

2010 Monitoring Summary



Blubber Creek on HWY 14 in Pickens County NW of Aliceville (33.14725/-88.17053)

BACKGROUND

In 1993, Blubber Creek was established as a reference stream that ADEM uses a “best attainable” standard for data collected from streams in the Southern Limestone/Dolomite Valleys and Low Rolling Hills ecoregion. It displays instream and habitat conditions that could be described as least disturbed as compared to other streams in the region.

Additionally, Blubber Creek was selected for surface water quality monitoring plan as part of the 2010 Assessment of the Escatawpa, Mobile, and Tombigbee (EMT) River Basins. The objectives of the EMT Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the EMT basin group.



Figure 1. Blubber Creek at BLBP-1, April 4, 2010.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Blubber Creek is a small *Fish & Wildlife (F&W)* stream, northwest of Aliceville in Pickens County. Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forest (71%). As of September 1, 2012, the Alabama Department of Environmental Management has not issued any 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. Blubber Creek at BLBP-1 is a low-gradient stream characterized by sand and organic substrates (Figure 1). Overall habitat quality was rated as *sub-optimal* for supporting macroinvertebrate communities due to reduced bank and vegetative stability and instream habitat quality.

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 the macroinvertebrate community to be in *poor* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Upper Tombigbee River
Drainage Area (mi ²)		17
Ecoregion ^a		65i
% Landuse		
Open water		<1
Wetland	Woody	4
	Emergent herbaceous	<1
Forest	Deciduous	38
	Evergreen	16
	Mixed	17
Shrub/scrub		10
Grassland/herbaceous		<1
Pasture/hay		4
Cultivated crops		6
Development	Open space	4
	Low intensity	<1
Population/km ^{2b}		11

a. Southern Limestone/Dolomite Valleys and Low Rolling Hills

b. 2000 US Census

Table 2. Physical characteristics of Blubber Creek at BLBP-1, May 26, 2010.

Physical Characteristics		
Width (ft)		20
Canopy cover		Shaded
Depth (ft)	Run	2.0
	Pool	4.0
% of Reach		
	Run	60
	Pool	40
% Substrate		
	Clay	4
	Mud/Muck	3
	Gravel	1
	Sand	50
	Silt	10
	Organic Matter	33

Table 3. Results of the habitat assessment conducted in Blubber Creek at BLBP-1, May 26, 2010.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	60	Sub-optimal (59-70)
Sediment Deposition	65	Sub-optimal (59-70)
Sinuosity	70	Sub-optimal (65-84)
Bank and Vegetative Stability	53	Marginal (35-59)
Riparian Buffer	81	Sub-optimal (70-89)
Habitat Assessment Score	143	
% Maximum score	65	Sub-optimal (59-70)

Table 4. Results of the macroinvertebrate bioassessment conducted in Blubber Creek at BLBP-1, May 26, 2010.

Macroinvertebrate Assessment		
	Results	Scores (0-100)
Taxa richness and diversity measures		
% EPC taxa	20	21
% Dominant Taxon	38	25
Taxonomic composition measures		
% EPT minus Baetidae and Hydropsychidae	3	5
Functional feeding group		
# Collector Taxa	21	70
Community tolerance		
% Nutrient Tolerant individuals	49	28
WMB-I Assessment Score	---	30
WMB-I Assessment Rating		Poor (16-31)

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. When possible, in situ measurements and water samples were collected monthly, semi-monthly (metals), or quarterly (pesticides, atrazine, and semi-volatile organics) from April through December 2010 to help identify any stressors to the biological communities.

Stream flows at BLBP-1 were low (<1 cubic feet per second) during the July and August sampling events. During September and October sampling, Blubber Creek was characterized by disconnected pools with no stream flow. In December, stream flow was elevated and unwadeable; no stream flow was collected.

Stream pH was <6.0 during the August and December sampling events. Low flow conditions are the potential cause for E. coli concentrations that exceeded F&W criteria with 1300 colonies/100mL during the month of August. Estimated concentrations of arsenic appeared to be elevated in April. In comparison with reference reach data, median specific conductance and hardness concentrations were elevated for a typical Southern Limestone/Dolomite Valleys and Low Rolling Hills ecoregion stream.

SUMMARY

Bioassessment results indicated the macroinvertebrate community to be in *poor* condition. However, the stream reach was characterized by low flow conditions during much of the sampling season. Sampling should continue to accurately assess biological and water quality conditions.

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Table 5. Summary of water quality data collected April-December, 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	E	
Physical								
Temperature (°C)	6	8.1	27.5	20.8	20.1	6.7		
Turbidity (NTU)	7	11.8	23.9	19.3	18.4	4.7		
Total Dissolved Solids (mg/L)	6	24.0	62.0	38.0	41.7	13.4		
Total Suspended Solids (mg/L)	6	3.0	15.0	7.0	8.2	4.2		
Specific Conductance (µmhos)	6	32.3	53.9	36.8	39.5 ^G	8.4		
Hardness (mg/L)	6	7.0	20.2	12.4	12.6 ^G	4.9		
Alkalinity (mg/L)	6	<	2.9	26.6	14.0	14.8	9.0	
Stream Flow (cfs)	6	0.2	9.9	5.8	5.4	4.4		
Chemical								
Dissolved Oxygen (mg/L)	6	6.7	11.1	8.0	8.3	1.6		
pH (su)	6	5.6 ^C	6.7	6.4	6.3	0.4	2	
Ammonia Nitrogen (mg/L)	6	<	0.021	<	0.010	0.010	0.0001	
Nitrate+Nitrite Nitrogen (mg/L)	6	0.028	0.072	0.040	0.043	0.015		
Total Kjeldahl Nitrogen (mg/L)	6	<	0.080	0.376	0.239	0.240	0.119	
Total Nitrogen (mg/L)	6	<	0.078	0.416	0.289	0.283	0.120	
† Dissolved Reactive Phosphorus (mg/L)	6	0.005	0.016	0.014	0.012	0.004		
Total Phosphorus (mg/L)	6	0.027	0.075	0.034	0.040	0.018		
CBOD-5 (mg/L)	6	<	2.0	<	2.0	1.0	1.0	0.0
Chlorides (mg/L)	6	1.8	2.8	2.1	2.2	0.4		
Atrazine (µg/L)	1			<	0.02			
Total Metals								
† Aluminum (mg/L)	6	<	0.033	0.522	0.114	0.174	0.202	
Iron (mg/L)	6	1.210	2.640	2.200	2.092	0.533		
Manganese (mg/L)	6	0.401	1.110	0.652	0.698	0.301		
Dissolved Metals								
† Aluminum (mg/L)	6	<	0.033	0.071	0.016	0.026	0.022	
Antimony (µg/L)	6	<	0.7	<	1.9	0.9	0.8	0.2
† Arsenic (µg/L)	6	1.3 ^H	<	2.1	1.0	1.1	0.1	1
† Cadmium (mg/L)	6	<	0.0001	<	0.014	0.002	0.003	0.003
Chromium (mg/L)	6	<	0.009	<	0.013	0.006	0.006	0.001
Copper (mg/L)	6	<	0.013	<	0.020	0.006	0.007	0.001
Iron (mg/L)	6	<	0.026	0.484	0.314	0.305	0.176	
Lead (µg/L)	6	<	1.7	<	1.7	0.8	0.8	0.0
Manganese (mg/L)	6	0.368	0.966	0.587	0.633	0.258		
† Mercury (µg/L)	6	<	0.1	<	0.1	0.01	0.01	0.01
Nickel (mg/L)	6	<	0.019	<	0.042	0.010	0.011	0.005
† Selenium (µg/L)	6	<	1.7	2.3	0.8	1.1	0.6	
Silver (mg/L)	6	<	0.0001	<	0.002	0.0001	0.0001	0.0001
Thallium (µg/L)	6	<	0.6	<	0.6	0.3	0.3	0.01
Zinc (mg/L)	6	<	0.012	<	0.030	0.015	0.014	0.004
Biological								
Chlorophyll a (µg/L)	6	<	0.10	2.14	0.28	0.82	1.04	
† E. coli (col/100mL)	6	110	1300 ^C	155	383	469	1	

C=F&W criterion violated; E=# samples that exceeded criteria; G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 65i; H=F&W human health criterion exceeded; J=estimate; N=# samples.