Alabama Department of Environmental Management

Rivers and Streams Monitoring Program

Ecological Reference Reach Site

2008 Monitoring Summary

Bear Creek on unnamed Houston County Road west of Dothan (31.20769/-85.54619)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) monitors Bear Creek as a "best attainable condition" reference watershed for comparison with streams throughout the Dougherty Plains ecoregion. Data collected at these reaches are used as the basis of comparison for streams in same ecoregion and to develop water quality criteria.

Additionally, Bear Creek was selected for biological and water quality monitoring as part of the 2008 South East 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.

Figure 1. Reach Charactristics of Bear Creek at BRH-1.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Bear Creek at BRH-1 is a *Fish & Wildlife (F&W)* stream located in the Dougherty Plains ecoregion in Houston County. Based on the 2000 National Land Cover Dataset, land cover within the watershed is mainly cultivated crops and pasture/hay, with some forest (19%), shrubs, and wetlands. Bear Creek watershed has a low population density. As of February 23, 2011, no 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, this information can give an indication of physical condition and the availability and quality of habitat. Bear Creek at BRH-1 (Figure 1) is characterized by a flowing braided channel. Bottom substrates consist of sand, silt, and mud. The abundant organic matter and root banks provide good habitat for biological communities. Having a good riparian zone along with stable banks and ample instream habitat, the overall habitat quality was categorized as *optimal*.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Choctawhatchee River
Drainage Area (mi^2)		19
Ecoregion[a]		65g
% Landuse		
Open water		<1
Wetland	Woody	8
	Emergent herbaceous	<1
Forest	Deciduous	6
	Evergreen	11
	Mixed	2
Shrub/scrub		9
Grassland/herbaceous		1
Pasture/hay		21
Cultivated crops		37
Development	Open space	5
	Low intensity	<1
	Moderate intensity	<1
Population/km^2 [b]		20

a.Dougherty Plains
b.2000 US Census

Table 2. Physical characteristics of Bear Creek at BRH-1, July 17, 2008.

Physical Characteristics		
Width (ft)		50
Canopy Cover		Shaded
Depth (ft)		
	Run	1.5
	Pool	3.8
% of Reach		
	Run	50
	Pool	50
% Substrate		
	Mud/Muck	25
	Sand	20
	Silt	20
	Organic Matter	35

Table 3. Results of the habitat assessment conducted on Bear Creek at BRH-1, July 17, 2008.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	69	Optimal >65
Sediment Deposition	85	Optimal >65
Sinuosity	98	Optimal >84
Bank and Vegetative Stability	86	Optimal >74
Riparian Buffer	95	Optimal >89
Habitat Assessment Score	**184**	
% Maximum Score	**84**	**Optimal >65**

BIOASSESSMENTS

Macroinvertebrate bioassessment results from Bear Creek at BRH-1 will be used as a benchmark for wadeable flowing braided streams. Total taxa richness was forty nine. Five EPT taxa were collected from the site (Table 4).

Table 4. Results of the macroinvertebrate bioassessment conducted in Bear Creek at BRH-1, July 17, 2008.

Macroinvertebrate Assessment	
	Results
Taxa richness measures	
Total Taxa richness	49
# Ephemeroptera (mayfly) genera	2
# Trichoptera (caddisfly) genera	3
Taxonomic composition measures	
% Non-insect taxa	12
% Plecoptera	0
% Dominant taxa	29
Functional composition measeures	
% Predators	9
Tolerance measures	
Beck's community tolerance index	7
% Nutrient tolerant organisms	43

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. *In situ* measurements and water samples were collected in June, August and October or quarterly (pesticides, atrazine, and semi-volatile organics) in 2008 to help identify any stressors to the biological communities. Median concentrations of specific conductance and hardness were higher than expected based on 90th percentile of data collected within this reach since 1991. Low pH and low dissolved oxygen are typical of braided, riverine swamps.

SUMMARY

To be used for comparison with other streams, "best-attainable" reference reaches must be representative of other streams in the ecoregion. Hardness and specific conductance were elevated as compared to previously collected data. Sampling should continue to monitor water quality and biological conditions within the reach. As the ecoregion is unique, additional reference reaches are needed to establish macroinvertebrate indices specific for this stream type.

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Table 5. Summary of water quality data collected March-October, 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	E
Physical									
Temperature (°C)	4		21.0	24.9	24.2	23.6	1.8		
Turbidity (NTU)	4		7.2	11.7	9.8	9.6	1.9		
Total Dissolved Solids (mg/L)	3	<	1.0	64.0	46.0	36.8	32.7		
Total Suspended Solids (mg/L)	3	<	1.0	2.0	1.0	1.2	0.8		
Specific Conductance (µmhos)	4		57.5	66.6	63.2 G	62.6	3.9		
Hardness (mg/L)	3		13.7	19.7	15.2 G	16.2	3.1		
Alkalinity (mg/L)	3		17.7	22.2	21.5	20.5	2.4		
Chemical									
Dissolved Oxygen (mg/L)	4		4.5C	5.3	5.1	5.0	0.4		1
pH (su)	4		5.8C	6.4	6.2	6.2	0.3		1
Ammonia Nitrogen (mg/L)	3	<	0.015	0.031	0.008	0.015	0.014		
Nitrate+Nitrite Nitrogen (mg/L)	3		0.143	0.248	0.180	0.190	0.053		
Total Kjeldahl Nitrogen (mg/L)	3	<	0.150	0.326	0.075	0.159	0.145		
Total Nitrogen (mg/L)	3	<	0.218	0.574	0.255	0.349	0.196		
Dissolved Reactive Phosphorus (mg/L)	3		0.010	0.014	0.010	0.011	0.002		
Total Phosphorus (mg/L)	3		0.020	0.033	0.030	0.028	0.007		
CBOD-5 (mg/L)	3	<	1.0	4.4	0.5	1.8	2.2		
COD (mg/L)	3	<	2.0	14.8	7.5	7.8	6.9		
TOC (mg/L)	1					4.9			
Chlorides (mg/L)	3		4.5	5.0	4.9	4.8	0.3		
Atrazine (µg/L)	2	<	0.05	< 0.05	0.02	0.02	0.00		
Total Metals									
Aluminum (mg/L)	3	<	0.015	0.025	0.010	0.014	0.010		
Iron (mg/L)	3		0.803	4.040	3.000	2.614	1.653		
Manganese (mg/L)	3		0.485	0.954	0.683	0.707	0.235		
Dissolved Metals									
Aluminum (mg/L)	3	<	0.015	0.019	0.008	0.008	0.001		
Antimony (µg/L)	3	<	2.0	< 2.0	1.0	1.0	0.0		
Arsenic (µg/L)	3	<	2.2	< 2.2	1.1	1.1	0.0		
Cadmium (mg/L)	3	<	0.003	0.005	0.002	0.002	0.001		
Chromium (mg/L)	3	<	0.004	0.013	0.002	0.004	0.003		
Copper (mg/L)	3	<	0.005	0.013	0.002	0.004	0.002		
Iron (mg/L)	3		0.727	0.836	0.783	0.782	0.054	J	
Lead (µg/L)	3	<	1.5	< 1.5	0.7	0.7	0.0		
Manganese (mg/L)	3		0.412	0.899	0.715	0.675	0.246	J	
Mercury (µg/L)	3	<	0.0	< 0.0	0.0	0.0	0.0		
Nickel (mg/L)	3	<	0.004	0.006	0.003	0.003	0.001		
Selenium (µg/L)	3	<	1.5	1.6	0.8	0.8	0.0		
Silver (mg/L)	3	<	0.002	0.003	0.002	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	0.003	0.002	0.001		
Biological									
Chlorophyll a (ug/L)	3	<	0.10	1.07	0.53	0.55	0.51		
Fecal Coliform (col/100 mL)	3		10	140	35	62	68	J	

C= *(F&W)* criterion violated; G=value higher than median concentration of all verified data collected from braided streams in this ecoregion; J=estimate; M=value>90% all verified data collected from braided streams in this ecoregion; N= # samples; Q=qualifier.