

2005 Monitoring Summary



Bridge Creek at Autauga County Road 40 (32.56901/-86.51175)

BACKGROUND

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

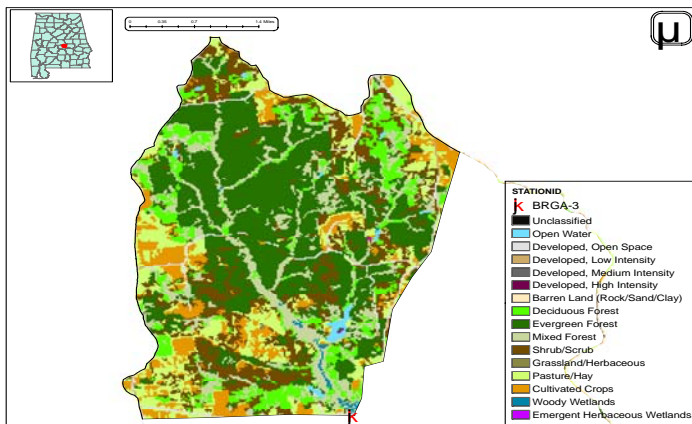


Figure 1. Sampling location and landuse within the Bridge Creek watershed at BRGA-3.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Bridge Creek at BRGA-3 is a small *Fish & Wildlife (F&W)* stream located near the city of Prattville (Fig. 1). This watershed falls within the Fall Line Hills ecoregion (65i) usually characterized by low to moderate gradient streams with sand and gravel substrates. Landuse within the watershed is primarily forest (58%), with some agricultural areas (21%).

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. Bridge Creek at BRGA-3 is a low-gradient, sand-bottomed stream in the Alabama River basin. The presence of mixed forests and pasture/hay areas are characteristic of streams in the Fall Line Hills ecoregion. Overall habitat quality was categorized as *optimal*.

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 the score for each metric. Metric results indicated the macroinvertebrate community to be characterized by excellent populations of Stoneflies and predator groups, indicating *excellent* community condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics	
Drainage Area (mi ²)	13
Ecoregion ^a	65i
% Landuse	
Open water	1
Wetland	Woody <1
	Emergent herbaceous <1
Forest	Deciduous 10
	Evergreen 34
	Mixed 14
Shrub/scrub	17
Grassland/herbaceous	<1
Pasture/hay	12
Cultivated crops	9
Development	Open space 2
	Low intensity <1
Population/km ^{2b}	16
# NPDES Permits ^c	TOTAL 3
401 Water Quality Certification	1
Mining General Permit (old)	2

a. Fall Line Hills

b. 2000 US census data

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

Table 2. Physical characteristics at BRGA-3, June 16, 2005.

Physical Characteristics	
Width (ft)	22.5
Canopy cover	Shaded
Depth (ft)	
	Run 1.5
	Pool 1.0
% of Reach	
	Run 85
	Pool 15
% Substrate	
	Gravel 14
	Sand 70
	Silt 1
	Organic Matter 15

Table 3. Results of the habitat assessment conducted on Bridge Creek at BRGA-3, June 16, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	58	Marginal (41-58)
Sediment deposition	79	Optimal (> 70)
Sinuosity	65	Sub-optimal (65-84)
Bank and vegetative stability	66	Sub-optimal (60-74)
Riparian buffer	88	Sub-optimal (70-90)
Habitat assessment score	160	
% Maximum score	73	Optimal (> 70)

Table 4. Results of the macroinvertebrate bioassessment conducted in Bridge Creek at BRGA-3, June 16, 2005.

Macroinvertebrate Assessment			
	Results	Scores	Rating
Taxa richness measures			
# EPT genera	22	88	Excellent (>78)
Taxonomic composition measures			
% Non-insect taxa	5	100	Excellent (>78)
% Plecoptera	7	100	Excellent (>78)
% Dominant taxa	19	78	Excellent (>78)
Functional composition measures			
% Predators	19	100	Excellent (>78)
Tolerance measures			
Beck's community tolerance index	21	95	Excellent (>78)
% Nutrient tolerant organisms	19	85	Excellent (>78)
WMB-I Assessment Score	---	92	Excellent (>78)

WATER CHEMISTRY

Results of water chemistry analyses 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. Median concentrations of all parameters were similar to the 90th percentile of data collected at least impaired reference reaches in ecoregion 65i. DDT was present at an elevated level in the sample collected on 8/23/2005.

CONCLUSIONS

Bioassessment results indicated the macroinvertebrate community to be in *excellent* condition. Overall habitat quality was categorized as *optimal*, although instream habitat was somewhat limited. Intensive water quality sampling did not indicate any impairment.

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. Metals results were compared to ADEM's chronic aquatic life use criteria adjusted for hardness.

Parameter	N	Min	Max	Median	Avg	SD
Physical						
Temperature (°C)	8	12.0	27.0	24.4	22.8	4.8
Turbidity (NTU)	8	4.7	16.9	8.5	9.1	3.9
Total Dissolved Solids (mg/L)	7	7.0	53.0	35.0	31.4	16.8
Total Suspended Solids (mg/L)	7	6.0	18.0	11.0	11.9	4.5
Specific Conductance (µmhos)	8	20.0	27.4	22.3	22.9	2.4
Hardness (mg/L)	5	4.2	6.7	5.5	5.4	0.9
Alkalinity (mg/L)	7	2.5	6.1	3.6	4.0	1.3
Stream Flow (cfs)	8	0.7	46.9	28.0	24.9	---
Chemical						
Dissolved Oxygen (mg/L)	8	6.7	10	7.2	7.7	1.1
pH (su)	8	6.1	7.1	6.4	6.5	0.3
Ammonia Nitrogen (mg/L)	7	< 0.015	0.058	0.023	0.023	0.018
Nitrate+Nitrite Nitrogen (mg/L)	7	< 0.025	0.205	0.144	0.133	0.063
Total Kjeldahl Nitrogen (mg/L)	7	< 0.150	0.330	0.184	0.206	0.086
Total Nitrogen (mg/L)	7	0.175	0.438	0.356	0.340	0.101
Dissolved Reactive Phosphorus (mg/L)	6	< 0.004	0.011	0.005	0.005	0.003
Total Phosphorus (mg/L)	7	< 0.004	0.056	0.013	0.023	0.021
CBOD-5 (mg/L)	7	< 1.0	3.5	1.6	1.6	0.9
TOC (mg/L)	1	3.4	3.4	3.4	3.4	---
^J Chlorides (mg/L)	6	4.0	4.8	4.2	4.3	0.3
Atrazine (µg/L)	1	0.06	0.06	0.06	0.06	---
Total Metals						
Aluminum (mg/L)	4	< 0.015	0.206	0.135	0.121	0.094
Iron (mg/L)	4	0.115	1.98	1.495	1.271	0.829
Manganese (mg/L)	4	0.092	0.182	0.129	0.133	0.040
Dissolved Metals						
Aluminum (mg/L)	4	< 0.015	< 0.015	0.008	0.008	0.000
Antimony (µg/L)	3	< 2	< 2	1	1	0.0
Arsenic (µg/L)	4	< 10	< 10	5	5	0.0
Cadmium (mg/L)	3	< 0.005	< 0.005	0.003	0.003	0.000
Chromium (mg/L)	3	< 0.004	< 0.004	0.002	0.002	0.000
Copper (mg/L)	4	< 0.005	1.63	0.003	0.409	0.814
Iron (mg/L)	3	0.034	0.231	0.114	0.126	0.099
Lead (µg/L)	3	< 2	< 2	1	1	0.0
Manganese (mg/L)	3	0.045	0.104	0.091	0.080	0.031
^J Mercury (µg/L)	3	< 0.3	< 0.3	0.15	0.2	0.09
Nickel (mg/L)	3	< 0.006	< 0.006	0.003	0.003	0.000
Selenium (µg/L)	3	< 10	< 10	5	5	0.0
Silver (mg/L)	4	< 0.003	< 0.003	0.002	0.002	0.000
Thallium (µg/L)	4	< 1	< 1	0.5	0.500	0.000
Zinc (mg/L)	3	< 0.006	< 0.006	0.003	0.003	0.000
Biological						
^J Chlorophyll a (µg/L)	7	0.53	3.74	1.60	1.91	1.1
^J Fecal Coliform (col/100 mL)	7	36	390	70	127	122

J=estimate; N=# samples

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