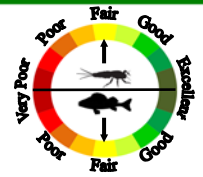


2014 Monitoring Summary



Johnson Creek at Bullock County Road 14 (32.02099/-85.55812)

BACKGROUND

The Upper Pea River 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 cooperation with ARSN, macroinvertebrate and fish community surveys, and intensive water quality monitoring were conducted of Johnson Creek at JHCB-1. The objectives of this monitoring were to provide data to fully assess biological, chemical, and physical conditions within the reach, estimate overall water quality within the basin, and support restoration efforts.



Figure 1. Johnson Creek at JHCB-1, May 15, 2014.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		Choctawhatchee River
Basin		14
Drainage Area (mi²)		65D
Ecoregion^a		65D
% Landuse^b		
Open water		<1%
Wetland	Woody	5%
	Emergent herbaceous	<1%
Forest	Deciduous	22%
	Evergreen	21%
	Mixed	9%
Shrub/scrub		19%
Grassland/herbaceous		1%
Pasture/hay		11%
Cultivated crops		5%
Development	Open space	5%
	Low intensity	1%
	Moderate intensity	<1%
	High intensity	<1%
Population/km^{2c}		14
# NPDES Permits^d	TOTAL	2
Construction		2

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. Johnson Creek is a *Fish & Wildlife (F&W)* stream located in the Southern Hilly Gulf Coastal Plain sub-ecoregion (65d). At this location, Johnson Creek drains fourteen square miles in Bullock County. Based on the 2011 National Land Cover Dataset, landuse within the watershed is primarily forest (52%) with some agriculture (16%), and development (<8%). As of April 1, 2016, there are two NPDES permitted outfalls active in this watershed.

REACH CHARACTERISTICS

General observations (Table 2) and a habitat assessment (Table 3) were completed during the macroinvertebrate 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. Johnson Creek at JHCB-1 is a low gradient, glide-pool stream with sand, and silt substrates (Figure 1). Overall habitat quality was categorized as *marginal* due to the lack of instream habitats, straight channel, sediment deposition and unstable banks.

BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). The WMB-I uses measures of taxonomic richness, community composition, and community tolerance to assess the overall health of the macroinvertebrate community. Each metric is scored on a 100 point scale. The final score is the average of all individual metric scores. Metric results indicated the macroinvertebrate community to be in *fair* community condition (Table 4a).

The fish community in Johnson Creek at JHCB-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 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 Johnson Creek at JHCB-1 was 38, indicating the fish community to be in *fair* condition (Table 4b).

Table 2. Physical characteristics of Johnson Creek at JHCB-1, June 5, 2014.

Physical Characteristics	
Width (ft)	20
Canopy Cover	Mostly Shaded
Depth (ft)	
Run	0.5
Pool	1.5
% of Reach	
Run	90
Pool	10
% Substrate	
Mud/Muck	1
Sand	77
Silt	15
Organic Matter	7

Table 3. Results of the habitat assessment conducted on Johnson Creek at JHCB-1, June 5, 2014.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	29	Poor (<31)
Sediment Deposition	35	Marginal (31-<55)
Sinuosity	43	Marginal (31-<55)
Bank Vegetative Stability	51	Marginal (31-<58)
Riparian Buffer	84	Sub-Optimal (60-84)
Habitat Assessment Score	87	
% of Maximum Score	51	Marginal (31-<57)

Table 4a. Results of the macroinvertebrate bioassessment conducted in Johnson Creek at JHCB-1, June 5, 2014.

Macroinvertebrate Assessment		
	Results	
Taxa richness and diversity measures		
	# EPT taxa	15
Taxonomic composition measures		
	% Non-insect taxa	12
	% Plecoptera	4
	% Dominant taxon	16
Functional feeding group		
	% Predators	8
Community tolerance		
	Becks community tolerance index	3
	% Nutrient tolerant individuals	38
	WMB-I Assessment Score	47
	WMB-I Assessment Rating	Fair (37-55)

Table 4b. Results of the fish community assessment conducted in Johnson Creek at JHCB-1, June 6, 2014.

Fish Community Assessment		
	Results	Score
Species Richness & Diversity		
Total native species	20	5
Number of shiner species	4	3
Number of sucker species	0	1
Number of centrarchid species	7	5
Number of darter+madtom species	4	3
Tolerance & Intolerance Measures		
Percent of tolerant species	6.58	3
Percent Green Sunfish & Yellow Bullhead	1.97	3
Trophic Measures		
Percent insectivorous cyprinids	56.58	3
Percent invertivores	24.34	1
Percent top carnivores	1.97	3
Abundance, Condition & Reproductive Measures		
Percent DELT+hybrids	0	5
Number of lithophilic spawners	11	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, semi-monthly (for metals) from March through October of 2014 to help identify any stressors to the biological communities. No samples could be collected in July as stream was at flood stage and not wadeable. E.coli exceeded human health criterion in May. Heavy rains the day before sampling might have contributed to the high E.coli results. Median values of nutrients, chlorides, metals (total and dissolved aluminum, dissolved iron) and chlorophyll *a* were higher than expected based on the 90th percentile of reference reaches within the ecoregion 65d.

FOR MORE INFORMATION, CONTACT:

Sreeletha Kumar, ADEM Environmental Indicators Section
1350 Coliseum Boulevard Montgomery, AL 36110
(334) 260-2782 skumar@adem.state.al.us

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	E	Q
Physical								
Temperature (°C)	8	12.5	25.3	20.9	20.2	4.2		
Turbidity (NTU)	8	17.1	97.8	24.6	32.7	26.5		
Total Dissolved Solids (mg/L)	7	47.0	246.0	100.0	119.8	85.4		
Total Suspended Solids (mg/L)	7	12.0	52.0	15.0	20.4	14.3		
Specific Conductance (µmhos)	8	33.1	377.0	94.4 ^G	144.0	127.0		
Hardness (mg/L)	3	10.0	34.6	25.5 ^G	23.4	12.4		
^J Alkalinity (mg/L)	7	4.0	77.1	24.3	35.7	28.5		
Monthly Stream Flow (cfs)	6	1.9	39.9	10.2	14.9	14.8		
Stream Flow during Sample Collection (cfs)	6	1.9	39.9	10.2	14.9	14.8		
Chemical								
Dissolved Oxygen (mg/L)	8	5.2	10.8	7.3	7.7	1.7	1	
pH (su)	8	5.8 ^C	7.3	6.9	6.8	0.4	1	
Ammonia Nitrogen (mg/L)	7	< 0.006	0.206	0.106 ^M	0.109	0.071		
Nitrate+Nitrite Nitrogen (mg/L)	7	0.071	4.510	0.279	1.162	1.616		
Total Kjeldahl Nitrogen (mg/L)	7	0.610	1.600	0.956 ^M	1.044	0.350		
Total Nitrogen (mg/L)	7	0.826	5.900	1.314 ^M	2.206	1.871		
Dissolved Reactive Phosphorus (mg/L)	7	0.023	2.900	0.205 ^M	0.838	1.109		
^J Total Phosphorus (mg/L)	7	0.160	3.240	0.377 ^M	1.075	1.225		
^J CBOD-5 (mg/L)	7	< 2.0	< 2.0	1.0	1.0	0.0		
Chlorides (mg/L)	7	2.0	43.9	7.9 ^M	16.3	16.3		
Total Metals								
Aluminum (mg/L)	3	0.305	2.470	0.594 ^M	1.123	1.175		
Iron (mg/L)	3	1.700	3.180	2.870	2.583	0.780		
Manganese (mg/L)	3	0.068	0.093	0.069	0.077	0.014		
Dissolved Metals								
^J Aluminum (mg/L)	3	0.140	0.547	0.281 ^M	0.323	0.207		
Antimony (µg/L)	3	< 0.2	< 0.2	0.1	0.1	0.0		
^J Arsenic (µg/L)	3	0.8	3.2 ^H	1.1	1.7	1.3		3
Cadmium (µg/L)	3	< 0.246	< 0.246	0.123	0.123	0.000		
^J Chromium (µg/L)	3	0.964	1.840	1.274	1.359	0.444		
^J Copper (mg/L)	3	0.0006	0.001	0.001	0.0009	0.0003		
Iron (mg/L)	3	0.912	1.840	1.000 ^M	1.251	0.512		
^J Lead (µg/L)	3	0.3	0.5 ^S	0.3	0.3	0.1		1
^J Manganese (mg/L)	3	0.048	0.072	0.064	0.061	0.012		
^J Nickel (mg/L)	3	0.001	0.001	0.001	0.001	0.000		
Selenium (µg/L)	3	< 0.4	< 0.4	0.2	0.2	0.0		
Silver (µg/L)	3	< 0.252	< 0.252	0.126	0.126	0.000		
Thallium (µg/L)	3	< 0.2	< 0.2	0.1	0.1	0.0		
^J Zinc (mg/L)	3	0.005	0.006	0.005	0.005	0.001		
Biological								
Chlorophyll <i>a</i> (µg/L)	7	1.34	45.39	5.34 ^M	11.19	15.70		
^J E. coli (col/100mL)	7	127	4839 ^H	261	902	1738	1	

C= F&W criterion exceeded; E= # samples that exceeded criteria; G=value > median concentration of all verified reference reach data collected in the ecoregion 65d; H=F&W human health criterion exceeded; J=estimate; M=value > 90th percentile of all verified ecoregional reference reach data collected within ecoregions 65d; N=# samples; Q= criterion exceedance uncertain; S=F&W hardness-adjusted life use criterion exceeded.

SUMMARY

As part of the assessment process, ADEM will review the monitoring information presented in this report along with all other available data. Bioassessment results indicated the macroinvertebrate and fish communities to be in *fair* condition. However, habitat quality and availability was assessed as *marginal*. Additionally, nutrients, chlorides, and a few metals were higher than expected for this ecoregion. Monitoring should continue to ensure that water quality and biological conditions remain stable.