2010 Monitoring Summary

Poor ™

Pine Creek at US Hwy 31 in Autauga County (32.42566\ -86.41230)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Pine Creek watershed for biological and water quality monitoring as part of the 2010 Assessment of the Alabama, Coosa and Tallapoosa (ACT) River Basins. The objectives of the ACT Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the ACT River basins.

Figure 1. Pine Creek at PNCE-1, May 27, 2010.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Pine Creek at PNCE-1 is a *Fish & Wildlife (F&W)* stream located in the Southeastern Floodplains and Low Terraces ecoregion (65p) near Prattville, Alabama (Autauga County). However the majority of the watershed upstream of PNCE-1 flows through the Fall Line Hills (65i) ecoregion. Based on the 2006 National Land Cover Dataset, land cover within the watershed is an even mixture of developed area (30%), and forest (33%). As of May 13, 2013, there were 70 NPDES permitted outfalls active within the watershed, the majority of which are construction stormwater permits.

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. Pine Creek at PNCE–1 is a primarily sand bottomed stream, although some small gravel riffles were present (Figure 1). Overall habitat quality was categorized as *marginal* for supporting aquatic macroinvertebrate communities.

BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WBM-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 in comparison to least-impaired reference reaches in the same ecoregion. The final score is the average of all individual metric scores. Metric results indicated the macroinvertebrate community in Pine Creek at PNCE-1 to be in *poor* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Alabama River
Drainage Area (mi^2)		15
Ecoregion[a]		65p
% Landuse		
Open water		<1
Wetland	Woody	1
	Emergent herbaceous	<1
Forest	Deciduous	11
	Evergreen	7
	Mixed	15
Shrub/scrub		12
Pasture/hay		15
Cultivated crops		9
Development	Open space	12
	Low intensity	13
	Moderate intensity	4
	High intensity	1
Population/km^2[b]		843
# NPDES Permits[c]	TOTAL	70
401 Water Quality Certification		3
Construction Stormwater		64
Industrial General		3

a. Southeastern Floodplains & Low Terraces
b. 2000 US Census
c. #NPDES permits downloaded from ADEM's NPDES Management System database, May 13, 2013.

Table 2. Physical characteristics of Pine Creek at PNCE-1, May 11, 2010.

Physical Characteristics		
Canopy Cover		Estimate 50/50
Width (ft)		25
Depth (ft)		
	Riffle	0.6
	Run	1.0
	Pool	1.5
% of Reach		
	Riffle	10
	Run	87
	Pool	3
% Substrate		
	Boulder	1
	Cobble	3
	Gravel	12
	Sand	74
	Silt	3
	Organic Matter	7

Table 3. Results of the habitat assessment conducted on Pine Creek at PNCE-1, May 11, 2010.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	47	Marginal (40-52)
Sediment Deposition	40	Marginal (40-52)
Sinuosity	63	Marginal (45-64)
Bank and Vegetative Stability	35	Marginal (35-59)
Riparian Buffer	38	Poor <50
Habitat Assessment Score	**108**	
% Maximum Score	**45**	**Marginal (40-52)**

Table 4. Results of the macroinvertebrate bioassessment conducted in Pine-Creek at PNCE-1, May 11, 2010.

Macroinvertebrate Assessment	
	Results
Taxa richness and diversity measures	
# Ephemeroptera (mayfly) taxa	3
# Plecoptera (stonefly) taxa	0
# Trichoptera (caddisfly) taxa	2
Taxonomic composition measures	
% Non-insect taxa	12
% Plecoptera	0
% Non-insect organisms	1
Community tolerance	
Becks community tolerance index	1
WMB-I Assessment Score	**28**
WMB-I Assessment Rating	**Poor (24-47)**

WATER CHEMISTRY

Water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected bi-monthly during May through November of 2010 to help identify any stressors to the biological communities. In situ parameters were also measured in May during the macroinvertebrate assessment. Data collected from Pine Creek at PNCE-1 met *F&W* use classifications criteria. Although guidelines to assess other parameters have not been established for streams in ecoregion 65p, the majority of the watershed is located within the Fall Line Hills ecoregion 65i. Median specific conductance, hardness, nitrate-nitrite nitrogen, and total nitrogen had values greater than expected for ecoregion 65i.

SUMMARY

Bioassessment results indicated the macroinvertebrate community in Pine Creek at PNCE-1 to be in *poor* condition and the habitat to be only *marginal* in its ability to support a healthy macroinvertebrate community. Median specific conductance, hardness, conductivity were higher than expected based on reference reach data collected in the Fall Line Hills ecoregion. Monitoring at Pine Creek should continue to ensure conditions remain stable at the site.

Table 5. Summary of water quality data collected May-November, 2010. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL). 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
Physical								
Temperature (°C)	5		15.5	26.7	18.9		21.0	5.0
Turbidity (NTU)	5		5.8	12.8	6.7		7.7	3.0
Total Dissolved Solids (mg/L)	4		12.0	60.0	30.0		33.0	21.5
Total Suspended Solids (mg/L)	4		1.0	10.0	5.5		5.5	4.6
Specific Conductance (μmhos)	5		57.0	63.6	58.3 [G]		59.7	2.7
Hardness (mg/L)	2		18.3	19.6	19.0 [G]		19.0	0.9
Alkalinity (mg/L)	4		13.8	16.2	15.7		15.4	1.1
Stream Flow (cfs)	5		7.3	14.4	9.3		10.0	2.7
Chemical								
Dissolved Oxygen (mg/L)	5		8.0	9.6	9.0		8.7	0.7
pH (su)	5		6.3	7.5	6.4		6.7	0.5
Ammonia Nitrogen (mg/L)	4	<	0.018	0.021	0.010		0.012	0.004
Nitrate+Nitrite Nitrogen (mg/L)	4		0.885	0.998	0.969 [M]		0.955	0.050
Total Kjeldahl Nitrogen (mg/L)	4	<	0.080	0.455	0.153		0.200	0.200
Total Nitrogen (mg/L)	4	<	0.925	1.412	1.142 [M]		1.156	0.223
[J] Dissolved Reactive Phosphorus (mg/L)	4		0.003	0.009	0.006		0.006	0.003
Total Phosphorus (mg/L)	4		0.011	0.016	0.012		0.013	0.002
[J] CBOD-5 (mg/L)	4	<	2.0	2.0	1.0		1.0	0.0
Chlorides (mg/L)	4		3.1	3.6	3.4		3.4	0.2
[J] Atrazine (μg/L)	2		0.05	0.08	0.06		0.06	0.02
Total Metals								
[J] Aluminum (mg/L)	2	<	0.033	0.086	0.051		0.051	0.049
Iron (mg/L)	2		0.685	0.705	0.695		0.695	0.014
Manganese (mg/L)	2		0.064	0.066	0.065		0.065	0.001
Dissolved Metals								
[J] Aluminum (mg/L)	2	<	0.033	0.061	0.039		0.039	0.031
Antimony (μg/L)	2	<	1.9 <	1.9	0.9		0.9	0.0
Arsenic (μg/L)	2	<	2.1 <	2.1	1.0		1.0	0.0
[J] Cadmium (mg/L)	2	<	0.000016	0.000016	0.000016		0.000016	0.000
Chromium (mg/L)	2	<	0.013 <	0.013	0.006		0.006	0.000
Copper (mg/L)	2	<	0.013 <	0.013	0.006		0.006	0.000
Iron (mg/L)	2		0.322	0.340	0.331		0.331	0.013
Lead (μg/L)	2	<	1.7 <	1.7	0.8		0.8	0.0
Manganese (mg/L)	2		0.050	0.056	0.053		0.053	0.004
Mercury (μg/L)	2	<	0.080 <	0.080	0.040		0.040	0.000
Nickel (mg/L)	2	<	0.019 <	0.019	0.010		0.010	0.000
Selenium (μg/L)	2	<	1.7 <	1.7	0.8		0.8	0.0
Silver (mg/L)	2	<	0.000015	0.000015	0.000015		0.000015	0.000
Thallium (μg/L)	2	<	0.6 <	0.6	0.3		0.3	0.0
Zinc (mg/L)	2	<	0.030 <	0.030	0.015		0.015	0.000
Biological								
Chlorophyll a (ug/L)	4	<	0.10	1.07	0.29		0.42	0.48
[J] E. coli (col/100mL)	4		86	205	145		145	59

G=value > median concentration of all verified reference data collected in ecoregion 65i; J=estimate; N=#of samples; M=value > 90th percentile of all verified ecoregional reference reach data collected within ecoregion 65i.