

2011 Monitoring Summary



Factory Creek at Sumter County Road 21 crossing (32.73773/-88.13251)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected Factory 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. Factory Creek at FCTS-41, May 18, 2011.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Factory Creek is a *Fish & Wildlife (F&W)* stream located in the Blackland Prairie ecoregion (65a). Based on the 2000 National Land Cover Dataset, landuse within the watershed is predominantly pasture/hay with some forested areas (24%). As of February 23, 2011, ADEM's NPDES Management System database shows a total of three 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. Factory Creek at FCTS-41 is a low-gradient, glide-pool stream with substrate composed primarily of hardpan clay (Figure 1). Overall habitat quality and availability was rated as *sub-optimal* for supporting diverse aquatic macroinvertebrate communities due to poor stream sinuosity.

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 in *fair* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin	Upper Tombigbee	
Drainage Area (mi²)	34	
Ecoregion^a	65a	
% Landuse		
Open water		3
Wetland	Woody	10
	Emergent herbaceous	1
Forest	Deciduous	14
	Evergreen	6
	Mixed	4
Shrub/scrub		9
Grassland/herbaceous		<1
Pasture/hay		46
Cultivated crops		3
Development	Open space	3
	Low intensity	<1
	Moderate intensity	<1
Barren		<1
Population/km^{2b}	11	
# NPDES Permits^c	TOTAL	3
	Construction Stormwater	3

a. Blackland Prairie

b. 2000 US Census

c. #NPDES permits downloaded from ADEM's NPDES Management System database, February, 23, 2011.

Table 2. Physical characteristics of Factory Creek at FCTS-41, May 18, 2011.

Physical Characteristics		
Canopy Cover	Mostly Open	
Width (ft)	8	
Depth (ft)		
	Run	0.5
	Pool	2.0
% of Reach		
	Run	40
	Pool	60
% Substrate		
	Hardpan Clay	83
	Boulder	2
	Cobble	2
	Gravel	2
	Sand	3
	Silt	5
	Organic Matter	3

Table 3. Results of the habitat assessment conducted on Factory Creek at FCTS-41, May 18, 2011.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	43	Marginal (40-52)
Sediment Deposition	84	Optimal >65
Sinuosity	28	Poor <45
Bank and Vegetative Stability	54	Marginal (35-59)
Riparian Buffer	65	Marginal (50-69)
Habitat Assessment Score	121	
% Maximum Score	55	Sub-optimal (53-65)

Table 4. Results of the macroinvertebrate bioassessment conducted in Factory Creek at FCTS-41, May 18, 2011.

Macroinvertebrate Assessment				
	Result Scores		Rating	
Taxa richness measures				
# EPT genera	14	56	Fair (38-56)	
Taxonomic composition				
% Non-insect taxa	13	60.2	Poor (30.9-61.8)	
% Plecoptera	2	11.7	Good (5.7-52.8)	
% Dominant taxa	24	63.9	Fair (47.1-70.5)	
Functional composition measures				
% Predators	14	46.9	Good (45.3-72.1)	
Tolerance measures				
Beck's community tolerance	7	31.8	Fair (21.3-31.8)	
% Nutrient tolerant organisms	34	60.0	Fair (50.9-76.2)	
WMB-I Assessment Score	--	47	Fair (38-56)	

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected March through September of 2011 to help identify any stressors to the biological communities.

Organics were not collected at Factory Creek. On April 5th, turbidity exceeded 50 NTU above background levels for the Blackland Prairie ecoregion, which may have been due to elevated stream flow and rainy weather conditions that occurred during the past 24 hours. Median total dissolved solids, specific conductance, and alkalinity values were higher than background levels for ecoregion 65a.

SUMMARY

Bioassessment results indicated the macroinvertebrate community to be in *fair* condition. Overall habitat quality was categorized as *sub-optimal* due to a poor stream sinuosity. Higher than expected total dissolved solids, specific conductance, and alkalinity may pose a potential concern for the biological communities of the reach.

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Table 5. Summary of water quality data collected March-September, 2011. 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
Physical						
Temperature (°C)	6	11.6	28.8	17.4	18.4	6.0
Turbidity (NTU)	6	15.4	102.0 ^T	36.4	42.7	33.0
Total Dissolved Solids (mg/L)	4	136.0	218.0	199.0 ^M	188.0	36.6
Total Suspended Solids (mg/L)	4	8.0	45.0	20.5	23.5	15.9
Specific Conductance (µmhos)	6	192.2	2711.0	330.4 ^G	693.5	990.7
Hardness (mg/L)	1				108.0 ^G	
Alkalinity (mg/L)	4	75.9	157.0	113.0 ^M	114.7	34.4
Stream Flow (cfs)	5	0.2	89.4	43.8	45.4	41.6
Chemical						
Dissolved Oxygen (mg/L)	6	5.4	10.6	8.7	8.4	1.7
pH (su)	6	7.0	8.1	7.3	7.5	0.4
Ammonia Nitrogen (mg/L)	4	< 0.005	0.051	0.002	0.015	0.024
^J Nitrate+Nitrite Nitrogen (mg/L)	4	0.016	0.155	0.054	0.070	0.060
Total Kjeldahl Nitrogen (mg/L)	4	0.451	1.040	0.822	0.784	0.249
^J Total Nitrogen (mg/L)	4	0.467	1.195	0.876	0.854	0.301
^J Dissolved Reactive Phosphorus (mg/L)	4	0.009	0.086	0.030	0.038	0.034
Total Phosphorus (mg/L)	4	0.042	0.175	0.138	0.124	0.057
CBOD-5 (mg/L)	4	< 2.0	2.2	1.0	1.3	0.6
Chlorides (mg/L)	4	3.8	9.3	5.6	6.1	2.7
Total Metals						
Aluminum (mg/L)	1				1.830	
Iron (mg/L)	1				0.998	
Manganese (mg/L)	1				0.108	
Dissolved Metals						
Aluminum (mg/L)	1			<	0.043	
Antimony (µg/L)	1			<	1.9	
Arsenic (µg/L)	1			<	1.4	
Cadmium (mg/L)	1			<	0.000	
Chromium (mg/L)	1			<	0.009	
Copper (mg/L)	1			<	0.020	
^J Iron (mg/L)	1				0.070	
Lead (µg/L)	1				1.1	
^J Manganese (mg/L)	1				0.007	
Mercury (µg/L)	1			<	0.0	
Nickel (mg/L)	1			<	0.042	
Selenium (µg/L)	1			<	1.3	
Silver (mg/L)	1			<	0.000	
Thallium (µg/L)	1			<	1.1	
Zinc (mg/L)	1			<	0.012	
Biological						
Chlorophyll a (ug/L)	4	< 0.10	13.35	4.54	5.62	5.61
^J E. coli (col/100mL)	1			>	2420	

G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 65a; 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 reference data collected in ecoregion 65a.