Alabama Department of Environmental Management

Use Support Assessment

Rivers and Streams Monitoring Program

2015 Monitoring Summary

Poor

Blackwater River at U.S. Highway 90 in Baldwin County (30.56552/-87.67212)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Blackwater River watershed for biological and water quality monitoring as part of the 2015 Rivers and Streams Monitoring Project. The objectives of the project were to provide data to fully assess each site and to estimate overall water quality statewide using macroinvertebrate and habitat surveys and intensive water quality sampling.

Figure 1. Blackwater River at BKRB-4, September 15, 2015.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Blackwater River is a *Fish and Wildlife (F&W)* stream located near of the city of Robertsdale, Alabama. At BKRB-4, the stream drains approximately 25 square miles. Based on the 2011 National Land Cover Dataset, landuse within the watershed is primarily cultivated crops, pasture/hay, and woody wetlands. As of April 1, 2016, eleven NPDES permits have been issued in this watershed.

REACH CHARACTERISTICS

General observations (Table 2) and a habitat assessment (Table 3) were completed during the fish community 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. Blackwater River at BKRB-4 is a slightly tannic, slow moving glide/pool stream with snags and woody debris comprising the majority of the substrate. (Figure 1). Overall habitat quality was categorized as *sub-optimal.*

BIOASSESSMENT RESULTS

The fish community in Blackwater River at BKRB-4 was sampled using Alabama's Fish Community Index of Biotic Integrity (AL-IBI), developed through a multi-agency (GSA, ADCNR, ADEM) project to establish a comprehensive fish community bioassessment tool for wadeable streams and rivers across the state. The data collected during this survey were used to score the overall health of the fish community, based on conditions expected for wadeable streams and rivers in the Southern Plains Ichthyoregion. The AL-IBI uses twelve measures of species richness and diversity, tolerance/intolerance, and abundance, condition, and reproduction to assess the overall health of the fish community. The final IBI score is the sum of all individual metrics on a 60 point scale. The IBI score for Blackwater River at BKRB-4 was 26, indicating the fish community to be in *poor* condition due to low native species and a high number of tolerant taxa collected during the sample (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Perdido River
Drainage Area (mi^2)		25
Ecoregion[a]		65F
% Landuse[b]		
Open water		<1%
Wetland	Woody	14%
	Herbaceous	<1%
Forest	Deciduous	<1%
	Evergreen	9%
	Mixed	1%
Shrub/scrub		10%
Grassland/herbaceous		6%
Pasture/hay		17%
Cultivated crops		31%
Development	Open space	7%
	Low intensity	2%
	Moderate intensity	<1%
	High intensity	<1%
Barren		<1%
Population/km^2[c]		52
# NPDES Permits[d]	**TOTAL**	11
Construction		3
Industrial General		6
Mining		2

a. Southern Pine Plains & Hills

b. 2011 National Land Cover Dataset

c. 2010 US Census

d. #NPDES outfalls downloaded from ADEM's NPDES Management System database, April 1, 2016.

Table 2. Physical characteristics of Blackwater River at BKRB-4, August 4, 2015.

Physical Characteristics		
Width (ft)		15
Canopy Cover		Shaded
Depth (ft)		
	Glide	2.5
	Pool	5.0
% of Reach		
	Run	70
	Pool	30
% Substrate		
	Mud/Muck	20
	Sand	15
	Silt	25
	Snags and woody debris	40

Table 3. Results of the habitat assessment conducted in Blackwater River at BKRB-4, August 4, 2015.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	67	Sub-Optimal (55-79)
Sediment Deposition	73	Sub-Optimal (55-79)
Sinuosity	90	Optimal (>79)
Bank Vegetative Stability	80	Optimal (>79)
Riparian Buffer	75	Sub-Optimal (60-84)
Habitat Assessment Score	***135***	
% of Maximum Score	***79***	**Sub-Optimal (57-80)**

Table 4. Results of the fish community bioassesment conducted in Blackwater River at BKRB-4, August 4, 2015.

Fish Community Assessment	Results	Score
Species Richness & Diversity		
Total native species	8	1
Number shiner species	2	1
Number of sucker species	0	1
Number of centrarchid species	2	1
Number of darter+madtom species	1	1
Tolerance & Intolerance Measures		
Percent of tolerant species	2.35	5
Percent Green Sunfish & Yellow Bullhead	0	5
Trophic Measures		
Percent insectivorous cyprinids	50.59	3
Percent invertivores	8.24	1
Percent top carnivores	0	1
Abundance, Condition & Reproductive Measures		
Percent DELT+hybrids	0	5
Number of lithophilic spawners	5	1
IBI Assessment Score		**26**
Condition		**Poor**

WATER CHEMISTRY

Results of water chemistry samples are presented in Table 5. In situ measurements and water samples were collected monthly during March through October 2015 to help identify any stressors to the biological community. Total dissolved solids, conductivity, hardness, alkalinity, nitrate+nitrite nitrogen, total nitrogen, total phosphorus, chlorides, iron, and manganese concentrations were higher than expected based on comparison with reference reach data for streams in the Southern Pine Plains & Hills ecoregion (65f). Organics collected on April 14, 2015 were below minimum detection limits. Instream pH was typical of streams located in ecoregion 65f, ranging from 5.3 to 6.2 s.u.

SUMMARY

Results of ADEM's 2015 fish community sampling indicated the fish community to be in *poor* condition due to low native species and a high number of tolerant taxa collected during the sample. However, several physical parameters, chlorides, nutrients (phosphorus and nitrogen), and some metals concentrations were higher than expected based on comparison with reference reach data for streams in the Southern Pine Plains & Hills ecoregion (65f). Monitoring should continue to ensure water quality standards are being met as a *Fish & Wildlife* designated stream.

Table 5. Summary of water quality data collected March through October, 2015. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL). Median (Med), 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	Q
Physical								
Temperature (°C)	9	19.1	25.9	20.2	21.7	2.7		
Turbidity (NTU)	9	3.6	16.8	6.5	7.4	4.2		
Total Dissolved Solids (mg/L)	8	46.0	108.0	57.0M	62.8	19.1		
J Total Suspended Solids (mg/L)	8	< 1.0	6.0	2.5	2.9	1.8		
Specific Conductance (µmhos/cm@25C)	9	38.3	72.9	59.6G	58.6	11.0		
Hardness (mg/L)	4	19.2	22.5	20.0G	20.4	1.5		
J Alkalinity (mg/L)	8	9.6	27.0	13.5M	15.0	5.4		
Monthly Stream Flow (cfs)	5	13.1	34.1	15.1	18.7	8.7		
Chemical								
Dissolved Oxygen (mg/L)	9	5.7	7.3	6.2	6.3	0.5		
pH (SU)	9	5.3C	6.2	6.0	5.9	0.3	4	
J Ammonia Nitrogen (mg/L)	8	< 0.024	0.060	0.018	0.025	0.017		
J Nitrate+Nitrite Nitrogen (mg/L)	8	0.189	0.702	0.507M	0.490	0.168		
J Total Kjeldahl Nitrogen (mg/L)	8	0.290	1.300	0.585M	0.760	0.410		
J Total Nitrogen (mg/L)	8	0.839	1.857	1.040M	1.250	0.424		
J Dissolved Reactive Phosphorus (mg/L)	8	< 0.003	0.019	0.008	0.008	0.006		
J Total Phosphorus (mg/L)	8	0.026	0.065	0.046M	0.045	0.014		
J CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0		
J Chlorides (mg/L)	8	5.8	12.0	8.9M	9.0	2.1		
Atrazine (µg/L)	1				0.18			
Total Metals								
Aluminum (mg/L)	4	< 0.106	0.236	0.139	0.142	0.102		
Iron (mg/L)	4	0.975	1.650	1.575M	1.444	0.315		
J Manganese (mg/L)	4	0.080	0.100	0.092M	0.091	0.008		
Dissolved Metals								
J Aluminum (mg/L)	4	< 0.106	0.146	0.053	0.076	0.046		
J Antimony (µg/L)	4	< 0.026	< 0.026	0.013	0.013	0.000		
J Arsenic (µg/L)	4	0.4	0.9H	0.8	0.8	0.2		4
J Cadmium (µg/L)	4	< 0.097	0.148S	0.048	0.073	0.050		1
J Chromium (mg/L)	4	0.0002	0.0005	0.0004	0.0004	0.0001		
J Copper (mg/L)	4	0.001	0.001	0.001	0.001	0.000		
Iron (mg/L)	4	0.945	1.150	0.978M	1.013	0.094		
J Lead (µg/L)	4	< 0.3	< 0.3	0.1	0.1	0.0		
J Manganese (mg/L)	4	0.021	0.100	0.072M	0.066	0.033		
J Nickel (µg/L)	4	< 0.408	0.421	0.204	0.258	0.109		
J Selenium (µg/L)	4	< 0.2	< 0.2	0.1	0.1	0.0		
Silver (µg/L)	4	< 1.742	< 1.742	0.871	0.871	0.011		
J Thallium (µg/L)	4	< 0.025	0.034	0.013	0.018	0.000		
J Zinc (mg/L)	4	< 0.002	0.003	0.002	0.002	0.001		
Biological								
Chlorophyll a (mg/m³)	8	< 1.00	< 1.00	0.50	0.50	0.00		
E. coli (MPN/DL)	8	32.0	190.0	77.0	85.1	50.1		

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 65f; H=*F&W*human health criterion exceeded; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 65f; N=# samples; S= *F&W* hardness-adjusted aquatic life use criteria exceeded; Q=# of uncertain exceedances

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