

# 2014 Monitoring Summary



## Feagin Creek at Covington County road 41 (31.41890/-86.43452)

### BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Grant Millpond-Feagin Creek sub-watershed (0314-0301-0403) watershed for biological and water quality monitoring as part of the 2014 Southeast Alabama Basin Assessment (SEAL). The watershed was identified as a priority of the US Fish and Wildlife Service, the Geological Survey of Alabama, the Alabama Department of Conservation and Natural Resources, The Alabama Clean Water Partnership, the Alabama Forestry Commission, and local stakeholders due to the potential for excessive sediment in the streambed. The objectives of the SEAL Basin Assessments were to provide data to assess biological, physical, and chemical conditions within the reach, estimate overall water quality within the SEAL basin group, and support restoration efforts.



Figure 1. Feagin Creek at FEGC-1, June 19, 2014.

### WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Feagin Creek is a *Fish & Wildlife (F&W)* stream located near Andalusia in the Conecuh River basin. Based on the 2011 National Land Cover Dataset, landuse within the watershed is primarily forested areas (53%) with some pasture and little development. As of April 1, 2016, two outfalls are active in this watershed.

### REACH CHARACTERISTICS

General observations (Table 2) and a habitat assessment (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.

Feagin Creek at FEGC-1 (Figure 1) is a high-gradient, predominantly sand bottomed stream in the Southern Pine Plains & Hills ecoregion. Overall habitat quality was categorized as *marginal* due to sediment deposition.

### 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 the average of all individual metric scores. Metric results indicated the macroinvertebrate community to be in *fair* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		Conecuh R
<b>Basin</b>		16
<b>Drainage Area (mi<sup>2</sup>)</b>		65F
<b>Ecoregion<sup>a</sup></b>		
<b>% Landuse<sup>b</sup></b>		
	Open water	1%
	Wetland	2%
	Woody	<1%
	Emergent herbaceous	17%
<b>Forest</b>	Deciduous	22%
	Evergreen	14%
	Mixed	14%
	Shrub/scrub	1%
	Grassland/herbaceous	19%
	Pasture/hay	6%
	Cultivated crops	4%
	Development	1%
	Open space	<1%
	Low intensity	<1%
	Moderate intensity	<1%
	High intensity	14
<b>Population/km<sup>2c</sup></b>		2
<b># NPDES Permits<sup>d</sup></b>	<b>TOTAL</b>	2
	Underground Injection Control	2

a.Southern Pine Plains & Hills

b.2011 National Land Cover Dataset

c.2010 US Census

d.#NPDES outfalls downloaded from ADEM's NPDES Management System database, April 1, 2016.

Table 2. Physical characteristics of Feagin Creek at FEGC-1, Jun 19, 2014.

Physical Characteristics	
<b>Width (ft)</b>	35
<b>Canopy Cover</b>	Mostly Shaded
<b>Depth (ft)</b>	
	Riffle 0.8
	Run 1.5
	Pool 1.5
<b>% of Reach</b>	
	Riffle 5
	Run 80
	Pool 15
<b>% Substrate</b>	
	Bedrock 3
	Boulder 2
	Cobble 2
	Gravel 3
	Sand 80
	Silt 5
	Organic Matter 5

**Table 3.** Results of the habitat assessment conducted on Feagin Creek at FEGC-1, June 19, 2014.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	50	Marginal (31-<55)
Sediment Deposition	35	Marginal (31-<55)
Sinuosity	73	Sub-Optimal (55-79)
Bank and Vegetative Stability	58	Marginal (31-<58)
Riparian Buffer	76	Sub-Optimal (60-84)
<b>Habitat Assessment Score</b>	<b>112</b>	
<b>% Maximum Score</b>	<b>56</b>	<b>Marginal (31-&lt;57)</b>

**Table 4.** Results of the macroinvertebrate bioassessment conducted in Feagin Creek at FEGC-1, Jun 19, 2014.

Macroinvertebrate Assessment		
	Results	Scores
<b>Taxa richness and diversity measures</b>		<b>(0-100)</b>
% EPC taxa	31	56
% Trichoptera & Chironomidae Taxa	43	35
<b>Taxonomic composition measures</b>		
% EP Individuals	19	37
<b>Functional feeding group</b>		
% Collector-Filterer Individuals	74	0
<b>Community tolerance</b>		
% Nutrient Tolerant individuals	36	50
<b>WMB-I Assessment Score</b>	---	<b>36</b>
<b>WMB-I Assessment Rating</b>		<b>Fair (31-45)</b>

## WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected during March through October of 2014 to help identify any stressors to the biological communities.

The F&W human health criterion for arsenic at FEGC-1 was exceeded during all sampling events. Specific conductance and hardness values were higher than the median concentration of all verified ecoregional reference reach data collected in ecoregion 65f. Alkalinity, total and dissolved iron, and manganese values were greater than 90% of all verified ecoregional reference reach data collected in the Southern Pine Plains & Hills ecoregion.

Although samples of total dissolved arsenic did exceed human health criteria in Feagin Creek, ADEM criteria for arsenic are expressed as dissolved trivalent arsenic (arsenite – As III). Presently studies are being conducted in order to provide a better understanding of the prevalence and areal distribution of dissolved trivalent arsenic to total arsenic in the State of Alabama. Upon conclusion of the studies Feagin Creek will be reassessed for arsenic violations.

## SUMMARY

Bioassessment results indicated the macroinvertebrate community to be in *fair* condition. Overall habitat quality was categorized as *marginal*. Some water quality results were elevated as compared to data from ADEM's least-impaired reference reaches in ecoregion 65f. Monitoring should continue to ensure that conditions remain stable.

**Table 5.** Summary of water quality data collected March to October 2014. 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)	10	12.9	25.0	21.1	19.9	4.4	
Turbidity (NTU)	10	6.0	33.3	12.4	13.6	7.7	
Total Dissolved Solids (mg/L)	8	1.0	69.0	52.5	41.4	23.1	
Total Suspended Solids (mg/L)	8	<1.0	22.0	6.0	6.8	7.0	
Specific Conductance (µmhos)	10	37.7	62.5	51.0 <sup>G</sup>	51.4	7.8	
Hardness (mg/L)	4	16.1	22.6	17.2 <sup>G</sup>	18.3	3.0	
Alkalinity (mg/L)	8	9.2	23.1	15.4 <sup>M</sup>	16.3	5.0	
Stream Flow (cfs)	10	4.5	44.0	15.7	17.4	11.1	
<b>Chemical</b>							
Dissolved Oxygen (mg/L)	10	8.0	11.0	8.6	9.0	1.0	
pH (su)	10	6.8	7.4	7.0	7.0	0.2	
<sup>J</sup> Ammonia Nitrogen (mg/L)	8	<0.006	0.010	0.003	0.004	0.002	
Nitrate+Nitrite Nitrogen (mg/L)	8	0.113	0.211	0.160	0.166	0.033	
<sup>J</sup> Total Kjeldahl Nitrogen (mg/L)	8	0.139	1.080	0.332	0.405	0.286	
<sup>J</sup> Total Nitrogen (mg/L)	8	0.328	1.248	0.507	0.571	0.286	
<sup>J</sup> Dissolved Reactive Phosphorus (mg/L)	8	0.003	0.005	0.004	0.004	0.001	
Total Phosphorus (mg/L)	8	0.012	0.040	0.020	0.021	0.009	
CBOD-5 (mg/L)	8	<2.0	<2.0	1.0	1.0	0.0	
Chlorides (mg/L)	8	2.9	4.8	4.3	4.1	0.6	
Atrazine (µg/L)	1				0.39		
<b>Total Metals</b>							
Aluminum (mg/L)	4	<0.050	0.430	0.276	0.252	0.168	
Iron (mg/L)	4	1.230	2.060	1.715 <sup>M</sup>	1.680	0.354	
Manganese (mg/L)	4	0.060	0.102	0.076 <sup>M</sup>	0.078	0.021	
<b>Dissolved Metals</b>							
<sup>J</sup> Aluminum (mg/L)	4	<0.050	0.090	0.048	0.053	0.033	
Antimony (µg/L)	4	<0.2	<0.2	0.1	0.1	0.0	
<sup>J</sup> Arsenic (µg/L)	4	0.4	0.8 <sup>H</sup>	0.7	0.7	0.1	4
Cadmium (µg/L)	4	<0.246	<0.246	0.123	0.123	0.000	
<sup>J</sup> Chromium (µg/L)	4	0.480	1.200	0.588	0.714	0.330	
<sup>J</sup> Copper (mg/L)	4	<0.0003	0.0004	0.0003	0.0003	0.000	
Iron (mg/L)	4	0.834	0.988	0.932 <sup>M</sup>	0.921	0.077	
<sup>J</sup> Lead (µg/L)	4	<0.2	0.3	0.1	0.2	0.1	
<sup>J</sup> Manganese (mg/L)	4	0.037	0.056	0.048 <sup>M</sup>	0.047	0.008	
<sup>J</sup> Nickel (mg/L)	4	<0.0003	0.0007	0.0006	0.0005	0.000	
Selenium (µg/L)	4	<0.4	<0.4	0.2	0.2	0.0	
Silver (µg/L)	4	<0.252	<0.252	0.126	0.126	0.000	
Thallium (µg/L)	4	<0.2	<0.2	0.1	0.1	0.0	
<sup>J</sup> Zinc (mg/L)	4	0.004	0.011	0.004	0.005	0.004	
<b>Biological</b>							
Chlorophyll a (ug/L)	8	<0.10	12.02	1.81 <sup>M</sup>	3.20	3.91	
E. coli (col/100mL)	8	172	1986	555	666	590	

E=# samples that exceeded criteria; G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 65f; H= F&W human health criterion exceeded; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 65f; N=# samples.

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