

2010 Monitoring Summary



§303(d)/TMDL Monitoring Site

Pursley Creek at AL Hwy 265 in Wilcox County (31.97998/-87.28157)

BACKGROUND

Pursley Creek has been on Alabama's Clean Water Act (CWA) §303(d) list of impaired waters since 1996. It is listed for organic enrichment (CBOD and NBOD) from dam construction, flow regulation/modification.

The Alabama Department of Environmental Management (ADEM) monitored Pursley Creek at PURW-2 to verify and document impairment caused by organic enrichment from dam construction, and flow regulation activities. Macroinvertebrate and habitat assessments were conducted at the site to verify impairment to aquatic communities. Results from these data may also be used in determining the biological and water quality criteria and Total Maximum Daily Load (TMDL) needs and priorities.

Pursley Creek was also selected for biological and water quality monitoring as part of the 2010 Alabama Coosa Tallapoosa (ACT) Basin Assessment Monitoring Project. 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 basins.



Figure 1. Pursley Creek at PURW-2, June 2, 2010.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Pursley Creek from Alabama River to its source is designated as a *Fish & Wildlife (F&W)* stream located in Wilcox County on the Southern Hilly Gulf Coastal Plain (65d). Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forest (73%), interspersed with shrubs/scrub, and pasture/hay. Population density is relatively low in this area. As of September 1, 2012, 11 NPDES permits have been issued 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. Typical of ecoregion 65d, Pursley Creek at PURW-2 is a low gradient stream with gravel, cobble, sand and hard pan clay substrates (Figure 1). Overall habitat quality was categorized as *sub-optimal*.

BIOASSESSMENT RESULTS

The benthic macroinvertebrate community was 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 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 in Pursley Creek at PURW-2 rated the site as *good*. Total taxa richness and EPT richness is high, though relative abundance of pollution tolerant individuals is higher than expected (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics	
Basin	Alabama River
Drainage Area (mi ²)	45
Ecoregion ^a	65d
% Landuse	
Open water	<1
Wetland	Woody 4
	Emergent herbaceous <1
Forest	Deciduous 26
	Evergreen 38
	Mixed 9
Shrub/scrub	14
Grassland/herbaceous	<1
Pasture/hay	5
Cultivated crops	1
Development	Open space 3
	Low intensity <1
	Moderate intensity <1
Population/km ^{2b}	11
# NPDES Permits ^c	TOTAL 11
	Construction Stormwater 6
	Industrial General 3
	Municipal Individual 2

a.Southern Hilly Gulf Coastal Plain

b.2000 US Census

c.#NPDES permits downloaded from ADEM's NPDES Management System database, September 1, 2012.

Table 2. Physical characteristics of Pursley Creek at PURW-2, May 11, 2010.

Physical Characteristics	
Canopy Cover	Mostly Shaded
Width (ft)	30
Depth (ft)	Riffle 0.6
	Run 2.0
	Pool 3.5
% of Reach	Riffle 10
	Run 70
	Pool 20
% Substrate	Clay 5
	Cobble 25
	Gravel 40
	Hard Pan Clay 10
	Sand 13
	Silt 2
	Organic Matter 5

Table 3. Results of the habitat assessment conducted on Pursley Creek at PURW-2, May 11, 2010.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	67	Optimal >65
Sediment Deposition	63	Sub-optimal (53-65)
Sinuosity	63	Marginal (45-64)
Bank and Vegetative Stability	50	Marginal (35-59)
Riparian Buffer	73	Sub-optimal (70-89)
Habitat Assessment Score	150	
% Maximum Score	62	Sub-optimal (53-65)

Table 4. Results of the macroinvertebrate bioassessment conducted in Pursley Creek at PURW-2, May 11, 2010.

Macroinvertebrate Assessment		Results
Taxa richness and diversity measures		
Total # Taxa		58
# EPT taxa		19
# Highly-sensitive and Specialized Taxa		4
Taxonomic composition measures		
% EPC taxa		40
% EPT minus Baetidae and Hydropsychidae		32
% Chironomidae Individuals		23
% Dominant Taxon		25
% Individuals in Dominant 5 Taxa		62
Functional feeding group		
# Collector Taxa		23
% Tolerant Filterer Taxa		12
Community tolerance		
# Sensitive EPT		8
% Sensitive taxa		31
% Nutrient Tolerant individuals		50
WMB-I Assessment Score		3
WMB-I Assessment Rating		Good

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. *In situ* measurements and water samples were collected in April, June, and August 2010 to help identify any stressors to the biological communities. *In situ* parameters suggested that Pursley Creek at PURW-2 was meeting its *F&W* use classification. Samples were collected in April and August, 2010 for analysis of pesticides, semi-volatile organics, and atrazine. All concentrations were below detection limits. Metals were generally below detection limits as well. Thallium exceeded the Human Health criterion for water and fish consumption on April 7, 2010.

SUMMARY

As part of the assessment process, ADEM will review the monitoring information presented in this report along with all other available data. Pursley Creek at PURW-2 was typical of other streams in the Southern Hilly Gulf Coastal Plains, which are generally low-gradient streams with gravel/sand substrates (Griffith et al. 2001). Results of the habitat assessment suggested that instream habitat was *sub-optimal* for supporting biological communities. Bioassessment results indicated the macroinvertebrate community to be in *good* condition. Monitoring should continue to ensure that water quality and biological conditions remain stable.

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	Q	E
Physical								
Temperature (°C)	7	20.2	29.9	26.2	25.8	3.5		
Turbidity (NTU)	11	2.0	28.7	4.1	7.5	8.4		
Total Dissolved Solids (mg/L)	3	116.0	134.0	128.0	126.0	9.2	J	
Total Suspended Solids (mg/L)	3	1.0	18.0	1.0	6.7	9.8	J	
Specific Conductance (µmhos)	7	125.4	221.1	195.1	185.5	32.1		
Hardness (mg/L)	3	75.2	93.4	79.3	82.6	9.6		
Alkalinity (mg/L)	3	59.7	91.6	73.4	74.9	16.0		
Stream Flow (cfs)	8	0.2	60.0	2.1	12.0	20.3		
Chemical								
Dissolved Oxygen (mg/L)	7	6.7	9.2	8.3	8.2	0.8		
pH (su)	7	7.4	8.4	7.7	7.8	0.3		
Ammonia Nitrogen (mg/L)	3	< 0.021	< 0.021	0.010	0.010	0.000		
Nitrate+Nitrite Nitrogen (mg/L)	3	< 0.003	0.004	0.003	0.003	0.001	J	
Total Kjeldahl Nitrogen (mg/L)	3	0.209	0.397	0.290	0.299	0.094		
Total Nitrogen (mg/L)	3	0.212	0.401	0.292	0.302	0.095	J	
Dissolved Reactive Phosphorus (mg/L)	3	0.014	0.016	0.014	0.015	0.001		
Total Phosphorus (mg/L)	3	0.017	0.021	0.018	0.019	0.002		
CBOD-5 (mg/L)	3	< 2.0	2.5	1.0	1.5	0.9		
Chlorides (mg/L)	3	3.7	4.6	4.2	4.2	0.5		
Atrazine (µg/L)	2	< 0.02	< 0.02	0.01	0.01	0.00		
Total Metals								
Aluminum (mg/L)	3	< 0.033	< 0.033	0.016	0.016	0.000		
Iron (mg/L)	3	< 0.026	0.376	0.231	0.207	0.183		
Manganese (mg/L)	3	< 0.001	0.083	0.000	0.028	0.048		
Dissolved Metals								
Aluminum (mg/L)	3	< 0.033	< 0.033	0.016	0.016	0.000		
Antimony (µg/L)	3	< 0.7	< 1.9	0.9	0.8	0.3		
Arsenic (µg/L)	3	< 0.4	< 2.1	1.0	0.8	0.5		
Cadmium (mg/L)	3	< 0.000	< 0.014	0.002	0.003	0.004		
Chromium (mg/L)	3	< 0.013	< 0.013	0.006	0.006	0.000		
Copper (mg/L)	3	< 0.013	< 0.013	0.006	0.006	0.000		
Iron (mg/L)	3	< 0.026	< 0.026	0.013	0.013	0.000		
Lead (µg/L)	3	< 1.0	< 1.7	0.8	0.7	0.2		
Manganese (mg/L)	3	< 0.001	< 0.001	0.001	0.001	0.000		
Mercury (µg/L)	3	< 0.080	< 0.080	0.040	0.040	0.0		
Nickel (mg/L)	3	< 0.019	< 0.019	0.010	0.010	0.000		
Selenium (µg/L)	3	< 0.4	< 1.7	0.8	0.6	0.4		
Silver (mg/L)	3	< 0.000	< 0.002	0.001	0.001	0.001		
Thallium (µg/L)	3	< 0.6	0.7 ^H	0.3	0.4	0.2	J	1
Zinc (mg/L)	3	< 0.030	< 0.030	0.015	0.015	0.000		
Biological								
Chlorophyll a (µg/L)	3	< 1.00	2.67	1.07	1.41	1.12		
E. coli (col/100mL)	10	12	579	89	132	165	J	

E=# samples that exceeded criteria; H=(*F&W*) human health criterion exceeded; J=estimate; N=# samples; Q=qualifier.

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