

2015 Monitoring Summary



Negro Creek at Baldwin County Road 87 (30.50008/-87.58168)

BACKGROUND

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



Figure 1. Negro Creek at NGOB-1, August 4, 2015.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Negro Creek is a *Fish & Wildlife* stream located in Baldwin County. Based on the 2011 National Land Cover Dataset, 70% of the landuse within the watershed is primarily cultivated crops, forest, and pasture. As of April 1, 2016, ADEM has issued ten NPDES permits 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. Negro Creek is a low-gradient, slow moving stream. The plentiful streams bends, snags and woody debris, and relatively deep pools provided optimal habitat and cover for aquatic organisms (Figure 1).

BIOASSESSMENT RESULTS

The fish community in Negro Creek at NGOB-1 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 fish community bioassessment tool for wadeable streams and rivers in Alabama. 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, and abundance, condition, and reproduction to assess the 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 Negro Creek at NGOB-1 indicated the fish community to be in *poor* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Perdido River
Drainage Area (mi²)		29
Ecoregion^a		65F
Landuse^b		
	Open water	<1%
	Wetland	Woody 14%
		Emergent herbaceous <1%
	Forest	Deciduous <1%
		Evergreen 7%
		Mixed <1%
	Shrub/scrub	5%
	Grassland/herbaceous	4%
	Pasture/hay	13%
	Crops	48%
	Development	Open space 6%
		Low intensity 1%
		Moderate intensity <1%
		High intensity <1%
	Barren	<1%
Population/km^{2c}		26
# NPDES Permits^d	TOTAL	10
	Construction	9
	Mining	1

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 Negro Creek at NGOB-1, August 4, 2015.

Physical Characteristics		
Width (ft)		25
Canopy Cover		Mostly shaded
Depth (ft)		
	Run	1.5
	Pool	3
% of Reach		
	Run	50
	Pool	50
% Substrate		
	Fine particulate organic matter	20
	Sand	30
	Snags/woody debris	50

Table 3. Results of the habitat assessment conducted on Negro Creek at NGOB-1, August 4, 2015.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	81	Optimal (>79)
Sediment Deposition	73	Sub-Optimal (55-79)
Sinuosity	95	Optimal (>79)
Bank Vegetative Stability	69	Sub-Optimal (58-79)
Riparian Buffer	78	Sub-Optimal (60-84)
Habitat Assessment Score	141	
% of Maximum Score	83	Optimal (>80)

Table 4. Results of the fish community bioassessment conducted on Negro Creek at NGOB-1, August 4, 2015.

Fish Community Assessment		
	Results	Score
Species Richness & Diversity		
Total native species	15	3
Number shiner species	2	1
Number of sucker species	0	1
Number of centrarchid species	5	3
Number of darter+madtom species	2	1
Tolerance & Intolerance Measures		
Percent of tolerant species	6.02	3
Percent Green Sunfish & Yellow Bullhead	3.61	1
Trophic Measures		
Percent insectivorous cyprinids	20.48	1
Percent invertivores	25.3	3
Percent top carnivores	1.2	3
Abundance, Condition & Reproductive Measures		
Percent DELT+hybrids	0	5
Number of lithophilic spawners	8	3
IBI Assessment Score		28
Condition		Poor

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. When possible, in situ measurements and water samples are collected monthly during March through October in 2015 to help identify any stressors to the biological communities. Dissolved cadmium exceeded criterion applicable to *F&W* use classification. Nitrate+nitrite nitrogen concentrations, total kjeldahl nitrogen, total nitrogen, total manganese, and chlorides were higher than expected for the Southern Pine Plains & Hills ecoregion (65f).

SUMMARY

Bioassessment results indicated the fish community to be in *poor* condition. Habitat quality and availability within the reach was adequate to support a diverse fish community. However, intensive water quality sampling indicated some physical parameters, nitrogen, and chlorides to be higher than expected for streams in the Southern Pine Plains & Hills ecoregion (65f). As part of the assessment process, ADEM will review the monitoring information presented in this report, along with all other available data.

Table 5. Summary of water quality data collected March-October, 2015. 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	Med	Avg	SD	Q
Physical							
Temperature (°C)	8	18.9	26.3	20.8	22.0	2.8	
Turbidity (NTU)	8	2.6	7.6	3.5	4.1	1.6	
Total Dissolved Solids (mg/L)	8	54.0	82.0	63.5 ^M	63.1	8.9	
^J Total Suspended Solids (mg/L)	8	<1.0	3.0	2.0	2.1	0.9	
Specific Conductance (µmhos/cm@25C)	8	68.2	82.8	74.4 ^G	74.7	4.5	
Hardness (mg/L)	4	23.7	25.9	24.8 ^G	24.8	0.9	
^J Alkalinity (mg/L)	8	14.0	21.0	16.0 ^M	16.1	2.4	
Monthly Stream Flow (cfs)	7	9.2	25.9	14.4	15.7	6.0	
Chemical							
Dissolved Oxygen (mg/L)	8	5.6	7.1	6.8	6.6	0.6	
pH (SU)	8	6.0	6.6	6.2	6.2	0.2	
^J Ammonia Nitrogen (mg/L)	8	<0.024	0.170	0.015	0.038	0.055	
^J Nitrate+Nitrite Nitrogen (mg/L)	8	0.530	0.894	0.786 ^M	0.738	0.124	
^J Total Kjeldahl Nitrogen (mg/L)	8	0.110	1.100	0.515 ^M	0.604	0.378	
^J Total Nitrogen (mg/L)	8	0.912	1.923	1.227 ^M	1.342	0.361	
^J Dissolved Reactive Phosphorus (mg/L)	8	<0.003	0.010	0.004	0.005	0.003	
^J Total Phosphorus (mg/L)	8	0.019	0.052	0.027	0.030	0.011	
^J CBOD-5 (mg/L)	8	<2.0	<2.0	1.0	1.0	0.0	
Chlorides (mg/L)	8	9.5	100.0	10.5 ^M	21.5	31.7	
Total Metals							
^J Aluminum (mg/L)	4	<0.106	0.221	0.109	0.123	0.084	
Iron (mg/L)	4	0.499	0.778	0.608	0.623	0.145	
^J Manganese (mg/L)	4	0.052	0.075	0.057 ^M	0.060	0.011	
Dissolved Metals							
^J Aluminum (mg/L)	4	<0.086	0.141	0.070	0.083	0.042	
^J Antimony (µg/L)	4	<0.026	0.037	0.020	0.023	0.012	
^J Arsenic (µg/L)	4	0.4	0.7 ^H	0.7	0.6	0.1	4
^J Cadmium (µg/L)	4	<0.097	0.195 ^S	0.048	0.085	0.073	1
^J Chromium (µg/L)	4	0.254	0.600	0.348	0.388	0.158	
^J Copper (µg/L)	4	0.345	1.680	0.639	0.826	0.598	
Iron (mg/L)	4	0.393	0.593	0.480	0.487	0.100	
^J Lead (µg/L)	4	<0.3	<0.3	0.1	0.1	0.0	
^J Manganese (mg/L)	4	0.039	0.068	0.040	0.047	0.014	
^J Nickel (µg/L)	4	<0.408	0.471	0.310	0.324	0.140	
^J Selenium (µg/L)	4	<0.2	0.3	0.1	0.2	0.1	
Silver (µg/L)	4	<1.742	<1.742	0.871	0.871	0.000	
^J Thallium (µg/L)	4	<0.025	0.043	0.019	0.024	0.014	
^J Zinc (µg/L)	4	<2.111	3.600	1.056	1.692	1.272	
Biological							
Chlorophyll a (mg/m ³)	8	<1.00	<1.00	0.50	0.50	0.00	
^J E. coli (MPN/DL)	8	29.0	130.0	44.0	69.0	43.1	

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; Q= # of uncertain exceedances; S= *F&W* hardness-adjusted aquatic life use criteria exceeded.

FOR MORE INFORMATION, CONTACT:
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