

2011 Monitoring Summary



Boardtree Creek at Marion County Road 33 (34.13538/-88.13391)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Boardtree Creek watershed for biological and water quality monitoring as part of the 2011 Assessment of the Escatawpa, Mobile, and Tombigbee (EMT) River Basins. The objectives of the EMT Basin Assessments were to assess biological conditions at each monitoring location, estimate overall water quality within the basin, identify impaired and reference reaches, and collect data for metric and criteria development.



Figure 1. Boardtree Creek at BRDM-89, June 1, 2011.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Boardtree Creek is a *Fish and Wildlife (F&W)* stream located in Marion County. Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forest (58%) and shrub/scrub. As of September 1, 2012, one NPDES permit has been issued 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. Boardtree Creek at BRDM-89 is a small, mostly shaded stream with gravel, sand, and silt (88%) substrates (Figure 1). Overall habitat quality was categorized as *optimal*.

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 *good* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Upper Tombigbee
Drainage Area (mi²)		16
Ecoregion^a		65i
% Landuse		
Wetland	Woody	3
Forest	Deciduous	37
	Evergreen	16
	Mixed	5
Shrub/scrub		20
Grassland/herbaceous		2
Pasture/hay		7
Cultivated crops		1
Development	Open space	5
	Low intensity	1
	Moderate intensity	1
Population/km^{2b}		16
# NPDES Permits^c	TOTAL	1
	Construction Stormwater	1

a. Fall Line Hills

b. 2000 US Census

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

Table 2. Physical characteristics of Boardtree Creek at BRDM-89, June 1, 2011.

Physical Characteristics	
Canopy Cover	Mostly Shaded
Width (ft)	20
Depth (ft)	
	Riffle 0.4
	Run 2.0
	Pool 3.0
% of Reach	
	Riffle 5
	Run 50
	Pool 45
% Substrate	
	Cobble 2
	Mud/Muck 2
	Gravel 25
	Sand 28
	Silt 35
	Organic Matter 8

Table 3. Results of the habitat assessment conducted on Boardtree Creek at BRDM-89, June 1, 2011.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	65	Sub-optimal (53-65)
Sediment Deposition	77	Optimal (>65)
Sinuosity	65	Sub-optimal (65-84)
Bank and Vegetative Stability	78	Optimal (>74)
Riparian Buffer	79	Sub-optimal (70-89)
Habitat Assessment Score	174	
% Maximum Score	72	Optimal (>65)

Table 4. Results of the macroinvertebrate bioassessment conducted in Boardtree Creek at BRDM-89, June 1, 2011.

Macroinvertebrate Assessment		
	Results	Scores
		(0-100)
Taxa richness and diversity measures		
% EPC taxa	27	44
% Dominant Taxon	22	70
Taxonomic composition measures		
% EPT minus Baetidae and Hydropsychidae	0	0
Functional feeding group		
# Collector Taxa	24	85
Community tolerance		
% Nutrient Tolerant individuals	33	56
WMB-I Assessment Score	---	51
WMB-I Assessment Rating		Good (48-74)

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In-situ measurements and water samples were collected in April, May, July and September of 2011 to help identify any stressors to the biological communities. *In situ* parameters suggested that Boardtree Creek at BRDM-89 was meeting the water quality criteria for *F&W* use classification. However, median values of specific conductance and hardness were greater than median concentrations of verified reference data collected in 65i ecoregion. Median ammonia-nitrogen was greater than the 90th percentile of all verified ecoregional reference data collected within ecoregion 65i. The turbidity value during the April site visit exceeded 50 NTU above the 90th percentile of all verified ecoregional reference reach data collected in the ecoregion 65i. Thunderstorms in the area likely contributed to the high turbidity value.

SUMMARY

As part of assessment process, ADEM will review the monitoring information presented in this report along with all other available data.

Bioassessment results indicated the macroinvertebrate community to be in *good* condition. The overall habitat assessment score was *optimal* with good instream habitat. However, intensive water chemistry results indicated that the main stressors to the biological community in Boardtree Creek were specific conductance, hardness, and ammonia nitrogen.

Table 5. Summary of water quality data collected April, May, July, and 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)	5	18.0	26.4	22.0	21.8	3.7
Turbidity (NTU)	5	3.6	84.9 ^T	8.0	22.2	35.1
Total Dissolved Solids (mg/L)	4	33.0	68.0	44.0	47.2	15.6
^J Total Suspended Solids (mg/L)	4	1.0	50.0	3.5	14.5	23.7
Specific Conductance (µmhos)	5	24.0	38.0	36.0 ^G	33.0	5.9
Hardness (mg/L)	4	< 2.7	10.0	9.3 ^G	7.4	4.1
Alkalinity (mg/L)	4	3.3	8.2	5.7	5.7	2.5
Stream Flow (cfs)	4	10.7	19.8	11.7	13.5	4.3
Chemical						
Dissolved Oxygen (mg/L)	5	7.5	9.2	7.8	8.0	0.6
pH (su)	5	6.2	7.4	6.9	6.9	0.5
^J Ammonia Nitrogen (mg/L)	4	0.100	0.500	0.500 ^M	0.400	0.200
^J Nitrate+Nitrite Nitrogen (mg/L)	4	0.066	0.219	0.201	0.172	0.071
^B Total Kjeldahl Nitrogen (mg/L)	0					
^B Total Nitrogen (mg/L)	0					
^J Dissolved Reactive Phosphorus (mg/L)	4	< 0.004	0.191	0.005	0.051	0.093
^B Total Phosphorus (mg/L)	0					
^J CBOD-5 (mg/L)	4	< 1.0	1.6	0.5	0.8	0.5
Chlorides (mg/L)	4	2.0	5.5	2.4	3.1	1.6
Total Metals						
^J Aluminum (mg/L)	3	0.088	0.281	0.182	0.184	0.096
^J Iron (mg/L)	3	0.976	1.250	1.130	1.119	0.137
^J Manganese (mg/L)	3	0.095	0.281	0.156	0.177	0.095
^J Dissolved Metals						
^J Aluminum (mg/L)	4	< 0.020	0.207	0.010	0.059	0.098
Antimony (µg/L)	4	< 2.0	< 2.0	1.0	1.0	0.0
Arsenic (µg/L)	4	< 1.0	< 1.0	0.5	0.5	0.0
^J Cadmium (mg/L)	4	< 0.0004	<0.0004	0.0002	0.0002	0.000
^J Chromium (mg/L)	4	< 0.003	< 0.003	0.002	0.002	0.000
Copper (mg/L)	4	< 0.300	< 0.300	0.150	0.150	0.000
^J Iron (mg/L)	4	0.219	0.361	0.262	0.276	0.063
Lead (µg/L)	4	< 2.0	< 2.0	1.0	1.0	0.0
^J Manganese (mg/L)	4	0.044	0.084	0.074	0.069	0.018
^{B,J} Mercury (µg/L)	3	< 0.035	< 0.200	0.100	0.072	0.048
Nickel (mg/L)	4	< 0.030	< 0.03	0.015	0.015	0.000
Selenium (µg/L)	4	< 3.0	< 3.0	1.5	1.5	0.0
Silver (mg/L)	4	< 0.001	< 0.001	0.000	0.000	0.000
Thallium (µg/L)	4	< 0.4	< 0.4	0.2	0.2	0.0
^J Zinc (mg/L)	4	< 0.020	< 0.02	0.010	0.010	0.000
Biological						
^J Chlorophyll a (ug/L)	4	< 1.00	5.34	0.78	1.85	2.34
^J E. coli (col/100mL)	3	115	225	150	163	56

B=Samples excluded due to Laboratory QC concerns; G=value > median of all ecoregional reference reach data collected in ecoregion 65i; J=estimate; M=value > 90th percentile of all verified ecoregional reference reach data collected within ecoregions 65i; N=# samples; T=.value exceeds 50 NTU above the 90th percentile of all verified ecoregional reference reach data collected in the ecoregion 65i.

FOR MORE INFORMATION, CONTACT:

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