Alabama Department of Environmental Management

Ecological Reference Reach

Rivers and Streams Monitoring Program

2014 Monitoring Summary

Fair

Franklin Mill Creek at U.S. Highway 31 in Escambia County (31.08008/-87.11441)

BACKGROUND

Franklin Mill Creek was monitored as part of the 2014 assessment of the Southeast Alabama River Basins. The objectives of the project were to assess the biological integrity of each monitoring site and to estimate overall water quality within the basin. Additionally, Franklin Mill Creek 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 Franklin Mill Creek as a "*best attainable*" condition reference watershed for comparison with other streams in ecoregion 65f.

Figure 1. Franklin Mill Creek at FKME-1, March 12, 2014.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Franklin Mill Creek at FKME-1 is a *Fish & Wildlife (F&W)* stream located approximately three miles southwest of the town of Brewton. Based on the 2011 National Land Cover Dataset, landuse within the watershed is forest (26%) with some shrubs and grassland. As of April 1, 2016, one outfall was active within the 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. Franklin Mill Creek at FKME-1 is a glide-pool stream with a bottom substrate dominated by sand (Figure 1). Habitat quality and availability were rated *marginal* for supporting diverse aquatic macroinvertebrate communities.

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 in comparison to conditions expected in Alabama Coastal Plain 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 FKME-1 rated the site as a 4, or *fair* (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Conecuh River
Drainage Area (mi^2)		8
Ecoregion[a]		65F
% Landuse[b]		
Open water		
Wetland	Woody	19%
	Emergent herbaceous	1%
Forest	Deciduous	<1%
	Evergreen	25%
	Mixed	1%
Shrub/scrub		31%
Grassland/herbaceous		20%
Pasture/hay		<1%
Cultivated crops		<1%
Development	Open space	2%
	Low intensity	<1%
	Moderate intensity	<1%
Population/km^2[c]		4
# NPDES Permits[d] **TOTAL**		1
Construction		1

a.Southern Pine Plains & Hills

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 Franklin Mill Creek at FKME-1, May 8, 2014.

Physical Characteristics		
Width (ft)		**20**
Canopy Cover		**Mostly Open**
Depth (ft)		
	Run	**1.0**
	Pool	**1.0**
% of Reach		
	Run	**95**
	Pool	**5**
% Substrate		
	Mud/Muck	**10**
	Gravel	**5**
	Sand	**64**
	Silt	**15**
	Organic Matter	**6**

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

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	35	Marginal (31-<55)
Sediment Deposition	45	Marginal (31-<55)
Sinuosity	18	Poor (<31)
Bank Vegetative Stability	53	Marginal (31-<58)
Riparian Buffer	36	Marginal (31-<60)
Habitat Assessment Score	***69***	
%f Maximum Score	***38***	**Marginal (31-<57)**

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

Macroinvertebrate Assessment	
	Results
Taxa richness and diversity measures	
Total # Taxa	50
# EPT taxa	11
# Highly-sensitive and Specialized Taxa	4
Taxonomic composition measures	
% EPC taxa	26
% Trichoptera & Chironomidae Taxa	32
% EP Individuals	20
% Chironomidae Individuals	45
% Individuals in Dominant 5 Taxa	52
Functional feeding group	
% Collector-Filterer Individuals	6
% Tolerant Filterer Taxa	6
Community tolerance	
# Sensitive EPT	3
% Sensitive taxa	16
% Nutrient Tolerant individuals	6
WMB-I Assessment Score	**4**
WMB-I Assessment Rating	**Fair**

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. The median value for specific conductance was higher than background levels for ecoregion 65f. pH exceeded *F&W* use class criteria for all sampling events, and zinc exceeded aquatic life use criteria for two out of four sampling events. Results for both pH and zinc were normal for ecoregion 65f.

SUMMARY

To be used for comparison with other streams, "best-attainable" reference reaches must be representative of other streams in the ecoregion. Franklin Mill Creek had a poor stream sinuosity, resulting in a *marginal* habitat rating. The macroinvertebrate community was in *fair* condition. Water quality results were within normal ranges for this stream type. 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)	9	15 2	25 5	20 4	20 4	3 9		
Turbidity (NTU)	9	2.5	15 2	4.0	4 9	4.0		
Total Dissolved Solids (mg/L)	8	21.0	49.0	40.0	39.4	8.5		
Total Suspended Solids (mg/L)	8	2.0	30.0	5.0	7.8	9.2		
Specific Conductance (µmhos)	9	18.6	22.9	20.6 G	20.4	1.3		
Hardness (mg/L)	4	2.9	3.9	3.8	3.6	0.5		
Alkalinity (mg/L)	8 <	0 9	2 1	0 5	0 9	0.7		
StreamFlow (cfs)	8	1 5	464	8 7	132	138		
Chemical								
Dissolved Oxygen (mg/L)	9	7.4	9 5	8.6	8 6	0.8		
pH (su)	9	4.6 C	5.8 C	5.4	5.3	0.3	9	
Ammonia Nitrogen (mg/L)	8 <	0.006 <	0.010	0.003	0.004	0.001		
J Nitrate+Nitrite Nitrogen (mg/L)	8	0.019	0.048	0.028	0.031	0.010		
J Total Kjeldahl Nitrogen (mg/L)	8	0.072	0.568	0.194	0.222	0.160		
J Total Nitrogen (mg/L)	8	0.107	0 597	0 218	0.254	0 160		
J Dissolved Reactive Phosphorus (mg/L)	8 <	0 003	0 004	0 003	0 003	0 001		
J Total Phosphorus (mg/L)	8	0.005	0 014	0 009	0 010	0 003		
J CBOD-5 (mg/L)	8 <	2.0 <	2 0	1.0	1 0	0.0		
COD (mg/L)	7 <	1.6	38.3	11.8	12.7	12.5		
TOC (mg/L)	8	3.0	9.5	5.2	5.5	2.2		
Chlorides (mg/L)	8	2.2	3.0	2.8	2.8	0.2		
Total Metals								
J Aluminum (mg/L)	4	0.100	0 210	0 136	0.146	0 046		
Iron (mg/L)	4	0 370	1 840	0 930	1 018	0 691		
J Manganese (mg/L)	4	0 023	0 034	0 025	0 027	0 005		
Dissolved Metals								
J Aluminum (mg/L)	4 <	0.050	0.173	0.084	0.091	0.061		
Antimony (µg/L)	4 <	0.2 <	0.2	0.1	0.1	0.0		
J Arsenic (µg/L)	4 <	0.2	0.4 H	0.3	0.3	0.1		2
Cadmium (µg/L)	4 <	0.246 <	0.246	0.123	0.123	0.000		
J Chromium (µg/L)	4	0.360	0 601	0 440	0.460	0 104		
J Copper (mg/L)	4 <	0 0002	0 0004	0 0004	0 0004	0 000		
Iron (mg/L)	4 <	0.037	0 980	0 487	0.478	0 432		
Lead (µg/L)	4 <	0.2 <	0 2	0.1	0.1	0.0		
J Manganese (mg/L)	4	0.022	0.032	0.024	0.026	0.004		
J Nickel (mg/L)	4	0.001	0.001	0.001	0.001	0.000		
Selenium (µg/L)	4 <	0.4 <	0.4	0.2	0.2	0.0		
Silver (µg/L)	4 <	0.252 <	0.252	0.126	0.126	0.000		
Thallium (µg/L)	4 <	0 2 <	0 2	0 1	0 1	0 0		
J Zinc (mg/L)	4	0 006	0 009 S	0 007	0 007	0 001	2	
Biological								
Chlorophyll a (ug/L)	8 <	0 10	19.58	0.05	2.71	6 84		
J E. coli (col/100mL)	8	31	1414	111	340	506		

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; N=# samples Q=# samples with uncertain exceedances; S= *F&W* hardness adjusted aquatic life use criteria exceeded.