STREAM ECOSUMMARY

Trout River below Turner Pond
WBID 2203
Duval County
February 14, 2013 and May 16, 2013

DEP conducted water quality and biological sampling at Trout River below Turner Pond in Duval County on February 14, 2013, and May 16, 2013, to assess attainment of designated uses. Stream Condition Index sampling was conducted as part of developing a Basin Management Action Plan for dissolved oxygen in the Trout River water body basin. 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 water body 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 water body 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.

Methods

This stream was sampled on February 14, 2013, by the DEP Northeast District Office. Surface water samples were collected for analysis of nutrients, chlorophyll *a*, color, alkalinity, and field parameters 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)

Chapter 62-302.531, F.A.C., provides that Numeric Nutrient Criteria are achieved in streams if: Information on chlorophyll *a* levels, algal mats or blooms, nuisance macrophyte growth, and changes in algal species composition do not indicate an imbalance in flora or fauna; AND EITHER

The average score of at least two temporally independent Stream Condition Indices (SCIs) is 40 or higher, with neither of the two most recent SCI scores less than 35, OR

The nutrient thresholds (expressed as annual geometric means) are not exceeded more than once in a three year period. The nutrient thresholds are found in Table 1. The floral and faunal measures are described below.

Table1. Nutrient thresholds for Florida Nutrient Regions, expressed as Annual Geometric Means (based on a minimum of four samples per year), not to be exceeded more than once in a three year period.

Nutrient Region	Total Phosphorus Threshold	Total Nitrogen Threshold
Panhandle West	0.06 mg/L	0.67 mg/L
Panhandle East	0.18 mg/L	1.03 mg/L
North Central	0.30 mg/L	1.87 mg/L
Peninsula	0.12 mg/L	1.54 mg/L
West Central	0.49 mg/L	1.65 mg/L
South Florida	No numeric nutrient threshold. The narrative criterion in paragraph 62-302.530(47)(b), F.A.C., applies.	

Dissolved Oxygen

Rule 62-302.533 (1), F.A.C., states that no more than 10 percent of the daily average percent dissolved oxygen (DO) saturation values shall be below 67 percent in the Panhandle West bioregion, 38 percent in the Peninsula and Everglades bioregions, or 34 percent in the Northeast and Big Bend bioregions. Percent saturation takes into account factors such as temperature, atmospheric pressure, and salinity.

Habitat Assessment

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).

Floral Assessment

Evaluations of stream flora include the Rapid Periphyton Survey (RPS, DEP SOP FS 7230), community composition information associated with dominant algal taxa (where applicable), Linear Vegetation Survey (LVS, DEP SOP 7320), and chlorophyll *a*. The RPS assesses the extent and thickness of algae in the stream reach, while the LVS assesses how closely the in-stream plant community resembles a minimally disturbed condition. Results are assessed as described beginning on page 8 of "*Implementation of Florida's Numeric Nutrient Standards*," dated April 2013, using evidentiary thresholds derived from a population of minimally disturbed reference sites.

Faunal Assessment

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 SCI was sampled and calculated per DEP SOP SCI 1000. For the SCI, ten measures of macroinvertebrate health are calculated and summed to yield a final score from 0-100. Average SCI scores ≥ 40 are considered "Healthy" (as long as neither of the latest two SCI scores were < 35) with scores ≥ 64 considered "Exceptional."



Figure 1. Location of Trout River below Turner Pond in Duval County.

Site Information

The Trout River below Turner Pond site is approximately 120 meters downstream of a pond on the Turner farm property. The land upstream of this site is utilized for cattle grazing. The flow of the river through the pasture has been altered to include ponds as part of Trout river flow. Immediately downstream from this site is a large swamp. The landscape development intensity index (LDI) is 2.29. This LDI value describes the amount of urban development upstream of the site on a scale of 1-10, one being natural, and 10 with the most urban development. The land upstream of this location is a source of localized nonpoint source pollution. This pollution runoff from the land to the River would be high after a rainfall. The Middle Trout WBID is on the Impaired Waters List as verified impaired for specific conductance, dissolved oxygen, fecal coliform, and iron.



Figure 2. Stream Condition Index site for Trout River below Turner Pond on 5/16/2013

Results

Water Quality

The water quality samples from February 2, 2013 complied with water quality criteria (Table 2). The dissolved oxygen (DO) was below the former state standard of 5.0 mg/L. The current standard is based on the temperature but met the revised state standard, which is based on percent saturation of DO and temperature, the values should be between 37% and 42% and accounts for the natural DO ranges found in Florida. The low DO level has been shown to be naturally occurring and can support a healthy benthic macroinvertebrate community. The nitrogen values were below class three numeric nutrient criteria for the Florida Peninsula nutrient region. The May 16, 2013 phosphorus level exceeded the numeric nutrient criteria for the Peninsula region. The numeric nutrient criteria for streams are expressed as the annual geometric mean and cannot be exceeded more than once in three years with a minimum of four samples. The increased nutrients measured in May can be attributed to high flows and increased runoff into the creek. On May 2 -4, 2013, three days of rainfall totaled over three inches. This increased runoff from the surrounding land increased delivery of organic matter into the stream. The organic matter subsequently breaks down and releases nutrients.

Table 2. Water quality results from 2/14/2013 and 5/16/2013, at Trout River below Turner Pond

Analyte	Result 2/14/13	Result 5/16/13	Applicable Class III Water Quality Criteria
Field Temperature (°C)	16.5	19.5	
Field pH (SU)	6.8	6.8	
Field Dissolved Oxygen (mg/L)	4.1	3.4	
Field Dissolved Oxygen (% saturation)	42.0	37.0	≥ 34% (Northeast Region)
Field Specific Conductance (µmhos/cm)	178	125	1275 µmhos/cm or 50% above background, whichever is greater
Alkalinity (mg $CaCO_3$/L)	36	22	

Color (PCU)	120	360	
Chlorophyll a (µg/L)	1	6.8	≤20µg/L; 3.5 to 20 µg/L=site specific
Total Phosphorus (mg/L)	0.073	0.19	≤0.12, as an annual geometric mean
Nitrate+Nitrite (mg/L)	0.02	0.066	
Ammonia (mg/L)	0.03	0.059	
Total Kejldahl Nitrogen (mg/L)	0.65	1.2	
Total Nitrogen (mg/L)	0.67	1.266	≤1.54, as an annual geometric mean

Habitat Assessment

The stream and river habitat assessment scores were 117 and 122 for the two samplings, which puts it in the optimal to suboptimal range. There were three habitats: snags, roots, and leafs. The stream was a sinuous stream with an intact riparian buffer. The high rain preceding the May sampling event caused displacement of vegetation from the upstream pond to the downstream study site. The vegetation was Alligator weed, *Alternanthera philoxeroides*, an invasive plant.

Stream Condition Index

The SCI score on 2/14/13 was 60 out of a possible 100 points, which is the category "Healthy." The total taxa richness ranged from 22 to 33 species in the two replicate analyses. The dominant species in the replicates were the midge, *Rheotanytarsus exiguus*, and the mayfly, *Caenis*. There were three sensitive species, and very few tolerant organisms (1.3-4%).

The 5/16/13 sampling SCI score was 38, which corresponds to a healthy designation. This SCI score is in the designated category "healthy;" however the margin of 22 points from the previous sample is a significant change. The dominant taxon for the second sampling was the amphipod *Hyallela azteca*. The Hyallella azteca comprised sixty to seventy percent of the total sample composition. It is likely the rain event washed down the high numbers of *Hyallela azteca* from the upstream pond into the stream segment.

The SCI metrics are designed to score the level of diversity in the following variables: total taxa, tolerance and sensitivity, percentages of macro invertebrate orders, as well as feeding guilds. In a healthy stream a good diversity is expected across all variables. When there is a preponderant dominance of one species, the score is lower. Two SCI sampling events, at a minimum, are used to determine the biological status of a water body. The average SCI score for Trout River below Turner Pond on February 14 and May 16, 2013 is 49, a "healthy" designation.

Floral Assessment

The results of floral surveys are shown in Table 3. The overall periphyton coverage on submerged logs and detritus was low to absent. The periphyton survey showed no high growth areas as described by algal thickness greater than 6 mm. The canopy was heavily shaded which prevents light penetration and growth of periphyton.

Table 3. Floral and faunal assessment results from 2/14/2013 and 5/16/2013 at Trout River.

Floral/Faunal Metric	Evidentiary Threshold of No Imbalances	Result 2/14/13 Sample [71174]	Result 5/16/13 Sample [71377]
LVS C of C	Site average ≥ 2.5		
LVS FLEPPC	Site average < 25%		
RPS % points ranked 4-6	< 25% rank 4-6 (algae > 6 mm thick). If 20 to 25 % rank 4-6, evaluate algal species	0	0
Chlorophyll *a* (corrected; µg/L)	< 3.2 ug/L. If 3.2 to 20 ug/L, site specific evaluation	1	6.8
Algal Community Composition	No adverse shifts in dominant taxa	N/A	N/A
SCI	Average ≥ 40	60	38

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:

Jeremy Parrish, Surface Water Assessment
Northeast District

Jeremy.M.Parrish@dep.state.fl.us

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