Pond Creek at Blue Springs WMA Road 45 (Covington County) (31.09315/-86.51805)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Pond Creek watershed for biological and water quality monitoring as part of the 2014 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. Pond Creek is also among the least-disturbed watersheds in the Dougherty Plain ecoregion (65g) based on land use, road density, and population density. The 2014 data will be used to evaluate the use of Pond Creek as *"best attainable"* condition reference watershed for comparison with other streams in this ecoregion.

Figure 1. Pond Creek at PONC-1, May 13, 2014.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Pond Creek is a small *Fish & Wildlife (F&W)* stream in Covington County's Blue Spring Wildlife Management Area. It is a tributary of Five Runs Creek which flows into the Yellow River. Based on the 2011 National Land Cover Dataset, land use within the watershed is primarily forest (85%) with some shrub/scrub. The majority of the watershed is unpopulated and less than six percent of the area is developed. As of April 1, 2016, no NPDES permitted outfalls are active 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 PONC-1 is a low gradient glide-pool stream (Figure 1). Instream substrates were dominated by sand, with abundant organic matter for macroinvertebrate colonization. Overall habitat quality was categorized as *marginal* for supporting macroinvertebrate communities.

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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 to assess the overall health of the macroinvertebrate community in comparison to conditions expected in Alabama Coastal Plain streams and rivers. Each site is placed in one of six levels, ranging from 1, or *natural* to 6, or *highly altered*. Metric results indicated the macroinvertebrate community in Pond Creek at PONC-1 to be in *good* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Yellow River
Drainage Area (mi^2)		6
Ecoregion[a]		65G
% Landuse[b]		
Open water		1%
Wetland	Woody	1%
	Emergent herbaceous	<1%
Forest	Deciduous	1%
	Evergreen	78%
	Mixed	6%
Shrub/scrub		5%
Grassland/herbaceous		<1%
Pasture/hay		2%
Development	Open space	4%
	Low intensity	<1%
	Moderate intensity	<1%
Population/km^{2}[c]		1

a. Dougherty Plain
b. 2011 National Land Cover Dataset
c. 2010 US Census

Table 2. Physical characteristics of Pond Creek at PONC-1, May 7, 2014.

Physical Characteristics		
Width (ft)		10
Canopy Cover		Shaded
Depth (ft)		
	Run	1.5
	Pool	2.5
% of Reach		
	Run	60
	Pool	40
% Substrate		
	Mud/Muck	2
	Sand	75
	Silt	3
	Organic Matter	20

Table 3. Results of the habitat assessment conducted in Pond Creek at PONC-1, May 7, 2014.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	42	Marginal (31-<55)
Sediment Deposition	65	Sub-optimal (55-79)
Sinuosity	30	Poor (<31)
Bank and Vegetative Stability	57	Marginal (31-<58)
Riparian Buffer	79	Sub-optimal (60-84)
Habitat Assessment Score	**99**	
% Maximum Score	**55**	**Marginal (31-<57)**

Table 4. Results of the macroinvertebrate bioassessment conducted in Pond Creek at PONC-1, May 7, 2014.

Macroinvertebrate Assessment	Results
Taxa richness and diversity measures	
Total # Taxa	49
# EPT taxa	15
# Highly-sensitive and Specialized Taxa	6
Taxonomic composition measures	
% EPC taxa	24
% Trichoptera & Chironomidae Taxa	35
% EP Individuals	25
% Chironomidae Individuals	15
% Individuals in Dominant 5 Taxa	57
Functional feeding group	
% Collector-Filterer Individuals	37
% Tolerant Filterer Taxa	4
Community tolerance	
# Sensitive EPT	8
% Sensitive taxa	37
% Nutrient Tolerant individuals	8
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 March through October 2014 to help identify any stressors to the biological communities. In situ parameters were also measured during the macroinvertebrate assessment. In stream pH measurements did not meet *F&W* use classification criteria during any of the nine sampling events. Median total aluminum and median dissolved aluminum concentrations were higher than expected, based on verified reference reach data collected in ecoregion 65g. No organics samples were collected.

SUMMARY

Pond Creek at PONC-1 is one of the dark tannic streams more commonly found in the coastal plains. Generally they are low-gradient, sand-bottomed streams. pH values less than 5.0 standard units are not unusual for this stream type. Habitat was rated *marginal* and the macroinvertebrate community was found to be in *good* condition, with adequate representation of pollution intolerant taxa (stoneflies). No immediate water quality concerns were noted.

Monitoring of Pond Creek at PONC-1 should continue to ensure that conditions remain stable at the site and to verify its status as a reference reach for ecoregion 65g.

Table 5. Summary of water quality data collected during March through October 2014. 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	Median	Avg	SD	Q	E
Physical								
Temperature (ºC)	9	11.8	24.2	21.4	20.2	4.0		
Turbidity (NTU)	9	1.8	11.8	2.4	4.2	3.4		
Total Dissolved Solids (mg/L)	8	< 1.0	53.0	24.5	23.5	17.7		
Total Suspended Solids (mg/L)	8	< 1.0	24.0	1.0	6.3	10.0		
Specific Conductance (µmhos)	9	11.9	34.3	18.0	19.2	6.7		
Hardness (mg/L)	4	1.4	4.6	1.7	2.4	1.5		
Alkalinity (mg/L)	8	< 0.9	31.1	0.5	4.3	10.8		
Monthly Stream Flow (cfs)	8	3.0	47.3	8.2	16.4	18.7		
Stream Flow during Sampling (cfs)	8	3.0	47.3	8.2	16.4	18.7		
Chemical								
Dissolved Oxygen (mg/L)	9	6.8	10.3	8.2	8.3	0.9		
pH (su)	9	4.2 C	5.4	4.7 M	4.7	0.4		9
Ammonia Nitrogen (mg/L)	8	< 0.006	< 0.010	0.003	0.004	0.001		
J Nitrate+Nitrite Nitrogen (mg/L)	8	0.006	0.221	0.036	0.059	0.068		
Total Kjeldahl Nitrogen (mg/L)	8	< 0.049	0.777	0.224	0.317	0.309		
J Total Nitrogen (mg/L)	8	< 0.054	0.818	0.251	0.376	0.329		
Dissolved Reactive Phosphorus (mg/L)	8	< 0.003	0.004	0.003	0.003	0.001		
Total Phosphorus (mg/L)	8	0.004	0.015	0.006	0.007	0.004		
CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0		
COD (mg/L)	7	7.4	51.6	19.9	22.2	15.5		
J TOC (mg/L)	8	2.3	23.8	7.5	9.3	7.0		
Chlorides (mg/L)	8	1.5	2.5	2.4	2.2	0.3		
Total Metals								
J Aluminum (mg/L)	4	0.191	0.827	0.449 M	0.479	0.262		
Iron (mg/L)	4	0.242	0.457	0.358	0.354	0.116		
J Manganese (mg/L)	4	0.011	0.027	0.019	0.019	0.006		
Dissolved Metals								
J Aluminum (mg/L)	4	< 0.050	0.597	0.278 M	0.295	0.251		
Antimony (µg/L)	4	< 0.2	< 0.4	0.1	0.1	0.1		
J Arsenic (µg/L)	4	< 0.2	0.3 H	0.1	0.2	0.1	1	
Cadmium (µg/L)	4	< 0.246	< 0.390	0.123	0.141	0.036		
J Chromium (µg/L)	4	0.433	0.695	0.565	0.564	0.148		
J Copper (mg/L)	4	< 0.0003	< 0.0004	0.0003	0.0001	0.000		
J Iron (mg/L)	4	< 0.037	0.340	0.205	0.192	0.133		
J Lead (µg/L)	4	< 0.2	< 0.5	0.2	0.2	0.1		
J Manganese (mg/L)	4	0.010	0.028	0.016	0.017	0.008		
J Nickel (mg/L)	4	< 0.0002	< 0.0005	0.0002	0.0001	0.000		
Selenium (µg/L)	4	< 0.4	< 0.5	0.2	0.2	0.0		
Silver (µg/L)	4	< 0.252	< 0.460	0.126	0.152	0.052		
Thallium (µg/L)	4	< 0.2	< 0.6	0.1	0.2	0.1		
J Zinc (mg/L)	4	0.004	0.004 S	0.004	0.004	0.000	2	
Biological								
Chlorophyll a (µg/L)	8	< 0.10	9.79	0.40	2.26	3.73		
J E. coli (col/100 mL)	8	2	1986	45	291	687		

C= *F&W* use criterion exceeded; E=# samples that exceeded criterion; H=*F&W* human health criterion exceeded; J=estimate; M=value greater than 90% median concentration of all verified reference reach data collected in ecoregion 65g; N=#of samples; Q=#of uncertain exceedances; S=*F&W* hardness-adjusted aquatic life use criterion exceeded.