "Exceptional" designation. In this sample many water quality sensitive macroinvertebrate groups were present including mayflies, stoneflies, caddis flies, dragonflies, black flies and midge flies. The macroinvertebrates collected represent the expected community of a healthy well balanced stream.

Conclusions

Although the water quality sample from this sampling event met all applicable water quality criteria, historical data confirmed that Ates Creek undergoes periods of intermittent low dissolved oxygen levels, low pH, and low alkalinity. Ates Creek drains naturally tannic water from a large area of surrounding wetlands. Wetlands have naturally low dissolved oxygen and, in tannic systems, have naturally low pH. As the low pH water enters the creek from the upstream wetlands, the alkalinity will be reduced accordingly as the buffering capacity is lost. The changes in alkalinity over time may be a result of the different sources of water that the creek is receiving, which in turn is dependent upon rainfall. Low alkalinity periods may indicate a wetland-dominated flow while periods with higher alkalinity may be periods of higher groundwater influence in addition to runoff from rain events. The SCI and Habitat Assessment data indicate that Ates Creek is functioning at as healthy, well-balanced stream.

Follow up on Ates Creek.

Another Habitat Assessment and Stream Condition Index were conducted on Ates Creek on July 27, 2010. The Habitat Assessment score was 125, in the "Optimal" category, and the SCI score was 87, corresponding with the "Healthy" designation. These data confirm that Ates Creek is a healthy, well-balanced stream despite intermittent low dissolved oxygen levels, low pH, and low alkalinity.

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.

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Contact and resources for more information

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