

2010 Monitoring Summary



Pintlala Creek at Old Hayneville Road (Montgomery County)(32.17548/-86.34467)

BACKGROUND

Pintlala Creek, from its confluence with Pinchony Creek to its source, has been placed on Alabama's §303(d) list of impaired water bodies since 2006. This 26.45 mile stretch of Pintlala Creek has been listed as impaired for not meeting criteria for its *Swimming/Fish and Wildlife (S/F&W)* use classification. The cause of impairment is listed as pathogens (i.e. fecal coliform concentrations) from pasture grazing, based on data collected 1999 through 2000. Total Maximum Daily Loads (TMDLs) are scheduled for completion by 2012. Additionally, the Alabama Department of Environmental Management (ADEM) selected the Pintlala 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 basin group.



Figure 1. Upstream-view of Pintlala Creek at PNTM-7, April 15, 2010.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Pintlala Creek is a *S/F&W* stream that originates in north Crenshaw County and then meanders along southwest Montgomery County. It combines with Pinchony and Steep Creek, before adding to the waters of the Alabama River. Based on the 2000 National Land Cover Dataset, land use within the watershed is mostly forest (47%), pasture, shrub/scrub, and cultivated crops. As of May 13, 2013, there are nine 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. Pintlala Creek at PNTM-7 is a low gradient, glide-pool stream (Figure 1). Instream substrates are largely sand and organic matter. Overall habitat quality was categorized as *sub-optimal* for supporting macroinvertebrate communities. Bank and vegetative stability were concerns at the site.

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 north Alabama's 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 in Pintlala Creek at PNTM-7 indicated a shift in community structure, with the relative abundance and numbers of pollution-sensitive taxa lower than expected, while relative abundance and numbers of pollution-tolerant taxa have increased (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		Alabama River
Basin		Alabama River
Drainage Area (mi²)		70
Ecoregion^a		65a
% Landuse		
Open water		<1
Wetland	Woody	11
	Emergent herbaceous	1
Forest	Deciduous	27
	Evergreen	16
	Mixed	4
Shrub/scrub		13
Grassland/herbaceous		<1
Pasture/hay		13
Cultivated crops		11
Development	Open space	3
	Low intensity	<1
	Moderate intensity	<1
Population/km^{2b}		40
# NPDES Permits^c	TOTAL	9
	401 Water Quality Certification	1
	Construction Stormwater	5
	Industrial General	1
	Municipal Individual	1
	Underground Injection Control	1

a.Blackland Prairie

b.2000 US Census

c.#NPDES permits downloaded from ADEM's NPDES Management System database, May13, 2013

Table 2. Physical characteristics of Pintlala Creek at PNTM-7, April 15, 2010.

Physical Characteristics	
Width (ft)	20
Canopy Cover	Mostly Shaded
Depth (ft)	
	Run 1.5
	Pool 4.0
% of Reach	
	Run 70
	Pool 30
% Substrate	
	Sand 50
	Silt 5
	Organic Matter 45

Table 3. Results of the habitat assessment conducted in Pintlala Creek at PNTM-7, April 15, 2010.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	63	Sub-optimal (53-65)
Sediment Deposition	68	Optimal >65
Sinuosity	65	Sub-optimal (65-84)
Bank and Vegetative Stability	39	Marginal (35-59)
Riparian Buffer	73	Sub-optimal (70-89)
Habitat Assessment Score	137	
% Maximum Score	62	Sub-optimal (53-65)

Table 4. Results of the macroinvertebrate bioassessment conducted in Pintlala Creek at PNTM-7, April 15, 2010.

Macroinvertebrate Assessment		Results
Taxa richness and diversity measures		
Total # Taxa		42
# EPT taxa		13
# Highly-sensitive and Specialized Taxa		1
Taxonomic composition measures		
% EPC taxa		45
% Trichoptera & Chironomidae Taxa		29
% EP Individuals		29
% Chironomidae Individuals		45
% Individuals in Dominant 5 Taxa		81
Functional feeding group		
% Collector-Filterer Individuals		40
% Tolerant Filterer Taxa		19
Community tolerance		
# Sensitive EPT		5
% Sensitive taxa		19
% Nutrient Tolerant individuals		60
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, April-September 2010, to help identify any stressors to the biological communities. *In situ* parameters were also measured during the macroinvertebrate assessment. Dissolved oxygen and *E. coli* results did not meet the S/F&W use classification criteria. Values for specific conductance, hardness, and alkalinity were higher than expected for the ecoregion. Dissolved arsenic exceeded the Human Health criterion in May and June based on estimated values. However, ADEM criterion for arsenic is expressed as dissolved trivalent arsenic (arsenite - As III). Presently, studies are being conducted in order to provide a better understanding of the prevalence and areal distribution of dissolved trivalent arsenic to total arsenic in Alabama. Upon conclusion of the studies, Pintlala Creek will be reassessed for arsenic violations. Organics results were mostly less than the minimum detection limit. However, atrazine was detected in one sample in July. Scheduled October and November samples could not be collected because Pintlala Creek at PNTM-7 had stopped flowing or was dry.

SUMMARY

Bioassessment results indicated the macroinvertebrate community in Pintlala Creek at PNTM-7 to be in *fair-poor* condition. Abnormal dissolved oxygen, atrazine and *E. coli* results stood out among the list of water quality parameters. Stream flows/water levels were generally lower than expected. Re-sampling this station is recommended to ensure the gathering of representative data under normal flow conditions.

Table 5. Summary of water quality data collected April-September, 2010. 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)	14	16.4	27.0	24.8	23.5	3.6		
Turbidity (NTU)	14	7.1	43.1	13.4	16.7	9.2		
Total Dissolved Solids (mg/L)	4	94.0	148.0	145.0	133.0	26.0		
Total Suspended Solids (mg/L)	4	5.0	33.0	6.0	12.5	13.7		
Specific Conductance (µmhos)	14	121.0	267.3	200.0 ^G	196.3	39.7		
Hardness (mg/L)	4	51.2	103.0	89.8 ^G	83.5	22.5		
Alkalinity (mg/L)	4	50.9	97.8	87.6 ^M	81.0	20.7		
Stream Flow (cfs)	9	0.5	16.8	3.9	7.3	7.3		
Chemical								
Dissolved Oxygen (mg/L)	14	0.7 ^C	7.8	4.4	4.3	2.6	7	
pH (su)	14	6.3	7.7	7.1	7.1	0.4		
Ammonia Nitrogen (mg/L)	4	< 0.021	0.041	0.010	0.018	0.015		
Nitrate+Nitrite Nitrogen (mg/L)	4	0.101	0.231	0.152	0.159	0.054		
Total Kjeldahl Nitrogen (mg/L)	4	0.365	0.718	0.426	0.484	0.161		
Total Nitrogen (mg/L)	4	0.515	0.949	0.554	0.643	0.205		
Dissolved Reactive Phosphorus (mg/L)	4	0.020	0.046	0.030	0.032	0.011		
Total Phosphorus (mg/L)	4	0.054	0.138	0.099	0.098	0.040		
CBOD-5 (mg/L)	4	< 2.0	< 2.0	1.0	1.0	0.0		
Chlorides (mg/L)	4	2.4	5.8	4.9	4.5	1.4		
Atrazine (µg/L)	2	< 0.02	0.05	0.03	0.03	0.03		
Total Metals								
Aluminum (mg/L)	4	0.335	2.220	0.600	0.939	0.879		
Iron (mg/L)	4	1.010	2.340	1.410	1.542	0.606		
Manganese (mg/L)	4	< 0.001	0.098	0.048	0.049	0.043		
Dissolved Metals								
Aluminum (mg/L)	4	< 0.033	< 0.033	0.016	0.016	0.000		
Antimony (µg/L)	4	< 0.7	< 1.9	0.9	0.8	0.3		
Arsenic (µg/L)	4	< 0.6	2.2 ^H	1.0	1.2	0.7	2	
Cadmium (mg/L)	4	< 0.003	< 0.014	0.007	0.006	0.003		
Chromium (mg/L)	4	< 0.013	< 0.013	0.006	0.006	0.000		
Copper (mg/L)	4	< 0.013	< 0.013	0.006	0.006	0.000		
Iron (mg/L)	4	< 0.026	0.357	0.190	0.187	0.142		
Lead (µg/L)	4	< 1.7	< 1.7	0.8	0.8	0.0		
Manganese (mg/L)	4	< 0.001	0.069	0.009	0.022	0.032		
Mercury (µg/L)	4	< 0.1	< 0.1	0.0	0.0	0.0		
Nickel (mg/L)	4	< 0.019	< 0.019	0.010	0.010	0.000		
Selenium (µg/L)	4	< 1.7	< 1.7	0.8	0.8	0.0		
Silver (mg/L)	4	< 0.002	< 0.002	0.001	0.001	0.000		
Thallium (µg/L)	4	< 0.6	< 0.6	0.3	0.3	0.0		
Zinc (mg/L)	4	< 0.030	< 0.030	0.015	0.015	0.000		
Biological								
Chlorophyll a (ug/L)	4	< 0.10	1.07	0.78	0.67	0.49		
<i>E. coli</i> (col/100mL)	12	22	2420 ^C	85	305	674	3	

C= F&W criterion exceeded; E= # samples that exceeded criterion; G=value greater than median concentration of all verified reference data collected in ecoregion 65a; H=F&W Human Health criterion exceeded; J=estimate; M=value > 90th percentile of all verified ecoregional reference reach data collected in ecoregion 65a; N=# samples; Q= # of uncertain criteria exceedances.

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