STREAM ECOSUMMARY

Upper Manatee River
Manatee County
WBID 1807C
STORET Station TP1; 24010002



Figure 1. Upper Manatee River - Highway 64, Manatee County.

DEP conducted water quality and biological sampling at the Upper Manatee River at Highway 64 (Figure 1) in Manatee County eleven times from 1993 and 2009 to assess attainment of designated uses. This site is one of many minimally disturbed streams that have been sampled throughout Florida for the purpose of establishing biological community expectations and identifying specific thresholds for assessing stream health. Overall, the habitat assessment and macroinvertebrate community data indicate that the site is still an appropriate reference site.

❖ Background

The assessment method used was the Stream Condition Index (SCI). The SCI is an assessment tool developed by the Florida Department of Environmental Protection (FDEP) to determine the 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, EPA considered a SCI score of 40 or higher to fully meet the expectation of a healthy, well-balanced community. Each SCI includes assessment of stream habitat, conducted per DEP SOP FT 3100. 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.

In the mid 1990s, the first version of the SCI was created based on the reference site expectations model (Barbour et al, 1996). The following decade, the SCI was recalculated using considerably more data and a human disturbance gradient to determine effective metrics. Impairment thresholds were calibrated using a Biological Condition Gradient approach (Fore *et. al.*, 2004 and 2007).

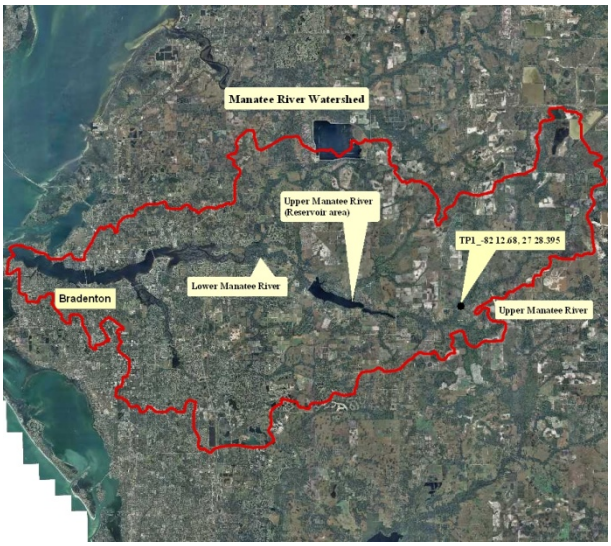


Figure 2. Manatee River watershed and site location

❖ Watershed Characteristics

The Manatee River Watershed (Figure 2) is located within Manatee County and drains approximately 360 square miles (Peterson, 1990). The river arises in the northeastern corner of Manatee County near Duette and flows 45 miles in a westerly direction to the Gulf of Mexico at the southern edge of Tampa Bay. The predominant land use category in the upper watershed is native forest, with some agriculture (row crops, citrus, and cattle range), and phosphate mining near the headwaters occurring in recent years. The lower estuarine watershed is highly populated,

mainly in the cities of Bradenton and Palmetto. The river is dammed 24 miles upstream of Tampa Bay, creating the Manatee River Reservoir, which provides the majority of drinking water for Manatee County.

The sampling site, TP1, was located in the Upper Manatee River, downstream of Highway 64 (Figures 2 and 3). At this location, the Manatee River is a third order stream surrounded by hardwood/pine flatwoods with some pasture areas.



Figure 3. Location of TP1 (2009 aerial photography)

❖ Methods

Eleven SCIs were collected between March 17, 1993 and April 2, 2009. Each one was sampled by DEP Southwest (SW) District Office staff per DEP SOP FS7420 and calculated per DEP SOP LT7200 (http://www.dep.state.fl.us/water/sas/qa/sops.htm). 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. Each SCI included habitat assessments per DEP SOP FT 3100. Habitat assessments from the 1990s were transformed in order to be comparable to currently accepted assessments.

❖ Results

The in-stream habitat in this area of the Manatee River is predominantly sandy bottom, typically with minimal substrate available for invertebrate and fish use (less than 10% snags, roots, and leaves). The Habitat Assessment (HA) scores ranged from 106 to 138, consistently falling in the optimal or suboptimal habitat categories (Table 1). The stream was always sampled when flowing steadily and water levels allowed accessibility to in-stream substrates. The riparian zone was natural and wide, although cattle were sometimes present in the riparian buffer zone.

Results of the SCI assessments are shown in Table 1. The Habitat Assessment methodology and scores in 1993 and 1994 were different from that adopted in 2004, so the old scores were adjusted for comparative purposes. The lower scores seen after 2004 were due to changes in the way percent available habitat was determined and do not reflect real deterioration in stream habitat. The SCI scores from 1993 through 2000 were calculated on a scale of 0 to 33 possible points and were consistently at the high end of the scale, typically receiving an “Excellent” rating. With the recalibration in 2004, the range extended to 100 possible points. While the resulting scores cannot be compared directly to those generated prior to 2004, the overall ratings are similar and indicate consistently healthy results, often in the “Exceptional” range. The variability in SCI scores is natural and most likely related to hydrological conditions, which in turn affects the availability and accessibility of habitat. Both prolonged low flow (sluggish conditions) and sudden high flow conditions (scouring) may naturally stress the benthic community.

Table 1.Stream Condition Index (SCI) scores obtained since 1993. Note that the maximum possible SCI_1992 score was 33. N/A - not available

Sampling date	HA score	SCI Version	SCI Score	
3/17/1993	128	SCI_1992	25	Good
8/11/1993	128	SCI_1992	31	Excellent
2/2/1994	138	SCI_1992	33	Excellent
8/3/1994	126	SCI_1992	31	Excellent
7/17/1996	N/A	SCI_1992	29	Excellent
11/21/2000	N/A	SCI_1992	33	Excellent
3/22/2006	111	SCI_2004	67	Fair
5/16/2007	106	SCI_2007	81	Category 1 Exceptional
12/17/2008	109	SCI_2007	64	Category 2 Healthy
4/2/2009	116	SCI_2007	75	Category 1 Exceptional

The most notable biological aspect of the upper watershed of the Manatee River is that it is the only

freshwater system in the DEP's SW District where the stonefly *Neoperla clymenae* has been collected since 1984 (Figure 4). Stoneflies are very sensitive to many environmental stressors. Because the stoneflies are not plentiful, they are rarely included in the subsampling procedure during lab analysis. Individuals of *Neoperla clymenae* are routinely observed while sampling, and were seen on April 2, 2009.



Figure 4. The stonefly *Neoperla* clymene on a snag, collected 4/2/09.

Water quality parameters are shown in Table 2. All variables are within ambient values typical of southwest Florida. There appears to be an upward trend in pH and conductivity levels from the early 1990s, possibly due to the increased groundwater content during periods of below normal rainfall. The land uses in the upper watershed really have not changed much from 1988 to 2011 (DEP Protect Our Waters website http://www.protectingourwater.org/).

Table 2. Surface water quality parameters for each sampling event. N/A - not available.

Date	Temp (^{O}C)	DO (mg/l)	pH (NTU)	Conductivity (umhos/cm)
3/17/1993	14.80	9.02	6.49	27
8/11/1993	26.00	N/A	5.93	180
2/2/1994	15.20	8.30	6.81	119
8/3/1994	25.30	7.20	6.63	123
3/14/1995	18.80	8.10	6.50	216
7/17/1996	26.46	6.13	6.29	129
11/21/2000	14.90	9.00	7.37	321
3/22/2006	21.43	8.65	7.51	301
5/16/2007	23.57	8.94	7.50	340
4/2/2009	22.07	7.64	7.67	342

❖ Significance

Biological sampling in the Upper Manatee River continues to indicate the health of the upper river and the status of TP1 as a reference site for the Manatee River. It is important to keep monitoring this reference sites to identify any possible changes or threats. In addition, the upper watershed serves as a southern refuge for the environmentally sensitive stonefly, *Neoperla clymenae*, and quite possibly the last population this far south in Florida.

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Manatee County Water Atlas

Peterson, Lindsay. 1990. Manatee River. in Marth, Del and Marty Marth, eds. *The Rivers of Florida*. Sarasota, Florida: Pineapple Press, Inc. ISBN 0-910923-70-1

DEP biological assessment resources: http://www.dep.state.fl.us/water/bioassess/index.htm