Alabama Department of Environmental Management

Basin Assessment Site

Rivers and Streams Monitoring Program

2010 Monitoring Summary

TM

Fair

Gravel Creek at AL 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 2010 Alabama Coosa Tallapoosa (ACT) Basin Assessment Monitoring Project. 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 basins.

Figure 1. Gravel Creek at GRVW-1, July 14, 2010.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Gravel Creek is a *Fish & Wildlife (F&W)* stream located in Wilcox County on the Southern Hilly Gulf Coastal Plain (65d), which is characterized by low to moderate gradient, mostly sand bottomed streams (Griffith et al. 2001). Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forest (85%) with some shrubs/scrub, pasture, cultivated crops, and woody wetlands. Population density is very low in this area. As of September 1, 2012, only one NPDES permit has been issued in this watershed.

REACH CHARACTERISTICS

General observations (Table 2) and a habitat assessment (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. Typical of ecoregion 65d, Gravel Creek at GRVW-1 is a low gradient, sand bottomed stream (Figure 1). Overall habitat quality was categorized as *marginal* for supporting macroinvertebrate communities.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Alabama River
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^2 [b]		1
# NPDES Permits[c]	**TOTAL**	1
Construction Stormwater		1

a.Southern Hilly Gulf Coastal Plain
b.2000 US Census
c.#NPDES permits downloaded from ADEM's NPDES Management

Table 2. Physical characteristics of Gravel Creek at GRVW-1, May 11, 2010.

Physical Characteristics		
Canopy Cover		Estimate 50/50
Width (ft)		35
Depth (ft)		
	Riffle	0.3
	Run	1.5
	Pool	3.0
% of Reach		
	Riffle	1
	Run	89
	Pool	10
% Substrate		
	Cobble	1
	Gravel	5
	Sand	87
	Silt	2
	Organic Matter	5

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 in comparison to least-impaired reference reaches in the same ecoregion. The final score is the average of all individual metric scores. Metric results indicated that the biological community at GRVW-1 was in *fair* condition (Table 4).

Table 3. Results of the habitat assessment conducted on Gravel Creek at GRVW-1, May 11, 2010.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	39	Poor <40
Sediment Deposition	39	Poor <40
Sinuosity	43	Poor <45
Bank and Vegetative Stability	31	Poor <35
Riparian Buffer	68	Marginal (50-69)
Habitat Assessment Score	**104**	
% Maximum Score	**43**	**Marginal (40-52)**

Table 4. Results of the macroinvertebrate bioassessment conducted in Gravel Creek at GRVW-1, May 11, 2010.

Macroinvertebrate Assessment	
	Results
Taxa richness and diversity measures	
# EPT taxa	13
Taxonomic composition measures	
% Non-insect taxa	4
% Plecoptera	7
% Dominant taxon	56
Functional feeding group	
% Predators	12
Community tolerance	
Becks community tolerance index	6
% Nutrient tolerant individuals	7
WMB-I Assessment Score	**50**
WMB-I Assessment Rating	**Fair (37-55)**

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. *In situ* measurements and water samples were collected in May, July, September, and November 2010 to help identify any stressors to the biological communities. *In situ* parameters suggested that Gravel Creek at GRVW-1 was meeting its *F&W* use classification. Samples were collected in May and September, 2010 for analysis of pesticides, semi-volatile organics, and atrazine. All concentrations were below detection limits. Collected metals were generally below detection limits as well. However, arsenic exceeded the Human Health criterion for water and fish consumption on May 6, 2010.

SUMMARY

While the habitat assessment indicated Gravel Creek at GRVW-1 to be only *marginal* for supporting the macroinvertebrate community, bioassessment results indicated the macroinvertebrate community to be in *fair* condition. Water quality was typical of other streams in the Southern Hilly Gulf Coastal Plains (65d). As part of the assessment process, ADEM will review the monitoring information presented in this report along with all other available data. Monitoring should continue to ensure that water quality and biological conditions remain stable.

Table 5. Summary of water quality data collected May-November, 2010. 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.

Parameter	N	Min	Max	Med	Avg	SD	Q	E
Physical								
Temperature (°C)	5	16.2	27.8	21.7	22.1	4.3		
Turbidity (NTU)	5	2.4	12.3	3.4	5.3	4.1		
Total Dissolved Solids (mg/L)	4	180.0	200.0	194.0	192.0	8.6	J	
Total Suspended Solids (mg/L)	4	< 1.0	10.0	1.5	3.4	4.5	J	
Specific Conductance (µmhos)	5	232.4	292.7	279.5	271.2	23.9		
Hardness (mg/L)	4	89.1	117.0	116.0	109.5	13.6		
Alkalinity (mg/L)	4	59.9	94.4	90.0	83.6	16.1		
Stream Flow (cfs)	4	0.4	11.0	0.9	3.3	5.1		
Chemical								
Dissolved Oxygen (mg/L)	5	6.3	8.3	7.5	7.3	0.9		
pH (su)	5	7.3	7.4	7.4	7.4	0.1		
Ammonia Nitrogen (mg/L)	4	< 0.021	< 0.021	0.010	0.010	0.000		
Nitrate+Nitrite Nitrogen (mg/L)	4	< 0.002	0.038	0.002	0.011	0.018	J	
Total Kjeldahl Nitrogen (mg/L)	4	< 0.080	0.449	0.316	0.280	0.180		
Total Nitrogen (mg/L)	4	< 0.042	0.450	0.336	0.291	0.187	J	
Dissolved Reactive Phosphorus (mg/L)	4	0.009	0.025	0.020	0.019	0.007	J	
Total Phosphorus (mg/L)	4	0.017	0.026	0.020	0.021	0.004	J	
CBOD-5 (mg/L)	4	< 2.0	< 2.0	1.0	1.0	0.0		
Chlorides (mg/L)	4	6.2	7.5	6.9	6.9	0.5		
Atrazine (µg/L)	2	< 0.02	< 0.02	0.01	0.01	0.00		
Total Metals								
Aluminum (mg/L)	4	< 0.033	0.360	0.050	0.119	0.163	J	
Iron (mg/L)	4	0.530	0.761	0.636	0.640	0.099		
Manganese (mg/L)	4	0.031	0.102	0.064	0.065	0.030	J	
Dissolved Metals								
Aluminum (mg/L)	4	< 0.033	0.069	0.019	0.031	0.026	J	
Antimony (µg/L)	4	< 1.9	< 1.9	0.9	0.9	0.0		
Arsenic (µg/L)	4	< 0.6 H	2.1	1.0	0.9	0.2	J	1
Cadmium (mg/L)	4	< 0.000	0.014	0.001	0.002	0.003		
Chromium (mg/L)	4	< 0.009	0.013	0.006	0.006	0.001		
Copper (mg/L)	4	< 0.013	0.020	0.006	0.007	0.002		
Iron (mg/L)	4	0.115	0.385	0.283	0.266	0.115	J	
Lead (µg/L)	4	< 1.7	< 1.7	0.8	0.8	0.0		
Manganese (mg/L)	4	0.018	0.077	0.055	0.051	0.025	J	
Mercury (µg/L)	4	< 0.1	< 0.1	0.0	0.0	0.0		
Nickel (mg/L)	4	< 0.019	0.042	0.015	0.016	0.008	J	
Selenium (µg/L)	4	< 1.7	< 1.7	0.8	0.8	0.0		
Silver (mg/L)	4	< 0.000	0.002	0.000	0.000	0.001		
Thallium (µg/L)	4	< 0.6	< 0.6	0.3	0.3	0.0		
Zinc (mg/L)	4	< 0.012	0.030	0.015	0.013	0.004		
Biological								
Chlorophyll a (ug/L)	4	0.53	1.07	0.98	0.89	0.26		
E. coli (col/100mL)	4	39	613	168	246	260		

E=# samples that exceeded criteria; H=(*F&W*) human health criterion exceeded; J=estimate; N=# samples; Q=# of uncertain exceedances.

FOR MORE INFORMATION, CONTACT:
Sreeletha P Kumar, ADEM Environmental Indicators Section
1350 Coliseum Boulevard Montgomery, AL 36110
(334) 260-2782 skumar@adem.state.al.us