

# 2005 Monitoring Summary



## Emuckfaw Creek in Tallapoosa County Near Zana (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 and to estimate overall water quality within the ACT basin group.

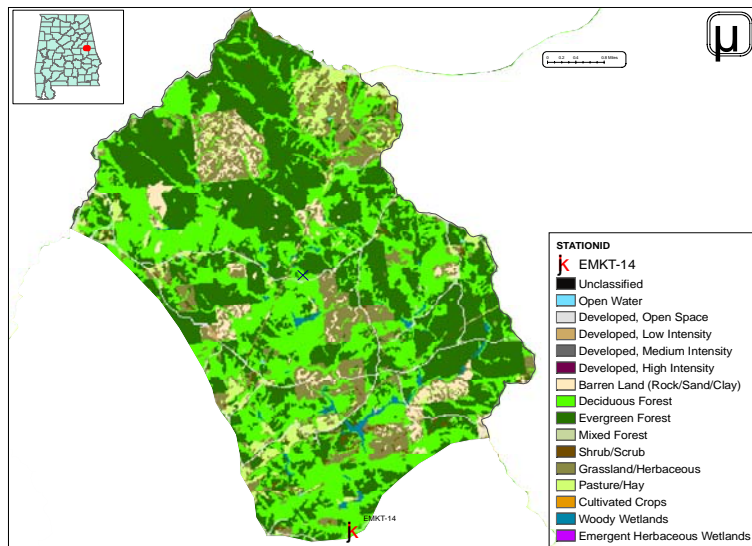


Figure 1. Sampling location and landuse within the Emuckfaw Creek watershed at EMKT-14.

### WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Emuckfaw Creek is a *Fish & Wildlife (F&W)* stream located near the city of Zana in the Tallapoosa River basin. Landuse within the watershed is primarily forest (74%), with grassland/herbaceous areas (Fig. 1), which are typical of watersheds in the Southern Inner Piedmont (Table 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. Emuckfaw Creek at EMKT-14 is a medium-gradient, riffle run stream characterized by sand and gravel substrates. Overall habitat quality was categorized as *sub-optimal* due to sedimentation and a lack of bank and vegetative stability.

### 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 4).

Table 1. Summary of watershed characteristics.

Physical Characteristics	
Drainage Area (mi <sup>2</sup> )	28
Ecoregion <sup>a</sup>	45a
% Landuse	
Open water	<1
Wetland	Woody 1
Forest	Deciduous 35
	Evergreen 39
	Mixed <1
Shrub/scrub	1
Grassland/herbaceous	13
Pasture/hay	4
Development	Open space 3
	Low intensity <1
Barren	4
Population/km <sup>2</sup> <sup>b</sup>	8
# NPDES Permits <sup>c</sup>	<b>TOTAL</b> 2
	Mining General Permit (old) 2

a. Southern Inner Piedmont

b. 2000 U.S. Census Data

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

Table 2. Physical characteristics at EMKT-14, May 9, 2005.

Physical Characteristics	
Width (ft)	30
Canopy cover	Mostly Open
Depth (ft)	
	Riffle 0.8
	Run 1.5
	Pool 2.5
% of Reach	
	Riffle 35
	Run 35
	Pool 30
% Substrate	
	Bedrock 1
	Cobble 13
	Gravel 30
	Sand 43
	Silt 3
	Organic Matter 10

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

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	78	Optimal (> 70)
Sediment deposition	43	Marginal (41-58)
Sinuosity	83	Sub-optimal (65-84)
Bank and vegetative stability	46	Marginal (35-59)
Riparian buffer	90	Sub-optimal (70-90)
Habitat assessment score	167	
<b>% Maximum score</b>	<b>69</b>	<b>Sub-optimal (59-70)</b>

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

Macroinvertebrate Assessment Results			
	Results	Scores	Rating
<b>Taxa richness measures</b>		<b>(0-100)</b>	
# Ephemeroptera (mayfly) genera	20	100	Excellent (>85)
# Plecoptera (stonefly) genera	6	100	Excellent (>75)
# Trichoptera (caddisfly) genera	7	58	Fair (45-66)
<b>Taxonomic composition measures</b>			
% Non-insect taxa	1	95	Excellent (>87.1)
% Non-insect organisms	1	98	Excellent (>97)
% Plecoptera	7	36	Good (19.7-59.8)
<b>Tolerance measures</b>			
Beck's community tolerance index	29	100	Excellent (>80.4)
<b>WMB-I Assessment Score</b>	<b>---</b>	<b>84</b>	<b>Good (72-86)</b>

## 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 total iron were 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 sedimentation and a lack of bank and vegetative stability. Median total iron concentrations were above values expected in the Southern Inner Piedmont 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
<b>Physical</b>						
Temperature (°C)	9	13.0	28.0	21.0	20.0	4.4
Turbidity (NTU)	9	3.1	18.0	5.6	7.5	5.1
Total dissolved solids (mg/L)	7	14.0	47.0	38.0	33.3	12.8
Total suspended solids (mg/L)	7	5.0	20.0	7.0	9.1	5.3
Specific conductance (µmhos)	8	15.2	34	27.7	27.4	5.7
Hardness (mg/L)	4	6.7	8.8	6.9	7.3	1.0
Alkalinity (mg/L)	7	6.9	25.5	8.7	10.9	6.6
Stream Flow (cfs)	8	17.0	78.6	38.9	39.8	---
<b>Chemical</b>						
Dissolved oxygen (mg/L)	9	7.7	11.08	9.3	9.2	1.0
pH (su)	9	6.8	7.77	7.0	7.0	0.3
Ammonia Nitrogen (mg/L)	7	< 0.015	0.037	0.008	0.013	0.011
Nitrate+Nitrite Nitrogen (mg/L)	7	0.040	0.096	0.065	0.068	0.020
Total Kjeldahl Nitrogen (mg/L)	7	0.025	0.481	0.075	0.155	0.155
Total nitrogen (mg/L)	7	0.084	0.567	0.171	0.222	0.166
Dissolved reactive phosphorus (mg/L)	7	< 0.004	0.007	0.002	< 0.004	0.002
Total phosphorus (mg/L)	7	0.011	0.056	0.039	0.038	0.014
CBOD-5 (mg/L)	7	< 1.0	4.2	1.3	1.7	1.3
COD (mg/L)	5	< 2.0	< 2.0	1.0	1.0	0.0
Chlorides (mg/L)	7	3.7	2.0	4.2	4.1	0.3
Atrazine (µg/L)	2	< 0.05	< 0.05	0.03	0.03	0.00
<b>Total Metals</b>						
Aluminum (mg/L)	4	0.015	0.21	0.05825	0.084	0.1
Iron (mg/L)	4	0.453	0.557	0.5075 <sup>M</sup>	0.506	0.1
Manganese (mg/L)	4	0.005	0.023	0.00475	0.009	0.0
<b>Dissolved Metals</b>						
Aluminum (mg/L)	4	< 0.015	0.13	0.0075	0.038	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	< 0.005	0.143	0.1025	0.0876	0.1
Lead (µg/L)	4	< 2	< 2	1	1	0.0
Manganese (mg/L)	4	< 0.005	0.02	0.0025	0.007	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
<b>Biological</b>						
<sup>J</sup> Chlorophyll a (µg/L)	7	0.53	21.36	2.14	4.81	7.4
<sup>J</sup> Fecal Coliform (col/100 mL)	7	17	330	56	94	108

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