

2005 Monitoring Summary



Socapatoy Creek at Coosa County Road 30 (32.96560/-86.14 960)

BACKGROUND

Hatchet Creek, an Outstanding Alabama Water located within the Coosa River Basin, has been used as a reference watershed to assess segments of the Cahaba River since 2004. Although located in different ecoregions, Hatchet Creek is physically similar to the Cahaba River in drainage, width, depth, and substrate composition.

Socapatoy Creek, a tributary of Hatchet Creek, has been sampled as part of this effort since 2005. The data collected will be used to develop a nutrient target for the Cahaba River TMDL, to monitor the health of Socapatoy Creek, and to continue to refine ADEM's nonwadeable, flowing biological assessment methods.

Socapatoy Creek was also selected for biological and water quality monitoring as part of the 2005 Assessment of the Alabama, Coosa, and Tallapoosa (ACT) River Basins. The objectives of the ACT Basin Assessments were to assess the biological integrity of each monitoring and to estimate overall water quality within the ACT basin group.

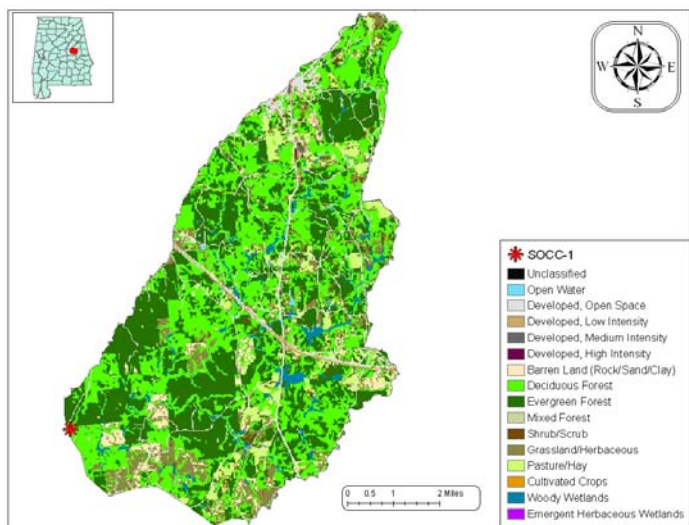


Figure 1. Sampling location and land use within the Socapatoy Creek watershed at SOCC-1.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Socapatoy Creek at SOCC-1 is a small *Fish and Wildlife (F & W)* stream located in the Southern Inner Piedmont ecoregion. Land cover within the watershed is approximately 72% forested and 10% grassland and shrub/scrub (Fig. 1). As of June 9, 2008, ADEM's NPDES Management System database showed a total of 22 permitted discharges located within the watershed. The town of Goodwater is located in the watershed and accounts for the small amount of urban area (7%).

REACH CHARACTERISTICS

General observations (Table 2) and habitat assessments (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. Socapatoy Creek at SOCC-1 is a low-gradient, riffle-run stream. Overall habitat quality was rated as *optimal* for supporting macroinvertebrate communities.

Table 1. Summary of watershed characteristics.

Physical Characteristics		
Drainage Area (mi ²)		46
Ecoregion ^a		45a
% Landuse		
Wetland	Woody	3
Forest	Deciduous	36
	Evergreen	35
	Mixed	1
Shrub/scrub		1
Grassland/herbaceous		9
Pasture/hay		6
Development	Open space	6
	Low intensity	1
Barren		2
Population/km ² ^b		18
# NPDES Permits ^c	TOTAL	22
	Construction Stormwater	6
	Mining General Permit (old)	9
	Municipal Individual	3
	Underground Injection Control	4

a. Southern Inner Piedmont

b. 2000 US Census data

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

Table 2. Physical characteristics at SOCC-1, June 23, 2005.

Physical characteristics		
Width (ft)		65
Canopy cover		Open
Depth (ft)	Riffle	1.3
	Run	1.5
	Pool	2.5
% of Reach		
	Riffle	40
	Run	40
	Pool	20
% Substrate		
	Bedrock	27
	Boulder	20
	Cobble	15
	Gravel	10
	Sand	25
	Silt	1
	Organic Matter	2

BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). The WMB-I uses measures of taxonomic richness, community composition, and community tolerance to assess the overall health of the macroinvertebrate community. Each metric is scored on a 100 point scale. The final score is an average of all individual metric scores. The final score indicated the biological community at SOCC-1 to be in *fair* condition (Table 4).

Table 3. Results of habitat assessment conducted at SOCC-1 on June 23, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	83	Optimal (> 70)
Sediment deposition	79	Optimal (> 70)
Sinuosity	90	Optimal (≥85)
Bank and vegetative stability	86	Optimal (≥75)
Riparian buffer	90	Sub-optimal (70-90)
Habitat assessment score	204	
% Maximum score	85	Optimal (> 70)

Table 4. Results of macroinvertebrate assessment conducted at SOCC-1, June 23, 2005.

Macroinvertebrate Assessment Results			
	Results	Scores	Rating
	(0-100)		
Taxa richness measures			
# Ephemeroptera (mayfly) genera	11	92	Excellent (>86)
# Plecoptera (stonefly) genera	6	100	Excellent (>86)
# Trichoptera (caddisfly) genera	9	75	Good (72-86)
Taxonomic composition measures			
% Non-insect taxa	9	65	Fair (48-72)
% Non-insect organisms	8	80	Good (72-86)
% Plecoptera	6	29	Poor (24-48)
Tolerance measures			
Beck's community tolerance index	13	46	Poor (24-48)
WMB-I Assessment Score	---	70	Fair (48-72)

WATER CHEMISTRY

Results of water chemistry are presented in Table 5. In situ measurements and water samples were collected monthly, semi-monthly (metals), or quarterly (pesticides, herbicides (atrazine), and semi-volatile organics) during March through October of 2005 to help identify any stressors to the biological communities. *In situ* parameters suggested that Socapatoy Creek at SOCC-1 was meeting water quality criteria for its F&W use classification. Dissolved oxygen concentrations ranged from 7.8-10.6 mg/L. Individual fecal coliform counts did not exceed 110 colonies/100 ml of sample. However, nitrate+nitrite-nitrogen and hardness were higher than expected based on the 90th percentile of all samples collected at reference reaches in ecoregion 45a.

CONCLUSIONS

ADEM monitored Socapatoy Creek as part of the Basin Assessment and as a "best attainable" condition reference reach watershed for the Cahaba River in 2005. Bioassessment results show the macroinvertebrate community to be in *fair* condition. Nitrogen (NO₃ + NO₂ - N) and hardness were parameters of concern at this reach.

Table 5. Summary of water quality data collected March-October, 2005. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL) when results were less than this value. Median, average (Avg), and standard deviations (SD) values were calculated by multiplying the MDL by 0.5 when results were less than this value.

Parameter	N	Min	Max	Median	Avg	SD
Physical						
Temperature (°C)	8	16.9	27.0	23.0	22.4	3.3
Turbidity (NTU)	8	7.7	54.1	12.5	17.3	15.2
Total dissolved solids (mg/L)	7	24.0	85.0	70.0	58.9	25.8
Total suspended solids (mg/L)	7	7.0	54.0	11.0	17.0	16.5
Specific conductance (µmhos)	8	39.5	54.4	45.2	45.3	4.6
Hardness (mg/L)	7	11.1	22.0	18.3	17.2	4.8
Alkalinity (mg/L)	7	10.4	17.8	16.7	15.2	3.0
Stream Flow (cfs)	7	29.0	100.3	47.5	61.2	--
Chemical						
Dissolved oxygen (mg/L)	8	7.8	10.6	9.4	9.3	1.0
pH (su)	8	6.8	8.1	7.5	7.5	0.5
Ammonia Nitrogen (mg/L)	7	< 0.015	0.015	0.008	0.008	0.000
Nitrate+Nitrite Nitrogen (mg/L)	7	0.051	0.113	0.091	0.087	0.020
Total Kjeldahl Nitrogen (mg/L)	7	< 0.150	0.777	0.191	0.346	0.289
Total nitrogen (mg/L)	7	0.201	1.033	0.436	0.516	0.306
Dissolved reactive phosphorus (mg/L)	7	< 0.004	0.030	0.014	0.014	0.010
Total phosphorus (mg/L)	7	0.037	0.161	0.072 ^M	0.074	0.042
CBOD-5 (mg/L)	7	< 1.0	2.4	1.7	1.6	0.6
COD (mg/L)	3	< 2.0	2.0	1.0	1.0	0.0
Chlorides (mg/L)	7	4.0	2.0	5.2	5.1	0.9
Total Metals						
Aluminum (mg/L)	1	--	--	--	0.418	--
Iron (mg/L)	1	--	--	--	1.990	--
Manganese (mg/L)	1	--	--	--	0.076	--
Dissolved Metals						
Aluminum (mg/L)	1	--	--	--	< 0.015	--
Antimony (µg/L)	1	--	--	--	< 2	--
Arsenic (µg/L)	1	--	--	--	10	--
Cadmium (mg/L)	1	--	--	--	< 0.005	--
Chromium (mg/L)	1	--	--	--	< 0.004	--
Copper (mg/L)	1	--	--	--	< 0.005	--
Iron (mg/L)	1	--	--	--	0.388	--
Lead (µg/L)	1	--	--	--	< 2	--
Manganese (mg/L)	1	--	--	--	0.067	--
Mercury (µg/L)	1	--	--	--	< 0.3	--
Nickel (mg/L)	1	--	--	--	< 0.006	--
Selenium (µg/L)	1	--	--	--	< 10	--
Silver (mg/L)	1	--	--	--	< 0.003	--
Thallium (µg/L)	1	--	--	--	< 1	--
Zinc (mg/L)	1	--	--	--	< 0.006	--
Biological						
^J Chlorophyll a (µg/L)	7	0.53	7.48	1.60	2.46	2.4
^J Fecal Coliform (col/100 mL)	7	29	110	73	74	29

^J=estimate; N=number of samples; M= value > 90th percent of ADEM's 45a reference reach samples.

FOR MORE INFORMATION, CONTACT:
Ruthie Young, ADEM Aquatic Assessment Unit
1350 Coliseum Boulevard Montgomery, AL 36110
(334) 260-2762 ryoung@adem.state.al.us