Alabama Department of Environmental Management

Rivers and Streams Monitoring Program

Basin Assessment

2014 Monitoring Summary

Fair

Judy Creek at Dale County Road 15 (31.52639/-85.58349)

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-2, July 9, 2014.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Judy Creek is a *Fish & Wildlife (F&W)* stream that drains approximately 51 square miles within the Choctawhatchee River basin and Southern Hilly Gulf Coastal Plain ecoregion. This watershed has a very low population density with less than 5% development. Based on the 2011 National Land Cover Dataset, landuse within the watershed is primarily forest (62%) with some shrub/scrub. As of April 1, 2016, no NPDES outfalls are active in the watershed.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Choctawhatchee R
Drainage Area (mi^2)		51
Ecoregion[a]		65D
% Landuse[b]		
Open water		<1%
Wetland	Woody	4%
	Emergent herbaceous	<1%
Forest	Deciduous	27%
	Evergreen	26%
	Mixed	7%
Shrub/scrub		18%
Grassland/herbaceous		2%
Pasture/hay		7%
Cultivated crops		5%
Development	Open space	3%
	Low intensity	<1%
	Moderate intensity	<1%
	High intensity	<1%
Population/km^2[c]		7

a.Southern Hilly Gulf Coastal Plain
b.2011 National Land Cover Dataset
c.2010 US Census

REACH CHARACTERISTICS

General observations (Table 2) and a habitat assessment (Table 3) were completed during the fish 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-2 is a glide-pool stream characterized by a sand substrate, typical of ecoregion 65d (Figure 1). Overall habitat quality was categorized as *marginal* for supporting fish communities due to evident sediment deposition, weak bank and vegetative stability, and a marginal riparian buffer.

BIOASSESSMENT RESULTS

The fish community in Judy Creek at JDYD-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 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 Judy Creek at JDYD-2 was 38, indicating the fish community to be in *fair* condition (Table 4).

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Table 2. Physical characteristics of Judy Creek at JDYD-2, June 5, 2014.

Physical Characteristics	
Width (ft)	40
Canopy Cover	Estimate 50/50
Depth (ft)	
Run	3.0
Pool	4.5
% of Reach	
Run	10
Pool	90
% Substrate	
Sand	60
Organic Matter	40

Table 3. Results of the habitat assessment conducted on Judy Creek at JDYD-2, June 5, 2014.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	59	Sub-Optimal (55-79)
Sediment Deposition	45	Marginal (31-<55)
Sinuosity	63	Sub-Optimal (55-79)
Bank Vegetative Stability	48	Marginal (31-<58)
Riparian Buffer	56	Marginal (31-<60)
Habitat Assessment Score	99	
%f Maximum Score	55	Marginal (31-<57)

Table 4. Results of the fish bioassessment conducted in Judy Creek at JDYD-2, June 5, 2014

Fish Community Assessment		
	Results	**Score**
Species Richness & Diversity		
Total native species	14	3
Number shiner species	6	5
Number of sucker species	0	1
Number of centrarchid species	1	1
Number of darter+madtom species	3	3
Tolerance & Intolerance Measures		
Percent of tolerant species	0	5
Percent Green Sunfish & Yellow Bullhead	0	5
Trophic Measures		
Percent insectivorous cyprinids	75	5
Percent invertivores	22.83	1
Percent top carnivores	1.09	3
Abundance, Condition & Reproductive Measures		
Percent DELT+hybrids	0	5
Number of lithophilic spawners	7	1
IBI Assessment Score		**38**
Condition		**Fair**

WATER CHEMISTRY

Results of water chemistry are presented in Table 5. In situ measurements and water samples were collected monthly, March through October of 2014. *In situ* parameters were also measured during the fish bioassessment. Median total and dissolved iron concentrations were slightly higher than background levels based on the 90th percentile of all least impaired reference reach data in ecoregion 65d. All other parameters were within expected ranges when compared to other stream the same ecoregion.

SUMMARY

Bioassessment results indicated the fish community to be in *fair* condition. The habitat assessment noted a lack of bank and vegetative stability, which can contribute to scouring from sedimentation and minimize habitat for aquatic communities. Median total and dissolved iron concentrations were slightly higher than background levels based on the 90th percentile of all least impaired reference reach data in ecoregion 65d. All other parameters were within expected ranges. Monitoring should continue to ensure that conditions within the reach 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)	8	11.9	25.1	20.2	19.6	5.0	
Turbidity (NTU)	8	6.8	26.2	20.1	18.6	6.5	
Total Dissolved Solids (mg/L)	8	4.0	66.0	48.0	43.6	20.4	
J Total Suspended Solids (mg/L)	8	< 1.0	15.0	6.0	7.1	5.3	
Specific Conductance (µmhos)	8	32.4	53.5	44.3	43.2	7.6	
Hardness (mg/L)	4	9.5	18.5	14.0	14.0	4.0	
J Alkalinity (mg/L)	8	6.4	16.7	10.3	11.3	3.8	
Stream Flow (cfs)	7	0.8	69.5	10.3	21.1	26.0	
Chemical							
Dissolved Oxygen (mg/L)	8	6.8	9.7	8.1	8.2	1.2	
pH (su)	8	6.1	7.2	6.7	6.7	0.4	
J Ammonia Nitrogen (mg/L)	8	< 0.006	0.047	0.005	0.014	0.017	
J Nitrate+Nitrite Nitrogen (mg/L)	8	0.068	0.149	0.094	0.102	0.030	
Total Kjeldahl Nitrogen (mg/L)	8	0.311	0.977	0.624	0.649	0.253	
J Total Nitrogen (mg/L)	8	0.381	1.126	0.742	0.751	0.273	
J Dissolved Reactive Phosphorus (mg/L)	8	0.003	0.006	0.004	0.004	0.001	
Total Phosphorus (mg/L)	8	0.016	0.068	0.022	0.033	0.021	
J CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0	
Chlorides (mg/L)	8	3.1	5.1	3.7	3.8	0.6	
Total Metals							
J Aluminum (mg/L)	4	0.094	0.329	0.282	0.247	0.107	
Iron (mg/L)	4	3.130	3.690	3.305M	3.358	0.236	
Manganese (mg/L)	4	0.087	0.235	0.116	0.138	0.066	
Dissolved Metals							
J Aluminum (mg/L)	4	< 0.050	0.058	0.025	0.033	0.016	
Antimony (µg/L)	4	< 0.2	< 0.4	0.1	0.1	0.1	
J Arsenic (µg/L)	4	0.7	1.3 A	0.9	0.9	0.2	4
Cadmium (µg/L)	4	< 0.246	< 0.39	0.139	0.149	0.034	
J Chromium (µg/L)	4	0.574	1.283	0.675	0.802	0.330	
J Copper (mg/L)	4	0.0003	0.001	0.000	0.000	0.000	
Iron (mg/L)	4	1.420	2.630	2.015M	2.020	0.608	
J Lead (µg/L)	4	< 0.2	< 0.5	0.2	0.2	0.1	
Manganese (mg/L)	4	0.060	0.229	0.091	0.118	0.077	
J Nickel (mg/L)	4	< 0.0004	0.001	0.000	0.000	0.000	
Selenium (µg/L)	4	< 0.4	< 0.49	0.2	0.2	0.0	
Silver (µg/L)	4	< 0.252	< 0.46	0.154	0.166	0.050	
Thallium (µg/L)	4	< 0.2	< 0.6	0.2	0.2	0.1	
J Zinc (mg/L)	4	0.003	0.006	0.004	0.004	0.001	
Biological							
Chlorophyll a (ug/L)	8	< 0.10	24.92	4.80	7.82	7.95	
J E. coli (col/100mL)	8	52	866	186	270	269	

A=*Fish & Wildlife* aquatic life use criterion exceeded; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in ecoregion 65d; N=# samples; Q=# of uncertain exceedences.