Alabama Department of Environmental Management

Ambient Monitoring Site

Rivers and Streams Monitoring Program

2007 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 94 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 2007 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 6, 2010.

WATERSHED CHARACTERISTICS

Table 1 summarizes the characteristics of the watershed upstream of Chickasaw Creek at CKSM-3, which is located within the Southern Pine Plains and Hills (65f) ecoregion *[Griffith et al. 2001]* in Mobile County. Based on the 2000 National Land Cover Dataset, about 75% of the watershed is comprised of forest and wooded wetlands. Only 7% percent of the land cover is composed of cultivated crops and pasture lands. Development accounted for 3% of land cover. As of February 23, 2011, the Department has issued 63 NPDES outfalls are active in this watershed, the vast majority of which are construction stormwater permits (81%).

REACH CHARACTRISTICS

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 at CKSM-3 is a tannic, low-gradient, sand bottomed stream characteristic of Alabama's coastal streams (Figure 1). Overall habitat quality was categorized as *sub-optimal*.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Mobile River
Drainage Area (mi^2)		125
Ecoregion[a]		65f
% Landuse		
Open water		1
Wetland	Woody	11
	Emergent herbaceous	<1
Forest	Deciduous	2
	Evergreen	53
	Mixed	8
Shrub/scrub		15
Grassland/herbaceous		<1
Pasture/hay		4
Cultivated crops		2
Development	Open space	3
	Low intensity	<1
	Moderate intensity	<1
	High intensity	<1
Barren		<1
Population/km^2[b]		24
# NPDES Permits[c]	**TOTAL**	63
Construction Stormwater		51
Mining		4
Industrial General		3
Industrial Individual		4
Municipal Individual		1

a.Southern Pine Plains & Hills

b.2000 US Census

c.#NPDES outfalls downloaded from ADEM's NPDES Management System database, 23 Feb 2011.

Table 2. Physical characteristics of Chickasaw Ck at CKSM-3, May 1, 2007.

Physical Characteristics		
Width (ft)		50
Canopy Cover		Mostly Open
Depth (Ft)		
	Run	1.5
	Pool	3.0
% of Reach		
	Run	45
	Pool	55
% Substrate		
	Clay	5
	Mud/Muck	4
	Sand	80
	Silt	5
	Organic Matter	6

Table 3. Results of the habitat assessment conducted on Chickasaw Creek at CKSM-3, May 1, 2007.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	50	Marginal (40-52)
Sediment Deposition	66	Optimal >65
Sinuosity	45	Marginal (45-64)
Bank and Vegetative Stability	49	Marginal (35-59)
Riparian Buffer	64	Marginal (50-69)
Habitat Assessment Score	**125**	
% Maximum Score	**57**	Sub-optimal (53-65)

Table 4. Results of the macroinvertebrate bioassessment conducted in Chickasaw Creek at CKSM-3, May 1, 2007.

Macroinvertebrate Assessment			
	Results	**Scores**	**Rating**
Taxa richness measures			
# EPT genera	19	76	Good (57-78)
Taxonomic composition measures			
% Non-insect taxa	6	93	Good (92.8-96.3)
% Plecoptera	2	10	Good (5.7-52.8)
% Dominant taxa	20	76	Good (70.6-85.2)
Functional composition measures			
% Predators	10	35	Fair (30.2-45.2)
Tolerance measures			
Beck's community tolerance index	21	95	Excellent (>65.9)
% Nutrient tolerant organisms	38	53	Fair (50.9-76.2)
WMB-I Assessment Score	**--**	**63**	**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. The relatively high taxa richness of mayflies, stoneflies and caddisflies, three pollution-intolerant groups, 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 June through October of 2007 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. Dissolved lead concentrations exceeded the chronic freshwater aquatic life use criteria on August 20, 2007. 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 2007 habitat and bioassessment studies indicated the macroinvertebrate community in Chickasaw Creek at CKSM-3 to be in *good* condition. However, water quality sampling results suggest that dissolved lead concentrations and conductivity may be concerns within this reach.

Table 5. Summary of water quality data collected March-October, 2007. 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
Physical						
Temperature (°C)	4	21.0	28.0	22.6	23.6	3.2
Turbidity (NTU)	4	2.3	11.0	2.9	4.8	4.2
Total Dissolved Solids (mg/L)	3	35.0	58.0	52.0	48.3	11.9
Total Suspended Solids (mg/L)	3	<5.0	8.0	2.5	4.3	3.2
Specific Conductance (µmhos)	4	31.5	35.0	34.5[G]	33.9	1.6
Hardness (mg/L)	3	8.0	9.0	9.0	8.7	0.6
Alkalinity (mg/L)	3	6.0	11.0	7.0	8.0	2.6
Stream Flow (cfs)	4	26.0	77.0	48.5	50.0	22.6
Chemical						
Dissolved Oxygen (mg/L)	4	7.6	8.4	7.9	8.0	0.4
pH (su)	4	6.1	6.7	6.4	6.4	0.3
Ammonia Nitrogen (mg/L)	3	<0.010	<0.010	0.005	0.005	0.000
Nitrate+Nitrite Nitrogen (mg/L)	3	0.043	0.125	0.051	0.073	0.045
Total Kjeldahl Nitrogen (mg/L)	3	<0.100	0.320	0.180	0.183	0.135
Total Nitrogen (mg/L)	3	<0.101	0.445	0.223	0.256	0.174
Dissolved Reactive Phosphorus (mg/L)	3	0.006	0.009	0.008	0.008	0.002
Total Phosphorus (mg/L)	3	0.015	0.021	0.017	0.018	0.003
CBOD-5 (mg/L)	3	<1.0	<1.0	0.5	0.5	0.0
Chlorides (mg/L)	3	<6.0	<6.0	3.0	3.0	0.0
Total Metals						
Aluminum (mg/L)	1				0.120	
Iron (mg/L)	1				1.510	
Manganese (mg/L)	1				0.026	
Dissolved Metals						
Aluminum (mg/L)	1				<0.050	
Antimony (µg/L)	1				<5.0	
Arsenic (µg/L)	1				<5	
Cadmium (mg/L)	1				<0.001	
Chromium (mg/L)	1				<0.010	
Copper (mg/L)	1				<0.010	
Iron (mg/L)	1				0.293	
Lead (µg/L)	1				2.8[A]	
Manganese (mg/L)	1				0.017	
Mercury (µg/L)	1				<0.5	
Nickel (mg/L)	1				<0.010	
Selenium (µg/L)	1				<5.0	
Silver (mg/L)	1				<0.001	
Thallium (µg/L)	1				<5.0	
Biological						
Chlorophyll a (µg/L)	3	<1.0	1.40	0.50	0.80	0.52
Fecal Coliform (col/100 mL)	3	100	1,000	100	400	520

A= S/F&W aquatic life use criteria exceeded; G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 65f; N=# samples.

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