Alabama Department of Environmental Management

§303(d)/TMDL Monitoring Site

Rivers and Streams Monitoring Program

2005 Monitoring Summary

Very Poor™

Three Mile Branch at Lower Wetumpka Rd. (Montgomery Co.)(32.45358/-86.25758)

BACKGROUND

Three Mile Branch from Lower Wetumpka Road to its source has been on Alabama's Clean Water Act (CWA) §303(d) list of impaired waters for not meeting its *Fish and Wildlife (F&W)* water use classifications. It is listed for pesticides from unknown sources.

At the request of the ADEM Water Division, ADEM Field Operations Division monitored Three Mile Branch at TMBM-1 to verify and document impairment from pesticides at this site. ADEM's Environmental Indicators Section (EIS) conducted macroinvertebrate and habitat assessments to verify impairment to aquatic communities. Monthly water chemistry samples were collected to identify the causes of impairment. Results from these data may also be used in determination of Total Maximum Daily Load needs and priorities.

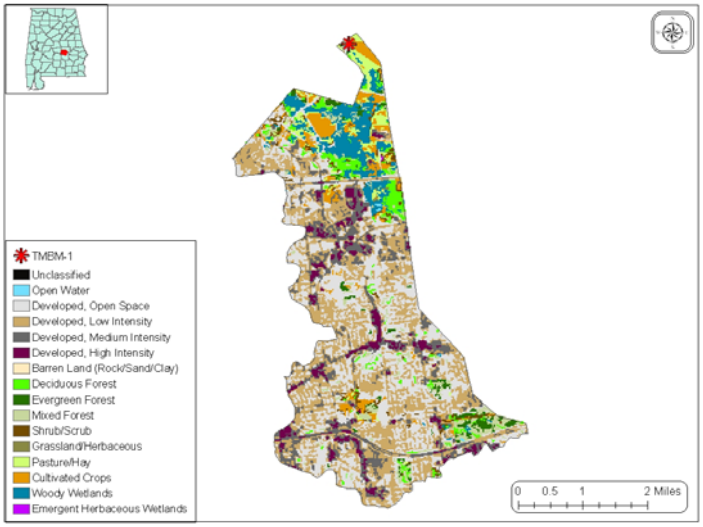

Figure 1. sampling location and watershed of Three Mile Branch at TMBM-1.

WATERSHED CHARACTERISTICS

The Three Mile Branch watershed at TMBM-1 is a small *Fish & Wildlife (F&W)* stream located within the city of Montogmery. Landuse within the watershed is primarily open and low intensity development, with some agricultural and forest land. The stream flows through the city of Montgomery (Fig. 1).

REACH CHARACTERISTICS

General observations (Table 2) and habitat assessments (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 Branch at TMBM-1 is a low-gradient, shaded stream reach characterized by sandy substrates. Overall habitat quality was categorized as *marginal* due to poor instream habitat, lack of sinuosity, and sediment deposition.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Drainage Area (mi^2)		14
Ecoregion[a]		65p
% Landuse		
Open water		<1
Wetland	Woody	6
	Emergent herbaceous	<1
Forest	Deciduous	4
	Evergreen	2
	Mixed	3
Shrub/scrub		2
Grassland/herbaceous		<1
Pasture/hay		3
Cultivated crops		5
Development	Open space	30
	Low intensity	29
	Moderate intensity	12
	High intensity	4
Population/km^2 [b]		839
# NPDES Permits[c]	**TOTAL**	74
401 Water Quality Certification		1
Construction Stormwater		49
Mining General Permit (old)		24

a.Southeastern Flood Plains and Low Terraces

b.2000 U.S. Census Data

c.#NPDES permits downloaded from ADEM's NPDES Management System database, 9 Jun 2008

Table 2. Summary of physical characteristics

Physical characteristics		
Width (ft)		12
Canopy cover		Shaded
Depth (ft)		
	Run	0.8
% of Reach		
	Riffle	0
	Run	98
	Pool	0
% Substrate		
	Sand	96
	Silt	2
	Organic Matter	2

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 an average of the score for each metric. Metric results indicated the macroinvertebrate community to be characterized by pollution-tolerant taxa goups and predators, indicating *very poor* community condition (Table 4).

Table 3. Results of a habitat assessment conducted at TMBM-1, June 14, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	24	Poor (<40)
Sediment deposition	45	Marginal (40-52)
Sinuosity	33	Poor (<45)
Bank and vegetative stability	51	Marginal (35-59)
Riparian buffer	64	Marginal (50-69)
Habitat assessment score	94	
% Maximum score	**43**	**Marginal (40-52)**

Table 4. Results of the macroinvertebrate bioassessment conducted at TMBM-1, June 14, 2005.

Macroinvertebrate Assessment			
	Results	**Scores**	**Rating**
Taxa richness measures			
# EPT genera	5	20	Poor (19-37)
Taxonomic composition measures			
% Non-insect taxa	21	18	Very Poor (<30.9)
% Plecoptera	0	0	Very Poor (<1.86)
% Dominant taxa	35	37	Poor (23.5-47.0)
Functional composition measures			
% Predators	9	0	Very Poor (<15.1)
Tolerance measures			
Beck's community tolerance index	0	0	Very Poor (<10.6)
% Nutrient tolerant organisms	62	13	Very Poor (<25.4)
WMB-I Assessment Score	**---**	**13**	**Very Poor (<19)**

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected monthly, semi-monthly (metals), or quarterly (pesticides, herbicides (atrazine), and semi-volatile organics) during March through October of 2005 to help identify any stressors to the biological communities. Median values of total dissolved solids, nitrate+nitrite-nitrogen, total kieldahl nitrogen, total nitrogen, dissolved reactive phosphorus, total phosphorus, CBOD -5, chlorides, atrazine, and fecal coliforms were greater than expected values in this ecoregion. The fecal coliform count was >2,000 colonies/100 mL in 2 of 7 samples collected (March 23rd and August 18th), above water quality criteria for its *Fish & Wildlife* use classification.

CONCLUSIONS

Results of the 2005 macroinvertebrate assessment indicated the macroinvertebrate community to be in *very poor* condition. Parameters of concern included total dissolved solid concentrations, nitrate+nitrite-nitrogen, total kieldahl nitrogen, total nitrogen, dissolved reactive phosphorus, total phosphorus, CBOD-5, chlorides, atrazine, and fecal coliforms.

FOR MORE INFORMATION, CONTACT:
Dusty Miller, ADEM Aquatic Assessment Unit
1350 Coliseum Boulevard Montgomery, AL 36110
(334) 260-2712 jmiller@adem.state.al.us

Table 5. Summary of water quality data collected March-October, 2005. 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	Median	Avg	SD
Physical						
Temperature (°C)	8	17.0	26.0	23.0	22.4	3.6
Turbidity (NTU)	8	4.1	29.2	5.8	9.4	8.5
Total Dissolved Solids (mg/L)	7	89.0	109.0	99.0M	99.4	6.1
Total Suspended Solids (mg/L)	7	4.0	35.0	6.0	12.0	11.4
Specific Conductance (µmhos)	8	52.6	128.8	120.9	111.9	25.2
Hardness (mg/L)	4	37.2	54.2	43.2	44.5	7.3
Alkalinity (mg/L)	7	38.1	46.3	44.2	42.9	3.5
Stream Flow (cfs)	8	3.3	16.3	5.3	7.6	---
Chemical						
Dissolved Oxygen (mg/L)	8	5.3	7.8	7.1	6.9	0.9
pH (su)	8	6.8	7.4	7.1	7.2	0.2
Ammonia Nitrogen (mg/L)	6	< 0.015	0.067	0.008	0.019	0.024
Nitrate+Nitrite Nitrogen (mg/L)	7	0.409	0.856	0.696M	0.635	0.170
Total Kjeldahl Nitrogen (mg/L)	7	0.171	0.756	0.479M	0.445	0.199
Total Nitrogen (mg/L)	7	0.945	1.275	1.062M	1.080	0.108
Dissolved Reactive Phosphorus (mg/L)	7	0.004	0.046	0.016M	0.023	0.017
Total Phosphorus (mg/L)	7	0.031	0.127	0.060M	0.072	0.033
CBOD-5 (mg/L)	7	< 1.0	4.9	1.5M	1.9	1.5
J Chlorides (mg/L)	7	5.1	7.9	6.4M	6.4	0.9
Atrazine (µg/L)	2	0.11	0.46	0.29M	0.29	---
Total Metals						
Aluminum (mg/L)	4	< 0.015	0.162	0.064	0.074	0.079
Iron (mg/L)	4	0.344	0.802	0.634	0.604	0.217
Manganese (mg/L)	4	0.033	0.058	0.051	0.048	0.011
Dissolved Metals						
Aluminum (mg/L)	4	< 0.015	0.021	0.014	0.014	0.008
Antimony (µg/L)	4	< 2	< 2	1	1	0.0
Arsenic (µg/L)	4	< 10	< 10	5	5	0.0
Cadmium (mg/L)	4	< 0.005	< 0.005	0.003	0.003	0.000
Chromium (mg/L)	4	< 0.004	< 0.004	0.002	0.002	0.000
Copper (mg/L)	4	< 0.005	< 0.005	0.003	0.003	0.000
Iron (mg/L)	4	< 0.05	0.185	0.124	0.121	0.057
Lead (µg/L)	4	< 2	< 2	1	1	0.0
Manganese (mg/L)	4	< 0.005	0.08	0.021	0.031	0.037
Mercury (µg/L)	4	< 0.3	< 0.3	0.15	0.15	0.000
Nickel (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.000
Selenium (µg/L)	4	< 10	< 10	5	5	0.0
Silver (mg/L)	4	< 0.003	< 0.003	0.002	0.002	0.000
Thallium (µg/L)	4	< 1	< 1	0.5	0.5	0.0
Zinc (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.000
Biological						
J Fecal Coliform (col/100 mL)	7	90	4500	770M	1360	1647

N=# samples; J=Reported value is an estimate; M=value > 25th percentile of all data collected within eco-region 65p.