Alabama Department of Environmental Management

Basin Assessment Site

Rivers and Streams Monitoring Program

2005 Monitoring Summary

Mud Creek at Perry Co Rd 12 (32.49023/-87.41521)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Mud Creek watershed for biological and water quality monitoring as part of the 2005 Assessment of the Alabama, Coosa, and Tallapoosa (ACT) River Basins.

A macroinvertebrate assessment, which is conducted to assess the biological integrity of each monitoring site and to estimate overall water quality within the ACT basin group, was attempted, but could not be completed due to non-flowing site conditions. A habitat assessment was conducted in April.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Mud Creek is a small *Fish & Wildlife (F&W)* stream located in Perry County near Uniontown (Fig. 1). At MUDP-1, the stream drains approximately 16 square miles of countryside. Landuse within the watershed is primarily pasture and cropland, with some wetland areas.

REACH CHARACTERISTICS

General observations (Table 2) and habitat assessments (Table 3) were completed during April, 2005. 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. Mud Creek at MUDP-1 is a shallow, low-gradient stream reach located in the Blackland Prairie ecoregion (Table 2). Overall habitat quality was categorized as *sub-optimal* due to bank erosion and a lack of in-stream habitat. The reach was also characterized by a relatively straight stream channel, which puts it at risk to impacts from sedimentation and scouring.

Table 1. Summary of watershed characteristics.

Physical Characteristics		
Drainage Area (mi^2)		16
Ecoregion[a]		65a
% Landuse		
Open water		4
Wetland	Woody	15
	Emergent herbaceous	4
Forest	Deciduous	9
	Evergreen	<1
	Mixed	<1
Shrub/scrub		6
Grassland/herbaceous		1
Pasture/hay		42
Cultivated crops		14
Development	Open space	3
	Low intensity	<1
Population/km^2 [b]		12
# NPDES Permits[c]	**TOTAL**	4
Construction Stormwater		3
Mining General Permit (old)		1

a. Blackland Prairie
b. 2000 U.S. Census data
c. #NPDES permits from ADEM's NPDES Management System database, 9 Jun 2008

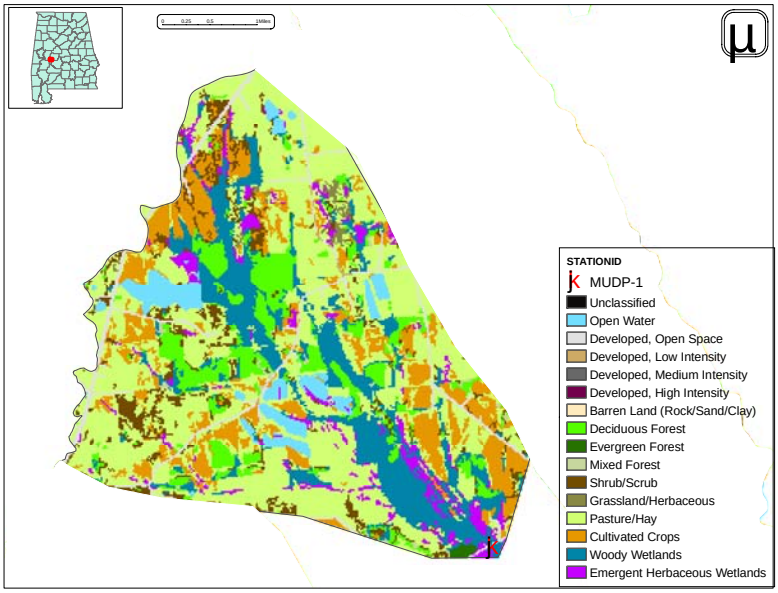

Figure 1. Sampling location and landuse within the Mud Creek watershed at MUDP-1.

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 4. 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. *In* situ parameters were measured during each site visit. One of six (17%) dissolved oxygen measurements (August 10, 2005) was less than 5.0 mg/L (4.9). The fecal coliform count was above the 2000 colonies/100 mL criteria for Fish & Wildlife Use Classification during one of six sampling events, with 5,200 colonies/100 mL measured during July 11, 2005. Stream flow at the time of collection appeared to be normal, although indications of elevated stream flow during the previous week were evident. Conductivity, chlorophyll-a, and median nutrient (nitrate+ nitrite-nitrogen, total Kjeldahl nitrogen, total nitrogen, total phosphorus) and chloride concentrations were also above values expected for Blackland Prairie streams.

Table 2. Physical characteristics of Mud Creek at MUDP-1, April 11, 2005.

Physical Characterization		
Width (ft)		15
Canopy cover		Mostly Shaded
Depth (ft)		
	Run	1.5
	Pool	2.0
% of Reach		
	Run	85
	Pool	15
% Substrate		
	Sand	30
	Silt	30
	Clay	34
	Organic Matter	6

Table 3. Results of habitat assessment conducted April 11, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	35	Poor (<40)
Sediment deposition	73	Optimal (>65)
Sinuosity	50	Marginal (45-64)
Bank and vegetative stability	23	Poor (<35)
Riparian buffer	85	Sub-optimal (70-90)
Habitat assessment score	121	
% Maximum score	**55**	**Sub-optimal (53-65)**

CONCLUSIONS

Monthly water quality samples indicated nutrient concentrations (nitrate+nitrite-nitrogen, total Kjeldahl nitrogen, total nitrogen, total phosphorus) in Mud Creek at MUDP-1 to be higher than expected for Blackland Prairie streams. Additionally, results of a habitat assessment conducted at the site suggested sedimentation and a lack of macroinvertebrate habitat within the stream reach. However, low stream flows during the sampling period prevented the performance of the macroinvertebrate assessment needed to assess the impact of nutrient and habitat conditions on the aquatic macroinvertebrate community.

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Table 4. Summary of water quality data collected March-October, 2005. 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. Metals results were compared to ADEM's chronic aquatic life use criteria adjusted for hardness.

Parameter	N	Min	Max	Median	Avg	SD
Physical						
Temperature (°C)	6	18.0	27.0	23.5	23.2	3.3
Turbidity (NTU)	6	31.8	242.0	68.8	108.6	84.6
Total dissolved solids (mg/L)	6	70.0	248.0	166.5	158.0	58.8
Total suspended solids (mg/L)	6	39.0	272.0	53.5	97.2	91.3
Specific conductance (µmhos)	6	80.1	320	226.6M	217.3	77.8
Hardness (mg/L)	3	30.0	77.3	64.6	57.3	24.5
Alkalinity (mg/L)	6	26.6	85.9	70.2	65.5	20.2
Stream Flow (cfs)	4	0.9	53.8	6.5	16.9	---
Chemical						
Dissolved oxygen (mg/L)	6	4.9C	8.5	6.9	6.8	1.4
pH (su)	6	6.8	8.09	7.7	7.6	0.5
Ammonia Nitrogen (mg/L)	6	< 0.015	0.094	0.020	0.033	0.034
Nitrate+Nitrite Nitrogen (mg/L)	6	0.026	0.261	0.184M	0.171	0.084
Total Kjeldahl Nitrogen (mg/L)	6	0.933	1.834	1.403M	1.359	0.312
Total nitrogen (mg/L)	6	1.096	2.066	1.494M	1.529	0.333
Dissolved reactive phosphorus (mg/L)	6	0.019	0.059	0.027	0.031	0.014
Total phosphorus (mg/L)	6	0.110	0.239	0.158M	0.158	0.047
CBOD-5 (mg/L)	6	< 1.0	5.3	2.7	3.0	1.8
Chlorides (mg/L)	6	10.7	65.2	19.2M	25.7	19.9
Atrazine (µg/L)	1				<0.05	
Total Metals						
Aluminum (mg/L)	3	0.465	4.22	0.882	1.856	2.1
Iron (mg/L)	3	1.47	3.72	2.25	2.480	1.1
Manganese (mg/L)	3	0.023	0.074	0.024	0.040	0.0
Dissolved Metals						
Aluminum (mg/L)	3	0.024	0.151	0.046	0.074	0.1
Antimony (µg/L)	3	< 2	< 2	1	1	0
Arsenic (µg/L)	3	< 10	< 10	5	5	0
Cadmium (mg/L)	3	< 0.005	< 0.005	0.0025	0.0025	0.0
Chromium (mg/L)	3	< 0.004	< 0.004	0.002	0.002	0.0
Copper (mg/L)	3	< 0.005	< 0.005	0.0025	0.003	0.0
Iron (mg/L)	3	0.033	0.322	0.073	0.1427	0.2
Lead (µg/L)	3	< 2	< 2	1	1	0
Manganese (mg/L)	3	< 0.005	< 0.005	0.0025	0.003	0.0
Mercury (µg/L)	3	< 0.3	< 0.3	0.15	0.15	0.0
Nickel (mg/L)	3	< 0.006	< 0.006	0.003	0.003	0.0
Selenium (µg/L)	3	< 10	< 10	5	5	0
Silver (mg/L)	3	< 0.003	< 0.003	0.0015	0.0015	0.0
Thallium (µg/L)	3	< 1	< 1	0.5	0.500	0
Zinc (mg/L)	3	< 0.006	< 0.006	0.003	0.003	0.0
Biological						
J Chlorophyll a (µg/L)	6	4.27	38.45	16.56M	20.11	13.8
J Fecal Coliform (col/100 mL)	6	190	> 5200C	485	1310	1949

J=estimate; N=# samples; C=value exceeds established criteria for Fish & Wildlife use classification; M=value > 90% of ADEM's verified reference reaches collected in ecoregions 65a/b