Alabama Department of Environmental Management

Basin Assessment Site

Rivers and Streams Monitoring Program

2011 Monitoring Summary

Good

Jackson Creek at Clarke County Road 3 (31.64646/-87.91032)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected Jackson Creek watershed for biological and water quality monitoring as part of the 2011 Escatawpa, Mobile, and Tombigbee (EMT) Basin Assessment. The objectives of the project were to assess the biological integrity of each monitoring site and to estimate overall water quality within the basin.

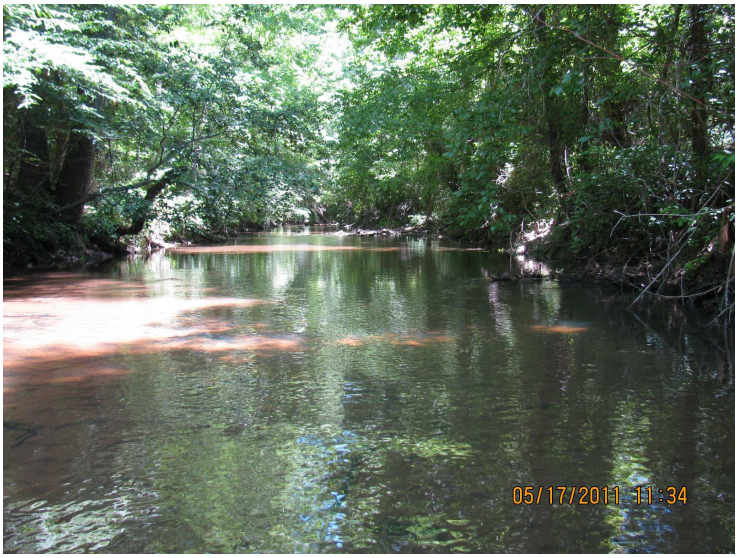

Figure 1. Jackson Creek at JKNC-1, May 17, 2011.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Lower Tombigbee River
Drainage Area (mi^2)		39
Ecoregion[a]		65q
% Landuse		
Open water		<1
Wetland	Woody	2
	Emergent herbaceous	<1
Forest	Deciduous	11
	Evergreen	31
	Mixed	27
Shrub/scrub		11
Grassland/herbaceous		9
Pasture/hay		4
Cultivated crops		<1
Development	Open space	4
	Low intensity	1
	Moderate intensity	<1
	High intensity	<1
Barren		<1
Population/km^2[b]		17
# NPDES Permits[c]	**TOTAL**	11
Construction Stormwater		8
Industrial General		1
Municipal Individual		2

a.Buhrstone/Lime Hills

b.2000 US Census

c.#NPDES permits downloaded from ADEM's NPDES Management System database, September 1, 2012.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Jackson Creek is a *Fish & Wildlife (F&W)* creek located within the Buhrstone/Lime Hills ecoregion (65q) in Clarke County. Based on the 2006 National Land Cover Dataset, landuse within the watershed is predominantly forest (69%). As of September 1, 2012, ADEM's NPDES Management System database shows eleven permitted discharges within the 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. Jackson Creek at JKNC-1 is a low-gradient stream with a substrate dominated by sand (Figure 1). Overall habitat quality and availability was rated as *sub-optimal* for supporting diverse aquatic macroinvertebrate communities due to poor stream sinuosity.

Table 2. Physical characteristics of Jackson Creek at JKNC-1, May 17, 2011.

Physical Characteristics		
Width (ft)		20
Canopy cover		Mostly Shaded
Depth (ft)		
	Run	0.8
	Pool	2.5
% of Reach		
	Run	97
	Pool	3
% Substrate		
	Gravel	8
	Sand	72
	Silt	5
	Organic Matter	15

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 the average of all individual metric scores. Metric results indicated the macroinvertebrate community to be characterized by pollution-intolerant taxa groups, indicating *good* community condition (Table 4).

Table 3. Results of the habitat assessment conducted on Jackson Creek at JKNC-1, May 17, 2011.

Habitat Assessment	(% Maximum Score)	Rating
Instream Habitat Quality	38	Poor (<40)
Sediment Deposition	55	Sub-optimal (53-65)
Sinuosity	38	Poor (<45)
Bank and Vegetative Stability	43	Marginal (35-59)
Riparian Buffer	85	Sub-optimal (70-89)
Habitat Assessment Score	**119**	
% Maximum score	**54**	**Sub-optimal (53-65)**

Table 4. Results of the macroinvertebrate bioassessment conducted in Jackson Creek at JKNC-1, May 17, 2011.

Macroinvertebrate Assessment		
	Results	**Scores**
Taxa richness and diversity measures		**(0-100)**
% EPC taxa	27	44
% Dominant Taxon	14	94
Taxonomic composition measures		
% EPT minus Baetidae and Hydropsychidae	0	0
Functional feeding group		
# Collector Taxa	26	95
Community tolerance		
% Nutrient Tolerant individuals	27	67
WMB-I Assessment Score	**---**	**60**
WMB-I Assessment Rating		**Good (48-74)**

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements (April, May, June, August, and October) and water samples (April, June, August, and October) were collected in 2011 to help identify any stressors to the biological communities.

The median values of specific conductance, hardness, alkalinity, and nitrate+nitrite nitrogen was higher than expected based on reference data collected in the Buhrstone/Lime Hills ecoregion (65q). Dissolved arsenic exceeded criteria applicable to Jackson Creek's *F&W* use classification on April 5. However, this elevated concentration may have been caused by high flow (65.6 cfs) from a storm event at the time of sampling.

SUMMARY

Overall habitat quality for Jackson Creek at JKNC-1 was categorized as *sub-optimal*. Although physical parameters, nutrients, and arsenic were greater than expected, bioassessment results indicated the macroinvertebrate community to be in *good* condition.

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Table 5. Summary of water quality data collected March-October, 2011. 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	E
Physical							
Temperature (°C)	5	15.3	25.0	18.3	20.0	4.5	
Turbidity (NTU)	5	3.1	17.1	4.0	6.3	6.0	
Total Dissolved Solids (mg/L)	4	64.0	88.0	72.0	74.0	10.6	
Total Suspended Solids (mg/L)	4	< 1.0	49.0	0.5	12.6	24.2	
Specific Conductance (µmhos)	5	93.2	114.7	96.6 G	99.2	8.9	
Hardness (mg/L)	4	38.6	49.6	41.0 G	42.6	5.1	
Alkalinity (mg/L)	4	39.5	47.1	41.4 M	42.4	3.5	
Stream Flow (cfs)	5	7.3	65.6	11.0	21.6	24.8	
Chemical							
Dissolved Oxygen (mg/L)	5	8.3	9.7	8.8	8.9	0.6	
pH (su)	5	7.0	7.7	7.4	7.4	0.3	
Ammonia Nitrogen (mg/L)	4	< 0.005	< 0.007	0.002	0.003	0.000	
Nitrate+Nitrite Nitrogen (mg/L)	4	0.062	0.253	0.226 M	0.192	0.088	
Total Kjeldahl Nitrogen (mg/L)	4	< 0.076	0.326	0.135	0.159	0.138	
Total Nitrogen (mg/L)	4	< 0.253	0.579	0.285	0.350	0.153	
J Dissolved Reactive Phosphorus (mg/L)	4	0.006	0.007	0.006	0.006	0.000	
J Total Phosphorus (mg/L)	4	0.007	0.020	0.010	0.012	0.006	
CBOD-5 (mg/L)	4	< 2.0	< 2.0	1.0	1.0	0.0	
Chlorides (mg/L)	4	3.1	3.5	3.4	3.3	0.2	
Total Metals							
J Aluminum (mg/L)	4	< 0.043	0.120	0.072	0.071	0.042	
Iron (mg/L)	4	0.384	0.821	0.454	0.528	0.202	
J Manganese (mg/L)	4	0.040	0.083	0.050	0.056	0.020	
Dissolved Metals							
Aluminum (mg/L)	4	< 0.043	< 0.043	0.022	0.022	0.000	
Antimony (µg/L)	4	< 1.9	< 1.9	0.9	0.9	0.0	
J Arsenic (µg/L)	4	< 1.4	1.7	0.7 H	1.0	0.5	1
Cadmium (mg/L)	4	< 0.000	< 0.000	0.000	0.000	0.000	
Chromium (mg/L)	4	< 0.009	< 0.009	0.004	0.004	0.000	
Copper (mg/L)	4	< 0.020	< 0.020	0.010	0.010	0.000	
J Iron (mg/L)	4	0.174	0.239	0.222	0.214	0.031	
Lead (µg/L)	4	< 0.9	< 0.9	0.5	0.5	0.0	
J Manganese (mg/L)	4	0.027	0.042	0.030	0.032	0.007	
Mercury (µg/L)	4	< 0.035	< 0.035	0.018	0.018	0.0	
Nickel (mg/L)	4	< 0.042	< 0.042	0.021	0.021	0.000	
Selenium (µg/L)	4	< 1.3	< 1.3	0.7	0.7	0.0	
J Silver (mg/L)	4	< 0.000	< 0.000	0.000	0.000	0.000	
Thallium (µg/L)	4	< 1.1	< 1.1	0.5	0.5	0.0	
Zinc (mg/L)	4	< 0.012	< 0.012	0.006	0.006	0.000	
Biological							
Chlorophyll a (µg/L)	4	< 0.10	1.34	0.05	0.37	0.64	
J E. coli (col/100mL)	4	56	260	124	141	87	

E=# samples that exceeded criteria; G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 65q; H=*F&W* human health criteria exceeded; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 65q; N=# samples.