

2005 Monitoring Summary



Gravel Creek at Alabama State Hwy 41 in Wilcox County (31.91803/-87.35910)

BACKGROUND

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

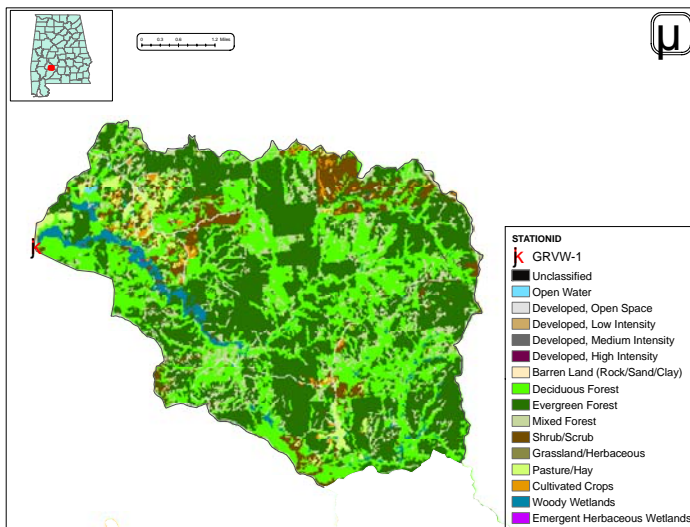


Figure 1. Sampling location and landuse within the Gravel Creek watershed at GRVW-1.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Gravel Creek is a small *Fish & Wildlife (F&W)* stream located in the Alabama River basin, approximately 5 miles south of Camden, AL, in central Wilcox County. Landuse within the watershed is primarily forest (85%), with some pasture areas (Fig. 1). There is little potential for impacts from point source and urban pollution, since only 1 permit has been issued and the population density in the watershed is very low.

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. Gravel Creek at GRVW-1 is typical of ecoregion 65d, characterized by low-gradient, sand-bottomed streams. Overall habitat quality was categorized as *marginal* due to *poor* sinuosity and *poor* 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 pollution-tolerant taxa groups, indicating *poor* community condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics	
Drainage Area (mi ²)	29
Ecoregion ^a	65d
% Landuse	
Open water	<1
Wetland	Woody 3 Emergent herbaceous <1
Forest	Deciduous 31 Evergreen 43 Mixed 11
Shrub/scrub	7
Pasture/hay	3
Cultivated crops	1
Development	Open space 2 Low intensity <1
Population/km ^{2b}	2
# NPDES Permits ^c	TOTAL 1
Construction Stormwater	1

a.Southern Hilly Gulf Coastal Plains

b.2000 US Census

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

Table 2. Physical characteristics at GRVW-1, May 25, 2005.

Physical characteristics	
Width (ft)	10
Canopy cover	Mostly Shaded
Depth (ft)	Run 0.8 Pool 1.0
% of Reach	Run 90 Pool 10
% Substrate	Cobble 1 Gravel 20 Sand 66 Silt 5 Clay 1 Organic Matter 5

Table 3. Results of the habitat assessment conducted on May 25,

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	44	Marginal (40-52)
Sediment deposition	49	Marginal (40-52)
Sinuosity	38	Poor (<45)
Bank and vegetative stability	24	Poor (<35)
Riparian buffer	88	Sub-optimal (70-90)
Habitat assessment score	106	
% Maximum score	48	Marginal (40-52)

Table 4. Results of the macroinvertebrate bioassessment conducted on May 25, 2005.

Macroinvertebrate Assessment			
	Results Scores		Rating
Taxa richness measures			
# EPT genera	14	56	Fair (37-56)
Taxonomic composition measures			
% Non-insect taxa	10	74	Fair (61.8-92.7)
% Plecoptera	2	1	Very Poor (<1.86)
% Dominant taxa	35	38	Poor (23.5-47.0)
Functional composition measures			
% Predators	4	1	Very Poor (<15.1)
Tolerance measures			
Beck's community tolerance index	5	23	Fair (21.2-31.8)
% Nutrient tolerant organisms	55	24	Very Poor (<25.4)
WMB-I Assessment Score	---	31	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. Median concentrations of alkalinity were above values expected in this ecoregion.

CONCLUSIONS

Bioassessment results indicated the macroinvertebrate community to be in *poor* condition. Overall habitat quality was categorized as *marginal* due to *poor* sinuosity and bank instability. Median concentrations of alkalinity and were slightly above values expected in this ecoregion.

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 (°C)	7	20.0	26.0	21.0	22.1	2.5
Turbidity (NTU)	8	2.9	268.0	6.6	53.3	91.7
Total Dissolved Solids (mg/L)	7	97.0	224.0	167.0	164.7	38.1
Total Suspended Solids (mg/L)	7	3.0	472.0	10.0	88.9	171.0
Specific Conductance (µmhos)	7	166.0	272.4	246.8	224.1	39.7
Hardness (mg/L)	4	81.9	124.0	106.3	104.6	18.4
Alkalinity (mg/L)	7	48.2	84.4	64.4 ^M	64.5	16.1
Stream Flow (cfs)	7	4.7	180.1	9.6	44.0	---
Chemical						
Dissolved Oxygen (mg/L)	7	5.7	9.3	8.2	8.0	1.2
pH (su)	7	6.5	7.6	7.5	7.3	0.4
Ammonia Nitrogen (mg/L)	7	< 0.015	0.015	0.008	0.008	0.000
Nitrate+Nitrite Nitrogen (mg/L)	7	< 0.003	0.033	0.024	0.019	0.015
Total Kjeldahl Nitrogen (mg/L)	7	< 0.150	0.585	0.215	0.234	0.189
Total Nitrogen (mg/L)	7	< 0.076	0.618	0.217	0.253	0.196
Dissolved Reactive Phosphorus (mg/L)	7	< 0.004	0.058	0.010	0.018	0.019
Total Phosphorus (mg/L)	7	< 0.004	0.088	0.058	0.051	0.028
CBOD-5 (mg/L)	6	< 1.0	3.5	1.5	1.7	1.0
^J Chlorides (mg/L)	7	3.8	9.5	7.1	6.9	1.8
Atrazine (µg/L)	2	< 0.05	0.05	0.03	0.03	---
Total Metals						
Aluminum (mg/L)	4	< 0.015	0.671	0.008	0.173	0.332
Iron (mg/L)	4	0.367	1.84	0.53	0.817	0.686
Manganese (mg/L)	4	0.016	0.043	0.027	0.028	0.011
Dissolved Metals						
Aluminum (mg/L)	4	< 0.015	0.084	0.025	0.036	0.036
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	0.097	0.123	0.1115	0.111	0.011
Lead (µg/L)	4	< 2	< 2	1	1	0.0
Manganese (mg/L)	4	< 0.005	0.048	0.018	0.022	0.023
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)	3	< 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 Chlorophyll a (µg/L)	7	0.27	7.48	3.56	3.18	2.76
^J Fecal Coliform (col/100 mL)	7	50	1300	260	516	504

J = Estimate; N = Number of Samples; M = Value > 90th percentile of verified ecoregional reference reach samples within eco-region 65d

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