Alabama Department of Environmental Management

Basin Assessment Site

Rivers and Streams Monitoring Program

2011 Monitoring Summary

Fair™

Magby Creek at Pickens County Road 53 (33.48097/-88.23650)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Magby 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 River basins.

Figure 1. Magby Creek at MGBP-1, March 22, 2011.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Upper Tombigbee
Drainage Area (mi^2)		23
Ecoregion[a]		65i
% Landuse		
Open water		<1
Wetland	Woody	9
	Emergent herbaceous	<1
Forest	Deciduous	37
	Evergreen	19
	Mixed	15
Shrub/scrub		9
Grassland/herbaceous		1
Pasture/hay		4
Cultivated crops		2
Development	Open space	4
	Low intensity	<1
	Moderate intensity	<1
Population/km^2[b]		5
# NPDES Permits[c]	**TOTAL**	1
Construction Stormwater		1

a.Fall Line Hills

b.2000 US Census

c.#NPDES permits outfalls from ADEM's NPDES Management System database, September 1, 2012.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Magby Creek at MGBP-1 is a *Fish & Wildlife (F&W)* stream on the border of Alabama and Mississippi and within the Fall Line Hills ecoregion (65i). Based on the 2006 National Land Cover Dataset, land cover within the watershed is mostly forest (71%). As of September 1, 2012, one NPDES outfall is active in the 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. Magby Creek at MGBP–1 is a primarily sand and clay bottomed stream (Figure 1). Instream habitat quality and bank vegetative stability were categorized as *marginal* for supporting aquatic macroinvertebrate communities.

Table 2. Physical characteristics of Magby Creek at MGBP-1, May 31, 2011.

Physical Characteristics	
Width (ft)	20
Canopy Cover	Estimate 50/50
Depth (ft)	
Run	1.5
Pool	4.0
% of Reach	
Run	5
Pool	95
% Substrate	
Clay	30
Mud/Muck	5
Gravel	2
Sand	37
Silt	15
Organic Matter	11

BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WBM-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 in Magby Creek at MGBP-1 to be characterized by non-insect taxa groups, indicating *fair* community condition (Table 4).

Table 3. Results of the habitat assessment conducted on Magby Creek at MGBP-1, May 31, 2011.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	48	Marginal (40-52)
Sediment Deposition	74	Optimal >65
Sinuosity	43	Poor <45
Bank and Vegetative Stability	35	Marginal (35-59)
Riparian Buffer	86	Sub-optimal (70-89)
Habitat Assessment Score	**131**	
% Maximum Score	**59**	**Sub-optimal (53-65)**

Table 4. Results of the macroinvertebrate bioassessment conducted in Magby Creek at MGBP-1 on May 31, 2011..

Macroinvertebrate Assessment		
	Results	**Scores**
Taxa richness and diversity measures		**(0-100)**
% EPC taxa	29	50
% Dominant Taxon	34	37
Taxonomic composition measures		
% EPT minus Baetidae and Hydropsychidae	6	9
Functional feeding group		
# Collector Taxa	16	45
Community tolerance		
% Nutrient Tolerant individuals	10	97
WMB-I Assessment Score	**---**	**47**
WMB-I Assessment Rating		**Fair (32-47)**

WATER CHEMISTRY

Water chemistry analyses are presented in Table 5. In situ measurements and water samples were scheduled to be collected bi-monthly during March through September of 2011 to help identify any stressors to the biological communities. However, due to drought conditions in 2011, water samples could only be collected twice, in March and in May. Additional in situ field parameters were collected in May, during the macroinvertebrate assessment. Median total dissolved solids, specific conductance and hardness values were higher than expected for the ecoregion. Stream pH was 5.7 s.u. on March 22, 2011, slightly below the *F&W* use classification criterion (6.0 su). Dissolved mercury results exceeded the freshwater Aquatic Life Use and Human Health criteria applicable to the *F&W* use classification during the March 22, 2011 sampling event. No organics samples were collected.

SUMMARY

The habitat at Magby Creek at MGBP-1 was assessed and found to be *sub-optimal* in its ability to support healthy and diverse aquatic macroinvertebrate communities. However, the overall macroinvertebrate community condition was rated as *fair*. Criteria exceedances were noted for pH and dissolved mercury.

Monitoring of Magby Creek at MGBP-1 should continue to ensure that water quality and biological conditions meet current standards.

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Table 5. Summary of water quality data collected March – May, 2011. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL). Median, average (Avg), and standard deviations (SD) values were calculated by multipling the MDL by 0.5 when results were less than this value.

Parameter	N	Min	Max	Med	Avg	SD	E
Physical							
Temperature (°C)	3	16.0	25.8	20.2	20.6	4.9	
Turbidity (NTU)	3	16.3	18.7	16.6	17.2	1.3	
Total Dissolved Solids (mg/L)	2	54.0	78.0	66.0 M	66.0	17.0	
Total Suspended Solids (mg/L)	2	2.0	3.0	2.5	2.5	0.7	
Specific Conductance (µmhos)	3	38.9	53.3	40.1 G	44.1	8.0	
Hardness (mg/L)	2	8.0	9.6	8.8 G	8.8	1.1	
Alkalinity (mg/L)	2	6.2	8.7	7.5	7.5	1.8	
Stream Flow (cfs)	2	11.2	27.2	19.2	19.2	11.3	
Chemical							
Dissolved Oxygen (mg/L)	3	5.1	9.0	8.4	7.5	2.1	
pH (su)	3	5.7 C	6.5	6.1	6.1	0.4	1
Ammonia Nitrogen (mg/L)	2	< 0.005	0.025	0.014	0.014	0.016	
Nitrate+Nitrite Nitrogen (mg/L)	2	0.023	0.041	0.032	0.032	0.013	
Total Kjeldahl Nitrogen (mg/L)	2	0.151	0.460	0.306	0.306	0.218	
Total Nitrogen (mg/L)	2	0.192	0.483	0.338	0.338	0.206	
J Dissolved Reactive Phosphorus (mg/L)	2	< 0.006	< 0.006	0.006	0.006	0.000	
Total Phosphorus (mg/L)	2	0.019	0.022	0.020	0.020	0.002	
CBOD-5 (mg/L)	2	< 2.0	< 2.0	1.0	1.0	0.0	
Chlorides (mg/L)	2	< 2.1	< 2.1	2.1	2.1	0.0	
Atrazine (µg/L)	1			<	0.02		
Total Metals							
Aluminum (mg/L)	2	0.269	0.647	0.458	0.458	0.267	
Iron (mg/L)	2	1.180	1.550	1.365	1.365	0.262	
Manganese (mg/L)	2	0.162	0.169	0.166	0.166	0.005	
Dissolved Metals							
Aluminum (mg/L)	2	< 0.043	< 0.043	0.022	0.022	0.000	
Antimony (µg/L)	2	< 1.9	< 1.9	0.9	0.9	0.0	
Arsenic (µg/L)	2	< 1.4	< 1.4	0.7	0.7	0.0	
Cadmium (µg/L)	2	< 0.022	< 0.022	0.011	0.011	0.000	
Chromium (µg/L)	2	< 9.000	< 9.000	4.500	4.500	0.000	
Copper (mg/L)	2	< 0.020	< 0.020	0.010	0.010	0.000	
J Iron (mg/L)	2	0.092	0.223	0.158	0.158	0.093	
Lead (µg/L)	2	< 0.9	< 0.9	0.5	0.5	0.0	
Manganese (mg/L)	2	0.149	0.154	0.152	0.152	0.004	
Mercury (µg/L)	2	< 0.035	1.264 AH	0.641	0.641	0.881	1
Nickel (mg/L)	2	< 0.042	< 0.042	0.021	0.021	0.000	
J Selenium (µg/L)	2	< 1.3	2.9	1.8	1.8	1.6	
Silver (µg/L)	2	< 0.015	< 0.015	0.008	0.008	0.000	
Thallium (µg/L)	2	< 1.1	< 1.1	0.5	0.5	0.0	
Zinc (mg/L)	2	< 0.012	< 0.012	0.006	0.006	0.000	
Biological							
Chlorophyll a (ug/L)	2	< 0.10	0.76	0.40	0.40	0.50	
J E. coli (col/100mL)	2	140	140	140	140	0	

A=exceeds *F&W* aquatic life use criterion; C=*F&W* criterion exceeded; E=# of exceedances; G=value higher than medium concentration of all verified ecoregional reference reach data collected in ecoregion 65i; H=exceeds *F&W* human health criterion; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in ecoregion 65i; N=# of samples.