

2014 Monitoring Summary



Abbie Creek at Highway 95 in Henry County (31.47246/-85.16238)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Abbie Creek watershed for biological and water quality monitoring as part of the 2014 Assessment of the Southeast Alabama Basin (SEAL). The objectives of the SEAL Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the basin. Fish community and habitat surveys were conducted at the site, along with water chemistry sampling.



Figure 1. Abbie Creek at ABIH-2 taken, July 30, 2014.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Abbie Creek is a *Fish & Wildlife (F&W)* stream located in Henry County, near the town of Abbeville. It has a drainage area of 146 square miles, draining portions of Barbour and Henry counties in Alabama before confluence with the Chattahoochee River. Based on the 2011 National Land Cover Dataset, fifty percent of the watershed is forested. As of April 1, 2016, ADEM has issued 28 NPDES permits in this watershed.

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. Abbie Creek at ABIH-2 (Figure 1) consists primarily of a hardpan clay substrate. Overall habitat quality was categorized as *sub-optimal*, with some sediment deposition and limited instream habitat and riparian buffers.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		Chattahoochee R
Basin		
Drainage Area (mi²)		146
Ecoregion^a		65D
% Landuse^b		
Open water		<1%
Wetland	Woody	3%
	Emergent herba- ceous	<1%
Forest	Deciduous	13%
	Evergreen	23%
	Mixed	14%
Shrub/scrub		17%
Grassland/herbaceous		2%
Pasture/hay		5%
Cultivated crops		16%
Development	Open space	4%
	Low intensity	1%
	Moderate intensity	<1%
	High intensity	<1%
Barren		<1%
Population/km^{2c}		15
# NPDES Permits^d	TOTAL	28
	Construction	7
	Industrial General	1
	Industrial Individual	1
	Mining	14
	Municipal	1
	Small Mining	4

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.

Table 2. Physical characteristics of Abbie Creek at ABIH-2, July 30, 2014.

Physical Characteristics		
Width (ft)		35
Depth (ft)		1.8
Canopy Cover	Estimate 50/50	
	Riffle	1.0
	Run	2.5
	Pool	1.5
% of Reach		
	Riffle	5
	Run	90
	Pool	5
% Substrate		
	Gravel	2
	Hard Pan Clay	72
	Sand	20
	Silt	2
	Organic Matter	4

Table 3. Results of the habitat assessment conducted on Abbie Creek at ABIH-2, July 30, 2014.

Habitat Assessment	% Max Score	Rating
Instream Habitat Quality	55	Sub-Optimal (55-79)
Sediment Deposition	69	Sub-Optimal (55-79)
Riffle frequency	52.5	Marginal (31-<55)
Bank Vegetative Stability	89	Optimal (>79)
Riparian Buffer	80	Sub-Optimal (60-84)
Habitat Assessment Score	139	
% Maximum Score	69	Sub-Optimal (57-80)

Table 4. Results of the fish community bioassessment conducted in Abbie Creek at ABIH-2, July 30, 2014.

Fish Community Assessment		
	Results	Score
Species Richness & Diversity Measures		
Total native species	14	1
Number shiner species	4	3
Number of sucker species	0	1
Number of centrarchid species	3	1
Number of darter+madtom species	3	1
Tolerance & Intolerance Measures		
Percent of tolerant species	0.97	5
Percent Green Sunfish & Yellow Bullhead	0.97	3
Trophic Measures		
Percent insectivorous cyprinids	33.98	3
Percent invertivores	40.78	3
Percent top carnivores	0	1
Abundance, Condition & Reproductive Measures		
Percent DELT+hybrids	0.97	1
Number of lithophilic spawners	8	1
IBI Assessment Score		24
Condition		Very Poor

BIOASSESSMENT RESULTS

The fish community in Abbie Creek at ABIH-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 Abbie Creek at ABIH-2 was 24, indicating the fish community to be in *very poor* condition (Table 4).

Only 14 native species were present at the time of the assessment and no sucker species were collected. The overall diversity of the stream was low, with an abundance of tolerant species found at this station.

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. When possible, in situ measurements and water samples were collected monthly or semi-monthly for metals during March through October 2014 to help identify any stressors to the biological communities. Specific conductance, total nitrogen, nitrate+nitrite nitrogen, and dissolved reactive phosphorous were higher than expected for ecoregional reference streams found in the Southern Hilly Gulf Coastal Plain ecoregion (65d). The F&W criterion for turbidity was exceeded during the month of October. Turbidity was highest on October 15, 2014, possibly due to heavy rains prior to sampling, and above normal flow stage. Furthermore, E. coli exceeded the single sample summer criterion in April and August, and the single sample winter criterion in October.

Table 5. Summary of water quality data collected March-October, 2014. 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.

Parameter	N	Min	Max	Med	Avg	SD	E	Q
Physical								
Temperature (°C)	9	14.2	25.3	24.0	21.4	4.2		
Turbidity (NTU)	9	11.3	112.0 ^T	26.7	40.3	36.6		1
Total Dissolved Solids (mg/L)	8	31.0	96.0	58.0	60.0	20.8		
Total Suspended Solids (mg/L)	8	6.0	69.0	20.0	24.0	19.1		
Specific Conductance (µmhos)	9	0.7	70.7	56.9 ^M	49.5	22.3		
Hardness (mg/L)	4	15.1	22.4	17.7	18.2	3.2		
Alkalinity (mg/L)	8	4.5	20.6	12.8	12.4	5.5		
Monthly Stream Flow (cfs)	1				63.2			
Stream Flow during Sample Collection (cfs)	1				63.2			
Chemical								
Dissolved Oxygen (mg/L)	9	8.2	10.4	8.9	8.9	0.6		
pH (su)	9	6.2	7.8	7.1	7.0	0.5		
^J Ammonia Nitrogen (mg/L)	8	<0.006	0.013	0.003	0.005	0.003		
Nitrate+Nitrite Nitrogen (mg/L)	8	0.183	1.166	0.744 ^M	0.722	0.312		
^J Total Kjeldahl Nitrogen (mg/L)	8	0.231	0.972	0.384	0.484	0.271		
^J Total Nitrogen (mg/L)	8	0.776	1.919	1.135 ^M	1.206	0.362		
^J Dissolved Reactive Phosphorus (mg/L)	8	0.005	0.086	0.020 ^M	0.027	0.027		
Total Phosphorus (mg/L)	8	0.033	0.108	0.060	0.060	0.023		
^J CBOD-5 (mg/L)	8	<2.0	<2.0	1.0	1.0	0.0		
Chlorides (mg/L)	8	1.8	5.8	4.4	4.3	1.3		
Total Metals								
Aluminum (mg/L)	4	0.267	0.650	0.465	0.462	0.157		
Iron (mg/L)	4	1.330	2.430	2.020	1.950	0.510		
^J Manganese (mg/L)	4	0.031	0.077	0.069	0.062	0.021		
Dissolved Metals								
^J Aluminum (mg/L)	4	<0.050	0.098	0.045	0.053	0.035		
Antimony (µg/L)	4	<0.2	<0.4	0.1	0.1	0.1		
^J Arsenic (µg/L)	4	0.5	0.6 ^H	0.5	0.5	0.0		4
Cadmium (µg/L)	4	<0.246	<0.390	0.123	0.141	0.036		
^J Chromium (µg/L)	4	0.410	1.150	0.766	0.773	0.360		
^J Copper (mg/L)	4	0.0003	0.001	0.0004	0.0005	0.0001		
Iron (mg/L)	4	0.771	0.985	0.788	0.833	0.102		
Lead (µg/L)	4	<0.2	<0.5	0.1	0.2	0.1		
^J Manganese (mg/L)	4	0.013	0.020	0.016	0.016	0.004		
^J Nickel (mg/L)	4	0.0004	0.002	0.0007	0.001	0.001		
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	<0.6	0.1	0.2	0.1		
^J Zinc (mg/L)	4	0.002	0.003	0.003	0.003	0.000		
Biological								
Chlorophyll a (ug/L)	8	<0.10	2.67	1.34	1.44	0.88		
^J E. coli (col/100mL)	8	179	4839 ^H	345	923	1592		3

C= F&W criterion violated; E= samples that exceeded criteria; H= human health criterion exceeded for F&W designated stream; J=estimate; M=value>90% of all verified ecoregional reference reach data collected in the ecoregion 65d; N= # samples; T= value exceeds 50 NTU above the 90th percentile of all verified ecoregional reference reach data collected in the ecoregion Southern Hilly Gulf Coastal Plain.

SUMMARY

As part of the assessment process, ADEM will review the monitoring information presented in this report, along with all other available data. Overall habitat quality was rated as *sub optimal* for Abbie Creek at ABIH-2. Bioassessment results indicated the fish community to be *very poor*. Further sampling may be required to get a representative rating of the stream and to ensure that water quality criteria are met and biological conditions remain stable.

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