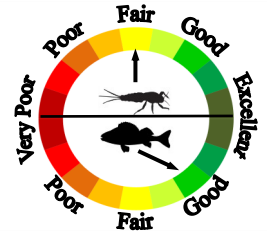


2019 Monitoring Summary



Shades Creek at Bibb County Road 12 near Gray Hill (33.22108/-87.03267)

BACKGROUND

Shades Creek was placed on Alabama's 1998 CWA section 303(d) list for impairment caused by siltation, dissolved oxygen, pathogens, turbidity and habitat alteration. The US Environmental Protection Agency approved a TMDL for Shades Creek in 2000. The Alabama Department of Environmental Management (ADEM) monitored two stations on Shades Ck in 2019 to evaluate conditions after implementation of the nutrient TMDL for the Cahaba River.

Shades Creek is within one of 50 Strategic Habitat Units (SHU) by the U.S. Fish and Wildlife Service (USFWS) and the Alabama Rivers & Streams Network (ARSN). SHUs are recognized as high quality habitats occupied by federally listed and state imperiled species.



Figure 1. Shades Creek at SHDJ-3, May 1, 2019.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Shades Creek is a *Fish & Wildlife (F&W)* stream located in the Southern Sandstone Ridges ecoregion of Bibb County. Based on the 2021 National Land Cover Dataset, landuse within the watershed is primarily forested (42%) and pasture (9%). Forty-three percent of the watershed has been developed. Shades Creek has 573 permitted outfalls.

REACH CHARACTERISTICS

General observations (Figure 1, Table 2) and a habitat survey (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. Shades Creek at SHDJ-3 (Figure 1) is a high-gradient, boulder, cobble and gravel bottomed stream. Habitat quality and availability was rated as *optimal* for supporting diverse aquatic macroinvertebrate and fish communities.

BIOASSESSMENT RESULTS

The benthic macroinvertebrate community was sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). Measures of taxonomic richness, community composition and pollution tolerance were used to assess the overall health of the macroinvertebrate community in comparison to conditions expected in north Alabama streams and rivers. Each site is placed in one of six levels ranging from 1, or *natural*, to 6, or *highly altered*. Survey results indicate the macroinvertebrate community to be in *fair* condition, with 63 total taxa and 15 sensitive and 1 highly sensitive taxa collected. (Table 4a).

The fish community in Shades Creek at SHDJ-3 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 to score the overall health of the fish community, based on conditions expected for Wadeable streams and rivers in the Ridge and Valley Piedmont 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 Shades Creek at SHDJ-3 was 44, indicating the fish community to be in *Good* condition (Table 4b).

Table 1. Summary of general watershed characteristics: SHDJ-3.

Watershed Characteristics	
Basin	Cahaba
Drainage Area (mi²)	131.6
Ecoregion^o	67h
Assessment Unit	AL03150202-0303-100
Use Class	F&W
AU Category	3
12-digit Hydrologic Unit Code (HUC)	31502020303
Conservation Status	
Strategic Habitat Unit †	27 Cahaba River
Landuse Categories (2021 National Land Cover Dataset)	
Open Water (%)	0.7
Wetland, Total (%)	3.3
Wetlands, Woody (%)	3.2
Emergent Herbaceous Wetlands (%)	0.1
Forested, Total (%)	41.8
Forested, Deciduous (%)	24.6
Forested, Evergreen (%)	5.8
Forested, Mixed (%)	11.4
Shrub/Scrub (%)	1.3
Grassland/Herbaceous (%)	0.8
Pasture/Hay (%)	9.0
Developed, Total (%)	42.9
Developed, Open Space (%)	19.1
Developed, Low Intensity (%)	13.5
Developed, Medium Intensity (%)	7.7
Developed, High Intensity (%)	2.5
Barren Land (Rock/Sand/Clay)(%)	0.1
Population/km (2020 US Census Data)	998
NPDES outfalls (NPDES database)	
Total # of Permitted Outfalls	573
# of Construction Stormwater Permits	405
# of Industrial General	142
# of Industrial Individual	4
# of Mining Permits	8
# of MS4 Permits	8
# of Municipal Permits	3
# of SID Permits	3

^o Southern Sandstone Ridges

† 12-digit HUC located in a Strategic Habitat Unit.

Table 2. Physical characteristics of Shades Creek at SHDJ-3, May 1, 2019.

Physical Characteristics	
Width (ft)	60
Canopy Cover	Mostly Open
Depth (ft)	
Riffle	1.0
Run	1.5
Pool	2.0
% of Reach	
Riffle	30
Run	60
Pool	10
% Substrate	
Boulder	50
Cobble	15
Gravel	15
Sand	10
Silt	5
Organic Matter	5

Table 3. Results of the habitat assessment survey conducted on Shades Creek at SHDJ-3, May 1, 2019.

Habitat Survey	% Max Score	Rating
Instream Habitat Quality	85	Optimal (80-100)
Sediment Deposition	86	Optimal (80-100)
Riffle Frequency	90	Optimal (80-100)
Bank Vegetative Stability	88	Optimal (80-100)
Riparian Zone Measurements	90	Optimal (80-100)
Habitat Assessment Score	175	
% Maximum Score	87	Optimal (85-100)

Table 4a. Results of the macroinvertebrate survey conducted on Shades Creek at SHDJ-3, May 1, 2019.

Macroinvertebrate Assessment	Results	Scores
Taxonomic richness and diversity metrics		
Taxa Count	63	63
# rare and highly sensitive taxa	1	1
# sensitive taxa	15	15
# sensitive EPT taxa	9	9
Percent taxon metrics		
% rare and highly sensitive taxa	2	2
% sensitive taxa	24	24
% sensitive EPT taxa	14	14
% highly tolerant taxa	13	13
Percent individual metrics		
% rare and highly sensitive individuals	0	0
% sensitive individuals	6	6
% sensitive EPT individuals	5	5
% tolerant individuals	39	39
WMB-I Survey Score		4.0
WMB-I Survey Rating		Fair (3.85-4.149)

Table 4b. Results of the fish survey conducted on Shades Creek at SHDJ-3, 06/19/2019.

Fish Assessment	Results	Scores
Taxonomic richness and diversity metrics		
Total Native Species	23	3
Number of shiner species	4	3
Number Lepomis species	4	3
Number of darter+madtom species	6	3
Tolerance metrics		
Number of intolerant species	3	5
Percent of tolerant species	7	5
Percent Lepomis	8	5
Trophic metrics		
Percent omnivores	19	3
Percent insectivorous Cyprinids	50	3
Percent top carnivores	2	3
Abundance, condition, and reproductive metrics		
Percent DELT+hybrids	0	5
Percent simple miscellaneous	24	3
IBI Survey Score		44
IBI Survey Rating		Good

WATER CHEMISTRY

Results of water chemistry are presented in Table 5. In situ measurements and water samples were collected monthly from March to October of 2019 to help identify any stressors to the biological communities. pH exceeded the aquatic life use criterion for the *Fish & Wildlife* use classification during three sampling events. Individual pH and dissolved oxygen values were higher than all verified ecoregional reference reach data collected in the ecoregion 67h. Median specific conductance, alkalinity, and nitrate-nitrite nitrogen values were higher than the median concentration of all verified ecoregional reference reach data collected in ecoregion 67h.

Table 5. Summary of water quality data collected March-October, 2019. 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.

SHDJ-3 AL03150202-0303-100	N	Min	Max	Med	Avg	SD	E	10thP	90thP
Physical									
Temperature (°C)	10	8.9	29.9	23.1	21.5	6.3		11.8	28.8
Turbidity (NTU)	11	2.4	12.1	3.4	5.0	3.6		2.6	12.1
Total Dissolved Solids (mg/L)	8	104.0	227.0	139.0	149.1	38.1		104.0	227.0
Total Suspended Solids (mg/L)	8	1.0	14.0	3.5	4.9	4.3		1.0	14.0
Specific Conductance (µmhos/cm)	10	156.6	349.7	265.9 ^G	267.1	55.1		194.2	335.2
Alkalinity (mg/L)	8	62.7	147.0	121.0 ^M	116.8	27.0		62.7	147.0
Measured Stream Flow (cfs)	6	1.2	70.1	14.6	22.0	24.7		1.2	70.1
Chemical									
Dissolved Oxygen (mg/L)	10	6.9 ^D	11.8	8.5	8.8	1.4		7.3	10.8
pH (SU)	10	7.8	8.7 ^C	8.1	8.2	0.3	3	7.8	8.7
Ammonia Nitrogen (mg/L)	7	<0.004	<0.016	0.008	0.006	0.003		0.002	0.008
Nitrate+Nitrite Nitrogen (mg/L)	8	0.096	0.348	0.156 ^M	0.195	0.088		0.096	0.348
Total Kjeldahl Nitrogen (mg/L)	7	<0.075	0.532	0.100	0.172	0.170		0.038	0.532
Total Nitrogen (mg/L)	7	<0.134	0.666	0.367	0.356	0.174		0.134	0.666
Dis Reactive Phosphorus (mg/L)	8	<0.005	0.009	0.005	0.005	0.002		0.002	0.009
Total Phosphorus (mg/L)	8	0.009	0.018	0.014	0.014	0.003		0.009	0.018
CBOD-5 (mg/L)	8	<2.0	<2.0	1.0	1.0	0.0		1.0	1.0
Chlorides (mg/L)	8	3.2	10.1	5.8	6.5	2.5		3.2	10.1
Sulfate (mg/L)	8	9.25	23.40	12.00	13.66	5.06		9.25	23.40
Biological									
Chlorophyll a (mg/m³)	8	<0.53	3.20	0.52	0.98	0.93		0.50	3.20
E. coli (MPN/DL)	8	5.2	142.1	34.4	47.5	43.0		5.2	142.1

C=F&W criterion violated; D=an individual value >90% of all verified ecoregional reference reach data collected in the ecoregion 67h; E=# samples that exceeded criteria; J=estimate; G= value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 67h; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 67h; N=# samples.

SUMMARY

As part of the assessment process, ADEM will review the monitoring information presented in this report, along with all other available data. Shades Creek at SHDJ-3 is typical of streams in the region, characterized by moderate to high gradient riffles with boulder, cobble and gravel substrates. pH exceeded the aquatic life use criterion for the *Fish & Wildlife* use classification during three sampling events. Individual pH and dissolved oxygen values were higher than all verified ecoregional reference reach data collected in the ecoregion 67h. Median specific conductance, alkalinity, and nitrate-nitrite nitrogen values were higher than the median concentration of all verified ecoregional reference reach data collected in ecoregion 67h. Macroinvertebrate diversity and taxa richness are *fair* and the fish community was found to be in *good* condition.

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