Alabama Department of Environmental Management

Ecological Reference Reach

Rivers and Streams Monitoring Program

2015 Monitoring Summary

Fair™

Tyro Creek at unnamed Tuscaloosa County Rd (33.56606/-87.57614)

BACKGROUND

Tyro Creek is one of the streams the Alabama Department of Environmental Management (ADEM) monitors as a "best attainable" condition reference watershed for comparison with other streams throughout the Shale Hills ecoregion (68F). It is among the least-disturbed watersheds in ecoregion 68F, based on land use, road density, and population density.

Figure 1. Tyro Creek at TYRT-61A, May 21, 2015.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Tyro Creek at TYRT-61A is a *Fish and Wildlife (F&W)* stream located in northern Tuscaloosa County. Based on the 2011 National Land Cover Dataset, landuse within the watershed is primarily forest (85%). As of April 1, 2016, there was one NPDES permitted outfall 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. Tyro Creek at TYRT-61A is a riffle-run stream characterized by bedrock and sand substrates (Figure 1). Overall habitat quality was rated as *sub-optimal* for supporting a diverse aquatic macroinvertebrate community.

BIOASSESSMENT RESULTS

The benthic macroinvertebrate community was 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. The final score indicated the biological community at TYRT-61A to be in *fair* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Black Warrior R
Drainage Area (mi^2)		21
Ecoregion[a]		68F
% Landuse[b]		
Open water		<1%
Wetland	Woody	3%
	Emergent herbaceous	<1%
Forest	Deciduous	31%
	Evergreen	43%
	Mixed	11%
Shrub/scrub		8%
Grassland/herbaceous		3%
Pasture/hay		<1%
Development	Open space	<1%
	Low intensity	<1%
	Moderate intensity	<1%
Population/km^2[c]		1
# NPDES Permits[d]	**TOTAL**	1
Industrial General		1

a. Shale 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 Tyro Creek at TYRT-61A, May 21, 2015.

Physical Characteristics		
Width (ft)		40
Canopy Cover		Mostly Open
Depth (ft)		
	Riffle	0.5
	Run	1.0
	Pool	2.5
% of Reach		
	Riffle	10
	Run	10
	Pool	80
% Substrate		
	Bedrock	33
	Boulder	2
	Cobble	10
	Gravel	5
	Sand	33
	Silt	10
	Organic Matter	7

Table 3. Results of the habitat assessment conducted on Tyro Creek at TYRT-61A, May 21, 2015.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	57	Sub-Optimal (55-79)
Sediment Deposition	66	Sub-Optimal (55-79)
Riffle frequency	72.5	Sub-Optimal (55-79)
Bank Vegetative Stability	61	Sub-Optimal (58-79)
Riparian Buffer	88	Optimal (>84)
Habitat Assessment Score	**135**	
% of Maximum Score	**67**	**Sub-Optimal (57-80)**

Table 4. Results of the macroinvertebrate bioassessment conducted in Tyro Creek at TYRT-61A, May 21, 2015.

Macroinvertebrate Assessment		
	Results	**Scores**
Taxa richness measures		**(0-100)**
# EPT taxa	18	61
Taxonomic composition measures		
% Non-insect taxa	7	77
% Dominant taxon	39	23
% EPC	34	65
Functional feeding group measures		
% Predators	14	57
Tolerance measures		
% Taxa as Tolerant	30	55
WMB-I Assessment Score	**---**	**56**
WMB-I Assessment Rating		**Fair (39-58)**

WATER CHEMISTRY

Results of water chemistry analyses are summarized in Table 5. In situ measurements and water samples were collected monthly during March-October 2015 to help identify any stressors to the biological community. Specific conductance and hardness were higher than the median concentration of all verified ecoregional reference reach data collected in ecoregion 68F, and concentrations of dissolved manganese were higher than 90% of ADEM's verified reference reaches collected in the same ecoregion.

SUMMARY

ADEM monitored Tyro Creek at TYRT-61A in 2015 for comparison with other streams throughout the Shale Hills ecoregion (68F). Overall habitat quality was rated as sub-optimal for supporting a diverse aquatic macroinvertebrate community. Bioassessment results show the macroinvertebrate community to be in *fair* condition. Water quality data indicates the stream to have higher concentrations of conductivity, hardness, and manganese than the median concentration of all verified ecoregional reference reach data collected in ecoregion 68F.

Table 5. Summary of water quality data collected March-October, 2015. 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	Q
	Physical							
	Temperature (°C)	8	14.9	29.4	23.8	22.9	5.0	
	Turbidity (NTU)	8	3.3	28.3	7.0	9.4	8.0	
J	Total Dissolved Solids (mg/L)	7	40.0	69.0	54.0	54.8	9.6	
	Total Suspended Solids (mg/L)	7	< 1.0	21.0	2.0	4.3	7.4	
	Specific Conductance (µmhos/cm)	8	55.0	79.0	69.2 G	68.4	9.8	
J	Hardness (mg/L)	4	5.3	28.6	17.0 G	17.0	12.3	
	Alkalinity (mg/L)	7	< 1.0	20.1	10.7	11.5	6.0	
	Monthly Stream Flow (cfs)	8	0.0	34.7	1.4	8.1	13.6	
	Measured Stream Flow (cfs)	6	0.2	34.7	2.6	10.8	14.9	
	Chemical							
	Dissolved Oxygen (mg/L)	8	6.8	10.3	8.0	8.4	1.4	
	pH (SU)	8	6.7	9.0	7.8	7.9	0.8	
J	Ammonia Nitrogen (mg/L)	7	< 0.007	0.134	0.004	0.024	0.048	
J	Nitrate+Nitrite Nitrogen (mg/L)	7	0.001	0.245	0.020	0.051	0.088	
J	Total Kjeldahl Nitrogen (mg/L)	7	0.073	0.452	0.249	0.272	0.159	
J	Total Nitrogen (mg/L)	7	0.096	0.639	0.269	0.324	0.198	
J	Dis Reactive Phosphorus (mg/L)	7	< 0.007	< 0.007	0.004	0.004	0.001	
J	Total Phosphorus (mg/L)	7	0.007	0.030	0.013	0.017	0.009	
	CBOD-5 (mg/L)	7	< 2.0	< 2.0	1.0	1.0	0.0	
J	COD (mg/L)	7	7.0	19.4	7.5	10.0	4.6	
J	TOC (mg/L)	7	1.2	5.6	1.9	2.9	1.8	
J	Chlorides (mg/L)	7	1.5	3.1	1.8	2.0	0.6	
	Total Metals							
J	Aluminum (mg/L)	4	0.065	0.968	0.143	0.330	0.427	
	Iron (mg/L)	4	0.437	1.050	0.662	0.703	0.278	
	Manganese (mg/L)	4	0.054	0.300	0.122	0.150	0.105	
	Dissolved Metals							
J	Aluminum (mg/L)	4	< 0.014	0.307	0.044	0.100	0.139	
J	Antimony (µg/L)	4	< 0.2	< 0.2	0.1	0.1	0.0	
J	Arsenic (µg/L)	4	< 0.1	0.5 H	0.2	0.2	0.2	2
	Cadmium (µg/L)	4	< 0.118	< 0.118	0.059	0.059	0.000	
J	Chromium (µg/L)	4	< 0.131	0.387	0.109	0.168	0.152	
J	Copper (µg/L)	4	< 0.180	0.671	0.288	0.334	0.292	
J	Iron (mg/L)	4	0.105	0.737	0.470	0.446	0.261	
	Lead (µg/L)	4	< 0.2	< 0.2	0.1	0.1	0.0	
J	Manganese (mg/L)	4	0.037	0.119	0.078 M	0.078	0.040	
J	Nickel (µg/L)	4	< 0.232	1.922	0.684	0.851	0.762	
	Selenium (µg/L)	4	< 0.3	< 0.3	0.2	0.2	0.0	
	Silver (µg/L)	4	< 0.208	< 0.208	0.104	0.104	0.000	
	Thallium (µg/L)	4	< 0.2	< 0.2	0.1	0.1	0.0	
J	Zinc (µg/L)	4	< 0.857	3.510	0.428	1.199	1.541	
	Biological							
	Chlorophyll a (mg/m³)	7	< 1.00	6.41	0.50	1.58	2.22	
	E. coli (MPN/DL)	7	7.5	547.5	37.3	106.0	195.2	

J=estimate; N=# samples; Q=# of uncertain exceedances; M=value > 90% of ADEM's verified reference reaches collected in ecoregion 68F; G=value higher than median of all verified ecoregional reference reach data collected in ecoregion 68F; H=*F&W* human health criterion exceeded.

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