

2005 Monitoring Summary



Sofkahatchee Creek at Elmore County Road 211 crossing (32.65347/ -86.21291)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Sofkahatchee Creek watershed 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 Assessment were to assess the biological integrity of each monitoring site and to estimate overall water quality within the ACT basin group.

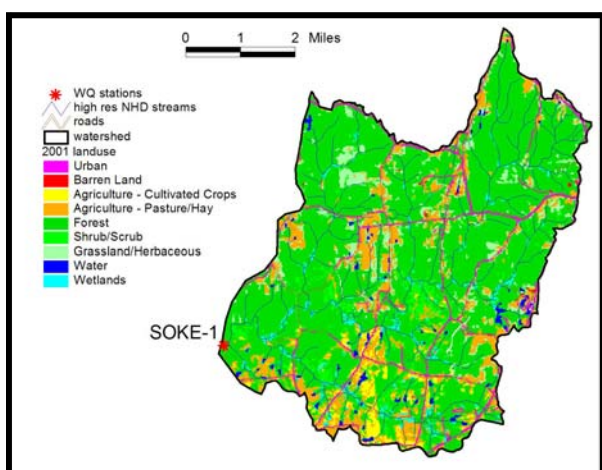


Figure 1. Sampling location and landuse within the Sofkahatchee watershed at SOKE-1.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Sofkahatchee Creek is a second-order *Fish & Wildlife (F&W)* stream located in Elmore County (Fig. 1). It flows into Jordan Lake Reservoir approximately 3 stream miles downstream of the assessment location. Landuse within the watershed is primarily forest, with some pasture areas. (Table 1).

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. Sofkahatchee Creek at SOKE-1 is a high-gradient, riffle-run stream reach characterized by a bedrock substrate. Habitat within the reach was rated as *optimal* for biological communities.

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 to be in *fair* condition (Table 4).

Table 1. Summary of watershed characteristics.

Physical Characteristics		
Drainage Area (mi ²)		30
Ecoregion ^a		45a
% Landuse		
Open water		1
Wetland	Woody	2
	Emergent herbaceous	<1
Forest	Deciduous	39
	Evergreen	20
	Mixed	6
Shrub/scrub		6
Grassland/herbaceous		6
Pasture/hay		12
Cultivated crops		2
Development	Open space	4
	Low intensity	<1
	Moderate intensity	<1
Barren		<1
Population/km ^{2b}		25
# NPDES Permits ^c	TOTAL	1
Construction Stormwater		1

a. Southern Inner Piedmont

b. 2000 Census data

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

Table 2. Physical characteristics at SOKE-1, June 24, 2005.

Physical Characteristics		
Width (ft)		40
Canopy cover		Mostly Open
Depth (ft)	Riffle	0.8
	Run	1.2
	Pool	2.5
% of Reach	Riffle	65
	Run	25
	Pool	10
% Substrate	Bedrock	70
	Boulder	5
	Cobble	5
	Gravel	5
	Sand	10
	Silt	3
	Detritus	2

Table 3. Results of the habitat assessment conducted June 24, 2005.

Habitat Assessment (% Maximum Score)	Rating
Instream habitat quality 88	Optimal (> 70)
Sediment deposition 79	Optimal (> 70)
Sinuosity 73	Sub-optimal (65-84)
Bank and vegetative stability 81	Optimal (≥75)
Riparian buffer 90	Sub-optimal (70-90)
Habitat assessment score 199	
% Maximum score 83	Optimal (> 70)

Table 4. Results of the macroinvertebrate assessment conducted June 24, 2005.

Macroinvertebrate Assessment Results			
	Results	Scores	Rating
Taxa richness measures		(0-100)	
# Ephemeroptera (mayfly) genera	11	92	Excellent (>85)
# Plecoptera (stonefly) genera	5	83	Excellent (>75)
# Trichoptera (caddisfly) genera	7	58	Fair (45-66)
Taxonomic composition measures			
% Non-insect taxa	5	78	Good (74.1-87.1)
% Non-insect organisms	3	91	Fair (62.7-93.9)
% Plecoptera	3	15	Fair (13.1-19.7)
Tolerance measures			
Beck's community tolerance index	17	61	Good (60.7-80.4)
WMB-I Assessment Score	---	68	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 indicated Sofkahatchee Creek at SOKE-1 to be meeting its *Fish & Wildlife* water use classification. Median concentrations of nutrients, total suspended and dissolved solids, and chlorides were within the expected limit for Southern Inner Piedmont streams. Collected metals were generally below detection limits. Maximum turbidity, total phosphorus, biochemical oxygen demand, and total suspended solid concentrations and fecal coliform counts occurred during a very high storm flow event. Flow was too dangerous to be measured during this site visit. Average stream flow from March-early June was 82.0 cfs; average stream flow late June-October was 13.7 cfs.

CONCLUSIONS

Bioassessment results indicated the macroinvertebrate community in Sofkahatchee Creek at SOKE-1 to be in *fair* condition. Other data indicated the site to be similar to least-impaired ecoregional reference reaches. Although in-stream habitat was rated as *optimal* for macroinvertebrate communities, the high percent bedrock substrate would have made the reach susceptible to scouring from the high flows experienced March-June and prior to the macroinvertebrate bioassessment.

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)	10	11.0	25.0	20.0	19.6	4.6
Turbidity (NTU)	10	3.4	366.0	9.8	45.8	112.7
Total dissolved solids (mg/L)	7	24.0	54.0	42.5	40.5	9.5
Total suspended solids (mg/L)	7	2.0	291.0	20.5 ^M	62.0	112.5
Specific conductance (µmhos)	10	26.6	51.5	37.3	37.9	7.3
Hardness (mg/L)	5	7.9	12.3	8.5	8.9	1.4
Alkalinity (mg/L)	7	3.7	26.2	8.0	8.4	4.3
Stream Flow (cfs)	9	6.4	107.5	57.0	51.6	---
Chemical						
Dissolved oxygen (mg/L)	10	7.1	10.2	9.0	8.8	1.0
pH (su)	10	6.2	7.96	7.3	7.3	0.5
Ammonia nitrogen (mg/L)	7	0.015	0.024	0.008	0.012	0.007
Nitrate+Nitrite nitrogen (mg/L)	7	0.003	0.073	0.043	0.041	0.024
Total Kjeldahl nitrogen (mg/L)	7	0.150	0.659	0.075	0.158	0.221
Total nitrogen (mg/L)	7	0.076	0.695	0.129	0.199	0.220
Dissolved reactive phosphorus (mg/L)	7	0.004	0.011	0.009	0.008	0.003
Total phosphorus (mg/L)	7	0.004	0.085	0.045	0.047	0.032
CBOD-5 (mg/L)	7	1.0	3.6	1.4	1.6	1.1
COD (mg/L)	1	2.0	2.0	1.0	1.0	
Chlorides (mg/L)	6	4.2	2.0	4.5	4.6	0.3
Atrazine (µg/L)	2	0.05	0.05	0.03	0.03	0.00
Total Metals						
Aluminum (mg/L)	4	0.015	0.386	0.272	0.246	0.2
Iron (mg/L)	4	0.36	1.18	0.718	0.819	0.3
Manganese (mg/L)	4	0.005	0.08	0.038	0.046	0.0
Dissolved Metals						
Aluminum (mg/L)	4	0.015	0.015	0.0075	0.008	0.0
Antimony (µg/L)	4	2	2	1	1	0.0
Arsenic (µg/L)	4	10	10	5	5	0.0
Cadmium (mg/L)	4	0.005	0.005	0.0025	0.0025	0.0
Chromium (mg/L)	4	0.004	0.004	0.002	0.002	0.0
Copper (mg/L)	4	0.005	0.005	0.0025	0.003	0.0
Iron (mg/L)	4	0.125	0.261	0.129	0.1343	0.0
Lead (µg/L)	4	2	2	1	1	0.0
Manganese (mg/L)	4	0.005	0.009	0.0025	0.005	0.0
Mercury (µg/L)	4	0.3	0.3	0.15	0.2	0.1
Nickel (mg/L)	4	0.006	0.006	0.003	0.003	0.0
Selenium (µg/L)	4	10	10	5	5	0.0
Silver (mg/L)	4	0.003	0.003	0.0015	0.0015	0.0
Thallium (µg/L)	4	1	1	0.5	0.5	0.0
Zinc (mg/L)	4	0.006	0.006	0.003	0.003	0.0
Biological						
^J Chlorophyll a (µg/L)	7	0.53	14.95	3.20	4.42	5.3
^J Fecal Coliform (col/100 mL)	7	43	9900 ^C	155	1759	3989

J=estimate; N=# samples; Min=minimum; Max=maximum; M=value > 90% of all verified ecoregional reference data within ecoregion 45a; C=value > criteria established for *Fish & Wildlife* streams.

FOR MORE INFORMATION, CONTACT:
 Lisa Houston Huff, ADEM Aquatic Assessment Unit
 1350 Coliseum Boulevard Montgomery, AL 36110
 (334) 260-2752 esh@adem.state.al.us