

2005 monitoring Summary



Emuckfaw Creek at State Highway 22 (33.27708/-85.69938)

BACKGROUND

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

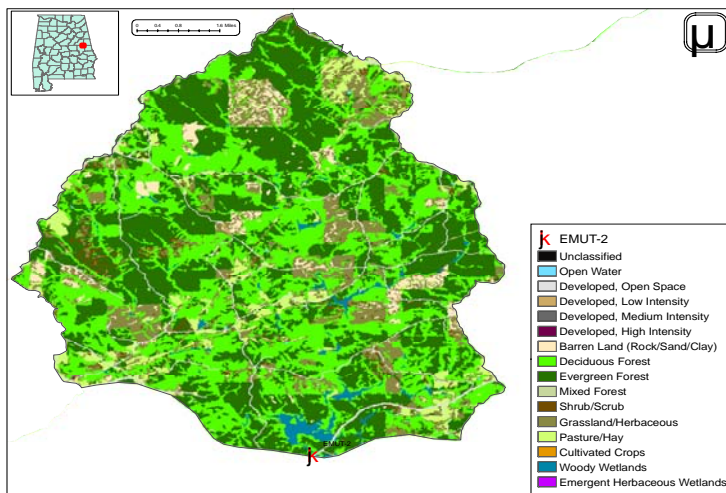


Figure 1. Sampling location and landuse within the Emuckfaw Creek watershed at EMUT-2.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Emuckfaw Creek is a small *Fish & Wildlife (F&W)* stream located near the city of Zana (Fig. 1). Landuse within the watershed is primarily forest (74%) and grassland .

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. Emuckfaw Creek at EMUT-2 is a low-gradient, sand-bottomed stream in the Tallapoosa River basin. The presence of mixed forests and pasture/hay areas are characteristic of streams in the Southeastern Inner Piedmont (Table 1). Overall habitat quality was categorized as *marginal* due to limited instream habitat, poor sinuosity, increased sedimentation, and a lack of stable bank vegetation and stabilization.

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. Overall results of the assessment indicates the community to be in *good* condition.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Drainage Area (mi ²)		50
Ecoregion ^a		45a
% Landuse		
Open water		<1
Wetland	Woody	2
Forest	Deciduous	36
	Evergreen	38
	Mixed	<1
Shrub/scrub		1
Grassland/herbaceous		12
Pasture/hay		5
Development	Open space	3
	Low intensity	<1
	Moderate intensity	<1
	High intensity	<1
Barren		3
Population/km ^{2b}		7
# NPDES Permits ^c	TOTAL	2
Mining General Permit (old)		2

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 EMUT-2, May 9, 2005.

Physical characteristics		
Width (ft)		50
Canopy cover		Mostly Open
Depth (ft)	Run	2.0
	Pool	3.0
% of Reach	Run	60
	Pool	40
% Substrate	Gravel	3
	Sand	79
	Clay	2
	Silt	10
	Organic Matter	6

Table 3. Results of the habitat assessment conducted May 9, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	41	Poor (<41)
Sediment deposition	44	Marginal (41-58)
Sinuosity	30	Poor (<45)
Bank and vegetative stability	43	Marginal (35-59)
Riparian buffer	90	Sub-optimal (70-90)
Habitat assessment score	119	
% Maximum score	54	Marginal (41-58)

Table 4. Results of the macroinvertebrate bioassessment conducted May 9, 2005.

Macroinvertebrate Assessment Results			
	Results	Scores	Rating
Taxa richness measures		(0-100)	
# Ephemeroptera (mayfly) genera	9	75	Good (71-85)
# Plecoptera (stonefly) genera	6	100	Excellent (>75)
# Trichoptera (caddisfly) genera	4	33	Poor (22-44)
Taxonomic composition measures			
% Non-insect taxa	2	92	Excellent (>87.1)
% Non-insect organisms	0	99	Excellent (>97)
% Plecoptera	14	70	Excellent (>59.8)
Tolerance measures			
Beck's community tolerance index	17	61	Good (60.7-80.4)
WMB-I Assessment Score	---	76	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. *In situ* measurements showed Emuckfaw Creek at EMUT-2 to be meeting established criteria for its *F&W* use classification. Median dissolved manganese concentrations were above values expected in 90% of ecoregional reference reach samples.

CONCLUSIONS

Bioassessment results indicated the macroinvertebrate community to be in *good* condition. However, overall habitat quality was categorized as *marginal* due to poor instream habitat, sedimentation, low sinuosity, and a lack of bank vegetation and stability. Median dissolved manganese concentrations were above values expected in this ecoregion.

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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	12.5	23.0	19.5	19.0	3.9
Turbidity (NTU)	8	4.8	33.2	6.9	10.7	9.3
Total dissolved solids (mg/L)	7	12.0	63.0	36.0	38.3	17.0
Total suspended solids (mg/L)	7	6.0	53.0	10.0	17.3	16.3
Specific conductance (µmhos)	8	17.6	33.1	28.2	28.1	4.8
Hardness (mg/L)	4	7.2	9.1	7.6	7.8	0.8
Alkalinity (mg/L)	7	8.2	28.4	9.8	12.2	7.2
Stream Flow (cfs)	6	32.1	85.2	75.0	66.7	---
Chemical						
Dissolved oxygen (mg/L)	8	7.8	10	9.3	9.1	0.8
pH (su)	8	6.8	7.41	7.0	7.1	0.2
Ammonia Nitrogen (mg/L)	7	< 0.015	0.028	0.008	0.013	0.008
Nitrate+Nitrite Nitrogen (mg/L)	7	0.037	0.092	0.068	0.070	0.020
Total Kjeldahl Nitrogen (mg/L)	7	< 0.150	0.187	0.075	0.111	0.056
Total nitrogen (mg/L)	7	0.112	0.278	0.144	0.181	0.074
Dissolved reactive phosphorus (mg/L)	7	< 0.004	0.005	0.002	0.003	0.001
Total phosphorus (mg/L)	7	< 0.004	0.071	0.044	0.039	0.024
CBOD-5 (mg/L)	7	< 1.0	4.8	1.6	1.9	1.5
Chlorides (mg/L)	7	3.7	18.2	4.0	6.0	5.4
Atrazine (µg/L)	2	0.05	0.05	0.03	0.03	0.00
Total Metals						
Aluminum (mg/L)	4	< 0.015	0.284	0.172	0.159	0.1
Iron (mg/L)	4	0.9	1.11	0.968	0.987	0.1
Manganese (mg/L)	4	0.059	0.099	0.064	0.072	0.0
Dissolved Metals						
Aluminum (mg/L)	4	< 0.015	0.125	0.0075	0.037	0.1
Antimony (µg/L)	4	< 2	< 2	1	1	0.0
Arsenic (µg/L)	4	< 10	< 10	5	5	0.0
Cadmium (mg/L)	4	< 0.005	< 0.005	0.0025	0.0025	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	0.093	0.184	0.164	0.1513	0.0
Lead (µg/L)	4	< 2	< 2	1	1	0.0
Manganese (mg/L)	4	0.036	0.086	0.056 ^M	0.059	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	0.500	0.0
Zinc (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.0
Biological						
^J Chlorophyll a (µg/L)	6	< 0.10	12.28	2.67	3.66	4.5
^J Fecal Coliform (col/100 mL)	7	57	370	190	174	112

^J=estimate; N=# samples; M=value > 90th percentile of all data collected within eco-region 45a