Alabama Department of Environmental Management

Basin Assessment Site

Rivers and Streams Monitoring Program

2014 Monitoring Summary

Fair

Judy Creek at Dale County Road 20

BACKGROUND

Judy Creek is a tributary of the West Fork of the Choctawhatchee River, which 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. In addition, Judy Creek was identified as a priority sub-watershed for ADEM's Clean Water Act §319 Nonpoint Source Program.

In cooperation with ARSN, the Alabama Department of Environmental Management (ADEM) selected the West Fork Choctawhatchee River watershed for biological and water quality monitoring as part of the Assessment of the Southeast Alabama (SE-AL) River basins. The objectives of this monitoring were to provide data to fully assess the biological, physical, and chemical conditions within the reach, to estimate overall water quality within the Southeast River Basin, and to provide data to support restoration efforts.

As part of the joint effort to meet these objectives, ADEM collected water samples from March to October of 2014, and the Geological Survey of Alabama (GSA) conducted a habitat and fish community assessment in June.

Figure 1. Judy Creek at JDYD-4, June 11, 2014.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Choctawhatchee R
Drainage Area (mi^2)		114
Ecoregion[a]		65D
% Landuse[b]		
Open water		1%
Wetland	Woody	4%
	Emergent herbaceous	<1%
Forest	Deciduous	25%
	Evergreen	25%
	Mixed	7%
Shrub/scrub		19%
Grassland/herbaceous		2%
Pasture/hay		7%
Cultivated crops		6%
Development	Open space	4%
	Low intensity	1%
	Moderate intensity	<1%
	High intensity	<1%
Barren		<1%
Population/km^2[c]		21
# NPDES Permits[d]	**TOTAL**	10
Construction		6
Small Mining		1
Underground Injection Control		3

a.Southern Hilly Gulf Coastal Plain

b.2011 National Land Cover Dataset

c.2010 US Census

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

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Judy Creek at JDYD-4 is a *Fish & Wildlife (F&W)* stream in Dale County. According to the 2011 National Land Cover Dataset, landuse within the watershed is primarily forest (57%), with some scrub and minimal development. As of April 1, 2016, ADEM has issued a total of ten NPDES permits in the area.

Table 2. Physical Characteristics of Judy Creek at JDYD-4, June 4, 2014.

Physical Characteristics		
Canopy		Estimate 50/50
% of Reach		
	Riffle	5
	Run	75
	Pool	20
% of Substrate		
	Bedrock	80
	Sand	15
	Organic Matter	5

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. Judy Creek at JDYD-4 consists of a bedrock substrate (Figure 1) with an overall habitat quality rating of *sub-optimal* due to channelization and minimal riparian buffer.

BIOASSESSMENT RESULTS

The fish community in Judy Creek at JDYD-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.

BIOASSESSMENT RESULTS, cont.

The final IBI score is the sum of all individual metrics on a 60 point scale. The IBI score for Judy Creek at JDYD-4 was 38, indicating the fish community to be in *fair* condition (Table 4). In comparison with Judy Creek at JUDD-1, approximately one mile upstream of JDYD-4, the fish community assessment was rated at *poor.*

Table 3. Results of the habitat assessment conducted on Judy Creek at JDYD-4, June 4, 2014.

Habitat Assessment	% Max Score	Rating
Instream habitat quality	57	Sub-Optimal(55-79)
Sediment deposition	73	Sub-Optimal (55-79)
Sinuosity	48	Marginal (31-<55)
Bank and vegetative stability	78	Sub-Optimal (58-79)
Riparian buffer	48	Marginal (31-<60)
Habitat assessment score	**108**	
% Maximum score	**64**	**Sub-Optimal (57-80)**

Table 4. Results of the fish community bioassessment in Judy Creek at JDYD-4, June 4, 2014.

Fish Community Assessment	Results	Score
Species Richness & Diversity		
Total native species	24	3
Number shiner species	5	3
Number of sucker species	2	3
Number of centrarchid species	7	3
Number of darter+madtom species	4	3
Tolerance & Intolerance Measures		
Percent of tolerant species	8.33	3
Percent Green Sunfish & Yellow Bullhead	1.67	3
Trophic Measures		
Percent insectivorous cyprinids	41.67	3
Percent invertivores	29.17	3
Percent top carnivores	1.67	3
Abundance, Condition & Reproductive Measures		
Percent DELT+hybrids	0	5
Number of lithophilic spawners	15	3
IBI Assessment Score		**38**
Condition		**Fair**

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected monthly or semi-monthly (metals) during March through October of 2014 to help identify any stressors to the biological communities. One *E. coli* sample exceeded the criteria applicable to Judy Creek's *Fish & Wildlife* use classification designation after a heavy rain event. Median dissolved iron was higher than 90% of all verified ecoregional reference reach data collected in ecoregion 65d when compared to the median concentration of reference reach data collected within the same ecoregion.

SUMMARY

Median dissolved iron concentrations were slightly higher than expected when compared to other streams within the 65d ecoregion, while all other water chemistry results were within expected ranges. The fish community assessment was rated as *fair* despite the habitat quality being rated as *sub-optimal*. Monitoring of this site should continue to ensure the habitat quality remains stable and water quality continues to meet its *Fish & Wildlife* criteria.

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	E
Physical								
Temperature (°C)	8	13.7	26.2	21.7	20.7	4.8		
Turbidity (NTU)	8	8.3	32.5	12.5	15.4	7.8		
Total Dissolved Solids (mg/L)	8	28.0	69.0	54.5	51.0	12.1		
Total Suspended Solids (mg/L)	8	6.0	32.0	10.0	12.4	8.6		
Specific Conductance (µmhos/cm@25C)	8	36.2	73.2	52.5	53.2	13.2		
Hardness (mg/L)	4	10.9	22.6	16.6	16.7	4.8		
Alkalinity (mg/L)	8	8.1	27.5	14.8	16.4	7.0		
Monthly Stream Flow (cfs)	6	8.5	101.9	22.4	36.3	36.0		
Chemical								
Dissolved Oxygen (mg/L)	8	7.3	9.8	9.1	8.7	1.1		
pH (SU)	8	6.5	7.3	6.8	6.8	0.2		
Ammonia Nitrogen (mg/L)	8 <	0.006	0.045	0.004	0.012	0.016		
Nitrate+Nitrite Nitrogen (mg/L)	8	0.094	0.158	0.122	0.124	0.028		
Total Kjeldahl Nitrogen (mg/L)	8	0.327	1.350	0.474	0.635	0.385		
Total Nitrogen (mg/L)	8	0.429	1.449	0.602	0.759	0.370		
J Dissolved Reactive Phosphorus (mg/L)	8	0.003	0.006	0.004	0.004	0.001		
Total Phosphorus (mg/L)	8	0.017	0.032	0.019	0.022	0.006		
J CBOD-5 (mg/L)	8 <	2.0	< 2.0	1.0	1.0	0.0		
Chlorides (mg/L)	8	3.3	5.1	4.1	4.0	0.6		
Total Metals								
J Aluminum (mg/L)	4	0.112	0.386	0.258	0.253	0.117		
Iron (mg/L)	4	1.250	2.920	2.425	2.255	0.737		
Manganese (mg/L)	4	0.076	0.151	0.082	0.098	0.036		
Dissolved Metals								
J Aluminum (mg/L)	4 <	0.050	0.084	0.042	0.048	0.029		
Antimony (µg/L)	4 <	0.2	< 0.4	0.1	0.1	0.1		
J Arsenic (µg/L)	4	0.6	1.2 H	0.8	0.8	0.3	4	
Cadmium (µg/L)	4 <	0.246	< 0.390	0.123	0.141	0.036		
J Chromium (mg/L)	4	0.0004	0.0006	0.000	0.000	0.000		
J Copper (mg/L)	4 <	0.0002	0.0005	0.000	0.000	0.000		
Iron (mg/L)	4	1.060	1.980	1.370 M	1.445	0.387		
J Lead (µg/L)	4 <	0.2	< 0.5 S	0.2	0.2	0.1	1	
J Manganese (mg/L)	4	0.030	0.137	0.066	0.075	0.045		
J Nickel (mg/L)	4 <	0.0004	0.0005	0.000	0.000	0.000		
Selenium (µg/L)	4 <	0.4	< 0.5	0.2	0.2	0.0		
Silver (µg/L)	4 <	0.252	< 0.460	0.126	0.152	0.052		
Thallium (µg/L)	4 <	0.2	< 0.8	0.1	0.2	0.1		
J Zinc (mg/L)	4	0.003	0.004	0.003	0.004	0.000		
Biological								
Chlorophyll a (mg/m³)	8 <	0.10	8.01	2.40	3.04	2.59		
J E. coli (MPN/DL)	8	101.7	980.4 H	388.0	392.2	280.0		1

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

FOR MORE INFORMATION, CONTACT:
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