Alabama Department of Environmental Management

Use Support Assessment

Rivers and Streams Monitoring Program

2013 Monitoring Summary

Fair

Powell Creek at Marengo County Road 44 (32.33693/-87.75557)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) monitored Powell Creek as part of its 2006 and 2011 Basin Assessments of the Escatawpa, Mobile, and Tombigbee River Basins. Monitoring of Powell Creek continued in 2013 to provide additional biological, chemical, and physical data to fully assess use support status for the 2016 Integrated Report.

Figure 1. Powell Creek at PWLM-32, June 26, 2013.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Powell Creek is a *Fish & Wildlife (F&W)* stream located in the Flatwoods/Blackland Prairie Margins Ecoregion (65b). Based on the 2006 National Land Cover Dataset, landuse within the watershed is predominantly pasture/hay with some wetland and forest (21%). As of September 1, 2012, 19 outfalls were active within 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. Powell Creek at PWLM-32 is a low-gradient, glide -pool stream with substrate composed primarily of hard pan clay and sand (Figure 1). Overall habitat quality and availability was rated as *sub-optimal* for supporting diverse aquatic macroinvertebrate communities.

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. Each metric is scored on a 100 point scale. The final score is the average of all individual metric scores. Metric results indicated the macroinvertebrate community to be in *fair* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Lower Tombigbee
Drainage Area (mi^2)		67
Ecoregion[a]		65b
% Landuse		
Open water		2
Wetland	Woody	13
	Emergent herbaceous	1
Forest	Deciduous	10
	Evergreen	5
	Mixed	6
Shrub/scrub		6
Grassland/herbaceous		1
Pasture/hay		51
Cultivated crops		1
Development	Open space	3
	Low intensity	<1
	Moderate intensity	<1
Barren		<1
Population/km^2[b]		6
# NPDES Permits[c]	**TOTAL**	19
Construction Stormwater		8
Industrial General		1
Municipal Individual		10

a.Flatwoods/Blackland Prairie Margins

b.2000 US Census

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

Table 2. Physical characteristics of Powell Creek at PWLM-32, June 26, 2013.

Physical Characteristics	
Width (ft)	25
Canopy Cover	Mostly Open
Depth (ft)	
Riffle	0.2
Run	2.0
Pool	2.5
% of Reach	
Riffle	5
Run	15
Pool	80
% Substrate	
Cobble	4
Gravel	5
Hard Pan Clay	40
Sand	36
Silt	5
Organic Matter	10

Table 3. Results of the habitat assessment conducted on Powell Creek at PWLM-32, June 26, 2013.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	58	Sub-Optimal (53-65)
Sediment Deposition	81	Optimal (>65)
Sinuosity	50	Marginal (45-<65)
Bank Vegetative Stability	50	Marginal (35-<59)
Riparian Buffer	90	Sub-Optimal (70-90)
Habitat Assessment Score	***132***	
%f Maximum Score	***60***	**Sub-Optimal (53-65)**

Table 4. Results of the macroinvertebrate bioassessment conducted in Powell Creek at PWLM-32, June 26, 2013.

Macroinvertebrate Assessment		
	Results	**Scores**
Taxa richness and diversity measures		**(0-100)**
% EPC taxa	30	53
% Trichoptera & Chironomidae Taxa	44	33
Taxonomic composition measures		
% EP Individuals	22	42
Functional feeding group		
% Collector-Filterer Individuals	32	45
Community tolerance		
% Nutrient Tolerant individuals	37	49
WMB-I Assessment Score	**---**	**44**
WMB-I Assessment Rating		**Fair (31-45)**

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected March through October of 2013 (metals were collected March, May, July, and September) to help identify any stressors to the biological communities. Total dissolved solids, specific conductance, hardness, alkalinity, and aluminum were present within the reach at concentrations exceeding background levels based on verified reference reach data collected in ecoregion 65b. Chromium concentrations exceeded *F&W* aquatic life use criteria in July and September; however, concentrations were normal for ecoregion 65b.

SUMMARY

Bioassessment results indicated the macroinvertebrate community to be in *fair* condition. Monitoring should continue to ensure that conditions remain stable.

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Table 5. Summary of water quality data collected March-October, 2013. 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
Physical							
Temperature (°C)	9	11.2	29.6	26.6	23.4	5.9	
Turbidity (NTU)	8	2.3	77.1	6.6	23.5	28.1	
J Total Dissolved Solids (mg/L)	8	142.0	232.0	188.5 M	188.1	25.4	
Total Suspended Solids (mg/L)	8	1.0	60.0	6.0	16.0	21.8	
Specific Conductance (µmhos)	9	192.1	360.6	300.6 G	287.8	56.4	
Hardness (mg/L)	4	97.6	142.0	109.5 G	114.6	19.6	
Alkalinity (mg/L)	8	85.1	154.0	120.5 M	118.6	25.0	
Stream Flow (cfs)	6	0.5	7.0	2.8	3.0	2.4	
Chemical							
Dissolved Oxygen (mg/L)	9	5.6	10.4	8.3	8.2	1.3	
pH (su)	9	7.2	8.3	7.9	7.8	0.3	
J Ammonia Nitrogen (mg/L)	8	< 0.015	0.192	0.012	0.038	0.063	
J Nitrate+Nitrite Nitrogen (mg/L)	8	< 0.002	1.484	0.044	0.345	0.592	
Total Kjeldahl Nitrogen (mg/L)	8	0.455	1.800	0.793	0.978	0.536	
J Total Nitrogen (mg/L)	8	< 0.457	3.284	0.805	1.323	1.056	
J Dissolved Reactive Phosphorus (mg/L)	7	< 0.004	0.049	0.010	0.019	0.017	
J Total Phosphorus (mg/L)	8	0.022	0.140	0.030	0.061	0.050	
J CBOD-5 (mg/L)	8	< 2.0	2.3	1.0	1.2	0.5	
Chlorides (mg/L)	8	3.7	9.3	8.0	7.1	2.1	
Total Metals							
Aluminum (mg/L)	4	< 0.076	3.340	1.302 M	1.495	1.595	
J Iron (mg/L)	4	0.126	2.800	1.371	1.417	1.359	
J Manganese (mg/L)	4	0.018	0.063	0.040	0.040	0.022	
Dissolved Metals							
Aluminum (mg/L)	4	< 0.076	0.342	0.182 M	0.186	0.171	
Antimony (µg/L)	4	< 0.1	< 2.6	0.7	0.7	0.7	
J Arsenic (µg/L)	4	1.4 H	2.0 H	1.8	1.7	0.3	4
Cadmium (µg/L)	4	< 0.046	< 0.170	0.054	0.054	0.036	
J Chromium (µg/L)	4	0.991 S	< 32.000	8.715	8.605	8.541	2
J Copper (mg/L)	4	0.000	< 0.031	0.008	0.008	0.008	
J Iron (mg/L)	4	0.062	0.626	0.197	0.270	0.262	
Lead (µg/L)	4	< 0.1	< 1.1	0.3	0.3	0.3	
J Manganese (mg/L)	4	0.010	0.014	0.012	0.012	0.002	
Mercury (µg/L)	2	< 0.057	< 0.057	0.028	0.028	0.000	
J Nickel (mg/L)	4	0.001	< 0.016	0.004	0.004	0.004	
J Selenium (µg/L)	4	< 0.3	< 1.4	0.8	0.5	0.2	
J Silver (µg/L)	4	< 0.215	< 2.120	0.869	0.726	0.450	
Thallium (µg/L)	4	< 0.1	< 1.1	0.3	0.3	0.3	
J Zinc (mg/L)	4	0.002	< 0.017	0.005	0.005	0.004	
Biological							
Chlorophyll a (ug/L)	8	< 0.10	10.88	1.07	3.20	4.16	

G=value higher than median concentration of all verified ecoregional reference reach data collected in ecoregion 65b; H=*F&W* human health criterion exceeded; J=Estimate; Q=number of uncertain exceedances; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 65b; N=samples; S=*F&W* hardness-adjusted aquatic life use criteria exceeded.