STREAM ECOSUMMARY

Banana Branch / Roberts Canal

4/12/12 and 12/10/2012

DEP conducted water quality and biological sampling at Banana Branch in Hendry County on April 12, 2012 and December 10, 2012 to assess attainment of designated uses. The sampling was conducted to observe the biological community and the main parameter of concern, dissolved oxygen. The stream was listed on the DEP Strategic Monitoring Plan for 2012. Overall, the water quality and macroinvertebrate community data indicated that the stream met the expectations for a healthy, well-balanced stream.

Background

Healthy, well-balanced stream and river communities may be maintained with some level of human activity, but excessive human disturbance may result in waterbody degradation. Human stressors may include increased inputs of nutrients, sediments, and/or other contaminants from watershed runoff, adverse hydrologic alterations, undesirable removal of habitat or riparian buffer vegetation, and introduction of nuisance (generally exotic) plants and animals. DEP evaluates 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 use support), and exceedances of these standards is associated with interference with the designated use. Additionally, DEP evaluates the health of floral (plants and algae) and faunal (animal) communities and conducts habitat assessments to diagnose potential physical impacts.

Methods

This stream was sampled on 4/12/2012 and 12/10/2012 by DEP South District staff.

Water Quality
Surface water samples were collected for analysis of nutrients, chlorophyll, color, and ions 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 consecutive 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."

Evaluation of Stream Exclusions for Applying Nutrient Criteria

When assessing a stream for compliance with numeric nutrient criteria (NNC) in Rule 62-302.531, F.A.C., it is important to note that several waterbody types are excluded from the stream definition in Rule 62-302.200(36), F.A.C. These include lake-like portions of rivers (where the lake NNC apply) and ditches/canals used for water management purposes, non-perennial streams, wetlands, and tidally fluctuating areas (where the narrative criterion, "no imbalances in natural populations of aquatic flora or fauna," continues to apply). The NNC in Rule 62-302.531, F.A.C., were applicable to this site.

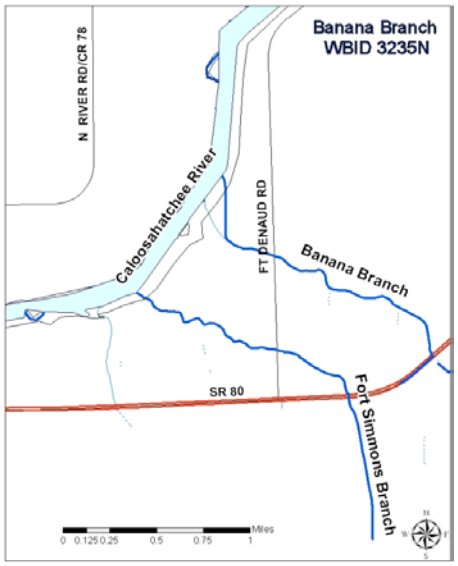


Figure 1. Location of Banana Branch in Hendry County.

Site Information

The SCI site starts on the east side of Fort Denaud Road and follows Banana Branch northwest for 100 meters (Figure 1). The stream has banks with a narrow wooded buffer encompassed by orange groves on one side and mowed grass with scattered trees on the other. It should be noted that Banana Branch is also known as Robert's Canal, and is an artificially channelized waterway to the north west of this more natural sampling site. The in-stream habitat consisted mostly of submerged roots, leaf mat, and sand.



Figure 2. Stream Condition Index site for Banana Branch on April 12, 2012 and December 10, 2012.

Results

Water Quality

The water quality samples complied with water quality criteria (Table 2).

Based on these two sampling events, the stream met the nutrient thresholds for the Peninsula; however the thresholds represent annual geometric mean concentrations (minimum of four samples) not to be exceeded more than once in any three calendar year period, and are used in combination with floral and faunal information. Therefore even though the thresholds were not exceeded, additional nutrient sampling may be needed to meet data sufficiency requirements to calculate and assess attainment of the water quality standard.

Although the SCI scores reflect a stream that meets its designated uses, it should be noted that a nutrient TMDL is under development for the downstream waterbody (Caloosahatchee River – WBID 3235B). In addition, a TMDL has been established for the tidal Caloosahatchee (WBIDs 3240A, 3240B, and 3240C). These downstream TMDLs may require nutrient load reductions in the Banana Branch WBID 3235B.

Table 2. Water quality results from 4/12/2012 and 12/10/2012 at Banana Branch

Analyte	Applicable Class III Water Quality Criteria	Result 4/12/12	Result 12/10/12
Field Temperature (°C)	-	21.88	22.09
Field pH (SU)	6.0 – 8.5	7.01	7.26
Field Dissolved Oxygen (mg/L)	-	6.11	5.10
Field Dissolved Oxygen (% saturation)	≥38% saturation	70%	58%
Field Specific Conductance (µmhos/cm)	≤ 1,275	611	520
Alkalinity (mg $CaCO_3$/L)	>20	169	190
Color (PCU)	-	65	91
Chlorophyll a (µg/L)	≤ 20 ug/l	1.2 I	1.3
Total Phosphorus (mg/L)	≤ 0.12 mg/L	0.05	0.096

Nitrate+Nitrite (mg/L)	-	0.008 I	0.19
Ammonia (mg/L)	-	0.025	0.051
Total Kejldahl Nitrogen (mg/L)	-	1.0	1.3
Total Nitrogen (mg/L)	≤1.54 mg/L	1.01	1.49

* Federally promulgated numeric nutrient criteria for the Peninsula nutrient region

Habitat Assessment

The stream and river habitat assessment score was 93 on 4/12/2012 and 87 on 12/10/2012, which are in the suboptimal range, and should support a healthy biological community. Substrate diversity, water velocity, habitat smothering, and artificial channelization scores were in the optimal and suboptimal range, while substrate availability, bank stability, and riparian buffer width and quality were marginal or poor.

Table 3. Floral and faunal assessment results from 4/12/2012 and 12/10/2012 at Banana Branch

Floral Metric	Evidentiary Threshold of No Imbalances	Result 4/12/12	Result 12/10/12
LVS C of C	Site average ≥ 2.5	N/A	N/A
LVS FLEPPC	Site average < 25%	N/A	N/A
RPS	< 25% rank 4-6 (algae > 6 mm thick) coverage. If 20 to 25 % rank 4-6 coverage, evaluate algal species	31%	0%
Chlorophyll *a* (corrected; µg/L)	< 3.2 ug/L. If 3.2 to 20 ug/L, site specific evaluation	1.2 I	1.3
Algal Community Composition	No adverse shifts in dominant taxa	Vaucheria sp.	None
SCI	Average ≥ 40	60 A	52 A

A – Value is the mean of two or more determinations
I – Reported value is between the method detection limit and the practical quantitation limit
N/A – Not available

Stream Condition Index

The average SCI score for this site was 56, with a 60 and 52 on 4/12/12 and 12/10/12 respectively, this corresponds with a “Healthy" designation.

Periphyton

The attached algal community in the stream exceeded the 25% threshold of algae greater than 1mm in length on April 12, 2012 (31%), but was not observed during the December 10, 2012 sampling. A follow-up sampling in the spring is advisable to determine whether the algae measured in April was a one-time occurrence or persists at other times of the year. (Table 3).



Figure 3. Banana Branch looking upstream

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