Alabama Department of Environmental Management

Ecological Reference Reach

Rivers and Streams Monitoring Program

2014 Monitoring Summary

Fair™

Jernigan Mill Creek at Louisville Street in Escambia County (31.03388/-87.16451)

BACKGROUND

Jernigan Mill Creek was monitored as part of the 2014 assessment of the Southeast Alabama River Basins. The objectives of the project were to provide data to fully assess the reach and to estimate overall water quality within the basin.

A previous survey of Jernigan Mill Creek at Louisville Street conducted by the Geological Survey of Alabama indicated the fish community to be in *good* condition. The reach is among the least-disturbed watersheds in the Southern Pine Plains and Hills ecoregion based on landuse, road density, and population density. Therefore, these data will also be used to evaluate the use of Jernigan Mill Creek as a "*best attainable*" condition reference watershed for comparison with other streams in ecoregion 65f.

Figure 1. Jernigan Mill Creek at JGME-1, September 3, 2014.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Conecuh R
Drainage Area (mi^2)		8
Ecoregion[a]		65F
% Landuse[b]		
Open water		<1%
Wetland	Woody	14%
	Emergent herbaceous	1%
Forest	Deciduous	1%
	Evergreen	17%
	Mixed	4%
Shrub/scrub		17%
Grassland/herbaceous		5%
Pasture/hay		12%
Cultivated crops		22%
Development	Open space	4%
	Low intensity	1%
	Moderate intensity	<1%
	High intensity	<1%
Population/km^2[c]		19

a.Southern Pine Plains & Hills

b.2011 National Land Cover Dataset

c.2010 US Census

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Jernigan Mill Creek at JGME-1 is a *Fish & Wildlife (F&W)* stream located in the small town of Pollard. Based on the 2011 National Land Cover Dataset, landuse within the watershed is forest (37%) with some shrubs and cultivated crops. As of April 1, 2016, no NPDES outfalls were active within the watershed (ADEM NPDES Management System).

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. Jernigan Mill Creek is a riffle-run stream with a bottom substrate dominated by gravel and sand (Figure 1). Habitat quality and availability were rated *sub-optimal* for supporting diverse aquatic macroinvertebrate communities.

Table 2. Physical characteristics of Jernigan Mill Creek at JGMB-1, May 8, 2014.

Physical Characteristics		
Width (ft)		15
Canopy Cover		Shaded
Depth (ft)		
	Riffle	0.3
	Run	0.5
	Pool	1.7
% of Reach		
	Riffle	3
	Run	80
	Pool	17
% Substrate		
	Gravel	60
	Sand	22
	Silt	10
	Organic Matter	8

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* condition (Table 4).

Table 3. Results of the habitat assessment conducted on Jernigan Mill Creek at JGME-1, May 8, 2014.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	63	Sub-Optimal (55-79)
Sediment Deposition	59	Sub-Optimal (55-79)
Riffle frequency	72.5	Sub-Optimal (55-79)
Bank Vegetative Stability	74	Sub-Optimal (58-79)
Riparian Buffer	75	Sub-Optimal (60-84)
Habitat Assessment Score	**136**	
% Maximum Score	**68**	**Sub-Optimal (57-80)**

Table 4. Results of the macroinvertebrate bioassessment conducted in Jernigan Mill Creek at JGME-1, May 8, 2014.

Macroinvertebrate Assessment		
	Results	**Scores**
Taxa richness and diversity measures		**(0-100)**
% EPC taxa	18	15
% Trichoptera & Chironomidae Taxa	41	43
Taxonomic composition measures		
% EP Individuals	17	33
Functional feeding group		
% Collector-Filterer Individuals	18	74
Community tolerance		
% Nutrient Tolerant individuals	32	58
WMB-I Assessment Score	**---**	**44**
WMB-I Assessment Rating		**Fair (31-45)**

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected March through October of 2014 to help identify any stressors to the biological communities. Organics were collected at Jernigan Mill Creek on April 2nd; with the exception of atrazine, all parameters were below detection limits. Median values for specific conductance, nitrate+nitrite nitrogen, total nitrogen, total and dissolved manganese, and chlorophyll *a* were higher than background levels, based on reference reach data from streams in ecoregion 65f. Stream pH was typical of the ecoregion.

SUMMARY

Condition of the macroinvertebrate community was rated as fair. In-stream habitat quality at Jernigan Mill Creek was rated as *sub-optimal*. Conductivity and nitrogen concentrations were higher than expected, based on ecoregional reference reach data. Monitoring should continue to ensure that water quality and biological conditions remain stable.

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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)	10	16.0	24.4	20.0	20.3	3.2		
Turbidity (NTU)	10	3.9	43.1	5.1	9.6	12.0		
Total Dissolved Solids (mg/L)	8	< 1.0	74.0	50.5	46.4	21.8		
Total Suspended Solids (mg/L)	8	2.0	47.0	6.5	13.9	15.9		
Specific Conductance (µmhos)	10	32.1	40.9	37.7 [=]	37.5	2.3		
Hardness (mg/L)	4	7.0	10.6	9.1	8.9	1.5		
· Alkalinity (mg/L)	8	2.9	6.0	4.9	4.8	0.9		
Monthly Stream Flow (cfs)	9	3.5	19.9	7.0	8.1	5.1		
Stream Flow during Sample Collection (cfs)	9	3.5	19.9	7.0	8.1	5.1		
Chemical								
Dissolved Oxygen (mg/L)	10	7.8	9.2	8.4	8.6	0.5		
pH (su)	10	5.6 [=]	6.7	6.3	6.2	0.4	2	
· Ammonia Nitrogen (mg/L)	8	< 0.006	0.014	0.004	0.005	0.004		
Nitrate+Nitrite Nitrogen (mg/L)	8	0.261	0.649	0.430 [M]	0.450	0.134		
· Total Kjeldahl Nitrogen (mg/L)	8	0.105	0.730	0.318	0.363	0.229		
· Total Nitrogen (mg/L)	8	0.510	0.993	0.834 [M]	0.813	0.160		
· Dissolved Reactive Phosphorus (mg/L)	8	< 0.002	0.005	0.004	0.003	0.001		
· Total Phosphorus (mg/L)	8	0.008	0.038	0.012	0.018	0.011		
· CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0		
COD (mg/L)	8	< 16	18.4	11.2	10.7	6.2		
TOC (mg/L)	8	2.5	6.6	4.2	4.5	1.6		
Chlorides (mg/L)	8	4.3	6.0	5.2	5.2	0.6		
Atrazine (µg/L)	1				0.34			
Total Metals								
· Aluminum (mg/L)	4	0.084	1.320	0.226	0.464	0.574		
Iron (mg/L)	4	0.753	1.770	1.212	1.236	0.504		
· Manganese (mg/L)	4	0.018	0.113	0.098 [M]	0.082	0.043		
Dissolved Metals								
· Aluminum (mg/L)	4	< 0.050	0.180	0.085	0.094	0.068		
Antimony (µg/L)	4	< 0.2	< 0.4	0.1	0.1	0.1		
· Arsenic (µg/L)	4	< 0.3	0.6 [-1]	0.4	0.4	0.2		3
Cadmium (µg/L)	4	< 0.246	< 0.390	0.124	0.142	0.036		
· Chromium (µg/L)	4	< 0.430	1.135	0.510	0.592	0.390		
· Copper (mg/L)	4	< 0.0003	0.0004	0.0003	0.0003	0.000		
Iron (mg/L)	4	0.414	0.830	0.514	0.568	0.184		
Lead (µg/L)	4	< 0.2	< 0.5	0.1	0.2	0.1		
· Manganese (mg/L)	4	0.008	0.089	0.081 [M]	0.065	0.038		
· Nickel (mg/L)	4	0.0003	0.002	0.0005	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		
· Zinc (mg/L)	4	0.004	0.012	0.007	0.007	0.004		
Biological								
Chlorophyll a (ug/L)	8	< 0.10	8.01	2.22 [M]	3.14	2.79		
· E. coli (col/100mL)	8	70	866	163	310	332		

C= *F&W* use class criteria exceeded; E=# samples with exceedances; G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 65f; H=*F&W* human health criteria exceeded; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 65f; N=# samples Q=# samples with uncertain exceedances.