

2005 Monitoring Summary



Jenkins Creek at Wares Ferry Rd. (Montgomery Co.) (32.40314/-86.11435)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Jenkins 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.

Additionally, this watershed was sampled in response to a request made by the Alabama Clean Water Partnership to assess dissolved oxygen, siltation, nutrient enrichment, pathogen, and habitat conditions and the impact of these factors on the aquatic biological community.

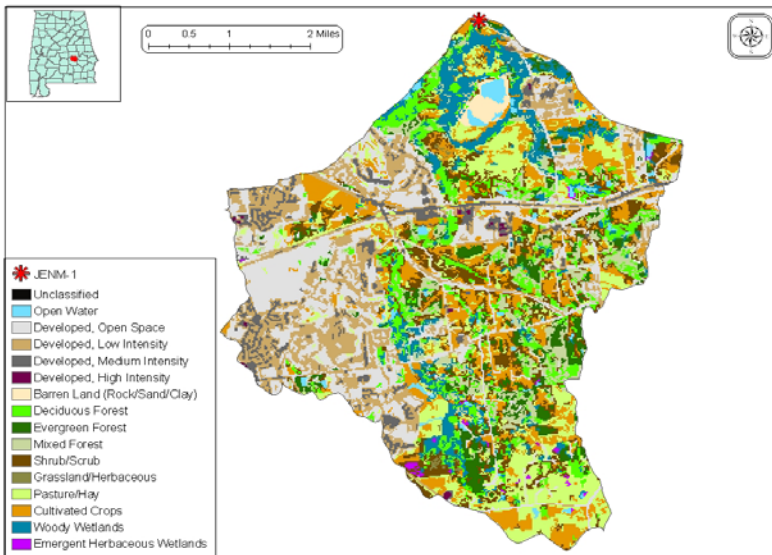


Figure 1. Sampling location and landuse within the Jenkins Creek watershed at JENM-1.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Jenkins Creek is a small *Fish & Wildlife (F&W)* stream located near the city of Montgomery (Fig. 1). Agriculture (26%) and development (35%) is prevalent within this watershed, with some forest land (19%) also present (Fig. 1). The ADEM's NPDES Management System database listed a high number of permitted discharges located within this watershed as of June 9, 2008.

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. Jenkins Creek at JENM-1 is a low-gradient stream characterized by sand, gravel, and organic substrates. Overall habitat quality was categorized as *sub-optimal* due to unstable banks and a lack of quality instream habitat. The reach was also characterized by a relatively straight stream channel, which also limits habitat and puts it at risk to impacts from sedimentation and scouring.

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 dominated by pollution-tolerant taxa, indicating *very poor* community condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Drainage Area (mi ²)		23
Ecoregion ^a		65p
% Landuse		
Open water		1
Wetland	Woody	7
	Emergent herbaceous	<1
Forest	Deciduous	8
	Evergreen	5
	Mixed	6
Shrub/scrub		10
Grassland/herbaceous		<1
Pasture/hay		12
Cultivated crops		14
Development	Open space	19
	Low intensity	12
	Moderate intensity	4
	High intensity	<1
Barren		1
Population/km ² ^b		138
# NPDES Permits ^c		
	TOTAL	136
401 Water Quality Certification		11
Construction Stormwater		118
Mining		7

a. Southeastern Flood Plains and Low Terraces

b. 2000 U.S. census data

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

Table 2. Physical characteristics at JENM-1, June 14, 2005.

Physical Characteristics		
Width (ft)		30
Canopy cover		Est. 50/50
Depth (ft)	Run	0.8
	Pool	2.5
% of Reach		
	Run	75
	Pool	25
% Substrate		
	Gravel	15
	Sand	70
	Silt	3
	Organic Matter	12

Table 3. Results of the habitat assessment conducted June 14, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	50	Marginal (40-52)
Sediment deposition	66	Optimal (>65)
Sinuosity	55	Marginal (45-64)
Bank and vegetative stability	59	Marginal (35-59)
Riparian buffer	84	Sub-optimal (70-90)
Habitat assessment score	136	
% Maximum score	62	Sub-optimal (53-65)

Table 4. Results of the macroinvertebrate bioassessment conducted June 14, 2005.

Macroinvertebrate Assessment			
	Results Scores		Rating
Taxa richness measures			
# EPT genera	11	44	Fair (37-56)
Taxonomic composition measures			
% Non-insect taxa	18	35	Poor (30.9-61.8)
% Plecoptera	0	0	Very Poor (<1.86)
% Dominant taxa	39	27	Poor (23.5-47.0)
Functional composition measures			
% Predators	3	0	Very Poor (<15.1)
Tolerance measures			
Beck's community tolerance index	1	5	Very Poor (<10.6)
% Nutrient tolerant organisms	70	0	Very Poor (<25.4)
WMB-I Assessment Score	---	16	Very Poor (<19)

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. Median concentrations of physical parameters (total dissolved and suspended solids, specific conductance, hardness, and alkalinity) and atrazine were above values expected in the southeastern floodplains ecoregion based on the 90th percentile of verified reference reach samples. The site did not exceed numeric criteria for metals. However, total metals (aluminum, iron, and manganese) were higher than expected in this ecoregion. Nutrient concentrations, CBOD-5 and chlorides were also elevated.

CONCLUSIONS

Macroinvertebrate community condition was rated as *very poor* at this location. Results of a habitat assessment and monthly water quality sampling suggest nutrient and metals enrichment at the site to be potential causes of the degraded biological condition. Elevated concentrations of solids and hardness could be indicative of runoff from urban sources.

FOR MORE INFORMATION, CONTACT:
 Dusty Miller, ADEM Aquatic Assessment Unit
 1350 Coliseum Boulevard Montgomery, AL 36110
 (334) 260-2712 jmill@adem.state.al.us

Table 5. Summary of water quality data collected March-October, 2005. 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)	8	16.0	28.0	25.0	24.3	3.9
Turbidity (NTU)	8	8.1	40.0	15.2	17.5	10.1
Total Dissolved Solids (mg/L)	7	44.0	127.0	93.5 ^M	87.2	24.2
Total Suspended Solids (mg/L)	7	5.0	63.0	17.5 ^M	22.8	20.5
Specific Conductance (µmhos)	8	106.8	171.3	128.5 ^M	129.4	20.8
Hardness (mg/L)	5	32.6	54.1	48.8 ^M	45.5	8.7
Alkalinity (mg/L)	7	32.6	49.3	43.4 ^M	42.5	6.6
Stream Flow (cfs)	7	5.1	78.7	8.5	18.8	---
Chemical						
Dissolved Oxygen (mg/L)	8	5.4	7.6	6.3	6.3	0.8
pH (su)	8	6.8	7.55	7.1	7.2	0.2
Ammonia Nitrogen (mg/L)	7	< 0.015	0.075	0.008	0.028	0.027
Nitrate+Nitrite Nitrogen (mg/L)	7	0.101	0.416	0.213 ^M	0.239	0.114
Total Kjeldahl Nitrogen (mg/L)	7	0.201	1.135	0.468 ^M	0.513	0.319
Total Nitrogen (mg/L)	7	0.497	1.236	0.737 ^M	0.752	0.257
Dissolved Reactive Phosphorus (mg/L)	7	0.008	0.048	0.018 ^M	0.021	0.013
Total Phosphorus (mg/L)	7	0.043	0.103	0.084 ^M	0.085	0.015
CBOD-5 (mg/L)	7	1.3	4.5	2.4 ^M	2.6	1.0
COD (mg/L)	4	< 2.0	< 2.0	1.0	1.0	0.0
^J Chlorides (mg/L)	7	5.5	10.2	7.3 ^M	7.3	1.4
Atrazine (µg/L)	2	0.09	0.30	0.20 ^M	0.20	0.62
Total Metals						
Aluminum (mg/L)	4	0.029	0.19	0.146 ^M	0.122	0.083
Iron (mg/L)	4	1.45	2.09	1.92 ^M	1.920	0.170
Manganese (mg/L)	4	0.107	0.224	0.173 ^M	0.170	0.055
Dissolved Metals						
Aluminum (mg/L)	4	< 0.015	0.135	0.008	0.050	0.074
Antimony (µg/L)	4	< 2	< 2	1	1	0
Arsenic (µg/L)	4	< 10	< 10	5	5	0
Cadmium (mg/L)	4	< 0.005	< 0.005	0.003	0.003	0.000
Chromium (mg/L)	4	< 0.004	< 0.004	0.002	0.002	0.000
Copper (mg/L)	4	< 0.005	< 0.005	0.003	0.003	0.000
Iron (mg/L)	4	0.416	1.19	0.515 ^M	0.707	0.421
Lead (µg/L)	4	< 2	< 2	1	1	0
Manganese (mg/L)	4	0.077	0.215	0.211 ^M	0.168	0.079
Mercury (µg/L)	4	< 0.3	< 0.3	0.15	0.15	0.000
Nickel (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.000
Selenium (µg/L)	4	< 10	< 10	5	5	0
Silver (mg/L)	4	< 0.003	< 0.003	0.002	0.002	0.000
Thallium (µg/L)	4	< 1	< 1	0.5	0.5	0
Zinc (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.000
Biological						
^J Chlorophyll a (µg/L)	7	0.27	4.27	3.47 ^M	2.89	1.64
^J Fecal Coliform (col/100 mL)	7	23	440	87 ^M	181	191

^J = Reported value is an estimate; N=# samples; M=Median concentrations > 25th percentile of expected values for ecoregion/subregion 65p