STREAM ECOSUMMARY

Ocklawaha River above St. Johns River, January 4, 2011

DEP conducted water quality and biological sampling at the Ocklawaha River in Putnam County on January 4, 2011. The Ocklawaha River was sampled as part of the strategic monitoring plan (SMP) for the Ocklawaha basin to verify potential biological and dissolved oxygen (DO) impairments. 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 even with some level of human disturbance, human 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 (F.A.C.), 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 are 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

The Ocklawaha River was sampled on January 4, 2011 by the DEP Central District Office. Surface water samples were collected for analysis of fecal coliform, biochemical oxygen demand, nutrients, chlorophyll-*a*, phaeophytin-*a*, color, alkalinity, turbidity, TDS, TSS, organic carbon, sulfate, chloride, and fluoride; following DEP 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). A water quality duplicate sample and field blank were collected at the same time as the Ocklawaha River water quality samples. 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 7200, the SCI score ranges and categories are: (68-100) Exceptional; (35-67) Healthy; and (0-34) Impaired. As part of numeric nutrient criteria development, DEP and EPA have concluded that a balanced faunal community is achieved if the average score of at least two temporally independent SCIs, performed at representative locations and times, is 40 or higher, with neither of the two most recent SCI scores 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).

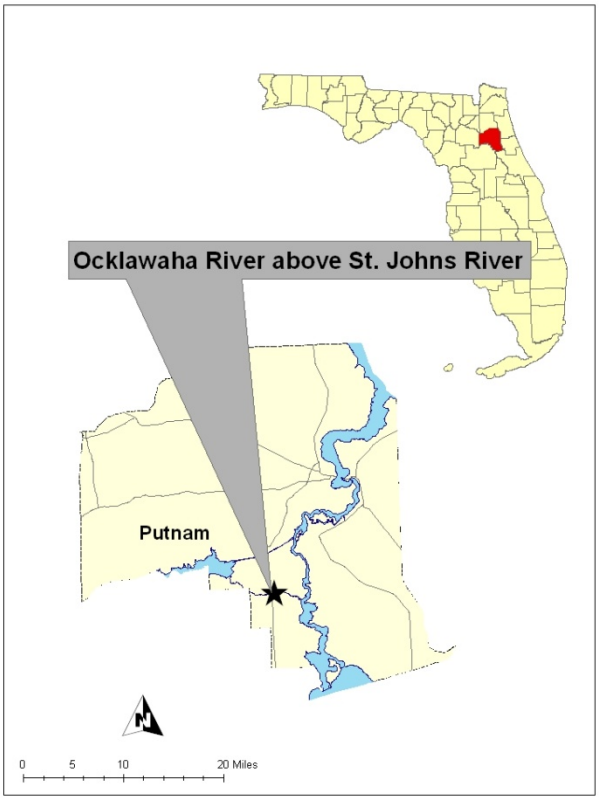


Figure 1: Location of the Ocklawaha River above the St. Johns River in Putnam County

Site Information

The Ocklawaha River was sampled upstream of the St. Johns River (downstream from Rodman Reservoir; See Figure 1). In this area, the average width of the river was 20 meters wide and the average depth was 2.5 meters. The sample site had an average velocity of 0.25 m/s. The stream bottom consisted mostly of sand, silt and natural organic material. The shoreline plant community consisted of cypress, red maple, swamp tupelo Carolina willow, climbing aster, wax myrtle, cattails, duck potato, and swamp lily (See Figure 2). The aquatic plant community consisted of islands of spatterdock. No exotic invasive plant species were identified during this assessment (www.FLEPPC.org). This sample was the first biological assessment conducted at this Ocklawaha River site.



Figure 2. Stream Condition Index transect at the Ocklawaha River on January 4, 2011.

Results

Water Quality

The water quality samples collected on January 4, 2011, complied with applicable water quality criteria. The dissolved oxygen (DO), total nitrogen (TN), and total phosphorus (TP) values meet the water quality standards outlined in Chapter 62-302, F.A.C. (Table 1).

An additional water quality sample was collected on April 14, 2011 for the strategic monitoring plan. The DO was 6.8 mg/L, TN was 0.51 mg/L and TP was 0.028 mg/L, all meeting surface water criteria specified in Chapter 62-302, F.A.C.

Table 1. Water quality results from January 4, 2011 at Ocklawaha River (STORET #: 20020561)

Analyte	Result	Result of Duplicate Sample	Applicable Class III Water Quality Criteria
Water Temperature (°C)	12.0		
Field pH (SU)	7.7		Within Range
Field Dissolved Oxygen (mg/L)	10.6		≥ 5.0 (mg/L)
Field Specific Conductance (µmhos/cm)	579		Not to exceed 50% of background or 1275 µmhos/cm
Secchi Depth (m)	VOB		
Total Depth (m)	3.6		
Alkalinity (mg $CaCO_3$/L)	148	147	
Turbidity (NTU)	0.45	0.8	≤ 29 above natural background
Total Dissolved Solids (mg/L)	324 A	323	
Total Suspended Solids (mg/L)	4 U	4 U	
Chloride (mg/L)	63	63	
Fluoride (mg/L)	0.17	0.17	≤ 10.0
Sulfate (mg/L)	55	54	
True Color (PCU)	9.0	9.9	
Chlorophyll-*a* (µg/L)	1.5	1.9	
Phaeophytin-*a* (µg/L)	0.96 I	0.55 I	
Organic Carbon (mg/L)	2.5 I	2.6 I	
Total Phosphorus (mg/L)	0.008 I	0.009 I	≤ 0.12 mg/L*
Orthophosphate (mg/L)	0.004 U	0.004 U	
Nitrate+Nitrite (mg/L)	0.21	0.21	
Ammonia (mg/L)	0.021	0.020 I	
Total Kjeldahl Nitrogen (mg/L)	0.26	0.26	
Total Nitrogen (mg/L)	0.47	0.47	≤ 1.54 mg/L*
Fecal Coliform (cfu /100 mL)	8 B		
Biochemical Oxygen Demand (mg/L)	1.0 I	0.8 I	

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

A - Value reported is the arithmetic mean (average) of two or more determinations

B – Results based on colony counts outside the acceptable range

I- The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit

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

VOB – Secchi disk was visible on bottom of stream

Habitat Assessment

The Stream and River Habitat Assessment score was 149, which is in the “Optimal” category. Four productive macroinvertebrate habitats were sampled: fallen trees (snags), leaf packs, aquatic vegetation and roots originating from the stream banks. Substrate availability scored in the suboptimal category with less than 25% of the productive habitats smothered with sand or silt. Otherwise, the stream had natural sinuosity, an adequate diversity of depths, and showed no evidence of physical alterations. The bank stability, riparian zone buffer width and vegetation quality components all scored perfect scores in the optimal category indicating that riparian disturbance is low in this watershed.

Stream Condition Index

The SCI score for this site was 74 out of a possible 100 points, corresponding with a “Exceptional" designation. In this sample, many water quality sensitive macroinvertebrate groups were present including mayflies, caddisflies, damselflies, dobsonflies, black flies, and aquatic beetles. The macroinvertebrates collected in this sample represent the expected macroinvertebrate diversity for a healthy, stream community.

Conclusions

The water quality data from this sampling event met all applicable water quality criteria including the dissolved oxygen criteria. The “Exceptional” SCI and “Optimal” Habitat Assessment data indicate that the Ocklawaha River is functioning as a very healthy, well-balanced stream and should not be listed as impaired for biology.

Follow up on Ocklawaha River

Another Habitat Assessment and Stream Condition Index were conducted on Ocklawaha River on April 14, 2011. The Habitat Assessment score was 124, in the “Optimal” category, and the SCI score was 71, corresponding with another “Exceptional” designation. These data confirm that the area of the Ocklawaha River studied met the expectations for a healthy, well-balanced stream.

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.

Contact and Resources for More Information

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http://www.dep.state.fl.us/central/Home/Watershed/default.htm

DEP Biological Assessment Resources:
http://www.dep.state.fl.us/water/bioassess/index.htm