

2005 Monitoring Summary



Bear Creek At Randolph County Road 97 (33.37664/-85.4438)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Bear 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.

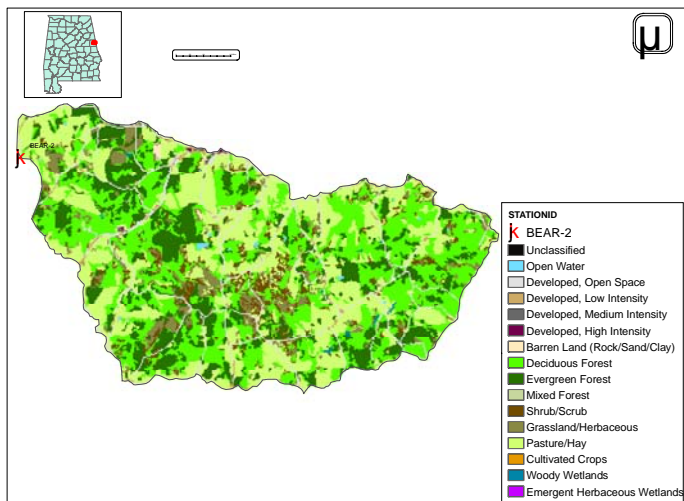


Figure 1. Sampling location and landuse within the Bear Creek watershed at BEAR-2.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Bear Creek is a small *Fish & Wildlife (F&W)* stream located near the city of Wedowee in the Tallapoosa River basin. Landuse within the watershed is primarily forest (52%) and pasture (Fig. 1). The presence of deciduous forests and pasture land are characteristic of streams in the Southern Inner Piedmont Ecoregion.

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. Bear Creek at BEAR-2 is a high-gradient, bedrock-bottomed stream. Overall habitat quality was categorized as *sub-optimal* due to limited riparian buffers, a lack of bank and vegetative stability, and some sedimentation.

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 in *good* condition.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Drainage Area (mi ²)		19
Ecoregion ^a		45a
% Landuse		
Open water		<1
Wetland	Woody	<1
	Emergent herbaceous	<1
Forest	Deciduous	33
	Evergreen	19
	Mixed	<1
Shrub/scrub		4
Grassland/herbaceous		<1
Pasture/hay		30
Development	Open space	5
	Low intensity	<1
	Moderate intensity	<1
	High intensity	<1
Barren		<1
Population/km ^{2b}		12
# NPDES Permits ^c	TOTAL	4
Construction Stormwater		4

a.Southern Inner Piedmont

b.2000 US Census

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

Table 2. Physical characteristics at BEAR-2, May 10, 2005.

Physical Characteristics		
Width (ft)		40
Canopy cover		Shaded
Depth (ft)		
	Riffle	0.5
	Run	1.0
	Pool	1.5
% of Reach		
	Riffle	15
	Run	75
	Pool	10
% Substrate		
	Bedrock	48
	Boulder	5
	Cobble	10
	Gravel	15
	Sand	15
	Silt	2
	Organic Matter	5

Table 3. Results of the habitat assessment conducted on Bear Creek on May 10, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	83	Optimal (> 70)
Sediment deposition	65	Sub-optimal (59-70)
Sinuosity	88	Optimal (≥85)
Bank and vegetative stability	39	Marginal (35-59)
Riparian buffer	49	Poor (<50)
Habitat assessment score	160	
% Maximum score	67	Sub-optimal (59-70)

Table 4. Results of the macroinvertebrate bioassessment conducted at Bear Creek on May 10, 2005.

Macroinvertebrate Assessment Results			
	Results	Scores	Rating
		(0-100)	
Taxa richness measures			
# Ephemeroptera (mayfly) genera	16	100	Excellent (>86)
# Plecoptera (stonefly) genera	5	83	Good (72-86)
# Trichoptera (caddisfly) genera	7	58	Fair (48-72)
Taxonomic composition measures			
% Non-insect taxa	3	88	Excellent (>86)
% Non-insect organisms	0	99	Excellent (>86)
% Plecoptera	3	16	Very Poor (<24)
Tolerance measures			
Beck's community tolerance index	30	100	Excellent (>86)
WMB-I Assessment Score	---	78	Good (72-86)

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. Atrazine was detected in June and October and higher than values expected in this ecoregion. Median values of nitrate+nitrite-nitrogen was also above values expected in this ecoregion.

CONCLUSIONS

Bioassessment results indicated the macroinvertebrate community to be in *good* condition. However, overall habitat quality was categorized as *sub-optimal* due to poor riparian buffer, marginal bank and vegetative stability, and some sediment deposition. Additionally, nitrogen (nitrate+nitrite-nitrogen) concentrations were above expected values for this ecoregion.

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	24.0	19.7	18.8	4.4
Turbidity (NTU)	8	4.4	24.0	5.9	10.6	8.3
Total dissolved solids (mg/L)	7	10.0	79.0	27.0	32.7	24.2
Total suspended solids (mg/L)	7	5.0	22.0	6.0	10.1	7.8
Specific conductance (µmhos)	8	17.3	36.7	28.6	28.5	5.5
Hardness (mg/L)	5	5.8	8.1	6.8	6.9	1.1
Alkalinity (mg/L)	7	3.9	21.4	6.2	7.9	6.1
Stream Flow (cfs)	7	6.5	36.4	24.4	23.9	---
Chemical						
Dissolved oxygen (mg/L)	8	7.9	10.1	9.1	9.1	0.7
pH (su)	8	6.4	7.91	6.9	7.1	0.6
Ammonia Nitrogen (mg/L)	7	< 0.015	0.017	0.008	0.010	0.004
Nitrate+Nitrite Nitrogen (mg/L)	7	0.217	0.346	0.322 ^M	0.307	0.043
Total Kjeldahl Nitrogen (mg/L)	7	< 0.150	0.360	0.075	0.194	0.148
Total nitrogen (mg/L)	6	0.292	0.682	0.402	0.468	0.156
Dissolved reactive phosphorus (mg/L)	7	< 0.004	0.017	0.005	0.006	0.005
Total phosphorus (mg/L)	7	0.026	0.091	0.036	0.051	0.027
CBOD-5 (mg/L)	7	< 1.0	2.6	1.3	1.4	0.8
Chlorides (mg/L)	7	4.2	15.9	4.6	6.3	4.2
Atrazine (µg/L)	2	< 0.05	< 0.05	0.03	0.03	0.00
Total Metals						
Aluminum (mg/L)	4	< 0.015	0.251	0.0435	0.086	0.11
Iron (mg/L)	4	0.52	0.614	0.555	0.561	0.04
Manganese (mg/L)	4	< 0.005	< 0.005	0.0025	0.003	0.000
Dissolved Metals						
		<				
Aluminum (mg/L)	4	< 0.015	0.133	0.0075	0.039	0.06
Antimony (µg/L)	4	< 2	< 2	1	1	0.0
Arsenic	4	< 10	< 10	5	5	0.0
Cadmium (mg/L)	4	< 0.005	< 0.005	0.0025	0.0031	0.0
Chromium (mg/L)	4	< 0.004	< 0.004	0.002	0.002	0.0
Copper (mg/L)	4	< 0.005	< 0.005	0.0025	0.003	0.0
Iron (mg/L)	4	< 0.005	0.176	0.1155	0.1024	0.07
Lead (µg/L)	4	< 2	< 2	1	1	0.0
Manganese (mg/L)	4	< 0.005	< 0.005	0.0025	0.003	0.0
Mercury (µg/L)	4	< 0.3	< 0.3	0.15	0.15	0.0
Nickel (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.0
Selenium (µg/L)	4	< 10	< 10	5	5	0.0
Silver (mg/L)	4	< 0.003	< 0.003	0.0015	0.0015	0.0
Thallium (µg/L)	4	< 1	< 1	0.5	0.5	0.0
Zinc (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.0
Biological						
^J Chlorophyll a (µg/L)	7	1.07	9.08	2.14	3.36	2.90
^J Fecal Coliform (col/100 mL)	7	80	610	200	286	196

^J=estimate; N=# samples; M=value > 90% of all verified eco-regional reference reach data collected in 45a.

FOR MORE INFORMATION, CONTACT:
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