Alabama Department of Environmental Management

Use Support Assessment

Rivers and Streams Monitoring Program

2014 Monitoring Summary

Fair-Poor

Folley Creek at Escambia County Road 53 (31.12779/-86.79647)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) monitored Folley Creek as part of its 2008 Basin Assessment of the Southeastern Alabama River Basins. Monitoring of Folley Creek continued in 2014 to provide additional biological, chemical, and physical data to fully assess the use support status of Folley Creek for the 2016 Integrated Water Quality Report.

Additionally, the site is among the least-disturbed watersheds in the Southeast Alabama River basins, based on landuse, road density, and population density. These data will be used to evaluate the use of Folley Creek at FYCE-1 as a reference reach for sub-ecoregion 65F. Reference reaches constitute best-attainable stream conditions for a particular ecoregion and are used for comparison.

Figure 1. Folley Creek at FYCE-1, May 5, 2014.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Folley Creek is a *Fish & Wildlife (F&W)* stream located within the *Southern Pine Plains and Hills* sub-ecoregion (65f). It drains approximately four square miles in Conecuh National Forest in Escambia County before flowing into the Conecuh River. Based on the 2011 National Land Cover Dataset, landuse within the watershed is primarily forest (71%), shrub/scrub and grassland. Population density is very low and less than 2% of the area has been developed. As of April 1, 2016, there are no 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 in Folley Creek at FYCE-1. Instream substrates were dominated by sand, with some organic matter for macroinvertebrate colonization (Figure 1). A relatively wide and shallow stream for its drainage area, habitat quality and availability within the reach were rated *marginal* for supporting macroinvertebrate communities.

BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). Measures of taxonomic richness, community composition, and community tolerance are used to assess the overall health of the macroinvertebrate community in comparison to conditions expected in south Alabama streams and rivers. Each site is placed in one of six levels, ranging from 1, or *natural* to 6, or *highly altered.* The macroinvertebrate survey conducted at FYCE-1 rated the site as a *4-*, or *Fair-Poor* condition (Table 4), with both a low number of organisms collected, and relatively low taxa richness.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Conecuh River
Drainage Area (mi^2)		4
Ecoregion[a]		65F
% Landuse[b]		
Wetland	Woody	<1%
	Emergent herbaceous	<1%
Forest	Deciduous	8%
	Evergreen	54%
	Mixed	9%
Shrub/scrub		15%
Grassland/herbaceous		11%
Pasture/hay		1%
Cultivated crops		1%
Development	Open space	1%
	Low intensity	<1%
Population/km^2[c]		<1

a.Southern Pine Plains & Hills

b.2011 National Land Cover Dataset

c.2010 US Census

Table 2. Physical characteristics of Folley Creek at FYCE-1, May 7, 2014.

Physical Characteristics		
Width (ft)		14
Canopy cover		Mostly Shaded
Depth (ft)		
	Run	0.5
	Pool	1.0
% of Reach		
	Run	90
	Pool	10
% Substrate		
	Gravel	1
	Sand	83
	Silt	3
	Organic Matter	13

Table 3. Results of the habitat assessment conducted on Folley Creek at FYCE-1, May 7, 2014.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	28	Poor (<31)
Sediment Deposition	73	Sub-optimal (55-79)
Sinuosity	35	Marginal (31-<55)
Bank and Vegetative Stability	76	Sub-Optimal (58-79)
Riparian Buffer	83	Sub-Optimal (60-84)
Habitat Assessment Score	**102**	
% Maximum Score	**57**	**Marginal (31-<57)**

Table 4. Results of the macroinvertebrate bioassessment conducted in Folley Creek at FYCE-1, May 7, 2014.

Macroinvertebrate Assessment	
	Results
Taxa richness and diversity measures	
Total # taxa	21
# EPT taxa	4
# Highly-sensitive and Specialized taxa	1
Taxonomic composition measures	
% non-insect taxa	5
% Trichoptera & Chironomidae taxa	38
% EP Individuals	71
% Dominanat taxon	64
Functional feeding group	
% Predators	11
% Tolerant Filterer taxa	10
Community tolerance	
Becks Index	2
# Sensitive EPT	1
% Sensitive taxa	19
% Nutrient Tolerant individuals	8
WMB-I Assessment Score	**4-**
WMB-I Assessment Rating	**Fair_Poor**

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected monthly, March through October of 2014, to help identify any stressors to the biological communities. Additionally, field parameters were collected during the macroinvertebrate assessment on May 7. Stream pH was typical of coastal plain streams within ecoregion 65f. The median dissolved zinc concentration was similar to background concentrations, based on ecoregion reference reach data for sub-ecoregion 65f. However, concentrations were higher than concentrations measured during sampling in 2008. Median specific conductance was higher than expected for the ecoregion.

SUMMARY

Bioassessment results indicated the overall macroinvertebrate community condition was rated as *fair-poor*. Habitat quality and availability were rated as *marginal* for supporting macroinvertebrates. Median specific conductance was greater measured above ecoregional reference site data. Monitoring of Folley Creek at FYCE-1 should continue to ensure that conditions remain stable at the site and to verify its status as a potential reference reach for sub-ecoregion 65F.

Table 5. Summary of water quality data collected March through 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		Median		Avg	SD	Q	E
Physical											
Temperature (°C)	9	15.5		23.5		20.5		20.1	2.9		
Turbidity (NTU)	9	4.3		52.4		11.4		13.9	14.8		
Total Dissolved Solids (mg/L)	8	29.0		62.0		35.5		39.0	10.2		
J Total Suspended Solids (mg/L)	8	3.0		20.0		10.5		10.5	5.3		
Specific Conductance (µmhos)	9	25.5		33.4		28.6		29.2	2.4		
Hardness (mg/L)	4	3.8		6.1		4.5	G	4.7	1.0		
Alkalinity (mg/L)	8	< 0.9		< 1.2		0.5		0.5	0.0		
Stream Flow (cfs)	8	0.1		9.0		5.1		4.9	3.2		
Stream Flow during Sampling (cfs)	7	2.2		9.0		6.5		5.6	2.7		
Chemical											
Dissolved Oxygen (mg/L)	9	7.3		9.8		8.4		8.4	0.8		
pH (su)	9	4.4	C	6.1		4.7		4.9	0.5		8
Ammonia Nitrogen (mg/L)	8	< 0.006		0.028		0.004		0.007	0.008		
J Nitrate+Nitrite Nitrogen (mg/L)	8	0.009		0.030		0.012		0.016	0.007		
J Total Kjeldahl Nitrogen (mg/L)	8	< 0.054		0.250		0.197		0.167	0.074		
J Total Nitrogen (mg/L)	8	< 0.039		0.259		0.214		0.183	0.073		
J Dissolved Reactive Phosphorus (mg/L)	8	< 0.002		0.005		0.003		0.003	0.001		
J Total Phosphorus (mg/L)	8	0.008		0.017		0.012		0.012	0.003		
J CBOD-5 (mg/L)	8	< 2.0		< 2.0		1.0		1.0	0.0		
COD (mg/L)	7	< 1.6		15.6		5.2		6.7	5.5		
TOC (mg/L)	8	1.6		4.9		2.6		2.7	1.1		
Chlorides (mg/L)	8	2.1		2.7		2.6		2.6	0.2		
Total Metals											
J Aluminum (mg/L)	4	0.119		0.717		0.473		0.446	0.246		
Iron (mg/L)	4	0.353		0.692		0.525		0.524	0.168		
J Manganese (mg/L)	4	0.020		0.039		0.032		0.031	0.010		
Dissolved Metals											
J Aluminum (mg/L)	4	0.073		0.272		0.204		0.188	0.094		
J Antimony (µg/L)	4	< 0.2		< 0.4		0.2		0.2	0.1		
J Arsenic (µg/L)	4	< 0.2		0.3	H	0.1		0.2	0.1	1	
J Cadmium (µg/L)	4	0.310	S	0.492	S	0.310		0.327	0.123	3	
J Chromium (µg/L)	4	0.188		0.748		0.358		0.413	0.264		
J Copper (mg/L)	4	< 0.0003		0.0004		0.0003		0.0003	0.000		
J Iron (mg/L)	4	0.141		0.344		0.203		0.223	0.087		
Lead (µg/L)	4	< 0.2		< 0.5		0.1		0.2	0.1		
J Manganese (mg/L)	4	0.019		0.036		0.030		0.028	0.008		
J Nickel (mg/L)	4	0.003		0.003		0.003		0.003	0.000		
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	0.017	S	0.030	S	0.019		0.021	0.006		4
Biological											
Chlorophyll a (µg/L)	8	< 0.10		3.20		0.05		0.66	1.10		
J E. coli (col/100 mL)	8	14		115		32		45	37		

C=*F&W* criterion exceeded; J=estimate; E=# of samples that exceeded criteria; G=value is greater than median concentration of all verified reference data collected in sub-ecoregion 65F; H=exceeds *F&W* human health criterion; N=# of samples; Q=# of uncertain criterion exceedances; S=exceeds hardness-adjusted aquatic life use criterion for *F&W* streams.

FOR MORE INFORMATION, CONTACT:
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