Alabama Department of Environmental Management

Basin Assessment Site

Rivers and Streams Monitoring Program

2006 Monitoring Summary

Good™

Wells Creek at Brunson Road (31.79108/-87.94448)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Wells Creek watershed for biological and water quality monitoring as part of the 2006 Assessment of the Escatawpa, Mobile, and Tombigbee (EMT) River Basins. The objectives of the EMT Basin Assessment were to assess each monitoring site's biological integrity and to estimate overall water quality within the EMT basin group.

Additionally, Wells Creek is among the least-disturbed watersheds in the EMT based on landuse, road density, and population density. Therefore, these data will be used to evaluate the use of Wells Creek as a "best attainable" condition reference watershed for comparison with other coastal plain streams.

Figure 1. Photo of Wells Creek at WELC-1 taken January 2010.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Wells Creek is a *Fish & Wildlife (F&W)* stream in Clarke County (Fig. 1). Land use within the watershed consists of mostly forest (83%). There are no NPDES permits 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. Wells Creek at WELC -1 is a low-gradient, sand-bottomed stream located in the Buhrstone/Lime Hills ecoregion (Figure 1). Overall habitat quality was categorized as *poor*.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Lower Tombigbee
Drainage Area (mi^2)		40
Ecoregion[a]		65q
% Landuse		
Open water		<1
Wetland	Woody	2
Forest	Deciduous	6
	Evergreen	58
	Mixed	19
Shrub/scrub		11
Grassland/herbaceous		<1
Pasture/hay		1
Cultivated crops		1
Development	Open space	2
	Low intensity	<1
	Moderate intensity	<1
Population/km^2 [b]		<1
# NPDES Permits[c]	**TOTAL**	0

a.Buhrstone/Lime Hills

b.2000 US Census

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

Table 2. Physical characteristics at Wells Creek at WELC-1 on May 25, 2006

Physical Characteristics		
Width (ft)		15
Canopy cover		Mostly Open
Depth (ft)		
	Run	0.3
	Pool	1.5
% of Reach		
	Run	90
	Pool	10
% Substrate		
	Cobble	1
	Gravel	5
	Sand	74
	Silt	10
	Organic Matter	10

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BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). The WMB-I measures taxonomic richness, community composition, and community tolerance to assess the overall health of the macroinvertebrate community. Metric results indicated the macroinvertebrate community in Wells Creek at WELC-1 to be in *good* condition (Table 4).

Table 3. Results of the habitat assessment conducted on Wells Ck at WELC-1, 05/25/2006.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	33	Poor <40
Sediment Deposition	61	Sub-optimal (53-65)
Sinuosity	38	Poor <45
Bank and Vegetative Stability	19	Poor <35
Riparian Buffer	54	Marginal (50-69)
Habitat Assessment Score	**88**	
% Maximum Score	**40**	**Poor <40**

Table 4. Results of the macroinvertebrate bioassessment conducted May 25, 2006.

Macroinvertebrate Assessment			
	Result	Scores	Rating
Taxa richness measures			
# EPT genera	14	56	Fair (38-56)
Taxonomic composition			
% Non-insect taxa	3	100	Excellent (>96.3)
% Plecoptera	8	41	Good (5.7-52.8)
% Dominant taxa	23	66	Fair (47.1-70.5)
Functional composition measures			
% Predators	24	83	Excellent (>72.1)
Tolerance measures			
Beck's community tolerance	9	41	Good (31.9-65.9)
% Nutrient tolerant organisms	34	59	Fair (50.9-76.2)
WMB-I Assessment Score	**--**	**64**	**Good (57-78)**

WATER CHEMISTRY

Results of water chemistry analyses are summarized in Table 5. When possible, in situ measurements and water samples are collected monthly, semi-monthly (metals), or quarterly (pesticides, herbicides (atrazine), and semi-volatile organics) during March through October to help identify any stressors to the biological communities. Results indicated conditions within Wells Creek at WELC-1 to be similar to ADEM's established reference reaches located within the Buhrstone/Lime Hills Ecoregion.

SUMMARY

Landuse, road density, and population density categorized Wells Creek among the least-disturbed watersheds in the EMT basin group. Bioassessment and water quality data indicated the reach to be in *good* condition and generally similar to established reference reaches in the Buhrstone/Lime Hills ecoregion. However, results of the habitat assessment suggested that habitat degradation may be a concern within the reach.

FOR MORE INFORMATION, CONTACT:
Aaron Goar, ADEM Aquatic Assessment Unit
1350 Coliseum Boulevard Montgomery, AL 36110
(334) 260-2755 agoar@adem.state.al.us

Table 5. Summary of water quality data collected March-October, 2006. 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) 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	Med	Avg	SD	Q
Physical								
Temperature (°C)	9		14.0	25.0	22.0	20.5	4.3	
Turbidity (NTU)	9		6.5	19.7	10.7	12.0	4.8	
Total Dissolved Solids (mg/L)	8		42.0	119.0	87.0	80.8	25.9	
Total Suspended Solids (mg/L)	8	<	2.0	15.0	6.0	6.4	4.2	
Specific Conductance (µmhos)	9		49.9	85.0	61.5	67.8	13.6	
Hardness (mg/L)	3		28.0	54.0	48.0	43.3	13.6	
Alkalinity (mg/L)	8		8.7	35.8	19.9	20.1	9.5	
Stream Flow (cfs)	6		1.1	31.9	5.0	9.0	11.6	
Chemical								
Dissolved Oxygen (mg/L)	9		7.3	9.1	7.6	7.9	0.6	
pH (su)	9		6.6	7.1	6.9	6.9	0.2	
Ammonia Nitrogen (mg/L)	8	<	0.010	0.091	0.050	0.045	0.035	
Nitrate+Nitrite Nitrogen (mg/L)	8	<	0.003	0.169	0.021	0.050	0.062	
Total Kjeldahl Nitrogen (mg/L)	8	<	0.150	0.790	0.564	0.500	0.236	
Total Nitrogen (mg/L)	8	<	0.096	0.959	0.634	0.550	0.275	
Dissolved Reactive Phosphorus (mg/L)	8	<	0.004	0.008	0.002	0.004	0.003	
Total Phosphorus (mg/L)	8	<	0.004	0.054	0.034	0.031	0.016	
CBOD-5 (mg/L)	8	<	1.0	2.9	1.0	1.2	0.9	
Chlorides (mg/L)	8	<	1.0	6.0	3.0	3.7	2.0	
Atrazine (µg/L)	1				<	0.05		
Total Metals								
Aluminum (mg/L)	3	<	0.100	1.000	0.220	0.423	0.507	
Iron (mg/L)	3		2.670	4.490	4.070	3.743	0.953	
Manganese (mg/L)	3		0.052	0.180	0.132	0.121	0.065	
Dissolved Metals								
Aluminum (mg/L)	3	<	0.100	0.200	0.190	0.147	0.084	
Antimony (µg/L)	3	<	7.5	7.5	3.8	3.8	0.0	
Arsenic (µg/L)	3	<	5.0	5.0	2.5	2.5	0.0	
Cadmium (mg/L)	3	<	0.000	0.000	0.000	0.000	0.000	
Chromium (mg/L)	3	<	0.005	0.005	0.002	0.002	0.000	
Copper (mg/L)	3	<	0.005	0.005	0.002	0.002	0.000	
Iron (mg/L)	3		0.644	4.040	1.210	1.965	1.819	
Lead (µg/L)	3	<	5.0	5.0	2.5	2.5	0.0	
Manganese (mg/L)	3		0.042	0.175	0.128	0.115	0.067	
Mercury (µg/L)	3	<	0.5	0.5	0.2	0.2	0.0	
Nickel (mg/L)	3	<	0.005	0.024	0.002	0.010	0.012	
Selenium (µg/L)	3	<	7.5	7.5	3.8	3.8	0.0	
Silver (mg/L)	3	<	0.0	0.0	0.0	0.0	0.0	
Thallium (µg/L)	3	<	2.5	9.0	4.5	3.4	1.9	
Zinc (mg/L)	3	<	0.005	0.005	0.002	0.002	0.000	
Biological								
Chlorophyll a (ug/L)	8	<	0.10	2.20	1.54	1.39	0.84	
Fecal Coliform (col/100 mL)	5		70	220	90	124	64	J

J=estimate; N= # of samples; M=value >90% of collected samples in ecoregion 65q; C=value exceeds established criteria for *F&W* water use classification