Alabama Department of Environmental Management

Basin Assessment Site

Rivers and Streams Monitoring Program

2005 Monitoring Summary

Fair™

Big Canoe Creek at County Road 31 (St. Clair County) (33.80434/-86.41965)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Big Canoe 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 each monitoring site's biological integrity and to estimate overall water quality within the ACT basin group.

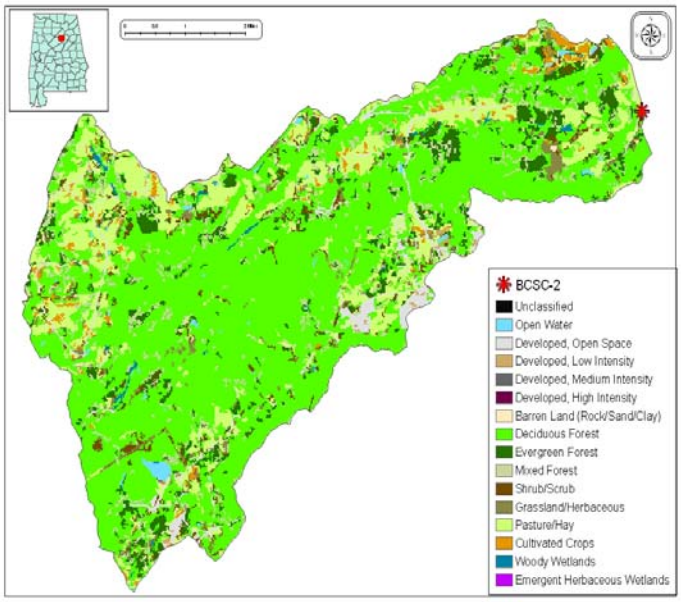

Figure 1. Sampling location and land use within the Big Canoe Creek at BCSC -2.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Big Canoe Creek at BCSC-2 is a *Fish & Wildlife (F&W)* stream within the *Southern Limestone/Dolomite Valleys and Low Rolling Hills* sub-ecoregion. It is dominated by forest (73%) with pastureland (Figure 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. Big Canoe Creek at BCSC-2 is a low-gradient characterized by an open canopy. An abundance of stable substrate rated overall habitat quality as *optimal*. However, sediment and bank erosion were noted within the reach.

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Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Drainage Area (mi^2)		37
Ecoregion[a]		67f
% Landuse		
Open water		1
Wetland	Woody	<1
Forest	Deciduous	61
	Evergreen	7
	Mixed	5
Shrub/scrub		2
Grassland/herbaceous		3
Pasture/hay		15
Cultivated crops		2
Development	Open space	3
	Low intensity	<1
	Moderate intensity	<1
Barren		<1
Population/km^2 [b]		53
# NPDES Permits[c]	**TOTAL**	19
Construction Stormwater		13
Mining		1
Mining General Permit (old)		5

a. Southern Limestone/Dolomite Valleys and Low Rolling Hills
b. 2005 Census data
c. #NPDES permits downloaded from ADEM's NPDES Management System database, 9 Jun 2008

Table 2. Physical characteristics at BCSC-2, May 20, 2005.

Physical Characteristics		
Width (ft)		50
Canopy cover		Mostly Open
Depth (ft)		
	Riffle	0.5
	Run	1.5
	Pool	3.5
% of Reach		
	Riffle	10
	Run	50
	Pool	40
% Substrate		
	Boulder	15
	Cobble	35
	Gravel	20
	Sand	10
	Silt	12
	Organic Matter	3

Table 3. Results of habitat assessment conducted at Big Canoe Creek at BCSC-2, May 20, 2005.

Habitat Assessment	(% Maximum Score)	Rating
Instream habitat quality	78	Optimal (> 70)
Sediment deposition	55	Marginal (41-58)
Sinuosity	68	Sub-optimal (65-84)
Bank and vegetative stability	59	Marginal (35-59)
Riparian buffer	90	Sub-optimal (70-90)
Habitat assessment score	172	
% Maximum score	**72**	**Optimal (> 70)**

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 at OAKC-1 to be in *fair* condition. Further information can be located in Table 3.

Table 4. Results of Macro invertebrate assessment conducted October

Macroinvertebrate Assessment Results			
	Results	**Scores (0-100)**	**Rating**
Taxa richness measures			
# Ephemeroptera (mayfly) genera	14	100	Excellent (>85)
# Plecoptera (stonefly) genera	3	50	Good (50-75)
# Trichoptera (caddisfly) genera	12	100	Excellent (>83)
Taxonomic composition measures			
% Non-insect taxa	8	70	Fair (49.4-74.1)
% Non-insect organisms	5	87	Fair (62.7-93.9)
% Plecoptera	2	9	Poor (6.56-13.1)
Tolerance measures			
Beck's community tolerance index	18	64	Good (60.7-80.4)
WMB-I Assessment Score	**---**	**69**	**Fair (48-72)**

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected monthly, and semi-monthly (metals), during March through October of 2005 to help identify any stressors to the biological communities.

Median chlorophyll *a* and chloride concentrations were higher than expected for the subecoregion 67f based on the 90th percentile of ecoreference data. All other parameters were within the expected ranges.

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)	9	11.0	23.0	22.0	18.6	4.8
Turbidity (NTU)	9	3.0	17.2	6.8	7.5	4.4
Total dissolved solids (mg/L)	7	58.0	145.0	98.0	97.3	30.6
Total suspended solids (mg/L)	7	3.0	32.0	7.0	9.7	10.3
Specific conductance (µmhos)	9	114.8	242.7	162.1	172.6	49.6
Hardness (mg/L)	5	55.8	148.0	66.1	79.9	38.3
Alkalinity (mg/L)	7	52.0	128.5	65.7	74.6	26.2
Stream Flow (cfs)	9	4.7	156.5	65.6	75.8	---
Chemical						
Dissolved oxygen (mg/L)	9	7.8	10.1	8.8	8.9	0.9
pH (su)	9	6.9	8.3	8.0	7.8	0.5
Ammonia Nitrogen (mg/L)	7	< 0.015	0.219	0.015	0.053	0.078
Nitrate+Nitrite Nitrogen (mg/L)	7	0.094	0.224	0.160	0.160	0.043
Total Kjeldahl Nitrogen (mg/L)	7	< 0.150	0.304	0.075	0.159	0.109
Total nitrogen (mg/L)	7	< 0.169	0.499	0.299	0.319	0.124
Dissolved reactive phosphorus (mg/L)	7	< 0.004	0.023	0.011	0.011	0.006
Total phosphorus (mg/L)	7	0.040	0.058	0.048	0.048	0.006
CBOD-5 (mg/L)	7	< 1.0	1.9	1.3	1.1	0.6
COD (mg/L)	1	< 2.0	2.0	1.0	1.0	0.0
Chlorides (mg/L)	6	4.0	2.0	4.3	4.4	0.3
Dissolved Metals						
Arsenic (µg/L)	4	10	10	5	5	0
Biological						
[J] Chlorophyll a (µg/L)	6	0.53	4.27	3.20[M]	2.70	1.54
[J] Fecal Coliform (col/100 mL)	7	20	160	70	84	44

J= estimate; N= # of samples; M= results were higher than 90% of all samples collected in the 67f sub-ecoregion.

CONCLUSION

The macroinvertebrate assessment was rated as *fair*. Chlorophyll *a* and chloride were higher than expected for this stream type. Sediment was also an issue within the reach.

FOR MORE INFORMATION, CONTACT:
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