

2008 Monitoring Summary



Ambient Monitoring Site

South Fork Cowikee Creek at Barbour County Road 79 (32.01750/-85.29583)

BACKGROUND

South Fork Cowikee Creek at SFCB-1 is one of a network of 94 ambient monitoring sites that the Alabama Department of Environmental Management (ADEM) monitors annually to identify long-term trends in water quality and to provide data for the development of TMDLs and water quality criteria.

This stream reach was also monitored as part of the 2008 Assessment of the Southeast Alabama (SE AL) River Basins. The objectives of this project were to assess the biological integrity of each monitoring site and to estimate overall water quality within the basin. A habitat and a macroinvertebrate assessment were also conducted on June 5, 2008, to assess the macroinvertebrate community condition within the reach.



Figure 1. South Fork Cowikee Creek at SFCB-1, May 4, 2011.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. South Fork Cowikee Creek at SFCB-1 is a shallow, *Swimming/Fish & Wildlife (S/F&W)* stream in Barbour County. Based on the 2000 National Land Cover Dataset, landuse is primarily forest (69%). Population density is relatively low. As of February 23, 2011, fifteen outfalls were active 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. South Fork Cowikee Creek at SFCB-1 is a riffle-run stream characterized by a sandy substrate (Figure 1). Overall habitat quality was categorized as *marginal* due to sediment deposition, unstable banks, channelization, and limited instream habitat. A severe drought had been in effect for 2008, causing very shallow depths and low stream flows. This may have had an impact on the availability of macroinvertebrate habitats.

BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). Measures of taxonomic richness, community composition, and community tolerance are used to assess the overall health of the macroinvertebrate community in comparison to conditions expected in north Alabama streams and rivers. Each site is placed in one of six levels, ranging from 1, or *natural* to 6, or *highly altered*. The macroinvertebrate survey conducted at SFCB-1 rated the site as a 4, or *Fair/Good*. Relative abundance and numbers of pollution-sensitive taxa are lower than expected, while relative abundance and numbers of pollution-tolerant taxa have increased (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Chattahoochee River
Drainage Area (mi ²)		112
Ecoregion ^a		65d
% Landuse		
Open water		<1
Wetland	Woody	5
	Emergent herbaceous	<1
Forest	Deciduous	28
	Evergreen	28
	Mixed	13
Shrub/scrub		14
Grassland/herbaceous		<1
Pasture/hay		4
Cultivated crops		4
Development	Open space	4
	Low intensity	<1
	Moderate intensity	<1
Population/km ^{2b}		7
# NPDES Permits ^c	TOTAL	15
	401 Water Quality Certification	1
	Construction Stormwater	12
	Municipal Individual	2

a.Southern Hilly Gulf Coastal Plain

b.2000 US Census

c.#NPDES outfalls downloaded from ADEM's NPDES Management System database, February 23, 2011

Table 2. Physical characteristics of South Fork Cowikee Creek at SFCB-1, June 5, 2008.

Physical Characteristics		
Width (ft)		20
Canopy Cover		Mostly Open
Depth (ft)		
	Riffle	0.6
	Run	0.9
	Pool	0.8
% of Reach		
	Riffle	10
	Run	80
	Pool	10
% Substrate		
	Bedrock	2
	Boulder	2
	Cobble	2
	Gravel	5
	Sand	85
	Silt	2
	Organic Matter	2

Table 3. Results of the habitat assessment conducted in South Fork Cowikee Creek at SFCB-1, June 5, 2008.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	40	Marginal (40-52)
Sediment Deposition	51	Marginal (40-52)
Sinuosity	43	Poor (<45)
Bank and Vegetative Stability	56	Marginal (35-59)
Riparian Buffer	83	Sub-optimal (70-89)
Habitat Assessment Score	126	
% Maximum Score	52	Marginal (40-52)

Table 4. Results of macroinvertebrate bioassessment conducted in South Fork Cowikee Creek at SFCB-1, June 5, 2008.

Macroinvertebrate Assessment		Results
Taxa richness and diversity measures		
Total # Taxa		45
# EPT taxa		11
# Highly-sensitive and Specialized Taxa		1
Taxonomic composition measures		
% EPC taxa		41
% EPT minus Baetidae and Hydropsychidae		22
% Chironomidae Individuals		72
% Dominant Taxon		22
% Individuals in Dominant 5 Taxa		68
Functional feeding group		
# Collector Taxa		20
% Tolerant Filterer Taxa		16
Community tolerance		
# Sensitive EPT		1
% Sensitive taxa		7
% Nutrient Tolerant individuals		44
WMB-I Assessment Score		4
WMB-I Assessment Rating		Good/Fair

WATER CHEMISTRY RESULTS

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected during May, July, and September of 2008. Median specific conductance, hardness, alkalinity, and chloride concentration values were higher than expected based on reference reach data collected in ecoregion 65d. All other physical, chemical, and biological parameters were within expected ranges.

SUMMARY

Despite the large area it drains, the severe drought that occurred throughout Alabama had a major impact on South Fork Cowikee Creek. Extremely shallow water levels and minimal flow were evident during every sampling visit. Bioassessment results indicated the macroinvertebrate community to be in *Fair/Good* condition. Specific conductance, hardness, alkalinity, and chlorides were elevated as compared to verified ecoregional reference reach data collected by ADEM.

Table 5. Summary of water quality data collected May, July, September of 2008. 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.

Parameter	N	Min	Max	Med	Avg	SD
Physical						
Temperature (°C)	4	21.4	25.5	24.4	23.9	1.7
Turbidity (NTU)	4	2.7	6.6	4.3	4.5	1.8
Total Dissolved Solids (mg/L)	3	40.0	102.0	102.0	81.3	35.8
Total Suspended Solids (mg/L)	3	< 1.0	3.0	1.0	1.5	1.3
Specific Conductance (µmhos)	4	120.7	222.8	184.4 ^G	178.0	45.8
Hardness (mg/L)	3	52.1	89.9	71.7 ^G	71.2	18.9
Alkalinity (mg/L)	3	40.0	62.9	48.9 ^M	50.6	11.5
Stream Flow (cfs)	3	2.6	10.9	4.5	6.0	4.4
Chemical						
Dissolved Oxygen (mg/L)	4	7.3	9.1	8.4	8.3	0.8
pH (su)	4	7.6	8.0	7.8	7.8	0.2
Ammonia Nitrogen (mg/L)	3	< 0.015	< 0.015	0.008	0.008	0.000
Nitrate+Nitrite Nitrogen (mg/L)	3	0.011	0.152	0.077	0.080	0.070
Total Kjeldahl Nitrogen (mg/L)	3	0.247	0.297	0.247	0.264	0.029
Total Nitrogen (mg/L)	3	0.258	0.449	0.324	0.344	0.097
Dissolved Reactive Phosphorus (mg/L)	3	0.011	0.015	0.012	0.013	0.002
Total Phosphorus (mg/L)	3	0.019	0.034	0.032	0.028	0.008
CBOD-5 (mg/L)	3	< 1.0	< 1.0	0.5	0.5	0.0
Chlorides (mg/L)	3	3.4	6.9	5.8 ^M	5.4	1.8
Total Metals						
Aluminum (mg/L)	3	0.059	0.123	0.091	0.091	0.032
Iron (mg/L)	3	0.318	1.250	0.807	0.792	0.466
Manganese (mg/L)	3	0.030	0.062	0.039	0.044	0.016
Dissolved Metals						
Aluminum (mg/L)	3	< 0.015	< 0.019	0.008	0.008	0.001
Antimony (µg/L)	3	< 2.0	< 2.0	1.0	1.0	0.0
Arsenic (µg/L)	3	< 2.2	< 2.2	1.1	1.1	0.0
Cadmium (µg/L)	3	< 3.000	< 5.000	2.500	2.167	0.577
Chromium (µg/L)	3	< 4.000	< 13.000	2.000	3.500	2.598
Copper (mg/L)	3	< 0.005	< 0.013	0.002	0.004	0.002
Iron (mg/L)	3	0.093	0.412	0.271	0.259	0.160
Lead (µg/L)	3	< 1.5	< 1.5	0.7	0.7	0.0
Manganese (mg/L)	3	0.027	0.046	0.040	0.038	0.010
Mercury (µg/L)	3	< 0.030	< 0.030	0.015	0.015	0.000
Nickel (mg/L)	3	< 0.004	< 0.006	0.003	0.003	0.000
Selenium (µg/L)	3	< 1.5	< 1.6	0.8	0.8	0.0
Silver (µg/L)	3	< 2.000	< 3.000	1.500	1.333	0.289
Thallium (µg/L)	3	< 0.6	< 0.6	0.3	0.3	0.0
Zinc (mg/L)	3	< 0.003	< 0.006	0.003	0.002	0.001
Biological						
Chlorophyll a (ug/L)	3	< 0.10	3.56	2.67	2.09	1.82
J Fecal Coliform (col/100 mL)	3	100	270	140	170	89

G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 65d; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 65d; N=# samples.

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