

2006 Monitoring Summary



Basin Assessment Site

Big Creek at Mobile Co Rd 63 Bridge Crossing (30.85591/-88.33430)

BACKGROUND

The Alabama Department Environmental Management (ADEM) selected the Big Creek watershed for biological and water quality monitoring as part of the 2006 Assessment of the Escatawpa, Mobile, Lower 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.

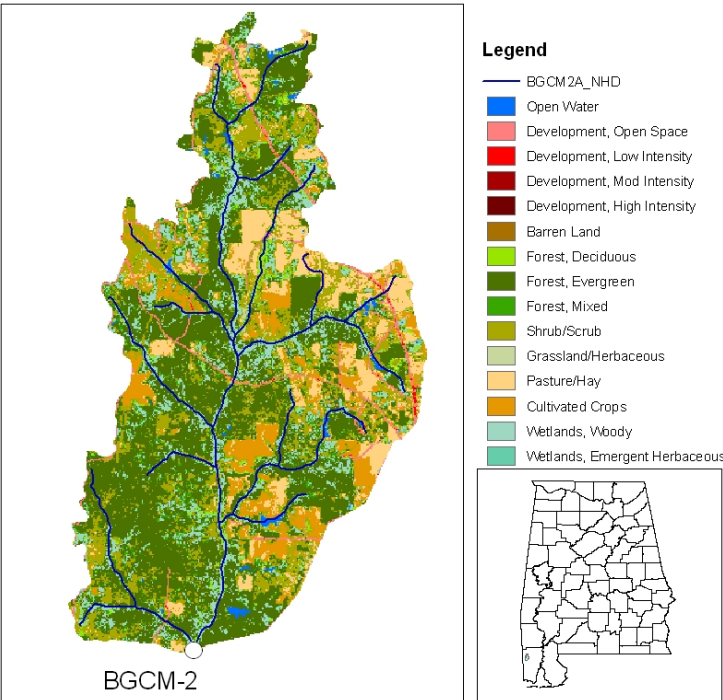


Figure 1. Sampling location and landuse within the Big Creek watershed at BGCM-2.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Big Creek at BGCM-2 is a small *Fish & Wildlife (F&W)* stream located in the Southern Pine Plains and Hills ecoregion (65f) (Griffith et al. 2001). Landuse within the watershed is mainly forest and woody wetlands (59%), with some (17%) pasture and crops (Figure 1). Four construction permits have been issued in the 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. Big Creek at BGCM-2 is a low-gradient stream with sand substrate. The presence of a riparian buffer and bank vegetation categorized overall habitat quality as *optimal*, although the availability of instream habitat was limited within the reach (Figure 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 to be in *good* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Escatawpa River
Drainage Area (mi ²)		31
Ecoregion ^a		65f
% Landuse		
Open water		1
Wetland	Woody	12
	Emergent herbaceous	<1
Forest	Deciduous	2
	Evergreen	40
	Mixed	5
Shrub/scrub		19
Grassland/herbaceous		<1
Pasture/hay		10
Cultivated crops		7
Development	Open space	3
	Low intensity	<1
	Moderate intensity	<1
Population/km ^{2b}		11
# NPDES Permits ^c	TOTAL	4
Construction Stormwater		3
Mining		1

a. Southern Pine Plains & Hills

b. 2000 US Census

c. #NPDES permits downloaded from ADEM's NPDES Management System database, 18 Sep 2009.

Table 2. Physical characteristics of Big Creek at BGCM-2, May18, 2006.

Physical Characteristics		
Width (ft)		20
Canopy cover		Mostly Shaded
Depth (ft)		
	Run	1.5
	Pool	4.0
% of Reach		
	Run	45
	Pool	55
% Substrate		
	Sand	82
	Silt	2
	Organic Matter	14
	Mud/Muck	2

Table 3. Results of the habitat assessment conducted on Big Creek at BGCM-2, May 18, 2006.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	53	Marginal (40-52)
Sediment deposition	74	Optimal (>65)
Sinuosity	55	Marginal (45-64)
Bank and vegetative stability	66	Sub-optimal (60-74)
Riparian buffer	95	Optimal (>90)
Habitat assessment score	152	
% Maximum score	69	Optimal (>65)

Table 4. Results of the macroinvertebrate bioassessment conducted in Big Creek at BGCM-2, May 18, 2006.

Macroinvertebrate Assessment			
	Results	Scores	Rating
Taxa richness measures			
# EPT genera	26	100	Excellent (>78)
Taxonomic composition measures			
% Non-insect taxa	8	87	Fair (61.9-92.7)
% Plecoptera	7	33	Good (5.7-52.8)
% Dominant taxa	18	80	Good (70.6-85.2)
Functional composition measures			
% Predators	9	30	Poor (15.1-30.1)
Tolerance measures			
Beck's community tolerance index	30	100	Excellent (>65.9)
% Nutrient tolerant organisms	33	61	Fair (50.9-76.2)
WMB-I Assessment Score	---	70	Good (57-78)



Figure 2. Big Creek watershed at BGCM-2, January 21, 2010.

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 2006 to help identify any stressors to the biological communities. The slightly acidic stream pH is characteristic of streams in this region of Alabama. The median concentration of nitrate+nitrite nitrogen was higher than expected based on the 90th percentile of reference reach data collected in this ecoregion.

SUMMARY

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

Habitat, bioassessment, and water quality data indicate the Big Creek at BGCM-2 to be in *good* condition despite limited instream habitat and higher than expected nitrogen concentrations.

Table 5. Summary of water quality data collected March-October, 2006. 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	16.5	26.2	21.4	21.5	3.5
Turbidity (NTU)	9	1.9	26.1	2.9	5.6	7.7
Total Dissolved Solids (mg/L)	8	4.0	55.0	35.0	30.6	16.9
Total Suspended Solids (mg/L)	8	< 1.0	11.0	3.3	4.3	3.6
Specific Conductance (µmhos)	9	26.6	42.3	28.8	30.3	4.8
Hardness (mg/L)	3	14.0	36.0	24.0	24.7	11.0
Alkalinity (mg/L)	8	2.1	12.0	6.3	6.2	3.1
Stream Flow (cfs)	9	12.0	74.0	20.0	26.0	19.2
Chemical						
Dissolved Oxygen (mg/L)	9	6.6	7.9	7.1	7.2	0.5
pH (su)	9	5.6 ^C	6.8	6.2	6.2	0.4
Ammonia Nitrogen (mg/L)	8	< 0.010	0.190	0.012	0.038	0.063
Nitrate+Nitrite Nitrogen (mg/L)	8	0.166	0.430	0.377 ^M	0.315	0.118
Total Kjeldahl Nitrogen (mg/L)	8	< 0.150	0.710	0.236	0.268	0.201
Total Nitrogen (mg/L)	8	0.246	1.092	0.609	0.584	0.268
Dissolved Reactive Phosphorus (mg/L)	8	< 0.004	0.020	0.007	0.009	0.006
Total Phosphorus (mg/L)	8	0.004	0.046	0.027	0.022	0.016
CBOD-5 (mg/L)	8	< 1.0	2.6	1.6	1.4	0.9
Chlorides (mg/L)	8	< 1.5	6.9	3.0	4.0	2.2
Atrazine (µg/L)	2	0.05	0.05	0.03	0.03	0.00
Total Metals						
Aluminum (mg/L)	3	< 0.1	2.3	0.200	0.850	1.258
Iron (mg/L)	3	0.554	1.41	0.634	0.866	0.473
Manganese (mg/L)	3	0.019	0.047	0.033	0.033	0.014
Dissolved Metals						
Aluminum (mg/L)	3	< 0.1	0.13	0.130	0.103	0.046
Antimony (µg/L)	3	< 7.5	< 7.5	3.8	3.8	0.0
Arsenic (µg/L)	3	< 5	< 5	2.5	2.5	0.0
Cadmium (mg/L)	3	< 0.0003	< 0.0003	0.0001	0.0001	0.000
Chromium (mg/L)	3	< 0.005	< 0.005	0.003	0.003	0.000
Copper (mg/L)	3	< 0.005	< 0.005	0.003	0.003	0.000
Iron (mg/L)	3	0.145	0.472	0.256	0.291	0.166
Lead (µg/L)	3	< 5	< 5	2.5	2.5	0.0
Manganese (mg/L)	3	0.019	0.037	0.025	0.027	0.009
Mercury (µg/L)	3	< 0.5	< 0.5	0.3	0.3	0.0
Nickel (mg/L)	3	< 0.005	0.007	0.0025	0.004	0.003
Selenium (µg/L)	3	< 7.5	< 7.5	3.8	3.8	0.0
Silver (mg/L)	3	< 0.001	< 0.001	0.0004	0.0004	0.000
Thallium (µg/L)	3	< 9	< 9	4.5	4.5	0.0
Zinc (mg/L)	3	< 0.005	< 0.005	0.003	0.003	0.000
Biological						
Chlorophyll a (µg/L)	8	< 0.10	2.20	1.12	1.13	0.78
^J Fecal Coliform (col/100 mL)	6	29	800	105	216	293

J=estimate; N= # of samples; C= value exceeds established criteria for *Fish & Wildlife* water use classification; M=value>90% of all verified ecoregional reference reach data collected in the ecoregion 65f.

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