

2006 Monitoring Summary



Sweetwater Creek at Marengo County Road 6 (32.06818/-87.90213)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Sweetwater Creek watershed for biological and water quality monitoring as part of the 2006 Assessment of the Escatawpa, Mobile, and Tombigbee (EMT) River Basins. The objectives of the EMT Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the EMT basin group.

Additionally, Sweetwater Creek is among the least-disturbed watersheds in the EMT based on landuse, road density, and population density. These data will be used to evaluate the use of Sweetwater Creek as a “best attainable” condition reference watershed for comparison with other coastal plain streams.



Figure 1. Sweetwater Creek at SWTM-1, February 11, 2010.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Sweetwater Creek is a *Fish & Wildlife* (F&W) stream located in the Southern Hilly Gulf Coastal Plain (65d) (Griffith et al. 2001). Landuse within the watershed is primarily deciduous and evergreen forest mixed with some scrub/shrub. As of June 9, 2008, four permits have been issued in this watershed.

REACH CHARACTERISTICS

General observations (Table 2) and a habitat assessment (Table 3) were completed during the macroinvertebrate assessment. In comparison with reference reaches in the same ecoregion, they give an indication of the physical condition of the site and the quality and availability of habitat. Sweetwater Creek at SWTM-1 is a shallow, low-gradient stream with a predominately sand substrate (Figure 1). The reach was characterized by unstable or eroding banks and a lack of instream habitat due to sedimentation.

BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were sampled using ADEM’s Intensive Multi-habitat Bioassessment methodology (WMB-I). The WMB-I measures of taxonomic richness, community composition, and community tolerance to assess the overall health of the macroinvertebrate community. Metric results indicated very few macroinvertebrate communities, but most were characterized by pollution-tolerant taxa groups, indicating *fair* community condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Lower Tombigbee
Drainage Area (mi ²)		30
Ecoregion ^a		65d
% Landuse		
Open water		<1
Wetland	Woody	4
	Emergent herbaceous	0
Forest	Deciduous	16
	Evergreen	32
	Mixed	24
Shrub/scrub		15
Grassland/herbaceous		<1
Pasture/hay		5
Cultivated crops		2
Development	Open space	3
	Low intensity	<1
	Moderate intensity	<1
Population/km ^{2b}		8
# NPDES Permits ^c	TOTAL	4
	Construction Stormwater	2
	Municipal Individual	1
	Underground Injection Control	1

a. Southern Hilly Gulf Coastal Plain

b. 2000 US Census

c. #NPDES permits downloaded from ADEM’s NPDES Management System database, 9 Jun 2008

Table 2. Physical characteristics of Sweetwater Ck at SWTM-1, May 31, 2006.

Physical Characteristics		
Canopy Cover		Mostly Shaded
Depth (Ft)		
Run		2.5
Pool		3.5
% of Reach		
Run		75
Pool		25
% Substrate		
Bedrock		2
Clay		4
Mud/Muck		2
Sand		75
Silt		7
Organic Matter		10

Table 3. Results of the habitat assessment conducted on Sweetwater Ck at SWTM-1, May 31, 2006.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	50	Marginal (40-52)
Sediment Deposition	58	Sub-optimal (53-65)
Sinuosity	63	Marginal (45-64)
Bank and Vegetative Stability	34	Poor <35
Riparian Buffer	90	Optimal >89
Habitat Assessment Score	124	
% Maximum Score	56	Sub-optimal (53-65)

Table 4. Results of the macroinvertebrate bioassessment conducted May 31, 2006.

Macroinvertebrate Assessment				
	Results	Scores	Rating	
Taxa richness measures				
# EPT genera	14	56	Fair (38-56)	
Taxonomic composition measures				
% Non-insect taxa	8	87	Fair (61.9-92.7)	
% Plecoptera	0	1	Very Poor (<1.86)	
% Dominant taxa	24	66	Fair (47.1-70.5)	
Functional composition measures				
% Predators	11	37	Fair (30.2-45.2)	
Tolerance measures				
Beck's community tolerance index	7	32		
% Nutrient tolerant organisms	17	89	Excellent (>88.1)	
WMB-I Assessment Score	--	53	Fair (38-56)	

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. When possible, in situ measurements and water samples are collected monthly, semi-monthly (metals), or quarterly (pesticides, herbicides (atrazine), and semi-volatile organics) during March through October to help identify any stressors to the biological communities. In May, the fecal coliform count was >5,300 colonies/100 mL of sample. Stream flow in May was 5.0 cfs.

SUMMARY

As part of the assessment process, ADEM will review the monitoring information presented in this report, along with all other available data.

Bioassessment results indicated the macroinvertebrate community in Sweetwater Creek at SWTM-1 to be in *fair* condition. Eroding stream banks and a lack of instream habitat were issues of concern within the reach.

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Table 5. Summary of water quality data collected March-October, 2006. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL). Median, average (Avg), and standard deviations (SD) values were calculated by multiplying the MDL by 0.5 when results were less than this value. Metals results were compared to ADEM's chronic aquatic life use criteria adjusted for hardness.

Parameter	N	Min	Max	Med	Avg	SD
Physical						
Temperature °C	9	13.0	26.9	21.5	21.2	4.4
Turbidity (NTU)	9	7.0	462.0	9.6	61.1	150.4
Total Dissolved Solids (mg/L)	7	9.0	109.0	77.0	73.4	35.0
Total Suspended Solids (mg/L)	7	< 1.0	578.0	4.0	87.6	216.3
Specific Conductance (µmhos)	9	31.9	96.0	81.9	78.6	19.2
Hardness (mg/L)	3	29.0	39.0	33.8	33.9	5.0
Alkalinity (mg/L)	7	5.6	42.3	31.2	28.4	11.2
Stream Flow (cfs)	6	1.4	53.6	4.6	13.6	20.2
Chemical						
Dissolved Oxygen (mg/L)	9	6.2	10.0	7.2	7.6	1.2
pH (su)	9	6.3	7.4	7.2	7.1	0.3
Ammonia Nitrogen (mg/L)	7	< 0.015	0.133	0.026	0.040	0.046
Nitrate+Nitrite Nitrogen (mg/L)	7	< 0.003	0.100	0.043	0.038	0.036
Total Kjeldahl Nitrogen (mg/L)	7	< 0.150	0.812	0.423	0.440	0.279
Total Nitrogen (mg/L)	7	< 0.086	0.855	0.481	0.478	0.308
Dissolved Reactive Phosphorus (mg/L)	7	< 0.004	0.016	0.002	0.007	0.007
Total Phosphorus (mg/L)	7	< 0.004	0.121	0.050	0.055	0.035
CBOD-5 (mg/L)	7	0.4	3.2	1.3	1.6	0.9
COD (mg/L)	2	< 2.0	2.0	1.0	1.0	0.0
TOC (mg/L)	2	2.1	5.2	3.6	3.6	2.2
Chlorides (mg/L)	5	2.0	6.3	3.6	3.5	1.8
Atrazine (µg/L)	1	< 0.05	<0.05	<0.05	< 0.05	<0.05
Total Metals						
Aluminum (mg/L)	3	0.165	0.260	0.220	0.215	0.048
Iron (mg/L)	3	1.930	2.260	1.980	2.057	0.178
Manganese (mg/L)	3	0.068	0.130	0.091	0.096	0.031
Dissolved Metals						
Aluminum (mg/L)	3	0.053	0.150	0.090	0.098	0.049
Antimony (µg/L)	3	< 7.5	10.0	3.8	4.2	0.7
Arsenic (µg/L)	3	< 5	10	3	3	1
Cadmium (mg/L)	3	< 0.000	0.015	0.000	0.003	0.004
Chromium (mg/L)	3	< 0.005	0.050	0.002	0.010	0.013
Copper (mg/L)	3	< 0.005	0.050	0.002	0.010	0.013
Iron (mg/L)	3	0.077	0.990	0.633	0.567	0.460
Lead (µg/L)	3	< 5	10	3	3	1
Manganese (mg/L)	3	0.063	0.110	0.085	0.086	0.024
Mercury (µg/L)	3	< 0.0	0.5	0.2	0.2	0.1
Nickel (mg/L)	3	< 0.005	0.050	0.002	0.010	0.013
Selenium (µg/L)	3	< 7.5	50.0	3.8	10.8	12.3
Silver (mg/L)	3	< 0.001	0.050	0.0	0.009	0.014
Thallium (µg/L)	3	< 2.5	10.0	4.5	3.6	2.0
Zinc (mg/L)	3	< 0.005	0.050	0.002	0.010	0.013
Biological						
Chlorophyll a (ug/L)	7	< 0.10	10.68	1.07	2.59	3.74
Fecal Coliform (col/100 mL) ^J	6	20	5,300 ^C	310	1,117	2,057

J=estimate; N=# samples; M=value > 90th percentile of all verified eco-regional reference reach data collected within eco-region 65d; C= value exceeds established criteria for F&W use classification.