

2005 Monitoring Summary



Basin Assessment Site

Robinson Creek at State Road 47 in Monroe County (31.68341/-87.21802)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Robinson 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.

Table 1. Summary of Watershed Characteristics

Watershed Characteristics		
Drainage Area (mi ²)		38
Ecoregion ^a		65d
% Landuse		
Open water		<1
Wetland	Woody	7
	Emergent herbaceous	<1
Forest	Deciduous	39
	Evergreen	30
	Mixed	9
Shrub/scrub		7
Grassland/herbaceous		<1
Pasture/hay		3
Cultivated crops		1
Development	Open space	2
	Low intensity	<1
	Moderate intensity	<1
Population/km ^{2b}		324
# NPDES Permits ^c	TOTAL	4
	Mining General Permit (old)	4

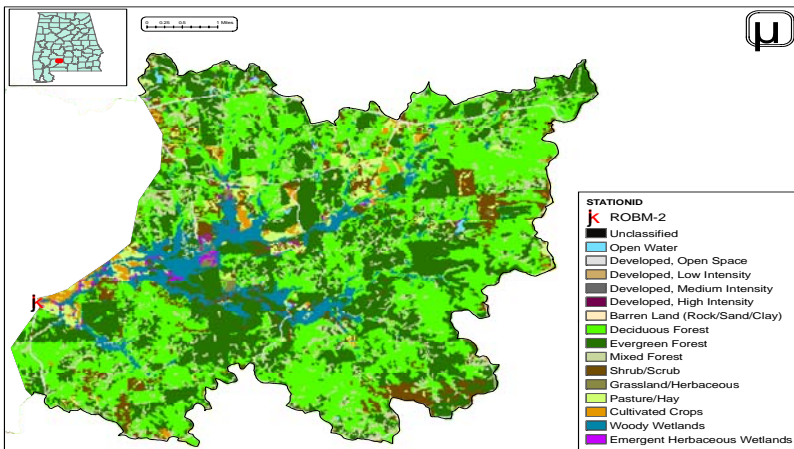


Figure 1. Sampling location and landuse within the Robinson Creek watershed at ROBM-2

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Robinson Creek at ROBM-2 is a *Fish & Wildlife (F&W)* stream located in Monroe County (Fig. 1). It is located within the Southern Hilly Gulf Coastal Plains (65d) (Table1). Landuse in the watershed is primarily forest (78%); the rest consists mainly of shrub/scrub and wooded wetlands. Silviculture was also noted in the watershed.

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. Robinson Creek at ROBM-2 was a low-gradient, glide pool stream with a bottom substrate consisting mostly of sand. There was evidence of bank erosion within the reach. Habitat quality and availability was rated as *marginal* for supporting diverse aquatic macroinvertebrate communities.

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 all individual metric scores. The final score indicated the biological community was rated as *fair* due to a lower percentage of predators and higher percentage of nutrient tolerant organisms for this stream type (Table 4).

a.Southern Hilly Gulf Coastal Plains
 b.2000 U.S. Census Data
 c.#NPDES permits downloaded from ADEM's NPDES Management System database, 9 Jun 2008

Table 2. Physical characteristics of Robinson Creek at ROBM-2, May 24, 2005.

Physical characteristics		
Width (ft)		15
Canopy cover		Shaded
Depth (ft)		
	Run	1.0
	Pool	2.0
% of Reach		
	Run	60
	Pool	40
% Substrate		
	Gravel	5
	Sand	62
	Silt	5
	Clay	5
	Organic Matter	23

Table 3. Results of the habitat assessment conducted on Robinson Creek at ROBM-2, May 24, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	51	Marginal (40-52)
Sediment deposition	58	Sub-optimal (53-65)
Sinuosity	33	Poor (<45)
Bank and vegetative stability	33	Poor (<35)
Riparian buffer	65	Marginal (50-69)
Habitat assessment score	110	
% Maximum score	50	Marginal (40-52)

Table 4. Results of the macroinvertebrate bioassessment of Robinson Creek at ROBM-2 conducted on May 24, 2005.

Macroinvertebrate Assessment			
	Results	Scores	Rating
Taxa richness measures			
# EPT genera	17	68	Good (56-78)
Taxonomic composition measures			
% Non-insect taxa	11	68	Fair (61.8-92.7)
% Plecoptera	3	12	Good (5.6-52.8)
% Dominant taxa	15	88	Excellent (>85.2)
Functional composition measures			
% Predators	12	9	Very Poor (<15.1)
Tolerance measures			
Beck's community tolerance index	7	32	Good (31.8-65.9)
% Nutrient tolerant organisms	46	40	Poor (25.4-50.8)
WMB-I Assessment Score	---	45	Fair (37-56)

WATER CHEMISTRY

Results of water chemistry 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. Fecal concentrations were >2000 colonies/100ml during high flow events in April and June. Results of other chemical analyses were below ecoregional guidelines based on 90th percentile of all verified reference data collected within the Southern Hilly Gulf Coastal Plain.

CONCLUSIONS

Bioassessment results indicated the macroinvertebrate community to be in *fair* condition. Habitat assessment results were scored as *marginal* due to sedimentation, bank erosion, and a lack of instream habitat. The high fecal concentrations during the months of April and June were likely due to a heavy rain events just days before sampling. Results of all other water quality data were well within criteria for ecoregion 65d.

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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)	7	19.5	27.0	20.0	21.9	2.8
Turbidity (NTU)	8	18.4	247.0	35.1	78.1	88.3
Total dissolved solids (mg/L)	7	61.0	119.0	108.0	99.6	20.0
Total suspended solids (mg/L)	7	4.0	257.0	29.0	87.9	109.3
Specific conductance (µmhos)	7	34.1	85.8	63.3	61.3	19.1
Hardness (mg/L)	4	18.3	28.2	24.4	23.8	4.1
Alkalinity (mg/L)	7	7.8	23.2	14.7	14.4	6.5
Stream Flow (cfs)	7	4.5	71.8	14.0	26.4	---
Chemical						
Dissolved oxygen (mg/L)	7	4.8	10.1	7.6	7.4	1.9
pH (su)	7	6.2	7.4	7.1	6.9	0.5
Ammonia Nitrogen (mg/L)	7	< 0.015	0.019	0.008	0.009	0.004
Nitrate+Nitrite Nitrogen (mg/L)	7	0.024	0.146	0.075	0.083	0.039
Total Kjeldahl Nitrogen (mg/L)	7	0.185	0.813	0.530	0.476	0.239
Total nitrogen (mg/L)	7	0.297	0.905	0.593	0.559	0.218
Dissolved reactive phosphorus (mg/L)	7	< 0.004	0.084	0.011	0.022	0.028
Total phosphorus (mg/L)	7	0.043	0.136	0.063	0.074	0.031
CBOD-5 (mg/L)	6	< 1.0	4.2	1.6	1.9	1.3
Chlorides (mg/L)	7	2.9	6.8	5.8	5.3	1.3
Atrazine (µg/L)	2	< 0.05	0.08	0.05	0.05	0.04
Total Metals						
Aluminum (mg/L)	4	< 0.015	3.460	0.248	0.991	1.700
Iron (mg/L)	4	1.67	7.22	2.10	3.27	2.60
Manganese (mg/L)	4	0.020	0.193	0.048	0.077	0.100
Dissolved Metals						
Aluminum (mg/L)	4	< 0.015	0.058	0.014	0.024	0.000
Antimony (µg/L)	4	< 2	< 2	1	1	0
Arsenic (µg/L)	4	< 10	< 10	5	5	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	0.204	0.357	0.268	0.274	0.100
Lead (µg/L)	4	< 2	< 2	1	1	0
Manganese (mg/L)	4	< 0.005	0.039	0.016	0.019	0.000
Mercury (µg/L)	4	< 0.3	< 0.3	0.15	0.15	0.00
Nickel (mg/L)	4	< 0.006	0.012	0.003	0.005	0.000
Selenium (µg/L)	3	< 10	< 10	5	5	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						
Chlorophyll a (µg/L)	7	1.07	6.41	2.67	3.51	1.90
Fecal Coliform (col/100 mL)	7	170	> 5000 ^c	930	1740	2034

J=estimate; N=#of samples; C=value exceeds established criteria for Fish & Wildlife water use classification.