STREAM ECOSUMMARY

Unnamed Drain at Halifax Drive, April 19, 2010

DEP conducted water quality and biological sampling at Unnamed Drain at Halifax Drive in Volusia County on April 19, 2010. Unnamed Drain was sampled as part of the strategic monitoring plan for the Upper East Coast basin to verify potential dissolved oxygen impairment. Overall, the water quality and macroinvertebrate community data indicated that the stream met expectations for a healthy, well-balanced stream. However, the total nitrogen and Stream Condition values were close to the impairment thresholds, and aquatic habitat conditions were not optimal.

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

This stream was sampled on April 19, 2010 by the DEP Central District Office. Surface water samples were collected for analysis of algal growth potential, biochemical oxygen demand, nutrients, chlorophyll-*a*, phaeophytin-*a*, turbidity, alkalinity, true color, sulfate and chloride; 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 blanks were collected at the same time as the Unnamed Drain 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).

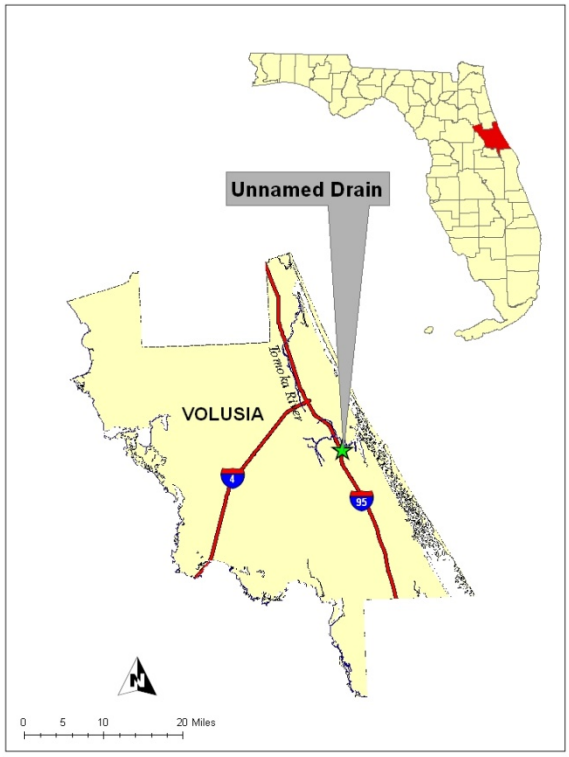


Figure 1. Location of Unnamed Drain at Halifax Dr. in Volusia County

Site Information

Unnamed Drain was sampled downstream of Halifax Drive bridge (see Figure 1). In this area, the average width of the stream was 1.5 meters and the average depth was 0.3 meters. The sample site had an average velocity of 0.25 m/s. The stream bottom consisted of sand, silt and muck. Periphyton was observed in the stream reach. The shoreline plant community consisted of pine, oak, red maple, cedar, wax myrtle, cabbage palm, saw palmetto, mock bishop's weed and water pennywort. The aquatic plant community consisted of southern naiad and azolla (See Figure 2). No exotic invasive plant species were identified during this assessment (www.FLEPPC.org).



Figure 2. Stream Condition Index transect at Unnamed Drain on 4-19-2010

No prior SCIs were conducted at the Unnamed Drain at Halifax Drive.

Results

Water Quality

The water quality samples complied with applicable water quality criteria (Table 1). The dissolved oxygen (DO), total nitrogen (TN), and total phosphorus (TP) values met the water quality standards outlined in Chapter 62-302, F.A.C. The TN concentration was just below the criterion, and that result was qualified due to a quality control failure, so additional samples should be evaluated to definitively determine compliance for TN (note that compliance with new numeric nutrient criteria cannot be determined with a single sample). A water quality sample was also collected on March 23, 2010. At that time the DO was 8.73 mg/L. Therefore, both DO measurements at this site met the Chapter 62-302, F.A.C. water quality standard of ≥ 5.0 mg/L.

Table 1. Water quality results from 4-19-2010 at Unnamed Branch at Halifax Drive (STORET # 27010216)

Analyte	Result	Sample Duplicate Result	Applicable Class III Water Quality Criteria
Field Temperature (°C)	20.8		
Field pH (SU)	7.6		Within Range
Field Dissolved Oxygen (mg/L)	8.17		≥ 5.0 (mg/L)
Field Specific Conductance (µmhos/cm)	191		Not to exceed 50% of background or 1275 µmhos/cm
Secchi Depth (m)	VOB		
Algal Growth Potential (mg/L)	4.11	6.26	
Alkalinity (mg $CaCO_3$/L)	20	21	
Turbidity (NTU)	6.4	6.2	
Chloride (mg/L)	25	25	
Sulfate (mg/L)	4.6	4.7	
True Color (PCU)	600	600	
Chlorophyll-*a* (µg/L)	1.3 I	1.4 I	
Phaeophytin-*a* (µg/L)	1.0 I	0.71 I	
Biochemical Oxygen Demand (mg/L)	1.7 I	1.9 I	
Total Phosphorus (mg/L)	0.037	0.036	≤ 0.12*
Nitrate+Nitrite (mg/L)	0.005 I	0.004 U	
Ammonia (mg/L)	0.026	0.025	
Total Kjeldahl Nitrogen (mg/L)	1.5	1.5	
Total Nitrogen (mg/L)	1.5	1.5	≤ 1.54*

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

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

U – Material was analyzed for but not detected. The reported value is the method detection limit for the sample analyzed.

VOB - Secchi disk visible on bottom of stream.

Habitat Assessment

The Stream Habitat Assessment score was 65, which is in the "Marginal" category. Two productive macroinvertebrate habitats were sampled: fallen trees (snags) and roots originating from the stream banks. Leaf packs were sampled as a minor habitat due to low availability. Substrate availability scored in the marginal category due to a low total percent habitat of 14% for the entire stream segment

surveyed. Over 25% of the productive habitats were smothered with sand or silt. The stream showed evidence of channelization but had developed some sinuosity within the spoil banks. Bank stability was marginal for the entire stream segment with obvious eroded areas. There was evidence of high water and scouring after rainfall events as Unnamed Drain transports stormwater in the watershed. The riparian buffer zone width and vegetation quality components scored in the poor category for both banks. Encroaching lawns and routine scouring were obvious sources of disturbance to the native plant community.

Stream Condition Index

The SCI score for this site was 46 out of a possible 100 points, corresponding with a "Healthy" designation. In this sample, many water quality sensitive species were present including mayflies, caddisflies, dragonflies, black flies, clams and aquatic beetles. The macroinvertebrates collected in this sample represent the expected macroinvertebrate diversity for a healthy, stream community.

Conclusions

Overall, the SCI and water quality data indicate that Unnamed Drain at Halifax Drive met the expectations for a healthy, well-balanced stream despite marginal habitat.

DEP was unable to collect a second sample in 2010 to confirm the assessment due to continuous low stream flow conditions. When streams are subject to very low flows or desiccation, it is imperative to wait at least a month after normal water level and flow returns, or six months if the stream was dry, to provide enough time for the macroinvertebrate community to reestablish before conducting a biological assessment.

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