Alabama Department of Environmental Management

Ambient Monitoring Site

Rivers and Streams Monitoring Program

2011 Monitoring Summary

Good

Chickasaw Creek at AL Hwy 158 in Mobile County (30.80297/-88.14334)

BACKGROUND

Chickasaw Creek at CKSM-3 is one of a network of 103 sites monitored annually by the Alabama Department of Environmental Management (ADEM) to identify long-term trends in water quality and to provide data for the development of TMDLs and water quality criteria. Habitat and macroinvertebrate assessments were conducted on Chickasaw Creek at AL Hwy 158 (CKSM-3) in 2011 to assess the biological integrity of the site.

Since 2000, Chickasaw Creek from Mobile College to its source has been on Alabama's Clean Water Act (CWA) §303(d) list of impaired waters for not meeting its *Swimming/Fish and Wildlife* (*S/F&W*) water use classifications. It is listed for mercury from atmospheric deposition.

Figure 1. Chickasaw Creek at CKSM-3, May 5, 2011.

WATERSHED CHARACTERISTICS

Table 1 summarizes the characteristics of the watershed upstream of Chickasaw Creek at CKSM-3. Chickasaw Creek at CKSM-3 is a *Swimming/Fish and Wildlife* (*S/F&W*) stream located within the Southern Pine Plains and Hills (65f) ecoregion in Mobile County. Based on the 2011 National Land Cover Dataset, landuse within the watershed is primarily forest (52%) with some shrubs and wetlands. As of April 1, 2016, 45 NPDES outfalls were active within the watershed (ADEM NPDES Management System).

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. Chickasaw Creek is a glide pool stream with a bottom substrate dominated by sand (Figure 1). Habitat quality and availability were rated *sub-optimal* for supporting diverse aquatic macroinvertebrate communities.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Mobile River
Drainage Area (mi^2)		125
Ecoregion[a]		65F
% Landuse[b]		
Open water		0%
Wetland	Woody	13%
	Emergent herbaceous	<1%
Forest	Deciduous	<1%
	Evergreen	42%
	Mixed	9%
Shrub/scrub		21%
Grassland/herbaceous		7%
Pasture/hay		2%
Cultivated crops		1%
Development	Open space	3%
	Low intensity	<1%
	Moderate intensity	<1%
	High intensity	<1%
Barren		<1%
Population/km^2[c]		24
# NPDES Permits[d]	**TOTAL**	45
Construction		22
Industrial General		12
Industrial Individual		6
Mining		3
Small Mining		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 Chickasaw Creek at CKSM-3, May 05, 2011.

Physical Characteristics		
Width (ft)		**50**
Canopy Cover		**Open**
Depth (ft)		
	Run	**2.0**
	Pool	**3.0**
% of Reach		
	Run	**65**
	Pool	**35**
% Substrate		
	Cobble	**1**
	Hard Pan Clay	**2**
	Sand	**82**
	Organic Matter	**15**

Table 3. Results of the habitat assessment conducted in Chickasaw Creek at CKSM-3, May 5, 2011.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	60	Sub-Optimal (53-65)
Sediment Deposition	66	Optimal (>65)
Sinuosity	40	Poor (<45)
Bank Vegetative Stability	45	Marginal (35-<59)
Riparian Buffer	80	Sub-Optimal (70-90)
Habitat Assessment Score	***121***	
% Maximum Score	***55***	**Sub-Optimal (53-65)**

Table 4. Results of the macroinvertebrate bioassessment conducted in Chickasaw Creek at CKSM-3, May 5, 2011.

Macroinvertebrate Assessment		
		Results
Taxa richness and diversity measures		
	# EPT taxa	25
Taxonomic composition measures		
	% Non-insect taxa	7
	% Plecoptera	5
	% Dominant taxon	17
Functional feeding group		
	% Predators	16
Community tolerance		
	Becks community tolerance index	19
	% Nutrient tolerant individuals	20
	WMB-I Assessment Score	**75**
	WMB-I Assessment Rating	**Good (56-78)**

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 *good* condition (Table 4).

WATER CHEMISTRY

Results of water chemistry analyses are summarized in Table 5. In situ measurements and water samples were collected every other month during March through September of 2011 to help identify any stressors to the biological communities. Chickasaw Creek at CKSM-3 met its use classification criteria for temperature, turbidity, and dissolved oxygen. The low stream pH measured at the site is typical of many coastal plain streams. Median conductivity was higher than expected based on the median concentration of reference reach data in this ecoregion.

SUMMARY

As part of the assessment process, ADEM will review the monitoring information presented in this report, along with all other available data. The 2011 habitat and bioassessment studies indicated the macroinvertebrate community in Chickasaw Creek at CKSM-3 to be in *good* condition. Monitoring should continue to ensure that conditions remain stable.

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Table 5. Summary of water quality data collected March-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	Med	Avg	SD	E
Physical								
Temperature (°C)	5		15.0	28.0	17.9	20.4	5.4	
Turbidity (NTU)	5		2.2	6.6	4.0	4.1	1.7	
Total Dissolved Solids (mg/L)	4		28.0	43.0	34.0	34.8	6.2	
Total Suspended Solids (mg/L)	4	<	5.0	8.0	3.8	4.5	2.6	
Specific Conductance (µmhos)	5		29.0	34.0	31.0 [3]	31.5	2.0	
J Hardness (mg/L)	4		4.0	8.1	7.7	6.9	1.9	
J Alkalinity (mg/L)	4	<	4.0	4.0	3.0	3.0	1.2	
Monthly Stream Flow (cfs)	5		38.0	220.0	53.0	111.4	90.0	
Stream Flow during Sample Collection (cfs)	5		38.0	220.0	53.0	111.4	90.0	
Chemical								
Dissolved Oxygen (mg/L)	5		7.5	10.2	8.8	8.7	1.0	
pH (su)	5		5.9 [C]	6.6	6.2	6.2	0.3	I
J Ammonia Nitrogen (mg/L)	4	<	0.014	0.030	0.007	0.013	0.012	
J Nitrate+Nitrite Nitrogen (mg/L)	4	<	0.006	0.051	0.026	0.027	0.020	
J Total Kjeldahl Nitrogen (mg/L)	4		0.350	0.560	0.355	0.405	0.103	
J Total Nitrogen (mg/L)	4		0.380	0.563	0.392	0.432	0.088	
J Dissolved Reactive Phosphorus (mg/L)	4		0.005	0.010	0.008	0.008	0.002	
Total Phosphorus (mg/L)	4	<	0.004	0.025	0.011	0.012	0.010	
J CBOD-5 (mg/L)	4	<	1.0	< 1.0	0.5	0.5	0.0	
Chlorides (mg/L)	4	<	0.2	< 0.2	0.1	0.1	0.0	
J Atrazine (µg/L)	3	<	0.02	< 0.02	0.01	0.01	0.00	
Total Metals								
J Aluminum (mg/L)	4		0.190	0.417	0.269	0.286	0.095	
J Iron (mg/L)	4		0.436	1.100	0.950	0.859	0.310	
J Manganese (mg/L)	4		0.011	0.035	0.022	0.022	0.010	
Dissolved Metals								
J Aluminum (mg/L)	4	<	0.044	0.160	0.124	0.108	0.060	
J Antimony (µg/L)	4	<	2.3	< 2.3	1.2	1.2	0.0	
Arsenic (µg/L)	4	<	1.9	< 2.8	1.2	1.2	0.3	
Cadmium (µg/L)	4	<	0.022	< 0.130	0.065	0.052	0.027	
J Chromium (µg/L)	4	<	6.000	< 6.000	3.000	3.000	0.000	
Copper (mg/L)	4	<	0.005	< 0.005	0.002	0.002	0.000	
J Iron (mg/L)	4		0.150	0.359	0.174	0.214	0.098	
J Lead (µg/L)	4	<	0.8	< 0.8	0.4	0.4	0.0	
J Manganese (mg/L)	4		0.009	0.150	0.020	0.050	0.067	
J Mercury (µg/L)	3	<	0.105	< 0.105	0.052	0.052	0.000	
J Nickel (mg/L)	4	<	0.007	< 0.007	0.004	0.004	0.000	
J Selenium (µg/L)	4	<	0.8	< 0.8	0.4	0.4	0.0	
Silver (µg/L)	4	<	0.015	< 0.200	0.100	0.077	0.046	
Thallium (µg/L)	4	<	0.9	< 1.2	0.6	0.5	0.1	
J Zinc (mg/L)	4	<	0.032	< 0.032	0.016	0.016	0.000	
Biological								
Chlorophyll a (ug/L)	4	<	1.00	1.00	0.50	0.62	0.25	
J E. coli (coli/100mL)	4		1	440	39	130	208	

C=*S/F&W* use class criterion violated; G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 65f; J=estimate; N=# samples.