

2019 Monitoring Summary

Ecological Reference Reach



Hatchet Creek at County Road 4 in Clay County (33.13045/-86.05469)

BACKGROUND

Hatchet Creek is among the least-disturbed watersheds within the Southern Inner Piedmont ecoregion, based on landuse, road density, and population density. Since 2016, it has been monitored by the Alabama Department of Environmental Management (ADEM) as a “high quality” reference watershed for comparison with other streams within the ecoregion. Data from reference watersheds are used to characterize natural or background conditions expected in different ecoregions throughout the state. Hatchet Creek was sampled in 2019 to provide high-quality reference reach data for Southern Inner Piedmont streams.

Hatchet 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. Hatchet Creek at HAT-3, June 13, 2019.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Hatchet Creek is a *Outstanding Alabama Waters (OAW)* stream located within the Coosa River Basin. According to the 2011 National Land Cover Dataset, the watershed is 77% forested with forty-four permitted outfalls. It is sparsely populated with few roads and urban development. It is located within a Strategic Habitat Unit (29 Hatchet Creek) that supports federally listed threatened or endangered aquatic species and other aquatic species listed to be of the *Highest* or *High Conservation Concern* by the state of Alabama. Hatchet Creek is designated by the U. S. Fish and Wildlife Service as a Critical Habitat for nine species of mussels.

REACH CHARACTERISTICS

General observations (Table 2) and a habitat survey (Table 3) were completed during the fish IBI 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. Hatchet Creek at HAT-3 (Figure 1) is a low to moderate gradient stream characterized predominantly by bedrock, boulder, and cobble substrate. Hatchet Creek consists of mostly runs, with limited percentages of riffles and pools within this reach. Overall habitat quality was categorized as *good* for supporting the biological communities in this stream type due to the lack of multiple layers of stable riffle substrate and a balance of velocity/depth regimes within the reach.

Table 1. Summary of general watershed characteristics: HAT-3 (2019).

Watershed Characteristics	
Basin	Coosa
Drainage Area (mi²)	59.5
Ecoregion^o	45a
Assessment Unit	AL03150107-0706-
Use Class	OAW/PWS/S/
AU Category	1
12-digit Hydrologic Unit Code (HUC)	031501070702
Conservation Status	
Strategic Habitat Unit [†]	29 Hatchet Creek
Landuse Categories (2011 National Land Cover Dataset)	
Open Water (%)	0.1
Wetland, Total (%)	2.6
Wetlands, Woody (%)	2.5
Wetlands, Emergent Herba-	0.1
Forested, Total (%)	77.2
Forested, Deciduous (%)	50.7
Forested, Evergreen (%)	25.2
Forested, Mixed (%)	1.2
Shrub/Scrub (%)	5.5
Grassland/Herbaceous (%)	7.5
Pasture/Hay (%)	4.6
Developed, Total (%)	2.3
Developed, Open Space (%)	2.3
Barren Land (Rock, Sand, Clay) (%)	0.2
Population/km (2010 US Census)	3
NPDES outfalls (NPDES database, Jan 1, 2016)	
Total # of Permitted Outfalls	44
# of Construction Stormwater	44
Roads	
Road Density	1.2
# Road Crossings per Stream km	0.4
Watershed Disturbance Score*	50
Watershed Disturbance Category*	3

^o Southern Inner Piedmont

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

* Measure of watershed disturbance based on landuse, population, and road density summarized in this table.

Table 2. Physical characteristics of Hatchet Creek at HAT-3, May 29, 2019.

Physical Characteristics	
Width (ft)	100
Canopy Cover	Estimate 50/50
Depth (ft)	
Riffle	0.5
Run	1.0
Pool	1.5
% of Reach	
Riffle	15
Run	60
Pool	25
% Substrate	
Bedrock	40
Boulder	10
Cobble	13
Gravel	15
Sand	15
Organic Matter	7

Table 3. Results of the habitat assessment survey conducted on Hatchet Creek at HAT-3, May 29, 2019.

Habitat Survey	% Max Score	Rating
Bank Vegetative Stability	89	Optimal (80-100)
Instream Habitat Quality	75	Sub-optimal/Optimal (75-79.999)
Riparian Zone Measurements	85	Optimal (80-100)
Sediment Deposition	81	Optimal (80-100)
Riffle Frequency	83	Optimal (80-100)
Habitat Assessment Score	164	
% Maximum Score	82	Good (63-83.999)

BIOASSESSMENT RESULTS

The fish community in Hatchet Creek at HAT-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 Hatchet Creek at HAT-3 was 46, indicating the fish community to be in *good* condition (Table 4). Three of the twenty-five native species found are known to be intolerant and found in high quality streams.

Table 4. Results of the fish survey conducted on Hatchet Creek at HAT-3, May 29, 2019.

Fish Assessment	Results	Scores
Taxonomic richness and diversity metrics		
Total Native Species	25	3
Number of shiner species	6	3
Number Lepomis species	2	1
Number of darter+madtom species	7	5
Tolerance metrics		
Number of intolerant species	3	5
Percent of tolerant species	1	5
Percent Lepomis	4	5
Trophic metrics		
Percent omnivores	3	5
Percent insectivorous Cyprinids	49	3
Percent top carnivores	2	3
Abundance, condition, and reproductive metrics		
Percent DELT+hybrids	0	5
Percent simple miscellaneous	29	3
IBI Survey Score		46
IBI Survey Rating		Good

WATER CHEMISTRY

Results of water chemistry analyses are summarized in Table 5. In situ measurements and water samples were collected semi-monthly, in April, June, August, and October of 2019 to help characterize the reach. Data collected in 2019 shows that Hatchet Creek at HAT-3 is fully supporting the “*Outstanding Alabama Waters*” use classification. Specific Conductance and Hardness were slightly elevated compared to existing benchmark data from ADEM’s least impaired reference reaches in the Southern Inner Piedmont ecoregion (45A).

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Table 5. Summary of water quality data collected April, June, August and 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.

HAT-3 AL03150107-0706-102	N	Min	Max	Med	Avg	SD	10thP	90thP
Physical								
Temperature (°C)	5	13.9	26.2	22.3	20.0	5.4	13.9	26.2
Turbidity (NTU)	5	4.3	6.3	5.4	5.5	0.8	4.3	6.3
Total Dissolved Solids (mg/L)	4	16.0	27.0	21.5	21.5	4.9	16.0	27.0
Total Suspended Solids (mg/L)	4	1.0	3.0	1.5	1.8	1.0	1.0	3.0
Specific Conductance (µmhos/cm)	5	29.5	48 ^D	41.4 ^G	41.0	7.3	29.5	48.0
Hardness (mg/L)	4	10.5	18.6 ^D	14.39 ^G	14.4	3.5	10.5	18.6
Alkalinity (mg/L)	4	8.9	18.1	14.6	14.0	3.8	8.9	18.1
Measured Stream Flow (cfs)	5	6.6	61.2	16.6	22.5	22.4	6.6	61.2
Chemical								
Dissolved Oxygen (mg/L)	5	7.5	10.6	8.2	8.7	1.3	7.5	10.6
pH (SU)	5	6.9	7.2	7.0	7.0	0.1	6.9	7.2
Ammonia Nitrogen (mg/L)	4	<0.004	<0.016	0.008	0.006	0.003	0.002	0.008
Nitrate+Nitrite Nitrogen (mg/L)	4	0.020	0.103	0.074	0.068	0.036	0.020	0.103
Total Kjeldahl Nitrogen (mg/L)	4	<0.2	1.610	0.100	0.478	0.755	0.100	1.610
Total Nitrogen (mg/L)	4	<0.163	1.630	0.194	0.545	0.724	0.163	1.630
Dis Reactive Phosphorus (mg/L)	4	<0.005	<0.005	0.002	0.002	0.000	0.002	0.002
^J Total Phosphorus (mg/L)	4	0.008	0.019	0.016	0.014	0.005	0.008	0.019
^J CBOD-5 (mg/L)	4	<2	<2	1.0	1.0	0.0	1.0	1.0
Chlorides (mg/L)	4	1.4	1.8	1.5	1.6	0.2	1.4	1.8
Sulfate (mg/L)	4	1.42	2.92	1.91	2.04	0.65	1.42	2.92
Total Metals								
^J Aluminum (T) (mg/L)	4	0.074	0.197	0.141	0.138	0.065	0.074	0.197
Iron (T) (mg/L)	4	0.314	0.777	0.540	0.543	0.190	0.314	0.777
^J Manganese (T) (mg/L)	4	<0.004	0.032	0.012	0.014	0.015	0.002	0.032
Dissolved Metals								
^J Aluminum (mg/L)	4	<0.023	0.122	0.042	0.054	0.048	0.012	0.122
Antimony (µg/L)	4	<1.48	<1.48	0.740	0.740	0.000	0.740	0.740
Arsenic (µg/L)	4	<0.689	<0.689	0.344	0.344	0.000	0.344	0.344
Cadmium (µg/L)	4	<0.726	<0.726	0.363	0.363	0.000	0.363	0.363
Chromium (µg/L)	4	<0.793	<0.793	0.396	0.396	0.000	0.396	0.396
^J Copper (µg/L)	4	<1.19	1.480	0.595	0.816	0.442	0.595	1.480
^J Iron (mg/L)	4	0.144	0.372	0.340	0.299	0.104	0.144	0.372
Lead (µg/L)	4	<0.697	<0.697	0.348	0.348	0.000	0.348	0.348
^J Manganese (mg/L)	4	<0.004	0.009	0.002	0.004	0.004	0.002	0.009
Nickel (µg/L)	4	<1.96	<1.96	0.980	0.980	0.000	0.980	0.980
Selenium (µg/L)	4	<1.9	<1.9	0.950	0.950	0.000	0.950	0.950
Silver (µg/L)	4	<1.35	<1.35	0.675	0.675	0.000	0.675	0.675
Thallium (µg/L)	4	<0.641	<0.641	0.320	0.320	0.000	0.320	0.320
Zinc (µg/L)	4	<2.34	6.740	1.170	2.562	2.785	1.170	6.740
Metals CCU	4	1.322	2.797	1.984	2.022	0.697	1.322	2.797
Biological								
Chlorophyll a (mg/m³)	4	<1	1.07	0.78	0.78	0.33	0.50	1.07
E. coli (MPN/DL)	4	42.0	224.7	64.8	99.1	85.4	42.0	224.7

D=an individual value >90% of all verified ecoregional reference reach data collected in the ecoregion 45A; E= # samples that exceeded criteria; J= estimate; N=# samples.; Q= uncertain estimate; G= ecoregional reference parameters that are above the expected median of data in ecoregion 45A.

SUMMARY

The ADEM monitors Hatchet Creek at HAT-3 as a “high-quality” reference reach for comparison with other Southern Inner Piedmont streams. Hatchet Creek at HAT-3 is typical of streams in the region, characterized by low to moderate gradient riffles with boulder and bedrock substrates. Located within the 29 Hatchet Creek SHU, the watershed is of reference quality, containing forty-four permitted outfalls and is mostly forested. Bioassessment results indicated the habitat and fish community were in *Good* condition and capable of supporting intolerant species. Water quality conditions are very high, exhibiting low water temperatures, and low concentrations of sediment and nutrients. However, during multiple sampling events, specific conductance and hardness values were elevated as compared to data from ADEM’s least impaired reference reaches in the Southern Inner Piedmont ecoregion (45A). Monitoring should continue to ensure that water quality and biological conditions remain stable.