STREAM ECOSUMMARY

Chipola River at Look and Tremble Shoals, September 6, 2011

FDEP conducted biological and water quality sampling at Chipola River at Look and Tremble Shoals in Calhoun County (Figure 1) on September 6, 2011 to assess attainment of designated uses.



Figure 1. Chipola River Look and Tremble SCI site on September 6, 2011.

Based on a September 1976 sample that contained the highest number of the sensitive EPT (mayfly, stonefly, caddisfly) taxa (48) in Florida, this site had been chosen as a possible Stream Condition Index (SCI) Benchmark site. Benchmark sites have consistently high SCI scores and are being used to assure compliance with Quality Assurance objectives. However, the macroinvertebrate community and water quality data indicated that the stream did not pass the SCI, and had elevated total nitrogen concentrations during September 2011. The low SCI scores (34 and 41) could have been due in part to record low water conditions.

Background

Although healthy, well-balanced stream and river communities may be maintained with some level of human activity, such 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. FDEP 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. FDEP 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 is associated with interference with the designated use. 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 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.

Methods

This stream was sampled on September 6, 2011 by the FDEP Northwest District Office. Surface water samples were collected following FDEP Standard Operating Procedures (SOPs, see http://www.dep.state.fl.us/water/sas/sop/sops.htmfor details). Sampling and analyses met FDEP quality assurance/ quality control standards (see http://www.dep.state.fl.us/water/sas/qa/index.htm)
The Stream Condition Index (SCI) was sampled per FDEP SOP FS7420 and calculated per FDEP 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 (% very tolerant and % dominant) increasing in response to human disturbance. According to FDEP SOP LT 7000, the SCI score ranges and categories are: (68-111) Exceptional; (35-67) Healthy; and (0-34) Impaired. Proposed biological health assessment criteria state that a site is considered to meet designated uses if the average of the two most recent temporally independent SCI scores is 40 or higher and neither of those scores is less than 35. The Stream and River Habitat Assessment was conducted per FDEP 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).

Site Information

This site STORET # 31020032 is located about 2 miles southwest of Altha in Calhoun County (N30° 31‘28.3“W-85° 09‘42.2“) below County Road (CR) 274 Willis Bridge (Figure 2).

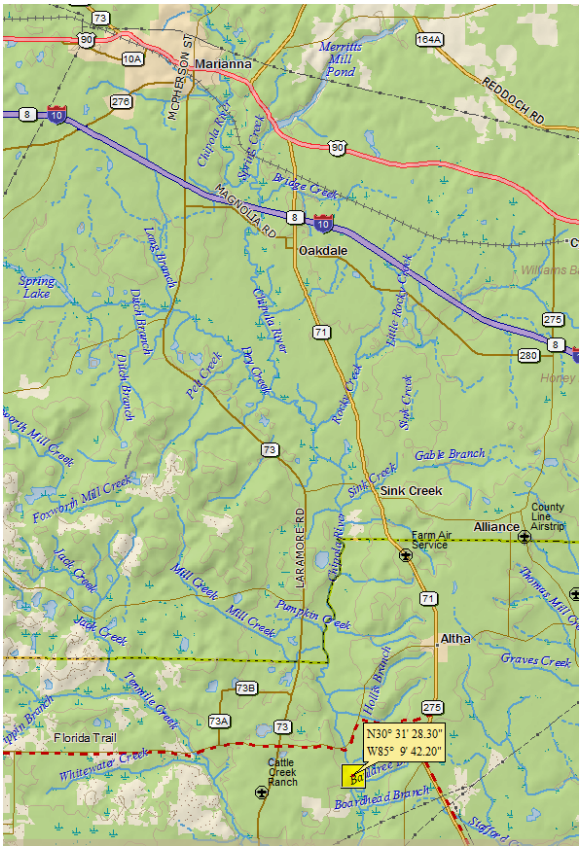


Figure 2. Location of Chipola River at Look and Tremble Shoals in Calhoun County.

Look and Tremble Shoals are considered Class I rapids, locally popular for tubing and swimming within the Florida paddling trail http://www.dep.state.fl.us/gwt/about/system.htm##1. Much of the land surrounding the Look and Tremble Shoals is owned and managed by the Northwest Florida Water Management District (NWFWMD). The site is located in Ecoregion 65g Southeastern Plains, Dougherty Plain, and flows into Apalachicola River and Bay. The USGS calculated drainage area above CR 274 was 781 square miles. The Chipola River was at record low flow conditions in 2011 according to USGS measurements. During sampling the USGS Altha gage height was 8.31 feet with a flow of 330 cubic feet per second (cfs). During the USGS period of record from 1922 through 2011 the highest annual daily mean flow was 2977 cfs in 1948 and the lowest was 569 in 2011. Gage height records from 1972-2011 recorded the lowest annual daily mean gage height in 2011 (8.745 ft). The Chipola River basin average daily water withdrawals permitted by NWFWMD as of July 2012 totaled 24 million gallons per day (mgd) groundwater and 1.2 mgd surface water, or a 24 mgd total for both. Higher amounts, totaling about 160 mgd, can be used for a limited duration. The river flow at 330 cfs is equivalent to about 213 mgd. The Chipola River baseflow is provided by springs that depend on groundwater levels. The relationship between pumping and spring flow has not been determined.

Results

Water Quality

The water quality samples complied with water quality criteria except for total nitrogen at 1.13 mg/l (Table 1). Groundwater monitoring reports to FDEP potable water section found wells in agricultural areas with nitrite-nitrate (NO2-NO3) concentrations in the 7 to 9 mg/l range (e.g. 8.89 mg/L near the town of Malone, 6.97 mg/L near the Jackson Correctional Institution, 6.84 mg/L near the Florida Caverns State Park campgrounds). The major component of the total nitrogen found in the Chipola Rive was NO2-NO3 (0.98 mg/l). The city of Marianna waste-water treatment facility effluent was removed from direct discharge to the Chipola River to limit its nutrient load. The wastewater is now piped to spray fields to

the south draining steephead streams flowing to Ten Mile Creek and Mill Creek before entering the Chipola River. The pH (7.99 SU), specific conductance (234 µmhos/cm), and alkalinity (108 mg/l) results were typical of the Karst limestone of the Floridian Aquifer System.

Table 1. Water quality results from September 6, 2011 at Chipola River Look and Tremble SCI site.

Analyte	Result	Remark	Applicable Class III Water Quality Criteria
Field Temperature (°C)	24.29		
Field pH (SU)	7.99		
Field Dissolved Oxygen (mg/L)	8.03		≥5.0
% Dissolved Oxygen Saturation	94		
Specific Conductance (µmhos/cm)	234		Not to exceed 50% of back-ground or 1275 µmhos/cm
Alkalinity (mg CaCO3/L)	108		
Turbidity	1		Not to exceed 29 over background
TDS (mg/l)	118		
TSS (mg/l)	2	I	
Color (PCU)	3.5	I	
Chloride (mg/l)	5.1		
Calcium (mg/l)	35.4		
Magnesium (mg/l)	6.37		
Sulfate (mg/l)	2.4		
Chlorophyll a (µg/L)	1	I	
Total Phosphorus (mg/L)	0.012		*0.06 mg/L
Nitrate+Nitrite (mg/L)	0.98		
Ammonia (mg/L)	0.014	I	
Total Kejldahl Nitrogen (mg/L)	0.15	I	
Total Nitrogen (mg/L)	1.13		*0.67 mg/L
Organic Carbon (mg/L	1	U	

I – Result was between the method detection limit (MDL) and the practical quantitation limit (PQL)
U – Compound was analyzed for but not detected
* Federally promulgated numeric nutrient criteria for Panhandle West nutrient region.

Habitat Assessment

The stream and river habitat assessment score was 139 in the optimal range. Substrate Availability (72%), Water Velocity, Artificial Channelization, Bank Stability, right bank Riparian Zone Buffer Width, and Riparian Vegetation Quality rated optimal. Habitat Smothering rated suboptimal. Substrate Diversity and left bank Riparian Zone Buffer Width rated marginal (due to adjacent road).

Stream Condition Index

The SCI scores for this site were 34 and 41 (Quality Assurance duplicate), corresponding with a potential "Not Healthy," designation. The dominant taxon was the algal grazing snail *Elimia* comprising 41% when combining both samples. All snails total 53%. The EPT, mayflies (Ephemeroptera), stoneflies (Plecoptera), and caddisflies (Trichoptera) made up only 13.7 % of the samples. The EPT are the more sensitive orders of the stream community. They normally comprise about 50% of the aquatic macroinvertebrate in the healthiest Panhandle streams. The stoneflies, the most sensitive to pollution were absent despite 94% dissolved oxygen saturation. There were 20 EPT (however, no stoneflies) taxa in both samples combined. Algal growth stimulated by elevated NO_2-NO_3 and low flow conditions favored a shift in the stream population from insects to snails.

Periphyton

The attached algal community in the stream was dominated by filamentous green algae *Ulothrix* with some *Cladophora* (Figure 3). Diatoms and cyano-bacteria (blue-green algae) were also common.

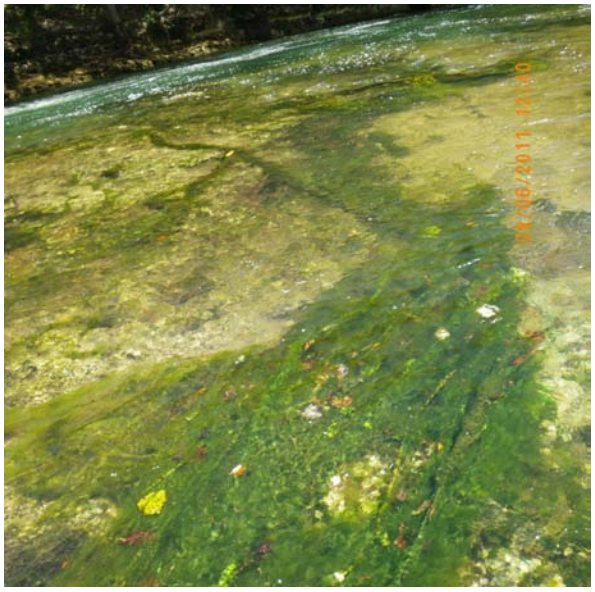


Figure 3. Filamentous algae bloom.

Some growth of algae (typically diatoms) is expected in a fully functioning stream, but an over abundance

of algae (especially filamentous algae) may reduce habitat quality (from smothering) and lead to excess organic matter production (and decomposition), which can harm fish and invertebrates. The elevated total nitrogen concentration (1.13 mg/l) primarily in the form of NO2-NO3 (0.98 mg/l), acts as a fertilizer that can stimulate algae blooms.

Thank you for your interest in conserving 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