STREAM ECOSUMMARY

Soldiers Creek Downstream of SR 419
2012

DEP conducted water quality and biological sampling at Soldiers Creek downstream of State Road 419 in Seminole County on January 30 and November 8, 2012. Soldiers Creek was sampled as part of the strategic monitoring plan for the Middle St. Johns basin to verify potential biological impairments. Overall, the water quality and macroinvertebrate community data indicated that the stream met expectations for a healthy, well-balanced stream.

Figure 1. Soldiers Creek downstream of SR 419 bridge

Background

Although healthy, well-balanced stream and river communities may be maintained even with some level of human disturbance, human activities may result in waterbody 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 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 support), and exceedances of these standards are associated with interference with the designated use. The Stream Condition Index (SCI) assesses how closely the macroinvertebrate community (*e.g.,* aquatic insects, clams, and crayfish) of a stream resembles the macroinvertebrate community of an undisturbed or "reference" condition. 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 Rapid Periphyton Survey and Linear Vegetation Survey provide an assessment of the attached algae and plant community within the stream.

Methods

This stream was sampled on January 30 and November 8, 2012, by DEP Central District Office biologists (Figure 1). Surface water samples were collected for analysis of nutrients, chlorophyll-*a*, phaeophytin-*a*, color, turbidity, alkalinity, and chloride samples were collected following DEP Standard Operating Procedures (SOPs, see http://www.dep.state.fl.us/water/sas/qa/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). Field blanks were collected in conjunction with water quality samples. The Stream Condition Index (SCI) was sampled per DEP SOP FS7420 and calculated per DEP SOP LT7200. The SCI consists of collecting macroinvertebrates via 20 D-frame dipnet sweeps (0.5 m in length) in the most productive habitats in a 100 m reach of stream. The organisms are sub-sampled, and identified to the lowest practical taxonomic level. The SCI is composed of ten metrics, eight of which decrease in response to human disturbance, with two metrics (%

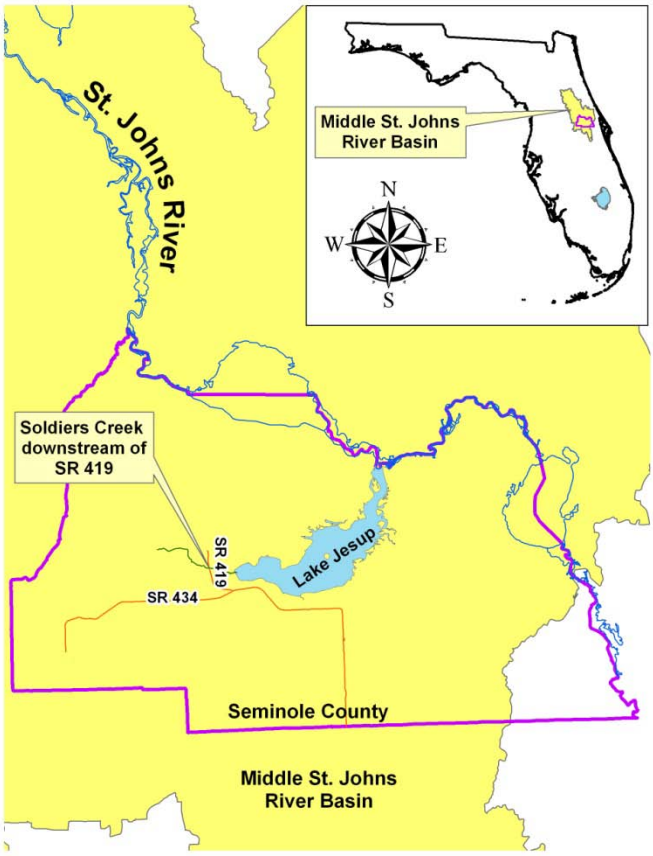

Figure 2. Location of Soldiers Creek at SR 419 in Seminole County.

very tolerant and % dominant) increasing in response to human disturbance. According to 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, DEP and EPA have concluded that a balanced faunal community is achieved if the average score of at least two temporally independent SCIs, performed at representative locations and times, is 40 or higher, with neither of the two most recent SCI scores less than 35.

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).
The Rapid Periphyton Survey (RPS) was conducted per DEP SOP FS 7230. The RPS quantifies the extent and abundance of attached algae in a 100 m stream reach.

Site Information

Soldiers Creek is located in Seminole County and is part of the middle St. Johns basin (Figure 2). Soldiers Creek, approximately 4.3 miles long, drains an area of about 19 square miles, encompassing portions of northern Longwood, Lake Mary and Winter Springs before entering Lake Jesup. Land use in the area is primarily residential development in the upper reaches of the stream and forested in the lower reaches, of which a large portion is contained within Seminole County's Soldiers Creek Park. FDEP biologists performed Habitat Assessment, Stream Condition Index, Rapid Periphyton Survey and collected water quality samples downstream of the SR 419 Bridge on January 30 and November 8, 2012. In this area, the average width of the stream was 9 meters and the average depth was 0.5 meters (Figure 3). The sample site had velocity measured at 0.25 m/s during both sample events. The stream bottom consisted primarily of sand with pockets of silt and fine organics. The shoreline vegetation community consisted of *Acer rubrum* (red maple), *Sabal palmetto* (sabal palmetto), *Liquidambar styraciflua* (Sweet Gum), *Smilax* (greenbrier), *Pontederia cordata* (pickerelweed), *Cephalanthus occidentalis (button bush), Vitis* (grapevine) and *Bidens alba* (beggarticks). Exotics present in the riparian zone were *Wedelia trilobata* (creeping ox eye), *Urena lobata* (Caesar's weed), *Dioscorea bulbifera* (air potato), *Limnophila sessiliflora* (Asian marshweed), *Alternanthera philoxoroides* (alligator weed), *Colocasia esculenta* (wild taro) and *Commelina diffusa* (common dayflower).

Figure 3. Soldiers Creek downstream of SR 419 bridge

Results

Water Quality

The water quality samples collected on January 30 and November 8, 2012, complied with all applicable water quality criteria in Chapter 62-302, Florida Administrative Code (Table 1). Nutrient values were also compared to numeric nutrient thresholds for streams that were adopted in December 2011, but which are not yet in effect. (Note that compliance with numeric nutrient criteria involve an annual geometric mean not to be exceeded more than once in any three year period). Field blanks were all below detection limits for all analytes.

Habitat Assessment

The Stream and River Habitat Assessment score was 94 on January 30, 2012, and 102 on November 8, 2012. Both scores reflect an overall "Suboptimal" condition. Only one major productive macroinvertebrate habitat was identified in the January 30 assessment: snags (fallen branches). Productive habitat abundance was less than 5% of the total sampled segment scoring in the "poor" category for substrate availability. Roots originating from the stream banks and leaf packs were also present and sampled, but were not in enough abundance to consider a major habitat. Water velocity was measured at 0.25 m/s, creating an adequate number of pools, but >25% of the sampled habitats were affected by silt and sand accumulation.

Two major productive macroinvertebrate habitats were identified in the November 8 assessment: snags (fallen branches) and leaf packs. Roots, originating from the stream banks were also present and sampled, but were not in enough abundance to consider a major habitat. Productive habitat abundance was again less than 5% of the total sampled segment scoring in the "poor" category for substrate availability. Water velocity was again measured at 0.25 m/s, creating an adequate number of pools, but >25% of the sampled habitats were still affected by silt and sand accumulation.

Both assessments revealed good sinuosity has developed within the old, channelized area. The stability of both banks of the stream was scored in the marginal category in both assessments and is a potential factor contributing to the silt and sand accumulation. Riparian buffer width scored in the optimal category as well as riparian zone quality, even though there was presence of scattered exotics.

Table 1. Water quality results from 1/30/2012 and 11/08/2012 for Soldiers Creek.

Analyte	Result 01/30/2012	Result 11/8/2012	Class III Fresh Water Quality Criteria
Field Temperature (°C)	15.2	16.3	
Field pH (SU)	8.0	7.9	
Field Dissolved Oxygen (mg/L)	9.14	8.91	$\geq$ 5.0
Field Specific Conductance (µmhos/cm)	317	267	Not to exceed 50% over background or 1275 µmhos/cm
Secchi Depth (m)	>0.5	>0.6	
Alkalinity (mg $CaCO_3$/L)	111	93 A	
Turbidity (NTU)	1.4	1.3	
Total Dissolved Solids (mg/L)	188 A	190 A	
Total Suspended Solids (mg/L)	4 I	3 I	
Chloride (mg/L)	27	26	
Fluoride (mg/L)	0.13	0.11	≤ 10
Sulfate (mg/L)	7.0	4.7	
True Color (PCU)	60 A	170	
Chlorophyll-*a* (µg/L)	1.3 I	0.55 U	
Phaeophytin-*a* (µg/L)	0.40 U	0.40 U	
Organic Carbon (mg C/L)	9.0	17	
Biochemical Oxygen Demand	0.67 I	0.69 I	
Fecal Coliforms	154 B	96	<800
Total Phosphorus (mg/L)	0.097	0.089	≤ 0.12*
Ortho-Phosphate	0.074	0.071	
Nitrate+Nitrite (mg/L)	0.28	0.20	
Ammonia (mg/L)	0.018 I	0.021	
Total Kjeldahl Nitrogen (mg/L)	0.43	0.84	
Total Nitrogen (mg/L)	0.71	1.04	≤ 1.54*

* F.A.C. Chapter 62-302 Surface Water Quality Standards

A - Value reported is the mean of two or more determinations

I- The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
U - Indicates that the compound was analyzed for but not detected.
B - Results based on colony counts outside the acceptable range.

Stream Condition Index

The SCI scores for this site were 46 and 39, corresponding with the low end of the "Healthy" designation. Low substrate diversity and availability, in conjunction with the effects of sand and silt accumulation, most likely contributed to the lower SCI score. In the January 30, 2012, SCI sample, three pollution-sensitive taxa were represented: the mayfly *Heptageniidae,* the caddisfly *Triaenodes*, and the dancefly *Hemerodromia.* Four pollution-tolerant taxa were represented: the snails *Physa and Pyrgophorus platyrachis, the* midge *Polypedilum illinense grp., and the worm Prostoma*. No Long-Lived taxa were represented in this sample (Table 2).

In the November 8, 2012, SCI sample, three pollution-sensitive taxa were represented: the mayfly *Heptageniidae*, black fly larvae *Simulium*, and caddisfly *Triaenodes*. One pollution-tolerant taxa was represented, the snail *Micromenetus*. Two long-lived species were represented by the bivalve *Corbicula fluminea*, and the dobsonfly *Corydalus cornutus* (Table 3).

The macroinvertebrates collected in these samples represent the expected macroinvertebrate diversity for a healthy stream community.

Rapid Periphyton Survey

On January 30, and November 8, 2012, periphyton was observed in relatively few areas and was not in problematic abundance.

Conclusion

Soldiers Creek, as sampled on January 30 and November 8, 2012, met all applicable State Water Quality Criteria. Habitat Assessment data indicated a suboptimal physical condition despite human disturbance in the watershed. Stream Condition Index data indicated the presence of a "healthy" macroinvertebrate community with sensitive and long-lived taxa that are indicative of good water quality conditions. A Rapid Periphyton Survey revealed no problematic abundance of periphyton.

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

Implementation of Florida's Numeric Nutrient Standards
http://www.dep.state.fl.us/water/wqssp/nutrients/docs/nnc_implementation.pdf

Seminole County Watershed Atlas
http://www.seminole.wateratlas.usf.edu/

Table 2. January 30, 2012 SCI taxa list

Taxon Name	Rep 1 # Counted	Rep 2 # Counted
Ancylidae	4	5
Argia	2	4
Atrichopogon	0	1
Baetis intercalaris	12	6
Caenis	0	2
Calopterygidae	1	0
Cheumatopsyche	19	20
Chironomidae	7	7
Dubiraphia vittata	2	2
Hemerodromia	1	0
Heptageniidae	0	3
Hetaerina	0	1
Hyalella azteca	2	4
Hydroptila	1	0
Hygrobates	0	1
Microcylloepus pusillus	33	27
Neotrichia	1	0
Oecetis	4	4
Pentaneura inconspicua	4	2
Physa	1	0
Polypedilum fallax	1	0
Polypedilum flavum	33	39
Polypedilum illinoense grp.	1	2
Polypedilum scalaenum grp.	0	3
Prostoma	0	1
Pyrgophorus platyrachis	2	0
Rhagovelia	3	2
Rheotanytarsus exiguus grp.	0	1
Scirtes	0	2
Simulium	3	2
Stenelmis	2	2
Stenochironomus	2	3
Tanytarsus sp. a epler	1	0
Tanytarsus sp. c epler	0	2
Triaenodes	1	3
Varichaetadrilus angustipenis	1	0
Sensitive	Long-Lived	Tolerant

Table 3. November 8, 2012 SCI taxa list

Taxon Name	Rep 1 # Counted	Rep 2 # Counted
Amphipoda	1	1
Ancylidae	4	1
Argia	4	2
Baetis intercalaris	4	6
Bivalvia	0	1
Cheumatopsyche	2	4
Chironomidae	4	4
Clathrosperchon	1	0
Coenagrionidae	2	1
Corbicula fluminea	2	0
Corydalus cornutus	1	0
Cricotopus or orthocladius	1	0
Dubiraphia vittata	2	2
Gammarus	2	6
Heptageniidae	0	2
Hirudinea	0	2
Hyalella azteca	2	7
Hydrobiidae	0	2
Microcylloepus pusillus	62	46
Micromenetus	1	0
Neotrichia	5	6
Oecetis	2	0
Oecetis persimilis	3	0
Pentaneura inconspicua	4	3
Platyhelminthes	0	1
Polypedilum fallax	0	2
Polypedilum flavum	27	37
Polypedilum scalaenum grp.	0	2
Pyrgophorus platyrachis	3	1
Rheotanytarsus exiguus grp.	1	1
Simulium	0	1
Sphaeriidae(mollusca)	1	2
Tanytarsus	0	2
Tanytarsus sp. a epler	1	0
Tipulidae	0	1
Triaenodes	1	1
Tribelos fuscicornis	0	1
Tubificidae	1	2
Sensitive	Long-Lived	Tolerant