STREAM ECOSUMMARY

Poley Creek, WBID 1583

Polk County

March 7, 2012 & December 13, 2012

STORET Station 275526708201506



Figure 1. Location of SCI site on Poley Creek.

The Florida Department of Environmental Protection Southwest District (SWD) biologists conducted water quality and biological sampling at Poley Creek (TP489POLEY, Figure 1) in Polk County on March 7, 2012 and again on December 13, 2012, with the objective to gain further information on the biological health of the watershed as part of Florida's Watershed Assessment and Total Maximum Daily Load programs. The parameter of concern identified for Poley Creek was Dissolved Oxygen (DO). Overall, the water quality and macroinvertebrate community data indicated that the stream met expectations for a healthy, well-balanced stream.

❖ Background

The biological assessment method used was the Stream Condition Index (SCI), developed by the Florida Department of Environmental Protection (FDEP) to determine ecological integrity of aquatic macroinvertebrate communities. The SCI assesses how closely the macroinvertebrate community of a stream resembles that of an undisturbed or "reference" condition. The SCI is based on ten measurements of the aquatic macroinvertebrate community, eight of which decrease in response to human disturbance, and two metrics (% very tolerant and % dominant) that increase with greater human disturbance. As described in DEP SOP LT 7000, the SCI score ranges and categories are: (68-100) Exceptional; (35-67) Healthy; and (0-34) Impaired. As part of numeric nutrient criteria development, an SCI score of 40 or higher, based on the two most recent samples, was determined to fully meet the expectation of a healthy, well-balanced community, with no single value below 35.

Each SCI includes assessment of stream habitat, Rapid Periphyton Survey (RPS), Linear Vegetation Survey (LVS) and qualitative collection of periphyton (algae that is attached to in-stream substrates). The habitat assessment evaluates the availability and quality of in-stream habitat for macroinvertebrates, and can help diagnose the cause of a low SCI score. The RPS data measures percent cover of algae present in the stream and the collected periphyton data provides species identification. Some growth of algae (diatoms in particular) is normal in a fully functioning stream, but an over-abundance of algae (especially filamentous algae) may reduce habitat quality (by smothering) and result in the production of excess organic matter. The decomposition of surplus organic matter can reduce the oxygen content of the stream water, which can harm fish and invertebrates.

The Rapid Periphyton Survey measures the relative percentage of filamentous algae in the 100 m stream segment. The Linear Vegetation Survey provides a snapshot of the aquatic plant community (plants growing on the banks are not taken into consideration).

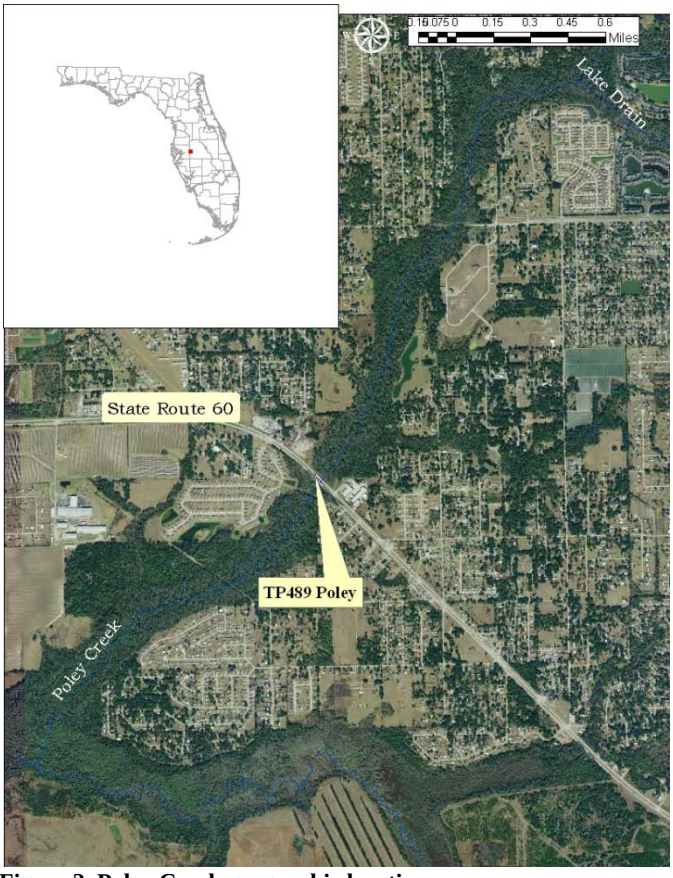


Figure 2. Poley Creek geographic location

❖ Watershed Characteristics

Poley Creek originates south of the Polk Parkway, in Lakeland, Polk County. The creek flows south for 9 miles until it converges with the North Prong of the Alafia River (Figure 2). The primary land use in Poley Creek is medium density residential development, with a small amount of agriculture (~15% of the total land use).

❖ Methods

The site (TP489POLEY) is located upstream of US Highway 60, above the area dredged during bridge construction (Figure 2). The SCIs were collected by the SWD staff on March 07, 2012 and December 13, 2012, per DEP SOP FS 7420. The SCI consists of collecting 20 D-frame dipnet sweeps (0.5 m in length) of the most productive habitats in a 100 m reach of stream. The organisms are sub-sampled, sorted, and identified to the lowest practical taxonomic level.

Periphyton (attached algae) was collected using DEP's Qualitative Periphyton Method (DEP SOP FS 7220). A total of 10 sample aliquots are apportioned across available habitats (snags, roots, leaf packs, vegetation and rock, excluding sediments) in a 100 m stream reach. To perform the method, a seasoned substrate is chosen, and algae is removed from a 9 cm diameter area and placed into a wide-mouth jar that was been filled with 100 ml of site water. Water and algae are mixed and a 4 ml aliquot is removed and placed into a centrifuge tube. Nine additional aliquots are sampled in this manner for a final volume of 40 ml. A subsample of algae in the vial are identified to the lowest practical taxonomic level.

The Rapid Periphyton Survey (RPS) was conducted per DEP SOP FS 7230. The RPS quantifies the extent and percentage of attached algae in a 100 m stream reach, with no taxonomic identification.

The Linear Vegetation Survey (LVS) was conducted per DEP SOP FS 7320. The LVS documents the submersed, floating, and emergent plant species growing within each 10 meter segment of a 100 m stream reach.

❖ Results

The Scores for the Habitat Assessment (HA) were 117 in March, and 127 in December, both of which were in the optimal habitat category, indicating that the stream reach has been minimally disturbed by human influences. The riparian zone was mostly natural and quite extensive, over 100 meters on both east and west sides. The in-stream habitat in this section of Poley Creek was predominantly sandy bottom. The water level was lower in March than in December, but there was sufficient flow and habitat for sampling on both dates. In March, there were two productive habitats (snags and roots) comprising over 6% substrate available for in-stream fauna. In December, three productive habitats were present (snags, roots and leaves), providing more than 6% available for invertebrate and fish use. Less than 25% of the habitat was smothered by either sand or silt accumulation and water velocity was 0.25 meters per second on both sampling days.

Table 1 summarizes the water quality measurements for March and December, 2012. All parameters met applicable criteria with the exception of Total Phosphorous (TP). On both dates, TP exceeded the reference stream-derived nutrient thresholds for the West Central Region (see Chapter 62-302.531, F.A.C.). However, compliance with numeric nutrient criteria requires calculation of an annual geometric mean, not to be exceeded more than once in any three year period, as well as an evaluation of flora and fauna, so additional information must be assessed (see below).

Table 1. Water quality results for sampling events on 03/07/12 and 12/13/12 at Poley Creek (TP489POLEY).

Analyte	Result 3/7/2012	Result 12/13/12	Applicable Class III Water Quality Criteria (freshwater)
Field Temperature (°C)	17.22	20.61	
Field pH (SU)	7.54	7.58	≥6 and ≤8.5
Field Dissolved Oxygen (mg/L)	7.76	6.94	≥ 5.0
Field Specific Conductance (µmhos/cm)	329	324	Not to exceed 50% of background or 1275 µmhos/cm
Alkalinity (mg $CaCO_3$/L)	135	111	≥20
Color (PCU)	28	52	
Chlorophyll a (µg/L)	5.8	1.8	
Total Phosphorus (mg/L)	1.8	0 .95	*0.49 mg/L
Nitrate+Nitrite (mg/L)	0.47	0.18	
Ammonia (mg/L)	0.042	0.025	
Total Kejldahl Nitrogen (mg/L)	0.75	0.6	
Total Nitrogen (mg/L)	1.22	0.78	*1.65 mg/L

* F.A.C. Chapter 62-302 Surface Water Quality Standards for West Central Region

In March, the SCI score was 41 and in December it was 48, meeting the requirements of the FDEP's healthy Category 2 status. The invertebrate community was quite diverse on both sampling dates, with several sensitive species. However, the grazing snails (Hydrobiidae and *Pyrgophorus platyrachis)* and the amphipod *Gammarus* sp. dominated both sampling events, comprising 36.32% and 35.86% of the community in March and December, respectively.

Pyrgophorus platyrachis and *Gammarus* are both grazers/scrapers, primarily of filamentous algae and diatoms.

The periphyton identification results indicated a productive algal community dominated by diatoms and did not suggest biological imbalance to the ecological integrity of the stream. In March, the attached algal community in the stream consisted of 82.33% diatoms, 3% green algae, 14.67% blue-green algae. In December, the attached algal community in the stream consisted of 89.33% diatoms, 2.67% green algae, 8% blue-green algae. The dominant diatom collected in March was *Planothidium delicatulum*, and in December was *Navicula sp*. The most common algae that was not a diatom, for both March and December was *Schizothrix calcicola*, a ubiquitous cyanobacteria species.

The Linear Vegetation Survey revealed no plants within the stream during both visits. The Rapid Periphyton Survey found no algal mats within the stream at the time of sampling.

❖ Significance

Total phosphorous levels at this location in Poley Creek on March 7 and December 13, 2012 exceeded the regional nutrient threshold; however, compliance with numeric nutrient criteria requires calculation of an annual geometric mean, not to be exceeded more than once in any three year period, and an evaluation of stream flora and fauna. Since the primary landuse in the basin is residential development, it is possible that lawn fertilization and other residential activities contribute to the elevated TP. However, because the stream flora and fauna were healthy, the existing levels of TP comply with the numeric nutrient criteria in Chapter 62-302.531, F.A.C.



Figure 4. Dragonfly emerging (TP489POLEY)

❖ Recommendations

FDEP recommends that continued water quality and biological sampling be performed, to determine if there are declining trends in biological quality and if the elevated TP is persistent and exceed the regional nutrient thresholds over time.

❖ References

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