

2005 Monitoring Summary



Robinson Creek just upstream of Big Flat Creek in Monroe County (31.68825/-87.31019)

BACKGROUND

The Alabama Department of Environmental Management 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.

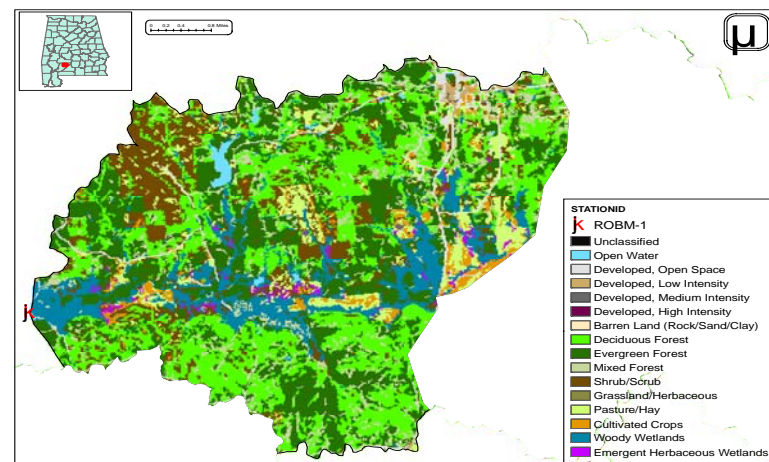


Figure 1. Sampling location and landuse within the Robinson Creek watershed at ROBM-1

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Robinson Creek at ROBM-1 is a *Fish & Wildlife (F&W)* stream located in Monroe County (Fig. 1). It is located within the Southern Hilly Gulf Coastal Plains (65d). Landuse in the watershed is primarily forest (63%); the rest consists mainly of shrub/scrub and wooded wetlands. Silviculture was also noted in the watershed and there are some permitted discharges.

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-1 is a low-gradient, glide pool stream with a bottom substrate dominated by sand. The reach had evidence of erosion. Habitat quality and availability was rated as *sub-optimal* 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 to be in *fair* condition (Table 4).

Table 1. Summary of Watershed Characteristics

Watershed Characteristics	
Drainage Area (mi ²)	68
Ecoregion ^a	65d
% Landuse	
Open water	1
Wetland	Woody 10
	Emergent herbaceous 1
Forest	Deciduous 29
	Evergreen 27
	Mixed 7
Shrub/scrub	13
Grassland/herbaceous	<1
Pasture/hay	6
Cultivated crops	3
Development	Open space 3
	Low intensity <1
	Moderate intensity <1
	High intensity <1
Population/km ^{2b}	166
# NPDES Permits ^c	TOTAL 10
	Mining 1
	Mining General Permit (old) 6
	Municipal Individual 3

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-1, May 24, 2005.

Physical Characteristics	
Width (ft)	30
Canopy cover	Shaded
Depth (ft)	
	Run 1.0
	Pool 3.0
% of Reach	
	Run 40
	Pool 60
% Substrate	
	Sand 80
	Silt 4
	Organic Matter 16

Table 3. Results of the habitat assessment conducted on Robinson Creek at ROBM-1, May 24, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	53	Marginal (40-52)
Sediment deposition	60	Sub-optimal (53-65)
Sinuosity	40	Poor (<45)
Bank and vegetative stability	26	Poor (<35)
Riparian buffer	90	Sub-optimal (70-90)
Habitat assessment score	119	
% Maximum score	54	Sub-optimal (53-65)

Table 4. Results of the macroinvertebrate bioassessment of Robinson Creek at ROBM-1 conducted on May 24, 2005.

Macroinvertebrate Assessment				
	Results	Scores	Rating	
		(0-100)		
Taxa richness measures				
# EPT genera	12	48	Fair (37-56)	
Taxonomic composition measures				
% Non-insect taxa	8	84	Fair (61.8-92.7)	
% Plecoptera	1	3	Poor (1.86-3.7)	
% Dominant taxa	19	78	Good (70.5-85.2)	
Functional composition measures				
% Predators	9	2	Very Poor (<15.1)	
Tolerance measures				
Beck's community tolerance index	3	14	Poor (10.6-21.2)	
% Nutrient tolerant organisms	33	61	Fair (50.8-76.2)	
WMB-I Assessment Score	---	41	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 a high flow event in April. Physical parameters measured at the site during each visit were within criteria for streams in ecoregion(65d). All other chemical analyses results were within expected concentrations based on 90th percentile of all verified reference data within the Southern Hilly Gulf Coastal Plains.

CONCLUSIONS

Bioassessment results indicated the macroinvertebrate community to be in *fair* condition. Habitat assessment results were scored as *sub-optimal* due to poor sinuosity, bank stability and lack of habitat. The higher than expected fecal concentration for the site visit in April was likely due to a heavy rain event just days before sampling. Results of all other water quality data were within expected range for streams in the Southern Hilly Gulf Coastal Plains.

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	19.0	29.0	21.0	22.5	3.6
Turbidity (NTU)	8	13.5	212.0	29.0	55.7	68.1
Total Dissolved Solids (mg/L)	7	68.0	144.0	104.0	107.3	25.6
Total Suspended Solids (mg/L)	7	3.0	305.0	39.0	71.3	106.7
Specific Conductance (µmhos)	7	51.1	97.8	89.2	79.4	19.3
Hardness (mg/L)	4	26.8	35.6	31.1	31.1	4.7
Alkalinity (mg/L)	7	7.7	34.5	23.6	20.8	10.4
Stream Flow (cfs)	4	13.4	78.9	21.2	33.7	---
Chemical						
Dissolved Oxygen (mg/L)	7	4.8	8.9	7.6	7.4	1.4
pH (su)	7	6.3	7.8	7.3	7.1	0.6
Ammonia Nitrogen (mg/L)	7	< 0.015	< 0.015	0.008	0.008	0.000
Nitrate+Nitrite Nitrogen (mg/L)	7	0.030	0.089	0.068	0.065	0.022
Total Kjeldahl Nitrogen (mg/L)	7	0.275	1.051	0.470	0.520	0.259
Total Nitrogen (mg/L)	7	0.343	1.081	0.559	0.585	0.245
Dissolved Reactive Phosphorus (mg/L)	7	< 0.004	0.021	0.013	0.011	0.007
Total Phosphorus (mg/L)	7	0.045	0.083	0.063	0.063	0.014
CBOD-5 (mg/L)	6	1.1	4.0	2.0	2.2	1.0
Chlorides (mg/L)	7	1.0	7.2	5.7	5.1	2.2
Atrazine (µg/L)	2	< 0.05	< 0.05	0.03	0.03	---
Total Metals						
Aluminum (mg/L)	4	0.016	0.334	0.093	0.134	0.151
Iron (mg/L)	4	1.93	2.31	2.07	2.095	0.158
Manganese (mg/L)	4	0.029	0.061	0.045	0.045	0.013
Dissolved Metals						
Aluminum (mg/L)	4	< 0.015	0.053	0.022	0.026	0.023
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	< 0.298	0.683	0.413	0.452	0.166
Lead (µg/L)	4	< 2	< 2	1	1	0
Manganese (mg/L)	4	< 0.005	0.043	0.022	0.023	0.023
Mercury (µg/L)	4	< 0.3	< 0.3	0.15	0.15	0.00
Nickel (mg/L)	4	< 0.006	< 0.009	0.003	0.005	0.003
Selenium (µg/L)	4	< 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						
^J Chlorophyll a (µg/L)	7	1.07	8.54	2.40	3.37	2.65
^J Fecal Coliform (col/100 mL)	7	40	> 3400	190	594	1239

J=estimate; N= # of samples

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