STREAM ECOSUMMARY

Cypress Creek, WBID 1402

Hillsborough County

STORET Station 28051158224353



The Florida Department of Environmental Protection (FDEP) Southwest District conducted water quality and biological sampling at Cypress Creek, Hillsborough County, in 2012. The purpose of the study was to assess the biological health of the stream and to evaluate whether the previously observed low dissolved oxygen (DO) was due to natural factors. This information will subsequently be used by Florida's Watershed Assessment and Total Maximum Daily Load programs. The macroinvertebrate community data demonstrated that the stream met expectations for a healthy, well-balanced stream. Based on the extensive natural riparian zone vegetation community (which buffers potential human effects) and the healthy biological score, it was concluded that the low dissolved oxygen levels in Cypress Creek are natural, and characteristic of a dark-water stream draining swampland.

❖ Background

The biological assessment method used was the Stream Condition Index (SCI), developed by 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 FDEP SOP LT 7200, the SCI score ranges and categories are: (68-100) Exceptional; (35-67) Healthy; and (0-34) Impaired. Recently adopted biological assessment criteria state that an SCI score of 40 or higher, based on the two most recent samples, with no single value below 35, meets the expectation of a healthy, well-balanced community.

Each SCI is accompanied by a stream Habitat Assessment (HA), 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 abundance 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 1. Geographic location of Cypress Creek STORET Station 28051158224353.

❖ Watershed Characteristics

Cypress Creek is a second-order, slow-flowing, dark-water stream that originates in the Big Cypress Swamp west of

Dade City in Pasco County. It flows south for approximately 20 miles until it converges with the Hillsborough River in the vicinity of the USF Riverfront Park north of Fletcher Ave in Temple Terrace (Figure 1). The primary land use in the Cypress Creek watershed is medium density residential development, but the extensive cypress flood plain has been left intact for the majority of the Creek's length. This riparian buffer, which has been minimally disturbed by human activities, provides ecosystem services such as flood attenuation and mitigation of nutrients and other potential pollutants that may have originated in the watershed.

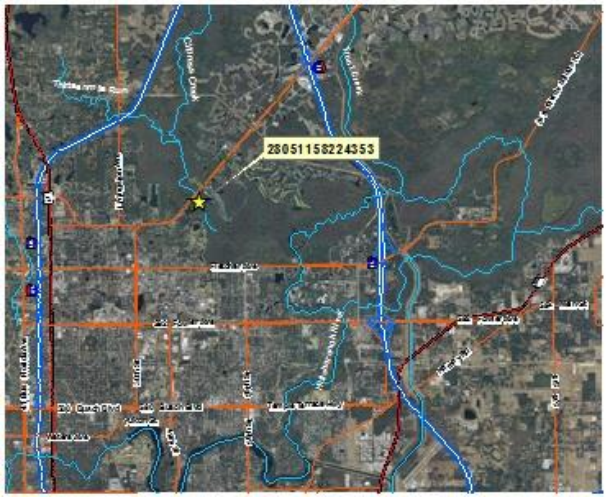


Figure 2. Cypress Creek site location (28051158224353).

Historically, water velocity and dissolved oxygen (DO) have been low throughout the watershed. Surface water DO data collected by several agencies, from 1968 to 2013, was compiled as average values for each month and shown in Figure 3 (Tampa Bay Water Atlas). Although monthly DO averages were consistently below the pre-2013 State Standard of 5.0 mg/l (Chapter 62-302, F.A.C, Surface Water Quality Standards, results from the DEP sampling events illustrate that this is a natural phenomenon.

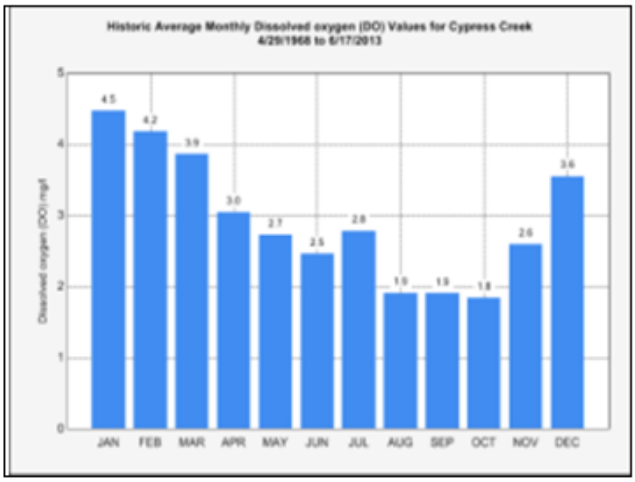


Figure 3. Average monthly DO values for Cypress Creek from 1968 to 2013 (Tampa Bay Water Atlas).

❖ Methods

The site (28051158224353) is located downstream of Bruce B. Downs Boulevard, below the area dredged during bridge construction (Figure 2). Cypress Creek in this location has greater water velocity than many other sites in the watershed. The SCIs were collected by the FDEP biologists on February 2, 2012, and December 26, 2012, per FDEP 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 per FDEP SOP LT 7200. Habitat Assessments were performed according to FDEP SOP FT 3100.

Periphyton (attached algae) was collected using FDEP's Qualitative Periphyton Method (FDEP 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.

The RPS was conducted per FDEP SOP FS 7230. The RPS quantifies the extent and percentage of attached algae in a 100 m stream reach.

The LVS was conducted per FDEP 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 142 on February and 136 in December, 2012, both in the optimal habitat category and indicate that human disturbance in the watershed is minimal The in-stream habitat in this section of Cypress Creek was predominantly sandy bottom. In February, there were three productive habitats (snags, macrophytes and roots) comprising 16% of stream area available for invertebrate and fish use. In December, the aquatic vegetation had been scoured out with the summer floods, leaving only two productive habitats (snags and roots), providing 15% of substrates available for invertebrate and fish use. There was virtually no habitat smothering by either sand or silt accumulation and bank erosion was virtually nonexistent.. Water velocity was 0.22 m/s on February 2, 2012 and 0.3 m/s on December 26, 2012 (both optimal values).

Table 1 summarizes the water quality measurements for February and December, 2012. While nutrients were low compared to the West Central thresholds, the elevated color (150 and 120 PCU) clearly indicated the presence of tannins leached from decaying leaf litter, which is typical of forested

swamps in Florida. The extensive cypress floodplain and riparian zone buffer, in conjunction with observations that there were minimal human sources of pollutants entering the stream, indicates that the water quality in Cypress Creek approximates natural conditions. Despite the minimal human disturbance, the DO percent saturation was moderately lower than the Peninsula criteria of 38%. DO levels in this range (and see Figure 3) are typical in swamp dominated systems, primarily due to the natural decomposition of the forest leaf litter and vegetative organic matter.

Table 1. Water quality results for sampling events on 02/02/12 and 12/26/12 at Cypress Creek (28051158224353).

Analyte	Result 2/02/12	Result 12/26/12	Applicable Class III Water Quality Criteria (freshwater)
Field Temperature (°C)	17.07	16.43	
Field pH (SU)	7.52	6.82	≥6 and ≤8.5
Field Dissolved Oxygen (mg/L)	2.92	3.68	
Field Dissolved Oxygen Percent Saturation	30.3	37.7	38% as a daily average
Field Specific Conductance (µmhos/cm)	277	289	Not to exceed 50% of background or 1275 µmhos/cm
Alkalinity (mg $CaCO_3$/L)	114	112	≥20
True Color (PCU)	150	120	
Corrected Chlorophyll a (µg/L)	1.4	3.7	
Total Phosphorus (mg/L)	0.035	0.047	*0.49 mg/L
Nitrate+Nitrite (mg/L)	0.018	0.013	
Ammonia (mg/L)	0.031	0.044	
Total Kejldahl Nitrogen (mg/L)	1.2	1.3	
Total Nitrogen (mg/L)	1.22	1.31	*1.65 mg/L

*** Chapter 62-302, F.A.C. , nutrient thresholds for the West Central Region, assessed as annual geometric means not to be exceed more than once in a three year period.**

Even though the DO was below 38% saturation, the biological community was healthy. In February, the SCI score was 54 and in December it was 52, both events meeting the requirements of the FDEP's "healthy" status. The invertebrate community was relatively diverse on both sampling dates, with low percent dominance by any one species. Mayflies and chironomid midges were the most abundant organisms on both dates.

The periphyton identification results indicated a productive algal community dominated by diatoms and did not reveal biological imbalance to the ecological integrity of the stream. In February, the attached algal community in the stream consisted of 77.41% diatoms, 4.32% green algae, and 17.94% blue-green algae. In December the attached algal community in the stream consisted of 69.33% diatoms, 3.67% green algae and 26.33% blue-green algae. The dominant diatom collected in February was *Achnanthes rupestoides*, and in December was *Hippodonta hungarica*. No filamentous green algae were observed during either sampling event.

In February, the macrophytes *Ludwigia repens* (red ludwigia) and *Hydrocotyl* sp. (pennywort) comprised 5% of the total stream area. In December, these plants were gone, having been flushed out by summer rain events.

❖ Significance

Dissolved oxygen levels in Cypress Creek have been shown to be historically below the previous Florida F.A.C water quality standard of 5.0 mg/l. At the FDEP site, 28051158224353, DO levels were also below the new 2013 DEP standard of 38% saturation. However, the biological results indicate that the macroinvertebrate and periphyton communities are healthy. The healthy biology, coupled with the extensive natural floodplain cypress forest, relatively high water color (tannins), and observations that there were no sources of pollutants reaching the stream, reinforces the conclusion that the DO is a natural phenomenon.

❖ References

FDEP-SOP-002/01 FS 7000 General Biological Community Sampling, 12/03/08
DEP Biology

FDEP-SOP-002/01 LT 7000 Determination of Biological Indices, 12/03/08
DEP Biological Indices

FDEP-SOP-001/01 FT 3000 Aquatic Habitat Characterization
DEP Habitat Assessment

Tampa Bay Water Atlas. Developed by Hillsborough County, University of South Florida and Florida Center for Community Design and Research.
http://www.tampabay.wateratlas.usf.edu/

Stream Condition Index (SCI) Report - Fore, L. et al. 2007. Development and Testing of Biomonitoring Tools for Macroinvertebrates in Florida Streams.
DEP SCI

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