Alabama Department of Environmental Management

Ecological Reference Reach

Rivers and Streams Monitoring Program

2015 Monitoring Summary

Mannings Creek at Pike County Road 7718 (31.93409/-85.95741)

BACKGROUND

Based on landuse, road density, and population density, Mannings Creek is among the least-disturbed watersheds within the Southeastern Alabama River Basins. In 2013, it was selected by the Alabama Department of Environmental Management (ADEM) as a candidate for "best attainable condition" reference watershed for comparison with streams throughout the Southern Hilly Gulf Coastal Plain ecoregion (65D). Monitoring of Mannings Creek continued in 2015 to provide additional biological, chemical, and physical data to fully assess the site for the 2016 Integrated Report.

Figure 1. Mannings Creek at MANP-1, May 14, 2015.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Mannings Creek at MANP-1 is a *Fish & Wildlife (F&W)* stream located in Pike County, approximately nine miles north of Troy. According to the 2011 National Land Cover Dataset, landuse within the watershed is primarily forest (66%), with some areas of shrub/scrub. Population density is low, as is the percentage of developed land (<4%). As of April 1, 2016, there were six NPDES permitted outfalls active within the watershed.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Conecuh River
Drainage Area (mi^2)		39
Ecoregion[a]		65D
Landuse[b]		
Open water		<1%
Wetland	Woody	7%
	Emergent herbaceous	<1%
Forest	Deciduous	18%
	Evergreen	39%
	Mixed	9%
Shrub/scrub		17%
Grassland/herbaceous		2%
Pasture/hay		4%
Cultivated crops		1%
Development	Open space	2%
	Low intensity	<1%
	Moderate intensity	<1%
Population/km^2[c]		4
# NPDES Permits[d]	**TOTAL**	6
Construction		6

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 Mannings Creek at MANP-1, May 18, 2015.

Physical Characteristics		
Width (ft)		15
Canopy Cover		Mostly Shaded
Depth (ft)		
	Run	0.8
	Pool	2
% of Reach		
	Run	85
	Pool	15
% Substrate		
	Clay	1
	Sand	73
	Silt	3
	Organic Matter	23

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. Mannings Creek at MANP-1 is a low-gradient, sand-bottomed glide-pool stream (Figure 1). Overall habitat quality was rated as *marginal* due to sedimentation, eroding banks, and a lack of instream habitat.

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 coastal plain 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 MANP-1 rated the site as a 4-, or *fair-poor* (Table 4).

Table 3. Results of the habitat assessment conducted in Mannings Creek at MANP-1, May 18, 2015.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	46	Marginal (31-<55)
Sediment Deposition	48	Marginal (31-<55)
Sinuosity	65	Sub-optimal (55-79)
Bank and Vegetative Stability	21	Poor (<31)
Riparian Buffer	83	Sub-optimal (60-84)
Habitat Assessment Score	**92**	
% Maximum score	**51**	**Marginal (31-<57)**

Table 4. Results of the macroinvertebrate bioassessment conducted in Mannings Creek at MANP-1, May 18, 2015.

Macroinvertebrate Assessment	
	Results
Taxa richness and diversity measures	
Total # Taxa	40
# EPT taxa	7
# Highly-sensitive and Specialized Taxa	0
Taxonomic composition measures	
% EPC taxa	30
% EPT minus Baetidae and Hydropsychidae	30
% Chironomidae Individuals	29
% Dominant Taxon	15
% Individuals in Dominant 5 Taxa	45
Functional feeding group	
# Collector Taxa	14
% Tolerant Filterer Taxa	15
Community tolerance	
# Sensitive EPT	1
% Sensitive taxa	18
% Nutrient Tolerant individuals	20
WMB-I Assessment Score	**4-**
WMB-I Assessment Rating	**Fair-Poor**

WATER CHEMISTRY

Results of water chemistry analyses are summarized in Table 5. In situ measurements and water samples were scheduled to be collected in March through October 2015. However, samples were not collected, July-October. In July, water in the creek stopped flowing. In August, the creek presented itself as intermittent pools. In September and October a dry stream bed was found. Results for ammonia nitrogen, chemical oxygen demand (COD), and total organic carbon (TOC) were higher than expected based on reference reach data for streams in ecoregion 65D. Stream pH was typical of coastal plain streams. No organics sampling was conducted.

SUMMARY

Mannings Creek at MANP-1 is a low gradient, sand bottomed stream reach located in the Southern Hilly Gulf Coastal Plain. Stream flows were extremely low in 2015, and appear to account for a slight decrease in habitat and biological conditions between the 2013 and 2015 sampling events.

Ammonia nitrogen, COD, and TOC concentrations were higher than expected for ecoregion 65D. Additional monitoring is recommended to provide additional chemical, physical, and biological data.

Table 5. Summary of water quality data collected March-June, 2015. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL) when results were less than this value for non-metals parameters. 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	Q	E
Physical								
Temperature (°C)	5	15.8	21.6	20.0	19.6	2.2		
Turbidity (NTU)	5	28.4	43.6	35.0	35.2	6.3		
Total Dissolved Solids (mg/L)	4	62.0	87.0	68.0	71.2	11.1		
Total Suspended Solids (mg/L)	4	8.0	33.0	16.0	18.2	10.6		
Specific Conductance (µmhos/cm)	5	33.9	52.2	42.4	43.5	7.4		
Hardness (mg/L)	1				15.1			
Alkalinity (mg/L)	4	6.2	14.4	7.8	9.0	3.6		
Monthly Stream Flow (cfs)	8	0.0	29.6	0.7	5.3	10.3		
Measured Stream Flow (cfs)	4	1.3	29.6	5.6	10.5	13.1		
Chemical								
Dissolved Oxygen (mg/L)	5	7.0	8.8	7.4	7.6	0.7		
pH (SU)	5	5.6 C	6.6	6.2	6.1	0.4		2
Ammonia Nitrogen (mg/L)	4	0.030	0.153	0.072 M	0.082	0.055		
J Nitrate+Nitrite Nitrogen (mg/L)	4	0.007	0.088	0.048	0.048	0.033		
Total Kjeldahl Nitrogen (mg/L)	4	0.464	0.706	0.626	0.606	0.115		
J Total Nitrogen (mg/L)	4	0.552	0.753	0.654	0.653	0.090		
J Dis Reactive Phosphorus (mg/L)	4	0.004	0.008	0.005	0.006	0.002		
Total Phosphorus (mg/L)	4	0.025	0.033	0.028	0.028	0.003		
CBOD-5 (mg/L)	4	< 2.0	< 2.0	1.0	1.0	0.0		
J COD (mg/L)	3	27.2	42.2	40.9 M	36.8	8.3		
J TOC (mg/L)	4	11.0	15.5	11.7 M	12.4	2.1		
Chlorides (mg/L)	4	2.5	3.8	2.9	3.0	0.6		
Total Metals								
Aluminum (mg/L)	1				1.610			
Iron (mg/L)	1				2.820			
J Manganese (mg/L)	1				0.076			
Dissolved Metals								
Aluminum (mg/L)	1				0.588			
Antimony (µg/L)	1				< 0.3			
J Arsenic (µg/L)	1				0.7 H			1
Cadmium (µg/L)	1				< 0.311			
J Chromium (µg/L)	1				2.056			
J Copper (µg/L)	1				1.061			
Iron (mg/L)	1				1.390			
J Lead (µg/L)	1				0.5 S			1
J Manganese (mg/L)	1				0.055			
J Nickel (µg/L)	1				1.202			
Selenium (µg/L)	1				< 0.4			
Silver (µg/L)	1				< 0.365			
Thallium (µg/L)	1				< 0.5			
J Zinc (µg/L)	1				4.869			
Biological								
Chlorophyll a (mg/m³)	4	< 1.00	16.00	1.45	4.85	7.49		
J E. coli (MPN/DL)	4	48.7	248.9	102.2	125.5	86.4		

C= *F&W* criteria exceeded; E=# samples that exceeded criteria; H=*F&W* human health criteria exceeded; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 65D; N=# samples; Q=# of samples that it is uncertain if an exceedance of criteria occurred; S=*F&W* hardness-adjusted aquatic life use criteria exceeded.

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