Alabama Department of Environmental Management

Basin Assessment Site

Rivers and Streams Monitoring Program

2011 Monitoring Summary

Poor

Three Mile Creek at US Hwy 98 in Mobile County (30.70789/-88.12378)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Three Mile 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 basin group. Habitat and macroinvertebrate assessments were conducted at Three Mile Creek at TMCM-1 on May 25, 2011.

Figure 1. Three Mile Creek at TMCM-1 on May 25, 2011, facing downstream.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Three Mile Creek at TMCM-1 is an *Agricultural & Industrial (A&I)* stream located in Mobile County in the Gulf Coast Flatwoods ecoregion (75a). Based on the 2006 Land Cover Dataset, landuse within the watershed is 68% development, 15% forest, and 12% wooded wetlands. Population density is high. As of September 1, 2012, there are 115 active NPDES discharges within this watershed, the majority of which are Construction Stormwater permits.

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. Three Mile Creek at TMCM-1 is a low-gradient stream characterized primarily by a sand/silt substrate (Figure 1). The riparian buffer, which protects the stream from run-off, and instream habitat were limited. Overall habitat quality was categorized as *poor*.

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 that the biological community at TMCM-1 was composed primarily of pollution-tolerant taxa groups, suggesting *poor* community condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Mobile River
Drainage Area (mi²)		14
Ecoregion[a]		75a
% Landuse		
Open water		<1
Wetland	Woody	12
	Emergent herbaceous	1
Forest	Deciduous	<1
	Evergreen	13
	Mixed	2
Shrub/scrub		2
Grassland/herbaceous		1
Pasture/hay		1
Development	Open space	47
	Low intensity	15
	Moderate intensity	5
	High intensity	1
Barren		<1
Population/km²[b]		816
# NPDES Permits[c]	**TOTAL**	115
401 Water Quality Certification		1
Coastal Certification		1
Construction Stormwater		91
Industrial General		2
Municipal Individual		18
Underground Injection Control		2

a. Gulf Coast Flatwoods

b. 2000 US Census

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

Table 2. Physical characteristics of Threemile Creek at TMCM-1, May 25, 2011.

Physical Characteristics		
Canopy Cover		Open
Width (ft)		50
Depth (ft)		
	Run	1.5
	Pool	2
% of Reach		
	Run	99
	Pool	1
% Substrate		
	Boulder	1
	Cobble	1
	Mud/Muck	10
	Gravel	15
	Sand	40
	Silt	30
	Organic Matter	3

Table 3. Results of the habitat assessment conducted on Threemile Ck at TMCM-1, May 25, 2011.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	28	Poor (<31)
Sediment Deposition	13	Poor (<31)
Sinuosity	20	Poor (<31)
Bank Vegetative Stability	81	Optimal (>79)
Riparian Buffer	5	Poor (<31
Habitat Assessment Score	***58***	
% of Maximum Score	***34***	**Marginal (31-<57)**

Table 4. Results of the macroinvertebrate bioassessment of Three Mile-Creek at TMCM-1 conducted on May 25, 2011.

Macroinvertebrate Assessment	
	Results
Taxa richness and diversity measures	
# EPT taxa	1
Taxonomic composition measures	
% Non-insect taxa	45
% Plecoptera	0
% Dominant taxon	36
Functional feeding group	
% Predators	6
Community tolerance	
Becks community tolerance index	0
% Nutrient tolerant individuals	14
WMB-I Assessment Score	**22**
WMB-I Assessment Rating	**Poor (19-37)**

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In- situ measurements and water samples, including metals, were collected March, May, July, and September, 2011 to help identify any stressors to the biological communities. In-situ parameters indicated that the reach was meeting the water quality criteria for it's *A&I* use classification. Pesticides, atrazine, and semi-volatile organics were collected in May and September; all results were below minimum laboratory detection limits.

SUMMARY

Bioassesment results indicated the macroinvertebrate community in Three Mile Creek at TMCM-1 to be in *poor* condition. Overall habitat quality was categorized as *poor* due to poor in-stream habitat quality and limited riparian buffers. Results of water quality sampling indicated the reach to be meeting criteria associated with it's *A&I* use classification criteria.

Table 5. Summary of water quality data collected March, 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.

Parameter	N		Min	Max	Med	Avg	SD
Physical							
Temperature (°C)	5		17 8	31.9	26 8	26 0	5 1
Turbidity (NTU)	5		2.6	27.0	3.1	7.9	10 7
Total Dissolved Solids (mg/L)	4		50.0	63.0	56.0	56.2	6.7
Total Suspended Solids (mg/L)	4	<	5.0	8.0	2.5	3.9	2.8
Specific Conductance (µmhos/cm@25C)	5		81 0	106.0	93 0	88 2	16 6
Hardness (mg/L)	4		23 0	37.9	32 8	31 6	6 6
Alkalinity (mg/L)	4		20.0	32.0	28.5	27.2	5.2
Monthly Stream Flow (cfs)	3		7.8	10.9	8.7	9.1	1.6
Chemical							
Dissolved Oxygen (mg/L)	5		7 5	13.1	8 5	9 3	2 2
pH (SU)	5		6 6	8.4	6 9	7 1	0 7
Ammonia Nitrogen (mg/L)	4	<	0 014	0.100	0.024	0 038	0.044
Nitrate+Nitrite Nitrogen (mg/L)	4		0.010	0.244	0.126	0.126	0.109
Total Kjeldahl Nitrogen (mg/L)	4		0 180	0.840	0.520	0 515	0.270
Total Nitrogen (mg/L)	4		0 241	1 084	0 820	0 641	0 356
Dissolved Reactive Phosphorus (mg/L)	4		0 004	0 007	0.006	0 006	0 001
Total Phosphorus (mg/L)	4		0 013	0.027	0.020	0 020	0.006
CBOD-5 (mg/L)	4	<	1.0	1.1	0.5	0.6	0.3
COD (mg/L)	1	<			<	2.0	
Chlorides (mg/L)	4	<	0 2	6.6	5 8	4 6	3 0
Atrazine (µg/L)	2		0.05	0 07	0 06	0.06	0.01
Total Metals							
Aluminum (mg/L)	4		0.150	0.954	0.183	0.368	0.392
Iron (mg/L)	4		0 818	0.978	0.951	0 924	0 073
Manganese (mg/L)	4		0 041	0 070	0 054	0 055	0 012
Dissolved Metals							
Aluminum (mg/L)	4	<	0.044	0.192	0.079	0 093	0.085
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	<	0 032	0 130	0.065	0 057	0 016
Chromium (mg/L)	4	<	0 008	0 008	0.003	0 003	0 000
Copper (mg/L)	4	<	0 005	0.005	0.002	0 002	0.000
Iron (mg/L)	4		0.339	0.469	0.354	0.379	0.060
Lead (µg/L)	4	<	0.8	0.8	0.4	0.4	0 0
Manganese (mg/L)	4		0 022	0 064	0 054	0 048	0 018
Mercury (µg/L)	3	<	0 105	0 173	0 052	0 093	0 070
Nickel (mg/L)	4	<	0 007	0.007	0.004	0 004	0.000
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
Zinc (mg/L)	4	<	0 032	0 032	0.016	0 016	0 000
Biological							
Chlorophyll a (mg/m³)	4	<	1.00	1.90	0.50	0.85	0.70
E. coli (MPN/DL)	4		3.0	53.0	16.0	22.0	23.4

E=# samples that exceeded criteria; H=*F&W* human health criteria exceeded; J=estimate; N=# samples.

FOR MORE INFORMATION, CONTACT:
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