



STREAM ECOSUMMARY

**Snell Creek, WBID 1472A
Polk County
STORET Station TP607Snell
April 22, 2010 and October 20, 2010**



Figure 1. Photo of Snell Creek SCI station.

DEP conducted water quality and biological sampling at Snell Creek (TP607Snell, Figure 1) in Polk County in 2010, 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. 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, conducted per DEP SOP FT 3000, and qualitative collection of periphyton (algae that is attached to in-stream substrates) collected per DEP SOP FS 7220. 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. The periphyton data identifies the kind of algae living in the stream. 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.

❖ Watershed Characteristics

Snell Creek originates from marshy areas south and east of Davenport, in eastern Polk County. It flows for 5 miles until it converges with Lake Marion Creek (Figure 2). Lake Marion Creek continues to flow to Lake Hatchineha, which in turn discharges to Lake Kissimmee, the Kissimmee River and Lake Okeechobee.

The southern part of Snell Creek's watershed lies within SFWMD's Lake Marion Creek & Reedy Creek Management Areas. Most of the basin is hardwood swamp (2005, SFWMD). The headwaters are urbanized (Davenport) and citrus groves are common on the eastern portion of the watershed. The site (TP607Snell) was located east of Haines City, north of the confluence with Lake Marion creek, upstream of Cypress Parkway (Figure 2).

❖ Methods

The SCIs were collected by DEP Southwest District Office staff on April 22, 2010 and October 20, 2010.



Figure 2. Snell Creek watershed geographic location

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) in October only. 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.

❖ Results

The riparian zone was mostly natural and quite extensive, about 70 meters on the west side and several hundred meters wide on the east side. The in-stream habitat in this section of Snell Creek was predominantly sandy bottom. In April, there were four productive habitats comprising 24% substrate available for invertebrate and fish use (snags, roots, aquatic vegetation and leaves). In October leaf habitat had been washed out by the summer rains and only three productive habitats were present; approximately 6% was available for invertebrate and fish use (snags, roots and aquatic vegetation). 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 April and October, 2010. All parameters with the exception of total nitrogen were within natural unimpaired levels. Total nitrogen exceeded the proposed state criteria due to elevated nitrate+nitrite concentrations on both dates.

Table 1. Water quality results for Snell Creek (TP607Snell) on 4/22/10 and 10/20/10.

Analyte	Result 4/22/2010	Result 10/20/2010	Applicable Class III Water Quality Criteria (freshwater)
Field Temperature (°C)	20.68	21.87	
Field pH (SU)	7.37	8.31	≥6 and ≤8.5
Field Dissolved Oxygen (mg/L)	6	7.74	≥ 5.0
Field Specific Conductance (µmhos/cm)	190	203	Not to exceed 50% of background or 1275 µmhos/cm
Alkalinity (mg CaCO ₃ /L)	51	46	≥20
Color (PCU)	80	15	
Chlorophyll a (µg/L)	1.7 I	0.55 U	
Total Phosphorus (mg/L)	0.053	0.029	*0.12 mg/L
Nitrate+Nitrite (mg/L)	1.4	2.8	
Ammonia (mg/L)	0.024	0.012	
Total Kjeldahl Nitrogen (mg/L)	0.53	0.35	
Total Nitrogen (mg/L)	1.93	3.15	*1.54 mg/L

I – Result was between the method detection limit (MDL) and the practical quantitation limit (PQL)

U – Indicates that the compound was analyzed for but not detected

* Federally promulgated numeric nutrient criteria for Peninsular nutrient region

In April, the SCI score was 54 and in October it was 47, 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 amphipod, *Hyalella azteca*, dominated on both sampling dates, comprising 37% and 55% of the community in April and October, respectively.

The Habitat Assessment (HA) scores were 135 in 129 in April and October, respectively, both of which were in the "Optimal" habitat category, indicating that the watershed has been minimally disturbed by human influences.

The periphyton results indicated a productive algal community and no biological imbalance to the ecological integrity of the stream. The attached algal community in the stream consisted of 67.44% diatoms, 10.63% blue-green algae, 11.74% yellow-green algae and 3.99% green algae. The dominant diatom was *Karayevia clevei*, a common species in both fresh and marine aquatic environments. The most common non-diatom algae was the filamentous yellow-green algae, *Vaucheria*. The filaments of *Vaucheria* are commonly known as "water felt" because the sparsely branched or un-branched filaments often form felt-like mats. *Vaucheria* is particularly common in the spring season.

❖ Significance

Total nitrogen levels at this location in Snell Creek on April 22 and October 20, 2010 exceeded the proposed water quality standards due to elevated nitrate+nitrite. However, the biological sampling indicated that Snell Creek supported a relatively healthy macroinvertebrate community. Potential ecological imbalance is reflected in the abundance of the algal grazing amphipod, *Hyalella azteca*.

❖ Recommendations

Possible sources of the elevated nitrate+nitrite include inorganic fertilizer from agricultural land use and organic nitrogen from septic tanks, which are common in the Davenport area. The source can be determined through nitrogen isotope analysis.



Figure 3. Damselfly in Snell CK (TP607SNELL)

❖ References

DEP Standard Operating Procedures (SOPs, see <http://www.dep.state.fl.us/water/sas/qa/sops.htm>)

Lake Marion Creek & Reedy Creek Management Areas; Five-Year General Management Plan (2005 – 2010). Land Stewardship Division South Florida Water Management District, April 2005. https://my.sfwmd.gov/portal/page/portal/pg_grp_sfwmd_landresources/portlet_mgmtplans/lake_mar_upper_reedy_plan_1105.pdf

Stream Condition Index (SCI) Report - Fore, L. et al. 2007. Development and Testing of Biomonitoring Tools for Macroinvertebrates in Florida Streams. http://publicfiles.dep.state.fl.us/dear/sas/sopdoc/sci_final.pdf

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