ADEM
Alabama Department of Environmental Management

Basin Assessment Site

Rivers and Streams Monitoring Program

2005 Monitoring Summary

™

Poor

Ramer Creek at Montgomery County Road 18 (32.25028/-86.24474)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Ramer Creek watershed for biological and water quality monitoring as part of the 2005 Assessment of the Alabama, Coosa, and Tallapoosa (ACT) River Basins. The objectives of the ACT Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the ACT basin group. The segment of Catoma Creek from Ramer Creek to the Alabama River has been on Alabama's Clean Water Act (CWA) §303(d) list of impaired waters since 1996 for organic enrichment/dissolved oxygen. It was also listed for pathogens from these sources (urban runoff/storm sewers, pasture grazing and agriculture) in 2002. In 2005, Ramer Creek at RMRM-9 was sampled to assess this tributary as a source of organic enrichment/ DO and pathogen impairment in support of the development of a Total Maximum Daily Load for Catoma Creek.
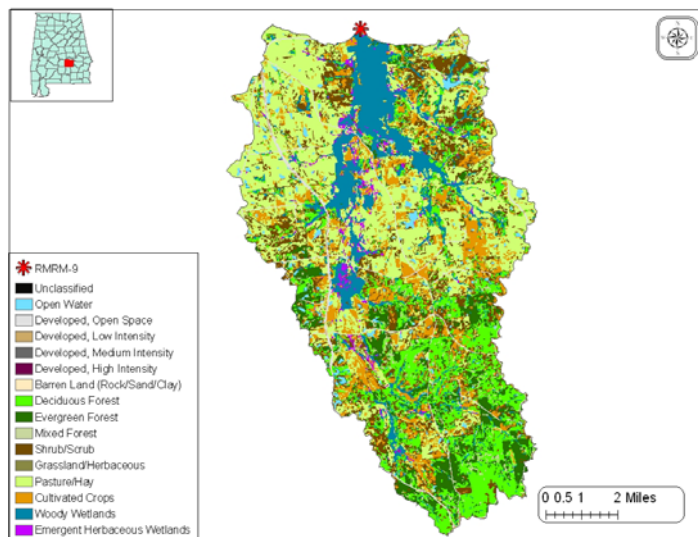

Figure 1. sampling location and watershed of Ramer Creek at RMRM-9.

WATERSHED CHARACTERISTICS

The Ramer Creek watershed is a small *Fish & Wildlife (F&W)* stream located near the city of Montgomery. Landuse within the watershed is primarily pasture land with some forest land and wooded wetland (Table 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. Ramer Creek at RMRM-9 is a low-gradient, mostly shaded stream reach characterized by sandy substrates. Overall habitat quality was categorized as *sub-optimal* due to marginal instream habitat quality and bank stability.

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 nutrient-tolerant taxa and predators, indicating *poor* community condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Drainage Area (mi^2)		77
Ecoregion[a]		65a
% Landuse		
Open water		2
Wetland	Woody	12
	Emergent herbaceous	1
Forest	Deciduous	16
	Evergreen	7
	Mixed	2
Shrub/scrub		14
Grassland/herbaceous		<1
Pasture/hay		30
Cultivated crops		12
Development	Open space	3
	Low intensity	<1
	Moderate intensity	<1
Population/km^{2b}		400
# NPDES Permits[c]	**TOTAL**	16
Construction Stormwater		10
Mining General Permit (old)		5
Industrial General		1

a. Blackland Prairie

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 at RMRM-9, June 14, 2005.

Physical Characteristics		
Width (ft)		12
Canopy cover		Mostly Shaded
Depth (ft)		
	Run	1.0
	Pool	1.8
% of Reach		
	Run	45
	Pool	55
% Substrate		
	Sand	85
	Silt	5
Organic Matter		10

Table 3. Results of a habitat assessment conducted at RMRM-9, June 14, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	50	Marginal (40-52)
Sediment deposition	56	Sub-optimal (53-65)
Sinuosity	48	Marginal (45-64)
Bank and vegetative stability	54	Marginal (35-59)
Riparian buffer	80	Sub-optimal (70-90)
Habitat assessment score	124	
% Maximum score	**56**	**Sub-optimal (53-65)**

Table 4. Results of the macroinvertebrate bioassessment conducted at RMRM-9, June 14, 2005.

Macroinvertebrate Assessment			
	Results	Scores	Rating
Taxa richness measures			
# EPT genera	16	64	Good (56-78)
Taxonomic composition measures			
% Non-insect taxa	8	86	Fair (61.8-92.7)
% Plecoptera	1	2	Poor (1.86-3.7)
% Dominant taxa	22	69	Fair (47.0-70.5)
Functional composition measures			
% Predators	3	1	Very Poor (<15.1)
Tolerance measures			
Beck's community tolerance index	4	18	Poor (10.6-21.2)
% Nutrient tolerant organisms	64	10	Very Poor (<25.4)
WMB-I Assessment Score	---	36	**Poor (19-37)**

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. Intensive fecal studies were conducted during two periods during July and September of 2005. Median values of dissolved reactive phosphorus, chlorides, and atrazine were greater than expected values in this ecoregion. The fecal coliform count was >2,000 colonies/100 mL in 2 of 17 samples collected (April 12th and August 17th), above water quality criteria for its *Fish & Wildlife* use classification.

CONCLUSIONS

Results of the 2005 macroinvertebrate assessment indicated the macroinvertebrate community to be in *poor* condition. Parameters of concern included dissolved reactive phosphorus, chlorides, and atrazine.

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. Metals results were compared to ADEM's chronic aquatic life use criteria adjusted for hardness

Parameter	N	Min	Max	Median	Avg	SD
Physical						
Temperature (ºC)	20	15.0	29.0	26.5	24.9	4.4
Turbidity (NTU)	20	3.6	67.0	16.1	22.0	18.0
Total Dissolved Solids (mg/L)	7	97.0	214.0	174.0	169.0	39.4
Total Suspended Solids (mg/L)	7	9.0	107.0	31.0	43.0	38.5
Specific Conductance (µmhos)	20	162.0	370	276.4	269.7	65.1
Hardness (mg/L)	5	81.5	141.0	109.0	105.3	23.7
Alkalinity (mg/L)	7	63.1	117.5	101.9	94.3	20.8
Stream Flow (cfs)	18	0.4	75.1	10.8	18.6	---
Chemical						
Dissolved Oxygen (mg/L)	20	4.9	8.2	5.6	5.9	1.0
pH (su)	20	6.8	7.9	7.5	7.4	0.3
Ammonia Nitrogen (mg/L)	7	< 0.015	0.045	0.024	0.023	0.016
Nitrate+Nitrite Nitrogen (mg/L)	7	0.009	0.174	0.044	0.064	0.058
Total Kjeldahl Nitrogen (mg/L)	7	0.489	1.202	0.558	0.643	0.251
Total Nitrogen (mg/L)	7	0.507	1.246	0.642	0.707	0.249
Dissolved Reactive Phosphorus (mg/L)	7	0.012	0.104	0.064^M	0.058	0.032
Total Phosphorus (mg/L)	7	0.112	0.196	0.122	0.138	0.035
CBOD-5 (mg/L)	7	< 1.0	3.5	2.8	2.5	1.0
^{J} Chlorides (mg/L)	7	5.2	12.6	9.5^M	9.1	2.4
Atrazine (µg/L)	2	< 0.05	0.09	0.07^M	0.07	---
Total Metals						
Aluminum (mg/L)	4	0.106	0.775	0.214	0.327	0.303
Iron (mg/L)	4	0.949	1.95	1.39	1.420	0.411
Manganese (mg/L)	4	< 0.005	0.036	0.016	0.018	0.013
Dissolved Metals						
Aluminum (mg/L)	4	< 0.015	0.126	0.015	0.041	0.057
Antimony (µg/L)	4	< 2	< 2	1.5	1.5	0.6
Arsenic (µg/L)	4	< 10	< 10	7.5	7.5	2.9
Cadmium (mg/L)	4	< 0.005	< 0.005	0.004	0.004	0.001
Chromium (mg/L)	4	< 0.004	< 0.004	0.003	0.003	0.001
Copper (mg/L)	4	< 0.005	< 0.005	0.004	0.004	0.001
Iron (mg/L)	4	0.078	0.405	0.3405	0.291	0.146
Lead (µg/L)	4	< 2	< 2	1.5	1.5	0.6
Manganese (mg/L)	4	< 0.005	0.031	0.018	0.017	0.016
Mercury (µg/L)	4	< 0.3	< 0.3	0.225	0.225	0.087
Nickel (mg/L)	4	< 0.006	< 0.006	0.0045	0.0045	0.002
Selenium (µg/L)	4	< 10	< 10	7.5	7.5	2.9
Silver (mg/L)	4	< 0.003	< 0.003	0.002	0.002	0.001
Thallium (µg/L)	4	< 1	< 1	0.75	0.8	0.3
Zinc (mg/L)	4	< 0.006	< 0.006	0.0045	0.0045	0.002
Biological						
^{J} Chlorophyll a (µg/L)	7	0.53	9.08	3.05	3.49	2.81
^{J} Fecal Coliform (col/100 mL)	17	10	5000	150	1423	2081

N=# samples; J=Reported value is an estimate; M= Median values > 90th percentile of all data collected within eco-region 65a.