ADEM
Alabama Department of Environmental Management

Use Support Assessment

Rivers and Streams Monitoring Program

2008 Monitoring Summary

™

Fair

Pond Creek at unnamed Crenshaw County Road east of Vernledge (31.77316/-86.26816)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Pond Creek watershed for biological and water quality monitoring as part of the 2008 Assessment of the Southeast Alabama (SE AL) River Basins. The objectives of the SE AL Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the SE AL basin group.

A macroinvertebrate screening assessment conducted in 1999 resulted in a *fair* rating. The 2008 data will be used to verify use support of Pond Creek.
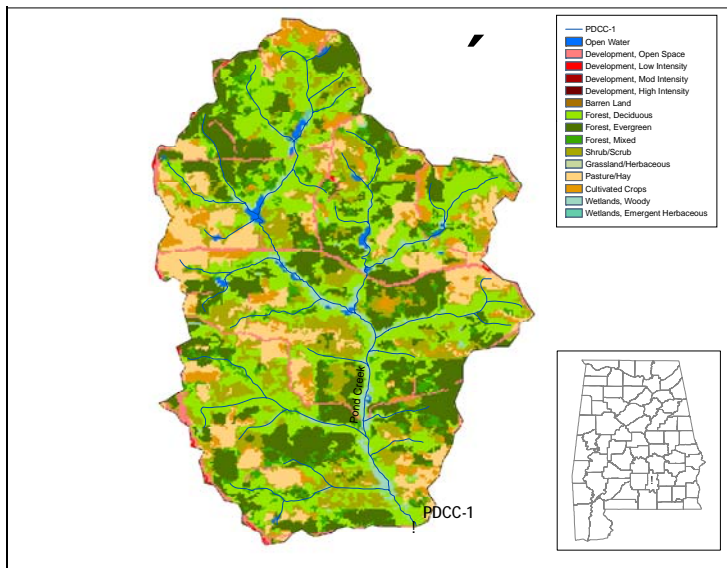

Figure 1. Sampling location and landuse within the Pond Creek watershed at PDCC-1.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Pond Creek is a small *Fish & Wildlife (F&W)* stream in Crenshaw County, east of Vernledge. It is a tributary of Patsaliga Creek which meets up with the Conecuh River in Point A reservoir. Land use within the watershed is primarily forest (58%) with some shrub/scrub and pasture/hay (Figure 1). Population density is low. As of February 17, 2011, two NPDES permits have been issued in the 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. Pond Creek at PDCC-1 is a low gradient, glide-pool stream. Instream substrates are dominated by sand. Overall habitat quality was categorized as 54% of the maximum score. A lack of bank and vegetative stability was noted.

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 metrics 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 to be in *fair* condition.

Table 1. Summary of watershed characteristics based on the 2000 National Land Cover Dataset.

Watershed Characteristics		
Basin		Perdido-Escambia River
Drainage Area (mi^2)		14
Ecoregion[a]		65d
% Landuse		
Open water		<1
Wetland	Woody	3
	Emergent herbaceous	<1
Forest	Deciduous	31
	Evergreen	22
	Mixed	5
Shrub/scrub		15
Pasture/hay		13
Cultivated crops		6
Development	Open space	4
	Low intensity	<1
Population/km^{2}[b]		9
# NPDES Permits[c]	**TOTAL**	2
Construction Stormwater		2

a. Southern Hilly Gulf Coastal Plain
b. 2000 US Census
c. #NPDES permits downloaded from ADEM's NPDES Management System database, February 17, 2011

Table 2. Physical characteristics of Pond Creek at PDCC-1, June 4, 2008.

Physical Characteristics		
Width (ft)		10
Canopy Cover		Shaded
Depth (ft)		
	Run	0.8
	Pool	1.5
% of Reach		
	Run	90
	Pool	10
% Substrate		
	Sand	85
	Silt	5
	Organic Matter	10

Table 3. Results of the habitat assessment conducted in Pond Creek at PDCC-1, June 4, 2008.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	46	Marginal (40-52)
Sediment Deposition	51	Marginal (40-52)
Sinuosity	53	Marginal (45-64)
Bank and Vegetative Stability	39	Marginal (35-59)
Riparian Buffer	85	Sub-optimal (70-89)
Habitat Assessment Score	**119**	
% Maximum Score	**54**	**Sub-optimal (53-65)**

Table 4. Results of the macroinvertebrate bioassessment conducted in Pond Creek at PDCC-1, June 4, 2008.

Macroinvertebrate Assessment			
	Results	Scores	Rating
Taxa richness measures		**(0-100)**	
# EPT genera	15	60	Good (57-78)
Taxonomic composition measures			
% Non-insect taxa	14	55	Poor (30.9-61.8)
% Plecoptera	5	26	Good (5.7-52.8)
% Dominant taxa	27	58	Fair (47.1-70.5)
Functional composition measures			
% Predators	13	45	Good (45.3-72.1)
Tolerance measures			
Beck's community tolerance index	11	50	Good (31.9-65.9)
% Nutrient tolerant organisms	34	60	Fair (50.9-76.2)
WMB-I Assessment Score	--	**51**	**Fair (38-56)**

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected July, September, and November 2008 to help identify any stressors to the biological communities. In situ parameters were also measured during the macroinvertebrate assessment. Pond Creek at PDCC-1 met *F&W* use classification criteria for temperature, turbidity, and dissolved oxygen. Metals concentrations of samples collected were generally below detection limits, with the exception of iron and manganese. Median specific conductance, total manganese and nitrate-nitrite nitrogen concentrations were higher than background levels, based on verified reference reach data collected in ecoregion 65d. No organics samples were collected. Water quality results from the only sampling event in July 1999 are included in Table 5 for reference.

SUMMARY

Pond Creek at PDCC-1 was typical of other streams in the Southeastern Plains, which are generally low-gradient streams with sand substrates. Both the 1999 and 2008 bioassessment results indicated the macroinvertebrate community to be in *fair* condition. Water quality sampling resulted in higher than expected nutrient concentrations and conductivity.

Table 5. Summary of water quality data collected during 2008. 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	1999 (July)
Physical								
Temperature (°C)	4	7.3	24.1	22.8	19.2	8.0		24.0
Turbidity (NTU)	4	5.5	11.5	9.6	9.1	2.5		15.4
Total Dissolved Solids (mg/L)	3	30.0	532.0	70.0	210.7	279.0		47.0
Total Suspended Solids (mg/L)	3	< 1.0	4.0	3.0	2.5	1.8		16.0
Specific Conductance (µmhos)	5	104.5	163.0	136.1G	132.5	21.5		64.0
Hardness (mg/L)	3	48.2	64.1	51.2	54.5	8.4		27.7
Alkalinity (mg/L)	3	47.1	61.8	49.9	52.9	7.8		35.0
Stream Flow (cfs)	4	2.7	5.4	5.0	4.5	1.2		21.0
Chemical								
Dissolved Oxygen (mg/L)	5	6.9	9.9	7.0	7.6	1.3		7.2
pH (su)	5	6.6	7.3	7.0	7.0	0.3		6.9
Ammonia Nitrogen (mg/L)	3	< 0.014	0.031	0.008	0.015	0.014		< 0.015
Nitrate+Nitrite Nitrogen (mg/L)	3	0.156	0.289	0.200M	0.215	0.068		0.220
Total Kjeldahl Nitrogen (mg/L)	3	< 0.141	0.150	0.075	0.074	0.003		0.560
Total Nitrogen (mg/L)	3	< 0.226	0.364	0.275	0.288	0.07		0.780
Dissolved Reactive Phosphorus (mg/L)	3	0.01	0.015	0.013	0.013	0.002		
Total Phosphorus (mg/L)	3	< 0.005	0.021	0.021	0.015	0.011	J	0.040
CBOD-5 (mg/L)	3	< 1.0	2.0	0.5	0.7	0.3		0.7
Chlorides (mg/L)	3	3.2	3.7	3.5	3.5	0.3		5.0
Total Metals								
Aluminum (mg/L)	3	< 0.019	0.090	0.040	0.046	0.041	J	< 0.200
Iron (mg/L)	3	0.865	1.560	1.540	1.322	0.396		2.630
Manganese (mg/L)	3	0.158	0.273	0.205M	0.212	0.058		0.107
Dissolved Metals								
Aluminum (mg/L)	3	< 0.015	< 0.019	0.010	0.009	0.001		
Antimony (µg/L)	3	< 2.0	< 2.0	1.0	0.1	0.0		
Arsenic (µg/L)	3	< 1.6	< 2.2	1.1	1.0	0.2		
Cadmium (mg/L)	3	< 0.003	< 0.005	0.002	0.002	0.001		
Chromium (mg/L)	3	< 0.004	< 0.013	0.006	0.005	0.003		
Copper (mg/L)	3	< 0.005	< 0.013	0.006	0.005	0.002		
Iron (mg/L)	3	0.251	0.772	0.328	0.450	0.281		
Lead (µg/L)	3	< 0.6	< 1.5	0.7	0.6	0.3		
Manganese (mg/L)	3	0.126	0.230	0.139M	0.165	0.057		
Mercury (µg/L)	3	< 0.0	< 0.1	0.0	0.0	0.0		
Nickel (mg/L)	3	< 0.004	0.014	0.003	0.006	0.007	J	
Selenium (µg/L)	3	< 1.5	1.7	0.8	1.1	0.5		
Silver (mg/L)	3	< 0.002	< 0.003	0.001	0.001	0.000		
Thallium (µg/L)	3	< 0.5	< 0.6	0.3	0.3	0.0		
Zinc (mg/L)	3	< 0.003	< 0.006	0.002	0.002	0.001		
Biological								
Chlorophyll a (ug/L)	3	0.80	2.14	1.07	1.34	0.71		
Fecal Coliform (col/100 mL)	3	37	150	44	77	63		137

G=value greater than median concentration of all verified reference data collected in ecoregion 65d; J=estimate; M=value exceeds the 90th percentile of all verified reference data collected in ecoregion 65d; N=# samples; Q=Laboratory Qualifier Codes.