

2005 Monitoring Summary



Coffee Creek at U.S. Hwy 80 near Uniontown (Perry County)(32.44577/-87.42329)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Coffee Creek watershed for biological and water quality monitoring as part of the 2005 Assessment of the Alabama, Coosa, and Tallapoosa (ACT) River Basins. The objectives of the ACT Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the ACT basin group.

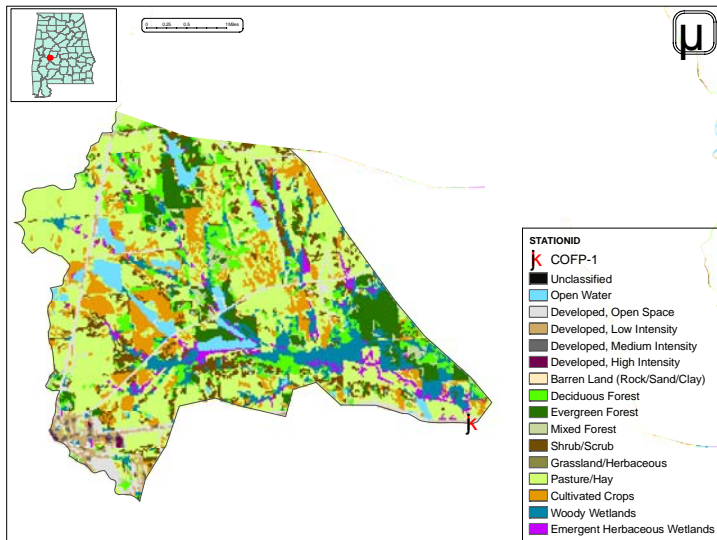


Figure 1. Sampling location and landuse within the Coffee Creek watershed at COFP-1.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Coffee Creek is a small Fish & Wildlife (F&W) stream located near the city of Uniontown in Perry County (Fig. 1). Landuse within the watershed is 40% pasture, 29% forest and wetland, and 11% cultivated crops. Population density is relatively low in this area.

REACH CHARACTERISTICS

General observations (Table 2) and habitat assessments (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. Coffee Creek at COFP-1 is a low-gradient, clay-bottomed stream in the Blackland Prairie ecoregion. Overall habitat quality was categorized as *poor*. Sand and silt comprised 35% of bottom substrates reflecting siltation and a lack of instream habitat in the reach. The reach was characterized by eroded banks, a relatively straight stream channel, and minimal riparian protection, which may also contribute to sedimentation at the site.

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 an average of the score for each metric. Metric results indicated the macroinvertebrate community to be characterized by pollution-tolerant taxa groups, indicating *very poor* community condition (Table 4).

Table 1. Summary of watershed characteristics.

Physical Characteristics		
Drainage Area (mi ²)		15
Ecoregion ^a		65a
% Landuse		
Open water		4
Wetland	Woody	9
	Emergent herbaceous	3
Forest	Deciduous	8
	Evergreen	7
	Mixed	2
Shrub/scrub		8
Grassland/herbaceous		<1
Pasture/hay		40
Cultivated crops		11
Development	Open space	5
	Low intensity	2
	Moderate intensity	<1
	High intensity	<1
Population/km ² ^b		12
# NPDES Permits ^c	TOTAL	10
	Construction Stormwater	5
	Mining General Permit (old)	5

a. Blackland Prairie

b. 2000 U.S. Census data

c. #NPDES permits from ADEM's NPDES Management System database, 9 Jun 2008

Table 2. Physical characteristics of Coffee Creek at COFP-1, May 26, 2005.

Physical Characterization		
Width (ft)		20
Canopy cover		Mostly Shaded
Depth (ft)	Riffle	0.2
	Run	0.8
	Pool	1.0
% of Reach		
	Riffle	5
	Run	90
	Pool	5
% Substrate		
	Bedrock	2
	Cobble	4
	Gravel	10
	Sand	70
	Silt	2
	Organic Matter	12

Table 3. Results of the habitat assessment conducted May 26, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	26	Poor (<40)
Sediment deposition	40	Marginal (40-52)
Sinuosity	28	Poor (<45)
Bank and vegetative stability	53	Marginal (35-59)
Riparian buffer	31	Poor (<50)
Habitat assessment score	78	
% Maximum score	35	Poor (<40)

Table 4. Results of the macroinvertebrate bioassessment conducted May 26, 2005.

Macroinvertebrate Assessment Results			
	Results	Scores	Rating
Taxa richness measures		(0-100)	
# Ephemeroptera (mayfly) genera	7	58	Fair (47-70)
# Plecoptera (stonefly) genera	0	0	Very Poor (<16)
# Trichoptera (caddisfly) genera	2	17	Very Poor (<22)
Taxonomic composition measures			
% Non-insect taxa	17	32	Poor (24.7-49.4)
% Non-insect organisms	27	30	Very Poor (<31.3)
% Plecoptera	0	0	Very Poor (<6.56)
Tolerance measures			
Beck's community tolerance index	1	4	Very Poor (<20.2)
WMB-I Assessment Score	---	20	Very Poor (<24)

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. *In situ* measurements and water samples were collected monthly, semi-monthly (metals), or quarterly (pesticides, herbicides (atrazine), and semi-volatile organics) during March through October of 2005 to help identify any stressors to the biological communities. Two of seven (29%) dissolved oxygen measurements (May 26th, August 11th) did not meet the *Fish & Wildlife* use criteria. The fecal coliform count was >2,000 colonies/100 mL in two of six (33%) samples collected (July 11th, August 11th). One of seven (17%) turbidity measurements (June 8th) was above water quality criteria for its *Fish & Wildlife* use classification. However, stream flows during the collection of these samples were above normal and may account for the elevated fecal coliform and turbidity results. Median values of nutrients (total Kjeldahl nitrogen, total nitrogen, total phosphorus), total dissolved solids, conductivity, hardness, alkalinity, and chlorides were above values expected in this ecoregion.

CONCLUSIONS

Bioassessment results indicated the macroinvertebrate community to be in *very poor* condition, below the levels expected to indicate support of the aquatic life use and verifying the impairment of the *Fish & Wildlife* use classification. Results of other data collected during 2005 suggest habitat degradation, siltation, and nutrient enrichment to be potential causes

Table 5. Summary of water quality data collected March-October, 2005. 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. 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)	7	17.0	28.0	23.0	22.8	3.5
Turbidity (NTU)	7	20.7	148.0 ^C	49.5	61.8	42.2
Total dissolved solids (mg/L)	6	87.0	317.0	214.5 ^M	205.5	76.3
Total suspended solids (mg/L)	6	13.0	96.0	55.0	54.2	29.6
Specific conductance (µmhos)	7	100.1	494	300.0 ^M	290.2	138.9
Hardness (mg/L)	3	43.4	207.0	152.0 ^M	134.1	83.3
Alkalinity (mg/L)	6	53.2	179.1	110.7 ^M	107.5	48.0
Stream Flow (cfs)	6	0.1	40	6.9	12.3	---
Chemical						
Dissolved oxygen (mg/L)	7	3.3 ^C	9.1	6.6	6.3	2.0
pH (su)	7	6.4	8.2	7.6	7.4	0.6
Ammonia Nitrogen (mg/L)	6	< 0.015	0.130	0.013	0.034	0.048
Nitrate+Nitrite Nitrogen (mg/L)	6	0.048	0.309	0.112	0.141	0.098
Total Kjeldahl Nitrogen (mg/L)	6	0.539	1.674	1.110 ^M	1.135	0.447
Total nitrogen (mg/L)	6	0.587	1.812	1.362 ^M	1.276	0.477
Dissolved reactive phosphorus (mg/L)	6	0.041	0.253	0.056	0.094	0.083
Total phosphorus (mg/L)	6	0.116	0.289	0.167 ^M	0.179	0.060
CBOD-5 (mg/L)	6	2.2	4.9	3.5	3.6	1.0
Chlorides (mg/L)	6	5.6	28.6	12.8 ^M	14.5	8.1
Atrazine (µg/L)	1				<0.05	
Total Metals						
Aluminum (mg/L)	3	0.26	0.471	0.457	0.396	0.1
Iron (mg/L)	3	0.455	0.919	0.563	0.646	0.2
Manganese (mg/L)	3	< 0.005	0.03	0.023	0.019	0.01
Dissolved Metals						
Aluminum (mg/L)	3	< 0.015	0.029	0.0075	0.015	0.01
Antimony (µg/L)	3	< 2	< 2	1	1	0
Arsenic (µg/L)	2	< 10	< 10	5	5	0
Cadmium (mg/L)	3	< 0.005	< 0.005	0.0025	0.0025	0.0
Chromium (mg/L)	3	< 0.004	< 0.004	0.002	0.002	0.0
Copper (mg/L)	3	< 0.005	< 0.005	0.0025	0.003	0.0
Iron (mg/L)	3	< 0.005	0.018	0.006	0.0088	0.01
Lead (µg/L)	3	< 2	< 2	1	1	0
Manganese (mg/L)	3	< 0.005	< 0.005	0.0025	0.003	0.0
Mercury (µg/L)	3	< 0.3	< 0.3	0.15	0.15	0.0
Nickel (mg/L)	3	< 0.006	< 0.006	0.003	0.003	0.0
Selenium (µg/L)	3	< 10	< 10	5	5	0
Silver (mg/L)	3	< 0.003	< 0.003	0.0015	0.0015	0.0
Thallium (µg/L)	3	< 1	< 1	0.5	0.500	0
Zinc (mg/L)	3	< 0.006	< 0.006	0.003	0.003	0.0
Biological						
^J Chlorophyll a (µg/L)	6	2.14	21.36	11.22 ^M	10.95	7.0
^J Fecal Coliform (col/100 mL)	6	70	> 10000 ^C	1175	3223	4165

J=estimate; N=# samples; M=value > 90th percentile of all verified ecoregional reference reach data collected within eco-region 65a; C= value exceeds established criteria for *Fish & Wildlife* use classification.

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