

# 2011 Monitoring Summary



## Okatuppa Creek at Choctaw County Road 18 near Melvin (31.93983/-88.40163)

### BACKGROUND

The Alabama Department of Environmental Management (ADEM) monitored Okatuppa Creek as a potential Ecoregional Reference Site, based on landuse data. Reference sites represent best-attainable conditions and provide background data used for comparison with other large coastal plain streams. Additionally, ADEM included the Okatuppa Creek watershed for biological and water quality monitoring as part of the 2011 Assessment of the Escatawpa, Mobile, and Tombigbee (EMT) River Basins. The objectives of the EMT Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the EMT basin group.



Figure 1. Okatuppa Creek at LT-14, May 10, 2011.

### WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Okatuppa Creek is a *Fish & Wildlife (F&W)* stream located within the *Buhrstone/Lime Hills sub-ecoregion*. It drains approximately 70 mi<sup>2</sup> in Choctaw County before its confluence with the Tombigbee River. Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forest (77%) and shrub/scrub. Population density is low and less than 5% of the area is developed. As of April 1, 2016, four NPDES permitted 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 in Okatuppa Creek at LT-14. Instream substrates were dominated by sand, with abundant organic matter for macroinvertebrate colonization (Figure 1). Habitat quality and availability within the reach were rated *marginal* for supporting macroinvertebrate communities.

### 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 in comparison to conditions expected in Alabama Coastal Plain streams and rivers. Each site is placed in one of six levels, ranging from 1, or *natural* to 6, or *highly altered*. Metric results indicated the macroinvertebrate community in Okatuppa Creek at LT-14 to be in *good-fair* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin	Tombigbee River	
Drainage Area (mi <sup>2</sup> )	70	
Ecoregion <sup>a</sup>	65Q	
% Landuse <sup>b</sup>		
Open water		<1%
Wetland	Woody	2%
	Emergent herbaceous	<1%
Forest	Deciduous	11%
	Evergreen	50%
	Mixed	16%
Shrub/scrub		14%
Grassland/herbaceous		3%
Pasture/hay		1%
Cultivated crops		<1%
Development	Open space	2%
	Low intensity	<1%
	Moderate intensity	<1%
	High intensity	<1%
Barren		<1%
Population/km <sup>2c</sup>		1
# NPDES Permits <sup>d</sup>	TOTAL	4
	Construction Stormwater	3
	Industrial General	1

a-Buhrstone/Lime 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 Okatuppa Creek at LT-14, May 17, 2011.

Physical Characteristics		
Width (ft)	20	
Canopy cover	Mostly Open	
Depth (ft)	Run	1.0
	Pool	2.5
% of Reach	Run	80
	Pool	20
% Substrate	Cobble	2
	Gravel	8
	Sand	64
	Silt	3
	Organic Matter	23

**Table 3.** Results of the habitat assessment conducted on Okatuppa Creek at

(GP) Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	38	Poor (<40)
Sediment Deposition	54	Sub-optimal (53-65)
Sinuosity	33	Poor (<45)
Bank and Vegetative Stability	31	Poor (<35)
Riparian Buffer	59	Marginal (50-<70)
<b>Habitat Assessment Score</b>	<b>88</b>	
<b>% Maximum Score</b>	<b>44</b>	<b>Marginal (40-&lt;53)</b>

**Table 4.** Results of the macroinvertebrate bioassessment conducted in

Macroinvertebrate Assessment		Results
<b>Taxa richness and diversity measures</b>		
	Total # Taxa	53
	# EPT taxa	19
	# Highly-sensitive and Specialized Taxa	4
<b>Taxonomic composition measures</b>		
	% EPC taxa	37
	% EPT minus Baetidae and Hydropsychidae	16
	% Chironomidae Individuals	58
	% Dominant Taxon	29
	% Individuals in Dominant 5 Taxa	63
<b>Functional feeding group</b>		
	# Collector Taxa	19
	% Tolerant Filterer Taxa	15
<b>Community tolerance</b>		
	# Sensitive EPT	7
	% Sensitive taxa	30
	% Nutrient Tolerant individuals	32
	<b>WMB-I Assessment Score</b>	<b>3-</b>
	<b>WMB-I Assessment Rating</b>	<b>Good-Fair</b>

## WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected March, May, July and September of 2011 to help identify any stressors to the biological communities. Additionally, field parameters were collected during the macroinvertebrate assessment on May 17. Median pH was slightly lower than expected for streams in the Buhrstone/Lime Hills sub-ecoregion. Estimated arsenic concentrations exceeded Human Health criteria for fish consumption in July. No organic samples were collected.

## SUMMARY

The habitat at Okatuppa Creek at LT-14 was assessed and found to be only *marginal* in its ability to support healthy and diverse aquatic macroinvertebrate communities. However, the overall macroinvertebrate community condition was rated as *good - fair*. Water chemistry analyses showed one uncertain Human Health criterion exceedance for arsenic, based on an estimated result.

Monitoring of Okatuppa Creek at LT-14 should continue to ensure that conditions remain stable at the site and to verify its status as a reference reach for the Buhrstone/Lime Hills ecoregion.

FOR MORE INFORMATION, CONTACT:  
Hugh E. Cox, ADEM Environmental Indicator Section  
1350 Coliseum Boulevard Montgomery, AL 36110  
(334) 260-2753 hec@adem.state.al.us

**Table 5.** Summary of water quality data collected March, May, July and September, 2011. 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	Median	Avg	SD	Q
<b>Physical</b>							
Temperature (°C)	5	11.8	26.8	23.3	21.2	6.0	
Turbidity (NTU)	5	6.1	14.9	11.1	10.7	4.0	
Total Dissolved Solids (mg/L)	4	< 1.0	108.0	88.0	71.1	48.7	
Total Suspended Solids (mg/L)	4	< 1.0	12.0	6.0	6.1	4.7	
Specific Conductance (µmhos)	5	61.3	88.4	70.0	72.2	10.0	
Hardness (mg/L)	3	18.2	26.8	21.6	22.2	4.3	
Alkalinity (mg/L)	4	2.9	15.5	7.5	8.4	5.3	
Stream Flow (cfs)	3	16.8	30.0	17.4	21.4	7.4	
<b>Chemical</b>							
Dissolved Oxygen (mg/L)	5	7.8	10.2	8.1	8.6	1.0	
pH (su)	5	6.3	6.7	6.5 <sup>M</sup>	6.5	0.1	
Ammonia Nitrogen (mg/L)	4	< 0.005	< 0.005	0.002	0.002	0.000	
<sup>J</sup> Nitrate+Nitrite Nitrogen (mg/L)	4	< 0.002	0.016	0.008	0.008	0.008	
Total Kjeldahl Nitrogen (mg/L)	4	< 0.107	0.309	0.289	0.235	0.122	
<sup>J</sup> Total Nitrogen (mg/L)	4	< 0.070	0.311	0.297	0.244	0.117	
<sup>J</sup> Dissolved Reactive Phosphorus (mg/L)	4	0.007	0.010	0.008	0.008	0.001	
<sup>J</sup> Total Phosphorus (mg/L)	4	0.008	0.021	0.012	0.013	0.006	
<sup>J</sup> CBOD-5 (mg/L)	4	< 2.0	< 2.0	1.0	1.0	0.0	
COD (mg/L)	4	7.8	17.3	12.8	12.7	3.9	
TOC (mg/L)	2	2.8	5.0	3.9	3.9	1.6	
Chlorides (mg/L)	4	2.4	2.8	2.6	2.6	0.2	
<b>Total Metals</b>							
<sup>J</sup> Aluminum (mg/L)	4	0.193	0.457	0.324	0.325	0.136	
Iron (mg/L)	4	0.620	1.740	1.075	1.128	0.464	
<sup>J</sup> Manganese (mg/L)	4	0.027	0.100	0.042	0.053	0.034	
<b>Dissolved Metals</b>							
<sup>J</sup> Aluminum (mg/L)	4	< 0.043	0.074	0.022	0.035	0.026	
Antimony (µg/L)	4	< 1.9	< 1.9	0.9	0.9	0.0	
<sup>J</sup> Arsenic (µg/L)	4	< 1.4	1.6	0.7 <sup>H</sup>	0.9	0.4	1
Cadmium (µg/L)	4	< 0.022	< 0.022	0.011	0.011	0.000	
Chromium (µg/L)	4	< 9.000	< 9.000	4.500	4.500	0.000	
Copper (mg/L)	4	< 0.020	< 0.020	0.010	0.010	0.000	
<sup>J</sup> Iron (mg/L)	4	0.153	0.364	0.234	0.246	0.109	
Lead (µg/L)	4	< 0.9	< 0.9	0.5	0.5	0.0	
<sup>J</sup> Manganese (mg/L)	4	0.019	0.093	0.028	0.042	0.034	
Mercury (µg/L)	4	< 0.035	< 0.035	0.018	0.018	0.000	
Nickel (mg/L)	4	< 0.042	< 0.042	0.021	0.021	0.000	
Selenium (µg/L)	4	< 1.3	< 1.3	0.7	0.7	0.0	
Silver (µg/L)	4	< 0.015	< 0.015	0.008	0.008	0.000	
Thallium (µg/L)	4	< 1.1	< 1.1	0.5	0.5	0.0	
Zinc (mg/L)	4	< 0.012	< 0.012	0.006	0.006	0.000	
<b>Biological</b>							
Chlorophyll a (mg/L)	4	< 0.10	1.07	0.05	0.30	0.51	
<sup>J</sup> E. coli (col/100 mL)	4	16	260	148	143	107	

H=F&W human health criteria exceeded; J=estimate; M=value>90% of all verified ecoregional reference reach data collected in ecoregion 65q; N=# of samples; Q=#of uncertain criteria exceedances.