

# 2016 Monitoring Summary



## Emuckfaw Creek at Bill Price Road in Tallapoosa County (33.05530/-85.69460)

### BACKGROUND

Emuckfaw Creek is among the least-disturbed watersheds within the Southern Inner Piedmont ecoregion, based on landuse, road density, and population density. Since 2004, it has been monitored by the Alabama Department of Environmental Management (ADEM) as a reference watershed for comparison with other streams within the ecoregion. Data from reference watersheds are used to characterize natural or background conditions expected in different ecoregions throughout the state.

Emuckfaw Creek was sampled in 2016 to provide reference reach data for Southern Inner Piedmont streams. Habitat and macroinvertebrate community surveys were conducted to assess the health of biological communities.



Figure 1. Emuckfaw Creek at EMKT-14, May 18, 2016.

Table 1. Summary of general watershed characteristics: EMKT-14 (2016)

Watershed Characteristics	
<b>Basin</b>	Tallapoosa
<b>Drainage Area (mi<sup>2</sup>)</b>	27.3
<b>Ecoregion<sup>o</sup></b>	45A
<b>Assessment Unit</b>	AL03150109-0308-100
<b>Use Class</b>	F&W
<b>AU Category</b>	5
<b>12-digit Hydrologic Unit Code (HUC)</b>	031501090308
<b>Landuse Categories (2011 National Land Cover Dataset)</b>	
Wetland, Total (%)	1.0
Wetlands, Woody (%)	1.0
Forested, Total (%)	75.8
Forested, Deciduous (%)	38.7
Forested, Evergreen (%)	36.9
Forested, Mixed (%)	0.1
Shrub/Scrub (%)	7.8
Grassland/Herbaceous (%)	9.1
Pasture/Hay (%)	3.3
Developed, Total (%)	2.5
Developed, Open Space (%)	2.4
Developed, Low Intensity (%)	0.1
Barren Land (Rock, Sand, Clay) (%)	0.5
<b>Population/km<sup>2</sup> (2010 US Census)</b>	2
<b>Roads</b>	
Road Density	1.1
# Road Crossings per Stream km	0.2
<b>Watershed Disturbance Score*</b>	43
<b>Watershed Disturbance Category*</b>	2

<sup>o</sup> Southern Inner Piedmont

\* Measure of watershed disturbance based on landuse, population, and road density summarized in this table.

Table 2. Physical characteristics of Emuckfaw Creek at EMKT-14, May 18, 2016.

Physical Characteristics	
<b>Width (ft)</b>	30
<b>Canopy Cover</b>	Mostly Open
<b>Depth (ft)</b>	
Riffle	0.8
Run	2.0
Pool	0.5
<b>% of Reach</b>	
Riffle	15
Run	75
Pool	10
<b>% Substrate</b>	
Boulder	1
Clay	1
Cobble	10
Gravel	20
Sand	50
Silt	5
Organic Matter	13

### WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Emuckfaw Creek is a *Fish & Wildlife (F&W)* stream, located three miles west of Daviston, in the Tallapoosa River basin. According to the 2011 National Land Cover Dataset, the watershed is over 75% forested, with no permitted outfalls. It is sparsely populated, with few roads. The ADEM's measure of watershed disturbance ranked the Emuckfaw Creek watershed in the top 90th percentile of the 1,450 wadeable, flowing watersheds sampled by ADEM throughout the state.

### REACH CHARACTERISTICS

General observations (Figure 1, Table 2) and a habitat survey (Table 3) were completed during the macroinvertebrate survey. 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 characterized by a predominantly sand substrate with some gravel. Overall habitat quality and availability has been rated as *sub-optimal* for supporting the macroinvertebrate communities.

**Table 3.** Results of the habitat assessment survey conducted on Emuckfaw Creek at EMKT-14, May 18, 2016.

Habitat Survey	% Max Score	Rating
Instream Habitat Quality	73	Sub-optimal (55-75)
Sediment Deposition	56	Sub-optimal (55-75)
Riffle Frequency	68	Sub-optimal (55-75)
Bank Vegetative Stability	54	Marginal (30-57)
Riparian Zone Measurements	85	Optimal (85-100)
<b>Habitat Assessment Score</b>	<b>136</b>	
<b>% Maximum Score</b>	<b>68</b>	<b>Sub-optimal (57-75)</b>

## BIOASSESSMENT RESULTS

The benthic macroinvertebrate community was sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). Measures of taxonomic richness, community composition and pollution tolerance were used to assess the overall health of the macroinvertebrate community in comparison to conditions expected in central Alabama streams and rivers. Each site is placed in one of six levels ranging from 1, or *natural*, to 6, or *highly altered*. The condition of the macroinvertebrate community has been rated as *good-excellent*, identifying Emuckfaw Creek at EMKT-14 as a level 3+, or near natural site. Taxa richness and diversity are very good, with 74 total taxa and 43 pollution-sensitive taxa collected at the site. Eighteen of the taxa are only found in the most pristine streams throughout Alabama and the southeast (Table 4).

**Table 4.** Results of the Macroinvertebrate assessment conducted on Emuckfaw Creek at EMKT-14, May 18, 2016.

Macroinvertebrate Assessment	Results
<b>Taxonomic richness and diversity metrics</b>	
Total # taxa	74
# rare and highly sensitive taxa	11
# sensitive taxa	32
# sensitive EPT taxa	13
<b>Percent taxon metrics</b>	
% sensitive EPT taxa	17.6
% sensitive taxa	43.2
% rare and highly sensitive taxa	14.9
% tolerant individuals	11.8
% tolerant taxa	6.8
<b>Percent individual metrics</b>	
% rare and highly sensitive individuals	8.8
% sensitive individuals	17.3
% sensitive EPT individuals	6.4
<b>WMB-I Survey Score</b>	<b>2.75</b>
<b>WMB-I Survey Rating</b>	<b>Good-excellent (2.3-2.75)</b>

## WATER CHEMISTRY

Results of water chemistry analyses are summarized in Table 5. In situ measurements and water samples were collected monthly and semi-monthly (metals), from March through October 2016 to help characterize the reach. In situ parameters were well within ranges to protect "fishable/swimmable" uses. Dissolved oxygen concentrations ranged from 7.3 to 9.0 mg/L. Turbidity ranged from 3.6 to 7.1 NTU.

The *E. coli* single sample summer criterion for F&W streams (298 colonies/100 mL) was exceeded in the August sample collection, with a count of 307.6 colonies/100 mL after a rain event. The criterion was also exceeded in September, with a count of 410.6 colonies/100 mL of sample when flow decreased to 2.4 cfs. The median concentration of dissolved iron was higher than expected when compared to other ecoregional reference streams in the 45A ecoregion.

**Table 5.** Summary of water quality data collected March-October, 2016. 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.

Parameter	N	Min	Max	Med	Avg	SD	E
<b>Physical</b>							
Temperature (°C)	9	13.8	24.8	18.2	18.9	4.4	
Turbidity (NTU)	9	3.6	7.1	4.4	4.6	1.0	
Total Dissolved Solids (mg/L)	8	6.0	37.0	26.5	24.1	10.5	
Total Suspended Solids (mg/L)	8	1.0	4.0	1.5	2.1	1.4	
Specific Conductance (µmhos/cm)	9	23.5	32.5	27.5	28.1	3.4	
Hardness (mg/L)	3	7.1	9.0	8.9	8.4	1.0	
Alkalinity (mg/L)	8	8.9	13.7	11.0	10.9	1.7	
Monthly Stream Flow (cfs)	9	0.1	53.7	18.9	23.3	20.9	
Measured Stream Flow (cfs)	8	2.4	53.7	24.9	26.2	20.3	
<b>Chemical</b>							
Dissolved Oxygen (mg/L)	9	7.3	9.8	8.3	8.4	1.0	
pH (SU)	9	6.4	6.9	6.5	6.5	0.2	
<sup>J</sup> Ammonia Nitrogen (mg/L)	8 <	0.007	0.030	0.004	0.008	0.005	
<sup>J</sup> Nitrate+Nitrite Nitrogen (mg/L)	8	0.002	0.093	0.060	0.056	0.032	
Total Kjeldahl Nitrogen (mg/L)	8 <	0.037	0.779	0.025	0.152	0.271	
<sup>J</sup> Dis Reactive Phosphorus (mg/L)	8 <	0.003	0.004	0.003	0.003	0.001	
Total Phosphorus (mg/L)	8	0.010	0.014	0.012	0.012	0.001	
CBOD-5 (mg/L)	8 <	2.0	< 2.0	1.0	1.0	0.0	
COD (mg/L)	8 <	1.8	3.4	1.5	1.7	0.7	
<sup>J</sup> TOC (mg/L)	8	1.0	1.5	1.2	1.2	0.2	
Chlorides (mg/L)	8	1.5	1.8	1.6	1.6	0.1	
Sulfate (mg/L)	8	0.80	1.28	0.85	0.94	0.18	
<b>Total Metals</b>							
Aluminum (T) (mg/L)	3 <	0.106	< 0.106	0.053	0.053	0.000	
Iron (T) (mg/L)	3	0.416	0.891	0.705	0.671	0.239	
<sup>J</sup> Manganese (T) (mg/L)	3 <	0.004	0.013	0.002	0.006	0.006	
<b>Dissolved Metals</b>							
<sup>J</sup> Aluminum (mg/L)	3 <	0.106	< 0.106	0.053	0.053	0.000	
Antimony (µg/L)	3 <	0.383	< 0.383	0.192	0.192	0.000	
Arsenic (µg/L)	3 <	0.415	< 0.415	0.208	0.208	0.000	
Cadmium (µg/L)	3 <	0.385	< 0.385	0.192	0.192	0.000	
Chromium (µg/L)	3 <	0.445	< 0.445	0.222	0.222	0.000	
<sup>J</sup> Copper (µg/L)	3 <	0.454	0.549	0.227	0.334	0.186	
<sup>J</sup> Iron (mg/L)	3	0.162	0.531	0.430 <sup>M</sup>	0.374	0.191	
Lead (µg/L)	3 <	0.362	< 0.362	0.181	0.181	0.000	
<sup>J</sup> Manganese (mg/L)	3 <	0.004	0.010	0.002	0.005	0.005	
Nickel (µg/L)	3 <	0.705	< 0.705	0.352	0.352	0.000	
Selenium (µg/L)	3 <	0.505	< 0.505	0.252	0.252	0.000	
Silver (µg/L)	3 <	0.478	< 0.478	0.239	0.239	0.000	
Thallium (µg/L)	3 <	0.348	< 0.348	0.174	0.174	0.000	
<sup>J</sup> Zinc (µg/L)	3 <	0.564	1.081	0.792	0.718	0.404	
<b>Biological</b>							
Chlorophyll a (mg/m <sup>3</sup> )	8 <	0.10	1.07	0.53	0.42	0.36	
<sup>J</sup> E. coli (MPN/DL)	8	86.0	410.6 <sup>H</sup>	158.5	192.1	114.0	2

E= # of samples that exceeded criteria; H= F&W human health criterion exceeded; J=estimate; M=value>90% of all verified ecoregional reference reach data collected in the ecoregion 45A; N=# of samples.

## SUMMARY

The ADEM monitors Emuckfaw Creek at EMKT-14 as a reference reach for comparison with other Southern Inner Piedmont streams. Emuckfaw Creek at EMKT-14 is sand-bottomed stream with small gravel riffles, typical of streams in the region.

The upstream watershed contains no permitted outfalls and is 76% deciduous and evergreen forest. The overall habitat quality and availability has been rated as *sub-optimal* for supporting the macroinvertebrate communities.

The macroinvertebrate community was rated as *good-excellent*, with high diversity and taxa richness within the reach. However, the dissolved iron concentration was higher than expected for this ecoregion. Monitoring should continue to ensure that conditions remain stable.

FOR MONITORING INFORMATION, CONTACT:  
 Rebekah Taylor, ADEM Environmental Indicators Section  
 1350 Coliseum Boulevard, Montgomery AL 36109  
 (334) 260-2759 Rebekah.taylor@adem.alabama.gov