

2006 Monitoring Summary



Perone Branch at AL Hwy 104 (30.54557/-87.78822)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Perone Branch watershed for biological and water quality monitoring as part of the 2001 Basin-wide Screening Assessment of the Escatawpa, Mobile, and Tombigbee (EMT) River Basins. The screening assessments were conducted at stream reaches where land use estimates and non-point source information from the local Soil and Water Conservation Districts indicated a moderate or high potential for impairment from non-point sources in non-urban areas. Results of the 2001 screening-level evaluation identified Perone Branch at PERB-98 for further monitoring during the 2006 Basin Assessment of the EMT River Basins to more fully assess biological conditions at the site, as well as the extent and cause of any impairment.



Figure 1. Perone Branch at PERB-98, January 2010.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Perone Branch is a *Fish & Wildlife (F&W)* stream in Baldwin County (Figure 1). Land use within the watershed consists of cultivated crops with some forest (29%) and pastureland. As of September 9, 2009, a total of 22 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. Perone Branch at PERB-98 is a low-gradient, glide-pool stream located in the Southern Pine Plains and Hills ecoregion (Figure 1). Overall habitat quality was categorized as *sub-optimal*.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		Mobile Bay Area
Basin		9
Drainage Area (mi ²)		65f
Ecoregion ^a		
% Landuse		
Open water		1
Wetland	Woody	2
	Emergent herbaceous	1
Forest	Deciduous	3
	Evergreen	19
	Mixed	7
Shrub/scrub		7
Grassland/herbaceous		<1
Pasture/hay		12
Cultivated crops		39
Development	Open space	8
	Low intensity	2
	Moderate intensity	<1
	High intensity	<1
Population/km ² ^b		75
# NPDES Permits ^c	TOTAL	22
	Construction Stormwater	22

a.Southern Pine Plains & Hills

b.2000 US Census

c.#NPDES permits downloaded from ADEM's NPDES Management System database, 18 Sep 2009

Table 2. Physical characteristics of Perone Branch at PERB-98, June 8, 2006.

Physical Characteristics	
Width (ft)	30
Canopy cover	Mostly Shaded
Depth (ft)	
	Run 1.0
	Pool 2.0
% of Reach	
	Run 70
	Pool 30
% Substrate	
	Gravel 5
	Sand 83
	Organic Matter 12

BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). The WMB-I measures 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 an average of each metric. Metric results indicated that the macroinvertebrate community to be in *fair* condition (Table 4).

Table 3. Results of the habitat assessment conducted June 8, 2006.

Habitat Assessment	(% Max Score)	Rating
Instream habitat quality	41	Marginal (40-52)
Sediment deposition	65	Sub-optimal (53-65)
Sinuosity	43	Poor (<45)
Bank and vegetative stability	70	Sub-optimal (60-74)
Riparian buffer	79	Sub-optimal (70-90)
Habitat assessment score	134	
% Maximum score	61	Sub-optimal (53-65)

Table 4. Results of the macroinvertebrate bioassessment conducted June 8, 2006.

Macroinvertebrate Assessment			
	Results	Scores	Rating
Taxa richness measures			
# EPT genera	14	56	Fair (38-56)
Taxonomic composition measures			
% Non-insect taxa	5	100	Excellent (>96.34)
% Plecoptera	0	2	Poor (1.86-3.7)
% Dominant taxa	26	60	Fair (47.1-70.5)
Functional composition measures			
% Predators	10	36	Fair (30.2-45.2)
Tolerance measures			
Beck's community tolerance index	10	45	Good (31.9-65.9)
% Nutrient tolerant organisms	33	62	Fair (50.9-76.2)
WMB-I Assessment Score	---	52	Fair (38-56)

WATER CHEMISTRY

Results of water chemistry analyses are summarized in Table 5. When possible, in situ measurements and water samples are collected monthly, semi-monthly (metals), or quarterly (pesticides, herbicides (atrazine), and semi-volatile organics) during March through October at Basin Assessment stations to help identify any stressors to the biological communities. Median concentrations of nitrate+nitrite nitrogen, total nitrogen, total Kjeldahl nitrogen and chlorophyll *a* were higher than expected based on the 90th percentile of reference reach data collected in ecoregion 65f. Stream pH also exceeded use criteria (>8.0 s.u.) during three out of ten sampling events.

SUMMARY

As part of the assessment process, ADEM will review the monitoring information presented in this report, along with all other available data.

Bioassessment results indicated the macroinvertebrate community in Perone Branch at PERB-98 to be in *fair* condition. Results of other data collected during 2006 suggest nutrient enrichment as a concern within the reach.

Table 5. Summary of water quality data collected March-October, 2006. 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. Metals results were compared to ADEM's chronic aquatic life use criteria adjusted for hardness.

Parameter	N	Min	Max	Median	Avg	SD
Physical						
Temperature (°C)	10	19.0	26.0	22.8	22.4	2.2
Turbidity (NTU)	10	2.2	130.0	3.9	16.6	39.9
Total Dissolved Solids (mg/L)	8	32.0	80.0	45.5	52.4	19.3
Total Suspended Solids (mg/L)	8	1.0	166.0	4.0	24.1	57.4
Specific Conductance (µmhos)	10	50.7	82.0	53.1	56.5	9.4
Hardness (mg/L)	3	17.0	42.0	34.0	31.0	12.8
Alkalinity (mg/L)	8	<1.0	11.0	6.5	5.8	3.4
Stream Flow (cfs)	10	10.3	43.5	13.9	16.3	9.7
Chemical						
Dissolved Oxygen (mg/L)	10	6.5	8.7	8.0	7.8	0.6
pH (su)	10	5.7 ^c	8.6 ^c	6.4	6.3	0.3
Ammonia Nitrogen (mg/L)	8	<0.010	0.070	0.008	0.016	0.022
Nitrate+Nitrite Nitrogen (mg/L)	8	0.846	1.544	1.313 ^M	1.214	0.282
Total Kjeldahl Nitrogen (mg/L)	8	<0.150	1.100	0.150	0.341	0.388
Total Nitrogen (mg/L)	8	1.277	1.971	1.530 ^M	1.555	0.214
Dissolved Reactive Phosphorus (mg/L)	8	<0.004	0.009	0.005	0.005	0.003
Total Phosphorus (mg/L)	8	<0.004	0.170	0.026	0.046	0.056
CBOD-5 (mg/L)	8	1.0	2.3	1.7	1.5	0.7
Chlorides (mg/L)	8	1.6	10.6	7.5	6.3	3.7
Atrazine (µg/L)	2	<0.05	0.06	0.04	0.04	0.02
Total Metals						
Aluminum (mg/L)	3	0.130	0.210	0.150	0.163	0.042
Iron (mg/L)	3	0.618	0.691	0.664	0.658	0.037
Manganese (mg/L)	3	0.046	0.075	0.058	0.060	0.015
Dissolved Metals						
Aluminum (mg/L)	3	0.100	0.160	0.110	0.123	0.032
Antimony (µg/L)	3	<7.5	<7.5	3.8	3.8	0.0
Arsenic (µg/L)	3	<5.0	<5.0	2.5	2.5	0.0
Cadmium (mg/L)	3	<0.0	<0.0	0.0	0.0	0.0
Chromium (mg/L)	3	<0.005	<0.005	0.003	0.003	0.000
Copper (mg/L)	3	<0.005	<0.005	0.003	0.003	0.000
Iron (mg/L)	3	0.187	0.269	0.210	0.222	0.042
Lead (µg/L)	3	<5.0	<5.0	2.5	2.5	0.0
Manganese (mg/L)	3	0.03	0.046	0.030	0.035	0.009
Mercury (µg/L)	3	<0.5	0.5	0.3	0.3	0.0
Nickel (mg/L)	3	<0.005	0.011	0.003	0.005	0.005
Selenium (µg/L)	3	<7.5	<7.5	3.8	3.8	0.0
Silver (mg/L)	3	<0.001	<0.001	0.000	0.000	0.000
Thallium (µg/L)	3	<2.5	<9.0	4.5	3.4	1.9
Zinc (mg/L)	3	<0.005	0.012	0.003	0.006	0.005
Biological						
Chlorophyll <i>a</i> (µg/L)	8	<1.00	5.34	2.85 ^M	2.81	1.85
Fecal Coliform (col/100 mL)	5	21	490	31	138	201

J=estimate; N= # of samples; M=value >90% of collected samples in ecoregion 45a; C=value exceeds established criteria for F&W water use classification

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