Alabama Department of Environmental Management

Basin Assessment Site

Rivers and Streams Monitoring Program

2011 Monitoring Summary

Fair

Cantrell Mill Creek at Four Oaks Road in Lamar County (34.03226/-88.02677).

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Cantrell Mill Creek watershed 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 biological conditions at each monitoring location, estimate overall water quality within the basin, identify impaired and reference reaches, and collect data for metric and criteria development.

Figure 1. Cantrell Mill Creek at CTML-6, June 1, 2011.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Cantrell Mill Creek is a *Fish and Wildlife* (*F&W*) stream located in Lamar County. Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forest (78%) with some shrubs, grasslands and pasture (Figure 1). As of September 1, 2012, five NPDES permits have been issued in this monitoring area.

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. Cantrell Mill Creek at CTML-6 is characterized by a predominate sand substrate and small gravel riffles. Overall habitat quality was categorized as *optimal* for this stream type.

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		
Basin		Upper Tombigbee
Drainage Area (mi^2)		11
Ecoregion[a]		65i
% Landuse		
Open water		1
Wetland	Woody	1
	Emergent herbaceous	<1
Forest	Deciduous	31
	Evergreen	35
	Mixed	12
Shrub/scrub		10
Grassland/herbaceous		4
Pasture/hay		2
Cultivated crops		<1
Development	Open space	4
	Low intensity	<1
	Moderate intensity	<1
Population/km^2[b]		2
# NPDES Permits[c]	**TOTAL**	5
Construction Stormwater		2
Mining		2
Municipal Individual		1

a. Fall Line Hills
b. 2006 US Census
c. #NPDES permits downloaded from ADEM's NPDES Management System database, September 1, 2012.

Table 2. Physical characteristics of Cantrell Mill Creek at CTML-6, June 1, 2011.

Physical Characteristics		
Width (ft)		15
Canopy Cover		Mostly Shaded
Depth (ft)		
	Riffle	0.4
	Run	1.0
	Pool	1.5
% of Reach		
	Riffle	5
	Run	80
	Pool	15
% Substrate		
	Boulder	1
	Cobble	5
	Gravel	15
	Sand	64
	Silt	10
	Organic Matter	5

Table 3. Results of the habitat assessment conducted on Cantrell Mill Creek at CTML-6, June 1, 2011.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	65	Sub-optimal (53-65)
Sediment Deposition	76	Optimal >65
Sinuosity	70	Sub-optimal (65-84)
Bank and Vegetative Stability	78	Optimal >74
Riparian Buffer	90	Optimal >89
Habitat Assessment Score	**177**	
% Maximum Score	**74**	**Optimal >65**

Table 4. Results of the macroinvertebrate bioassessment conducted in Cantrell Mill Creek at CTML-6, June 1, 2011.

Macroinvertebrate Assessment		
	Results	**Scores**
Taxa richness and diversity measures		**(0-100)**
% EPC taxa	38	77
% Dominant Taxon	43	10
Taxonomic composition measures		
% EPT minus Baetidae and Hydropsychidae	0	0
Functional feeding group		
# Collector Taxa	22	75
Community tolerance		
% Nutrient Tolerant individuals	56	15
WMB-I Assessment Score	**---**	**35**
WMB-I Assessment Rating		**Fair (32-47)**

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In-situ measurements and water samples were collected April, May, July, and September of 2011 to help identify any stressors to the biological communities. In situ parameters suggested that Cantrell Mill Creek at CTML-6 was meeting water quality criteria for *F&W* use classification. However, median values of specific conductance and hardness were greater than median concentrations of all verified reference data collected in the 65i ecoregion. Median Ammonia-Nitrogen and dissolved copper were greater than the 90th percentile of all verified ecoregional reference data collected within ecoregion 65i.

SUMMARY

Bioassessment results indicated the macroinvertebrate community to be in *fair* condition. The overall habitat assessment score was *optimal* with good instream habitat. Water chemistry results indicated that the main stressors to the biological community in Cantrell Mill Creek were specific conductance, hardness, ammonia nitrogen, and dissolved copper. Monitoring should continue to ensure that biological conditions remain stable.

FOR MORE INFORMATION, CONTACT:
Ransom Williams Jr., ADEM Environmental Indicators Section
1350 Coliseum Boulevard Montgomery, AL 36110
(334) 260-2715 rw@adem.state.al.us

Table 5. Summary of water quality data collected April, May, July, and September, 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.

Q	Parameter	N		Min	Max	Med	Avg	SD
	Physical							
	Temperature (°C)	5		17.8	26.5	21.9	21.4	3.6
	Turbidity (NTU)	5		3.9	112.0	10.2	28.6	46.7
	Total Dissolved Solids (mg/L)	4		34.0	51.0	38.5	40.5	7.4
J	Total Suspended Solids (mg/L)	4		2.0	100.0	3.5	27.2	48.5
	Specific Conductance (µmhos)	5		27.0	40.0	36.0	34.9	5.3
	Hardness (mg/L)	4	<	2.7	11.4	9.4	7.9	4.5
	Alkalinity (mg/L)	4		1.1	5.6	3.8	3.6	2.0
	Stream Flow (cfs)	4		2.3	6.4	3.5	3.9	1.9
	Chemical							
	Dissolved Oxygen (mg/L)	5		8.2	9.8	8.6	8.8	0.7
	pH (su)	5		6.2	7.1	6.6	6.6	0.4
J	Ammonia Nitrogen (mg/L)	4		0.100	0.500	0.500	0.400	0.200
J	Nitrate+Nitrite Nitrogen (mg/L)	4		0.024	0.157	0.144	0.117	0.063
B	Total Kjeldahl Nitrogen (mg/L)	0						
B	Total Nitrogen (mg/L)	0						
J	Dissolved Reactive Phosphorus (mg/L)	4	<	0.004	0.021	0.004	0.008	0.008
B	Total Phosphorus (mg/L)	0						
J	CBOD-5 (mg/L)	4	<	1.0	< 1.0	0.5	0.5	0.0
	Chlorides (mg/L)	4		1.4	2.3	1.6	1.7	0.4
	Total Metals							
J	Aluminum (mg/L)	3		0.072	0.480	0.411	0.321	0.218
J	Iron (mg/L)	3		0.054	0.184	0.091	0.110	0.067
J	Manganese (mg/L)	3		0.054	0.184	0.079	0.106	0.069
	Dissolved Metals							
J	Aluminum (mg/L)	4	<	0.020	0.101	0.020	0.038	0.043
	Antimony (µg/L)	4	<	2.0	< 2.0	1.0	1.0	0.0
	Arsenic (µg/L)	4	<	1.0	< 1.0	0.5	0.5	0.0
J	Cadmium (mg/L)	4	<	0.0004	<0.0004	0.0002	0.0002	0.000
J	Chromium (mg/L)	4	<	0.003	<0.003	0.002	0.002	0.000
	Copper (mg/L)	3	<	0.300	< 0.3	0.150[M]	0.150	0.000
J	Iron (mg/L)	4		0.070	0.194	0.141	0.136	0.054
	Lead (µg/L)	4	<	2.0	< 2.0	1.0	1.0	0.0
J	Manganese (mg/L)	4		0.144	0.173	0.152	0.155	0.012
BJ	Mercury (µg/L)	3	<	0.035	0.200	0.100	0.072	0.048
	Nickel (mg/L)	4	<	0.030	< 0.03	0.015	0.015	0.000
	Selenium (µg/L)	4	<	3.0	< 3.0	1.5	1.5	0.0
	Silver (mg/L)	4	<	0.001	<0.001	0.0005	0.0005	0.000
	Thallium (µg/L)	4	<	0.4	< 0.4	0.2	0.2	0.0
J	Zinc (mg/L)	4	<	0.020	< 0.02	0.010	0.010	0.000
	Biological							
J	Chlorophyll a (ug/L)	4	<	1.00	2.67	1.87	1.73	1.11
J	E. coli (col/100mL)	3		236	488	326	350	128

B=samples excluded due to Laboratory QC concerns; G=value > median of all ecoregional reference reach data collected in ecoregion 65i; J=estimate; M=value > 90th percentile of all verified ecoregional reference reach data collected within ecoregions 65i; N=# samples;