

2011 Monitoring Summary



§303(d)/TMDL Monitoring Site

Wahalak Creek at Choctaw County Road 43 southeast of Butler (32.03290/-88.17630)

BACKGROUND

Wahalak Creek from Spear Creek to the Tombigbee River has been on Alabama's Clean Water Act (CWA) §303(d) list of impaired waters since 2001 for not meeting its *Fish and Wildlife (F&W)* water use classification. It is listed for pathogens from municipal-urban runoff/storm sewers.

The Alabama Department of Environmental Management (ADEM) monitored Wahalak Creek at WHKC-1 to verify and document impairment caused by pathogens from municipal-urban runoff/storm sewer sources.

Wahalak Creek watershed was also selected for biological and water quality monitoring as part of the 2011 Assessment of the Escatawpa, Mobile, 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. Wahalak Creek watershed at WHKC-1, May 18, 2011.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Wahalak Creek from Tishlarka Creek to its source is designated as a *Fish and Wildlife (F&W)* stream located in the Southern Hilly Gulf Coastal Plain (65d) ecoregion near Butler, Alabama. Based on the 2006 National Land Cover Dataset, land cover within the watershed is primarily forest (69%) with some shrub/scrub and grassland. A total of twenty one NPDES outfalls are active in the watershed, as of September 4, 2012. Population density is relatively low.

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. Wahalak Creek at WHKC-1 is a low-gradient stream reach characterized by a straight channel, narrow riparian zone and unstable banks (Figure 1). Overall habitat quality was rated as *sub-optimal* for supporting the macroinvertebrate community.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Lower Tombigbee River
Drainage Area (mi²)		53
Ecoregion^a		65d
% Landuse		
Open water		<1
Wetland	Woody	3
	Emergent herbaceous	<1
Forest	Deciduous	25
	Evergreen	27
	Mixed	17
Shrub/scrub		14
Grassland/herbaceous		7
Pasture/hay		2
Cultivated crops		<1
Development	Open space	4
	Low intensity	<1
	Moderate intensity	<1
	High intensity	<1
Barren		<1
Population/km^{2b}		20
# NPDES Permits^c	TOTAL	21
	Construction Stormwater	7
	Municipal Individual	11
	Underground Injection Control	3

a.Southern Hilly Gulf Coastal Plain

b.2000 US Census

c.#NPDES outfalls downloaded from ADEM's NPDES Management System database, September 4, 2012.

Table 2. Physical characteristics of Wahalak Creek at WHKC-1, September 13, 2011.

Physical Characteristics		
Canopy Cover		Open
Width (ft)		30
Depth (ft)		
	Run	1.0
	Pool	4.0
% of Reach		
	Run	50
	Pool	50
% Substrate		
	Mud/Muck	2
	Gravel	2
	Hard Pan Clay	5
	Sand	80
	Organic Matter	11

Table 3. Results of the habitat assessment conducted on Wahalak Creek at WHKC-1, September 13, 2011.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	48	Marginal (40-52)
Sediment Deposition	60	Sub-optimal (53-65)
Sinuosity	35	Poor <45
Bank and Vegetative Stability	51	Marginal (35-59)
Riparian Buffer	68	Marginal (50-69)
Habitat Assessment Score	121	
% Maximum Score	55	Sub-optimal (53-65)

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 final score indicated the biological community at WHKC-1 to be in *fair* condition (Table 4).

Table 4. Results of the macroinvertebrate bioassessment conducted in Wahalak Creek at WHKC-1, September 13, 2011.

Macroinvertebrate Assessment				
	Results	Scores	Rating	
Taxa richness measures				
# EPT genera	13	52	Fair (38-56)	
Taxonomic composition measures				
% Non-insect taxa	20	25.0	Very Poor (<=30.8)	
% Plecoptera	0	2.2	Poor (1.86-3.7)	
% Dominant taxa	11	96.6	Excellent (>=85.3)	
Functional composition measures				
% Predators	26	90.6	Excellent (>=72.2)	
Tolerance measures				
Beck's community tolerance index	5	22.7	Fair (21.3-31.8)	
% Nutrient tolerant organisms	12	97.2	Excellent (>=88.2)	
WMB-I Assessment Score	--	55	Fair (38-56)	

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. Water samples were collected monthly, semi-monthly (metals), or two times (pesticides, semi-volatile organics and atrazine) during March through October of 2011 to help identify any stressors to the biological communities. Almost all metals were below the detection limits. Pesticides, semi-volatile organics and atrazine were not detected in samples collected in May and September. Total dissolved arsenic exceeded the human health criterion on October 18th; however, the criterion is expressed as dissolved trivalent arsenic (arsenite – As III). Presently, studies are being conducted to provide a better understanding of the prevalence and areal distribution of dissolved trivalent arsenic to total dissolved arsenic in Alabama. Upon conclusion of the studies, Wahalak Creek will be reassessed for arsenic violations.

SUMMARY

As part of the assessment process, ADEM will review the monitoring information presented in this report, along with all other available data.

Wahalak Creek at WHKC-1 was typical of other streams in the Southern Hilly Gulf Coastal Plains, which are generally low-gradient streams with sand substrates (Griffith et al. 2001). Bioassessment results indicated the macroinvertebrate community to be in *fair* condition. Overall habitat quality was rated as *sub-optimal*. Monitoring should continue to ensure that conditions remain stable.

Table 5. Summary of water quality data collected March-October, 2011 Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL). 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	Q
Physical							
Temperature (°C)	9	12.2	25.9	23.4	20.2	5.6	
Turbidity (NTU)	8	9.6	63.7	17.7	26.4	19.5	
Total Dissolved Solids (mg/L)	8	80.0	196.0	132.0	134.0	40.1	
Total Suspended Solids (mg/L)	8	< 1.0	51.0	8.5	16.2	18.2	
Specific Conductance (µmhos)	9	67.2	245	117.5	139.2	63	
Hardness (mg/L)	4	16.7	52.5	42.2	38.4	15.4	
Alkalinity (mg/L)	8	8.8	95.4	45.6	47.3	31.0	
Stream Flow (cfs)	9	1.2	19.9	5.0	6.5	6.0	
Chemical							
Dissolved Oxygen (mg/L)	9	5.2	9.7	7.8	7.5	1.5	
pH (su)	9	6.3	7.6	7.03	7.0	0.4	
Ammonia Nitrogen (mg/L)	8	< 0.005	0.094	0.014	0.024	0.031	
Nitrate+Nitrite Nitrogen (mg/L)	8	0.022	0.282	0.083	0.106	0.088	
Total Kjeldahl Nitrogen (mg/L)	8	0.338	0.827	0.514	0.570	0.192	
Total Nitrogen (mg/L)	8	0.432	0.981	0.640	0.676	0.181	
Dissolved Reactive Phosphorus (mg/L)	7	0.006	0.035	0.018	0.019	0.009	
Total Phosphorus (mg/L)	8	0.052	0.149	0.096	0.094	0.032	
CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0	
Chlorides (mg/L)	8	3.3	14.6	5.3	7.1	4.5	
Atrazine (µg/L)	2	< 0.02	< 0.02	0.01	0.01	0.00	
Total Metals							
Aluminum (mg/L)	4	0.094	0.419	0.248	0.252	0.134	
Iron (mg/L)	4	1.220	2.540	1.790	1.835	0.542	
Manganese (mg/L)	4	0.036	0.137	0.100	0.093	0.051	
Dissolved Metals							
Aluminum (mg/L)	4	< 0.043	0.061	0.033	0.037	0.019	
Antimony (µg/L)	4	< 1.9	< 1.9	0.9	0.9	0.0	
Arsenic (µg/L)	4	< 1.4	1.8 ^H	0.7	1.0	0.6	1
Cadmium (mg/L)	4	< 0.000	< 0.000	0.000	0.000	0.000	
Chromium (mg/L)	4	< 0.009	< 0.009	0.004	0.004	0.000	
Copper (mg/L)	4	< 0.020	< 0.020	0.010	0.010	0.000	
Iron (mg/L)	4	0.227	1.060	0.973	0.808	0.394	
Lead (µg/L)	4	< 0.9	< 0.9	0.5	0.5	0.0	
Manganese (mg/L)	4	0.032	0.126	0.080	0.079	0.053	
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 (mg/L)	4	< 0.000	< 0.000	0.000	0.000	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	
Biological							
Chlorophyll a (ug/L)	4	< 0.10	1.07	0.56	0.56	0.59	
E. coli (col/100mL)	8	17	866	118	315	353	

H=F&W human health criterion exceeded; J=estimate; N=# samples; Q= uncertain exceedance of criterion.

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