

2010 Monitoring Summary



Washington Creek at AL Hwy 183 in Perry County (32.56997/-87.39136)

BACKGROUND

Washington Creek is one of the streams the Alabama Department of Environmental Management (ADEM) monitors as a “best attainable condition” reference watershed for comparison with streams throughout the Blackland Prairie ecoregion (65a). It displays instream and habitat conditions that could be described as least-disturbed as compared to other streams in the region.

Additionally, Washington Creek was selected for biological and water quality monitoring as part of the 2010 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 site and to estimate overall water quality within the ACT basin group.



Figure 1. Washington Creek at WASP-1, April 14, 2010.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Washington Creek at WASP-1 is a *Fish & Wildlife (F&W)* stream located in Perry County near Marion. Based on the 2006 National Land Cover Dataset, landuse in the watershed is primarily forest (38%) and pasture with some cropland. Population density in the area is low, and less than 4% of the watershed is developed. As of September 1, 2012, ADEM has issued 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. Washington Creek at WASP-1 is a glide-pool stream with a benthic substrate that consists primarily of gravel (Figure 1). Overall habitat quality was categorized as *sub-optimal* for supporting 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 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 WASP-1 was in *fair* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		Alabama River
Basin		Alabama River
Drainage Area (mi²)		16
Ecoregion^a		65a
% Landuse		
Open water		<1
Wetland	Woody	6
	Emergent	
	herbaceous	1
Forest	Deciduous	15
	Evergreen	8
	Mixed	15
Shrub/scrub		5
Grassland/herbaceous		<1
Pasture/hay		32
Cultivated crops		11
Development	Open space	3
	Low intensity	<1
Population/km^{2b}		10

a.Blackland Prairie
b.2000 US Census

Table 2. Physical characteristics of Washington Creek at WASP-1, April 14, 2010.

Physical Characteristics		
Canopy Cover		Shaded
Width (ft)		30.0
Depth (Ft)		
	Run	1.0
	Pool	2.0
% of Reach		
	Run	70
	Pool	30
% Substrate		
	Clay	5
	Cobble	3
	Gravel	15
	Hard Pan Clay	65
	Sand	5
	Silt	2
	Organic Matter	5

Table 3. Results of the habitat assessment conducted on Washington Creek at WASP-1, April 14, 2010.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	57	Sub-optimal (53-65)
Sediment Deposition	64	Sub-optimal (53-65)
Sinuosity	30	Poor <45
Bank and Vegetative Stability	39	Marginal (35-59)
Riparian Buffer	85	Sub-optimal (70-89)
Habitat Assessment Score	132	
% Maximum Score	60	Sub-optimal (53-65)

Table 4. Results of macroinvertebrate assessment conducted in Washington Creek at WASP-1, April 14, 2010.

Macroinvertebrate Assessment		
	Results	Scores (0-100)
Taxa richness and diversity measures		
% EPC taxa	20	20
% Trichoptera & Chironomidae Taxa	37	58
Taxonomic composition measures		
% EP Individuals	25	48
Functional feeding group		
% Collector-Filterer Individuals	26	57
Community tolerance		
% Nutrient Tolerant individuals	39	45
WMB-I Assessment Score	---	46
WMB-I Assessment Rating		Fair (31-45)

WATER CHEMISTRY

Results of water chemistry are presented in Table 5. In 2010, in situ measurements and water samples were generally collected bimonthly, April through November, to help identify any stressors to the biological communities. However, streams in this ecoregion typically go dry during the summer and fall months. Samples were therefore collected monthly, April through July. In situ measurements and flows were measured during the macroinvertebrate bio-assessment and monthly, April through November when possible.

Maximum stream flows (62.2 cfs) occurred on April 8th. Turbidity and estimated concentrations of dissolved arsenic and thallium were above water quality criteria for the stream's F&W use classification during this sampling event. Organics were collected April 8th and May 12th, but were not detected. Median concentrations of total iron and total manganese were above values typical of streams in the Blackland Prairie ecoregion. Samples could not be collected in July because stream flow was reduced to a series of unconnected pools.

SUMMARY

Bioassessment results indicated the macroinvertebrate community in Washington Creek at WASP-1 to be in *fair* condition. Water quality data collected in 2010 suggest the site to be typical of other reference reaches in the Blackland Prairie ecoregion. However, median concentrations total iron and manganese were elevated for this stream type.

Table 5. Summary of water quality data collected April-June, 2010. 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	Med	Avg	SD	E
Physical							
Temperature (°C)	4	18.7	24.1	20.3	20.8	2.3	
Turbidity (NTU)	4	19.7	146.0 ^T	22.4	52.6	62.3	
^J Total Dissolved Solids (mg/L)	3	72.0	94.0	88.0	84.7	11.4	
Total Suspended Solids (mg/L)	3	6.0	254.0	7.0	89.0	142.9	
Specific Conductance (µmhos)	4	88.0	112.0	103.0	101.5	11.6	
Hardness (mg/L)	3	41.0	44.2	43.6	42.9	1.7	
Alkalinity (mg/L)	3	33.9	46.0	44.7	41.5	6.6	
Stream Flow (cfs)	4	2.9	62.2	5.7	19.1	28.8	
Chemical							
Dissolved Oxygen (mg/L)	4	7.6	8.5	7.8	7.9	0.4	
pH (su)	4	6.7	7.4	7.3	7.2	0.3	
Ammonia Nitrogen (mg/L)	3	< 0.021	0.113	0.010	0.045	0.059	
Nitrate+Nitrite Nitrogen (mg/L)	3	0.122	0.294	0.224	0.213	0.086	
Total Kjeldahl Nitrogen (mg/L)	3	0.495	2.761	0.665	1.307	1.262	
Total Nitrogen (mg/L)	3	0.719	2.883	0.959	1.520	1.186	
Dissolved Reactive Phosphorus (mg/L)	3	0.027	0.037	0.033	0.032	0.005	
Total Phosphorus (mg/L)	3	0.123	0.507	0.124	0.251	0.221	
CBOD-5 (mg/L)	3	< 2.0	6.9	1.0	3.0	3.4	
COD (mg/L)	2	8.7	9.1	8.9	8.9	0.3	
TOC (mg/L)	3	5.6	11.1	6.1	7.6	3.0	
Chlorides (mg/L)	3	3.7	4.9	4.0	4.2	0.6	
Atrazine (µg/L)	2	< 0.02	< 0.02	0.01	0.01	0.00	
Total Metals							
Aluminum (mg/L)	3	0.203	< 4.810	0.330	1.781	2624	
Iron (mg/L)	3	2720	11.900	3.180 ^M	5.933	5172	
Manganese (mg/L)	3	0.588	4.320	0.700 ^M	1.869	2123	
Dissolved Metals							
Aluminum (mg/L)	3	< 0.033	< 0.033	0.016	0.016	0.000	
Antimony (µg/L)	3	< 0.7	< 1.9	0.9	0.8	0.3	
^J Arsenic (µg/L)	3	< 1.4	< 2.1 ^H	1.0	1.2	0.2	1
Cadmium (mg/L)	3	< 0.003	< 0.014	0.002	0.003	0.003	
Chromium (mg/L)	3	< 0.013	< 0.013	0.006	0.006	0.000	
Copper (mg/L)	3	< 0.013	< 0.013	0.006	0.006	0.000	
Iron (mg/L)	3	0.367	0.947	0.877 ^M	0.730	0.317	
Lead (µg/L)	3	< 1.0	< 1.7	0.8	0.7	0.2	
Manganese (mg/L)	3	0.514	0.752	0.550 ^M	0.605	0.128	
^J Mercury (µg/L)	3	< 0.1	< 0.1	0.0	0.0	0.0	
Nickel (mg/L)	3	< 0.019	< 0.019	0.010	0.010	0.000	
Selenium (µg/L)	3	< 0.4	< 1.7	0.8	0.6	0.4	
Silver (mg/L)	3	< 0.002	< 0.002	0.001	0.001	0.000	
^J Thallium (µg/L)	3	< 0.6	< 0.6 ^H	0.3	0.4	0.1	1
Zinc (mg/L)	3	< 0.030	< 0.030	0.015	0.015	0.000	
Biological							
Chlorophyll a (µg/L)	3	< 0.10	64.10	2.29	22.15	36.35	
^J E. coli (col/100mL)	3	68.00	> 2,419.60	313.00	933.67	1,292.66	

E=# samples that exceeded criteria; H=F&W human health criteria exceeded; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 65a; N=# samples; T=value exceeds 50 NTU above the 90th percentile of all verified ecoregional reference reach data collected in the ecoregion 65a.

FOR MORE INFORMATION, CONTACT:

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