

2005 Monitoring Summary



Barbour Creek at Barbour County Road 79 (31.89744/-85.34024)

BACKGROUND

Barbour Creek, from the Chattahoochee River to its source, was on Alabama's 2004 Clean Water Act (CWA) §303(d) list of impaired waters for not meeting its *Fish and Wildlife* (F&W) water use classification due to siltation from agricultural runoff (ADEM 2004). Barbour Creek at BRC-2 is a mixed canopy stream characterized by sand substrate. Gravel, organic matter and silt make up the remaining substrate types (Table 2).

The Alabama Department of Environmental Management (ADEM) monitored Barbour Creek at BRC-2 to verify and document impairment from siltation. The ADEM conducted macroinvertebrate and habitat assessments to evaluate impairment to aquatic communities. Monthly water chemistry samples were collected to identify the causes of impairment.



Figure 1. Barbour Creek at BRC-2 downstream view (24 March 2005).



Figure 2. Barbour Creek at BRC-2, upstream view (24 March 2005).

Table 1. Habitat and MB-EPT assessment results conducted at BRC-2 June 15, 2005

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	35	Poor (<40)
Sediment deposition	55	Sub-optimal (53-65)
Sinuosity	50	Marginal (45-64)
Bank and vegetative stability	40	Marginal (35-59)
Riparian buffer	88	Sub-optimal (70-90)
Habitat assessment score	115	
% Maximum score	52	Marginal (40-52)

Table 2. Summary of physical characteristics of Barbour Creek at BRC-2, June 15, 2005.

Physical characteristics	
Ecoregion ^a	65d
Width (ft)	30
Canopy cover	Est. 50/50
Depth (ft)	
	Run 1.0
	Pool 2.0
% of Reach	
	Run 95
	Pool 5
% Substrate	
	Gravel 5
	Sand 85
	Silt 3
	Organic Matter 5

a. Southern Hilly Gulf Coastal Plains

RESULTS

Benthic macroinvertebrate communities were sampled using ADEM's Multi-habitat Bioassessment EPT methodology (MB-EPT). The method uses the number of families in three pollution-sensitive aquatic insect orders as an indicator of biological conditions. The results were compared to existing assessment thresholds for the Southern Hilly Gulf Coastal Plains ecoregion, where Barbour Creek is located, to evaluate the community's health (*data analysis SOP*). Nine EPT families were collected from Barbour Creek at BRC-2, indicating the community to be in *good* condition. The overall habitat quality was categorized as *marginal* due to sediment deposition, bank erosion, and an overall lack of instream habitat (Table 1).

WATER CHEMISTRY

Results of water chemistry samples collected March-October of 2005 are presented in Table 3. Samples were collected monthly or quarterly (hardness, chlorides). Chlorophyll *a* and Chemical Oxygen Demand (COD) were both collected once during this time frame. Median values of all physical and chemical parameters sampled were within the range expected in the Southern Hilly Gulf Coastal Plains ecoregion. The maximum turbidity and fecal coliform concentrations occurred during March, after a heavy rain event.

Table 3. 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)	9	11.2	26.0	23.0	19.3	5.7
Turbidity (NTU)	9	14.2	69.5	22.8	26.2	16.8
Total dissolved solids (mg/L)	7	26.0	90.0	42.0	46.4	21.1
Total suspended solids (mg/L)	7	13.0	71.0	25.0	30.9	22.7
Specific conductance (µmhos)	9	32.7	67.4	48.9	47.1	12.9
Hardness (mg/L)	3	11.0	14.4	11.1	12.2	1.9
Alkalinity (mg/L)	7	7.3	23.2	10.3	13.8	6.2
Stream Flow (cfs)	5	12.8	46.1	20.8	24.6	---
Chemical						
Dissolved oxygen (mg/L)	9	7.3	10.87	8.9	8.8	1.1
pH (su)	9	6.2	8.96	7.2	7.2	0.8
Ammonia Nitrogen (mg/L)	7	< 0.015	0.076	0.008	0.017	0.026
Nitrate+Nitrite Nitrogen (mg/L)	7	< 0.003	0.098	0.060	0.060	0.031
Total Kjeldahl Nitrogen (mg/L)	7	< 0.150	0.649	0.361	0.374	0.193
Total nitrogen (mg/L)	7	< 0.076	0.696	0.421	0.434	0.206
Dissolved reactive phosphorus (mg/L)	7	< 0.004	0.009	< 0.002	0.005	0.003
Total phosphorus (mg/L)	7	0.010	0.154	0.038	0.053	0.051
CBOD-5 (mg/L)	7	1.0	2.1	1.8	1.7	0.4
COD (mg/L)	1				< 1.0	
Chlorides (mg/L)	3	4.8	6.2	5.6	5.5	0.7
Biological						
Chlorophyll <i>a</i> (µg/L)	1				< 3.20	
^J Fecal Coliform (col/100 mL)	7	73	1260	220	356	404

N=# samples; J=Estimate

CONCLUSIONS

Results of the 2005 macroinvertebrate assessment indicated the macroinvertebrate community to be in *good* condition. Despite marginal habitat quality, median values of all physical and chemical parameters sampled were within the range expected in the Southern Hilly Gulf Coastal Plains ecoregion.

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