

2014 Monitoring Summary



Murder Creek at Upper Kirkland Rd in Escambia County (31.19198/-87.02632)

BACKGROUND

Murder Creek was identified as a Strategic Habitat Unit (SHU) by the Alabama Rivers & Streams Network (ARSN). SHUs are recognized as high-quality habitats occupied by federally listed and state imperiled species. The Long Branch-Murder Creek sub-watershed was identified as a priority watershed due to potential impacts from silvicultural activities, excessive streambed erosion and lack of riparian buffer.

In cooperation with ARSN, the Alabama Department of Environmental Management (ADEM) conducted habitat and fish community assessments on Murder Creek, August 20, 2014 as part of the 2014 Southeast Alabama (SEAL) River Basins Assessment. The objectives of this monitoring were to provide data to assess biological, physical, and chemical conditions at the site, estimate overall water quality within the SEAL Basin Group, and support restoration efforts.



Figure 1. Murder Creek at MURE-2, August 20, 2014.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Murder Creek is a *Fish and Wildlife (F&W)* stream located in the Southern Pine Plains and Hills ecoregion (65f), northeast of Brewton. Based on the 2011 National Land Cover Dataset, landuse within the watershed is primarily forest (61%). As of April 1, 2016, 80 outfalls were active within the watershed.

REACH CHARACTERISTICS

General observations (Table 2) and a habitat assessment (Table 3) were completed during the fish community bioassessment. 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. Murder Creek at MURE-2 is an open, low-gradient stream with primarily gravel, organic matter, and sand substrates (Figure 1). Overall habitat quality and availability was rated as *sub-optimal* for supporting diverse fish communities.

BIOASSESSMENT RESULTS

The fish community in Murder Creek at MURE-2 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 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.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Conecuh River
Drainage Area (mi²)		328
Ecoregion^a		65F
% Landuse^b		
Open water		<1%
Wetland	Woody	5%
	Emergent herbaceous	<1%
Forest	Deciduous	17%
	Evergreen	34%
	Mixed	10%
Shrub/scrub		13%
Grassland/herbaceous		6%
Pasture/hay		8%
Cultivated crops		3%
Development	Open space	3%
	Low intensity	1%
	Moderate intensity	<1%
	High intensity	<1%
Barren		<1%
Population/km^{2c}		10
# NPDES Permits^d	TOTAL	80
	401 Water Quality Certification	
	Construction	35
	Industrial General	25
	Industrial Individual	2
	No Exposure	3
	Small Mining	6
	Underground Injection Control	9

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 Murder Creek at MURE-2, July 1, 2014.

Physical Characteristics		
Width (ft)		80
Canopy Cover		Mostly Open
Depth (ft)		
	Run	3.0
	Pool	6.0
% of Reach		
	Run	50
	Pool	50
% Substrate		
	Clay	1
	Mud/Muck	5
	Gravel	35
	Sand	25
	Silt	5
	Organic Matter	29

BIOASSESSMENT RESULTS

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 IBI score for Murder Creek at MURE-2 was 36, indicating the fish community to be in *fair* condition.

Table 3. Results of the habitat assessment conducted on Murder Creek at MURE-2, July 1, 2014.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	74	Sub-Optimal (55-79)
Sediment Deposition	63	Sub-Optimal (55-79)
Sinuosity	63	Sub-Optimal (55-79)
Bank Vegetative Stability	70	Sub-Optimal (58-79)
Riparian Buffer	84	Sub-Optimal (60-84)
Habitat Assessment Score	131	
% Maximum Score	73	Sub-Optimal (57-80)

Table 4. Results of the Fish Community bioassessment conducted in Murder Creek at MURE-2, July 1, 2014.

Fish Community Assessment	Results	
	Results	Score
Species Richness & Diversity		
Total native species	23	3
Number shiner species	4	3
Number of sucker species	1	1
Number of centrarchid species	7	3
Number of darter+madtom species	5	3
Tolerance & Intolerance Measures		
Percent of tolerant species	0.75	5
Percent Green Sunfish & Yellow Bullhead	0	5
Trophic Measures		
Percent insectivorous cyprinids	45.86	3
Percent invertivores	15.79	1
Percent top carnivores	1.5	3
Abundance, Condition & Reproductive Measures		
Percent DELT+hybrids	0.38	3
Number of lithophilic spawners	13	3
IBI Assessment Score		36
Condition		Fair

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected March through October of 2014 to help identify any stressors to the biological communities. Organics were collected at Murder Creek on April 4th; however all parameters were below detection limits. Median values for several physical parameters and total manganese were higher than background levels for ecoregion 65f.

SUMMARY

The in-stream habitat quality at Murder Creek was rated as *sub-optimal*; however, median concentrations of several physical parameters and total manganese may have had an effect on fish communities. Monitoring should continue to ensure that water quality and biological conditions remain stable.

Table 5. Summary of water quality data collected March-October, 2014. 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	Q
Physical							
Temperature (°C)	10	15.8	26.8	23.0	22.1	4.3	
Turbidity (NTU)	10	3.7	27.4	7.5	11.3	8.0	
Total Dissolved Solids (mg/L)	8	36.0	96.0	70.5 ^M	69.5	17.8	
Total Suspended Solids (mg/L)	8	3.0	107.0	4.5	19.4	35.8	
Specific Conductance (µmhos)	10	63.8	83.9	81.6 ^G	80.3	9.9	
Hardness (mg/L)	4	28.4	35.3	31.0 ^G	31.4	3.0	
Alkalinity (mg/L)	8	27.0	40.8	32.0 ^M	33.2	5.0	
Monthly StreamFlow (cfs)	5	110.4	217.4	158.2	158.9	40.3	
StreamFlow during Sample Collection (cfs)	5	110.4	217.4	158.2	156.9	40.3	
Chemical							
Dissolved Oxygen (mg/L)	10	7.8	9.7	8.8	8.8	0.7	
pH (su)	10	7.0	8.1	7.4	7.4	0.3	
Ammonia Nitrogen (mg/L)	8	< 0.006	0.049	0.004	0.010	0.016	
Nitrate+Nitrite Nitrogen (mg/L)	8	0.062	0.143	0.130	0.119	0.031	
^J Total Kjeldahl Nitrogen (mg/L)	8	0.095	0.650	0.324	0.359	0.178	
^J Total Nitrogen (mg/L)	8	0.237	0.728	0.480	0.478	0.172	
^J Dissolved Reactive Phosphorus (mg/L)	8	0.003	0.006	0.004	0.004	0.001	
Total Phosphorus (mg/L)	8	0.013	0.052	0.016	0.024	0.015	
^J CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0	
Chlorides (mg/L)	8	3.0	3.8	3.6	3.5	0.3	
Atrazine (µg/L)	1				< 0.10		
Total Metals							
^J Aluminum (mg/L)	4	0.053	0.587	0.222	0.268	0.223	
Iron (mg/L)	4	0.708	1.700	1.037	1.120	0.472	
^J Manganese (mg/L)	4	0.020	0.108	0.072 ^M	0.068	0.038	
Dissolved Metals							
^J Aluminum (mg/L)	4	< 0.050	0.119	0.064	0.068	0.050	
Antimony (µg/L)	4	< 0.2	< 0.4	0.1	0.1	0.1	
^J Arsenic (µg/L)	4	0.4	0.7 ^H	0.4	0.5	0.1	4
Cadmium (µg/L)	4	< 0.246	< 0.390	0.124	0.142	0.038	
^J Chromium (µg/L)	4	0.443	1.131	0.658	0.722	0.305	
^J Copper (mg/L)	4	< 0.0003	0.0004	0.0003	0.0003	0.000	
Iron (mg/L)	4	0.447	0.944	0.482	0.589	0.237	
Lead (µg/L)	4	< 0.2	< 0.5	0.1	0.2	0.1	
^J Manganese (mg/L)	4	0.008	0.043	0.018	0.022	0.015	
^J Nickel (mg/L)	4	< 0.0003	< 0.0006	0.0005	0.0005	0.000	
Selenium (µg/L)	4	< 0.4	< 0.5	0.2	0.2	0.0	
Silver (µg/L)	4	< 0.252	< 0.480	0.126	0.152	0.052	
Thallium (µg/L)	4	< 0.2	< 0.6	0.1	0.2	0.1	
^J Zinc (mg/L)	4	0.002	0.014	0.003	0.006	0.006	
Biological							
Chlorophyll a (µg/l)	7	0.45	1.07	0.76	0.78	0.78	
^J E. coli (col/100mL)	8	20	133	44	58	37	

G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 65f; H=F&W human health criteria exceeded; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 65f; N=# samples Q=# samples with uncertain exceedances.

FOR MONITORING INFORMATION, CONTACT:
Alicia K. Phillips ADEM Environmental Indicators Section
1350 Coliseum Boulevard Montgomery, AL 36110
(334) 260-2797 akphillips@adem.alabama.gov