Alabama Department of Environmental Management

Basin Assessment Site

Rivers and Streams Monitoring Program

2005 Monitoring Summary

™

Fair

Ketchepedrakee Creek at State Highway 9 in Clay County (33.46342/-85.70072)

BACKGROUND

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

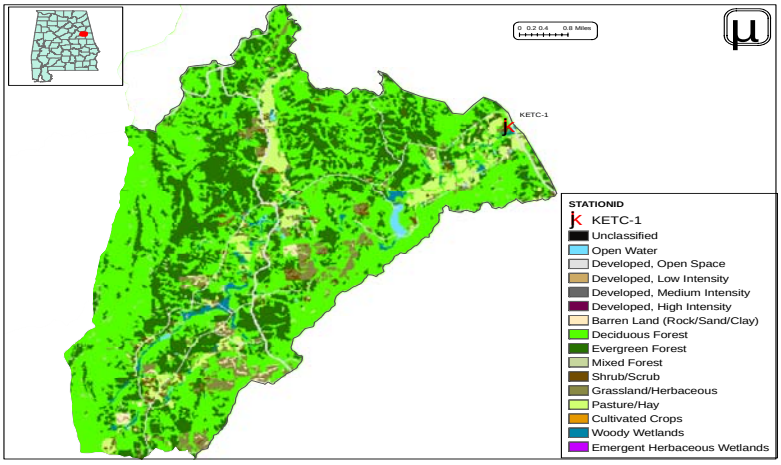

Figure 1. Sampling location and landuse within the Ketchepedrakee Creek watershed at KETC-1.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Ketchepedrakee Creek is a *Fish & Wildlife (F&W)* stream located in the Tallapoosa River basin near the city of Delta (Fig. 1). Landuse within the watershed is primarily forest (83%). The presence of forests are characteristic of streams in the Southeastern Inner Piedmont (Table 1).

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. Ketchepedrakee Creek at KETC-1 is a low-gradient stream characterized by relatively deep pools and sand, silt, and gravel substrates. Overall habitat quality was categorized as *sub-optimal* due to sedimentation, low sinuosity, and a lack of stable in-stream habitat.

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 *fair* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Drainage Area (mi^2)		37
Ecoregion[a]		45a
% Landuse		
Open water		<1
Wetland	Woody	1
Forest	Deciduous	55
	Evergreen	28
	Mixed	1
Shrub/scrub		1
Grassland/herbaceous		5
Pasture/hay		5
Development	Open space	3
	Low intensity	<1
Barren		1
Population/km^2[b]		10
# NPDES Permits[c]	**TOTAL**	3
Construction Stormwater		1
Mining General Permit (old)		2

a.Southern Inner Piedmont

b.2000 US Census Data

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

Table 2. Physical characteristics at KETC-1, May 9, 2005.

Physical Characteristics		
Width (ft)		40
Canopy cover		Est. 50/50
Depth (ft)		
	Riffle	0.65
	Run	0.0
	Pool	3.0
% of Reach		
	Riffle	5
	Run	2
	Pool	93
% Substrate		
	Boulder	3
	Cobble	2
	Gravel	10
	Sand	65
	Silt	15
	Organic Matter	5

Table 3. Results of the habitat assessment conducted at KETC-1, May 9, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	55	Marginal (41-58)
Sediment deposition	34	Poor (<41)
Sinuosity	58	Marginal (45-64)
Bank and vegetative stability	79	Optimal (≥75)
Riparian buffer	83	Sub-optimal (70-90)
Habitat assessment score	154	
% Maximum score	**64**	**Sub-optimal (59-70)**

Table 4. Results of the macroinvertebrate bioassessment conducted at KETC-1,

Macroinvertebrate Assessment Results			
	Results	**Scores (0-100)**	**Rating**
Taxa richness measures			
# Ephemeroptera (mayfly) genera	14	100	Excellent (>85)
# Plecoptera (stonefly) genera	2	33	Fair (32-49)
# Trichoptera (caddisfly) genera	9	75	Good (67-83)
Taxonomic composition measures			
% Non-insect taxa	4	83	Good (74.1-87.1)
% Non-insect organisms	0	99	Excellent (>97)
% Plecoptera	0	0	Very Poor (<6.56)
Tolerance measures			
Beck's community tolerance index	14	50	Fair (40.7-60.7)
WMB-I Assessment Score	**---**	**63**	**Fair (48-72)**

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. *In situ* parameters suggested that Ketchpedrakee Creek at KETC-1 was meeting water quality criteria for its *F&W* use classification. Median concentrations of other parameters were similar to concentrations measured in ADEM's least impaired ecoregion reference reaches located in Southern Inner Piedmont.

CONCLUSIONS

Bioassessment results indicated the macroinvertebrate community to be in *fair* condition. Intensive water quality sampling and habitat assessment results suggested sedimentation and a lack of instream habitat to be potential causes of the degraded biological condition.

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Table 5. Summary of water quality data collected March-October, 2005 at KETC-1. 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)	9	12.0	28.0	21.4	20.6	5.2
Turbidity (NTU)	9	9.1	23.4	11.5	13.0	4.4
Total dissolved solids (mg/L)	7	7.0	54.0	33.0	30.4	16.4
Total suspended solids (mg/L)	7	8.0	25.0	17.0	16.3	6.9
Specific conductance (µmhos)	9	30.9	51	38.1	40.1	6.3
Hardness (mg/L)	4	12.7	20.9	14.1	15.4	3.7
Alkalinity (mg/L)	7	11.1	30.3	14.2	16.5	7.1
Stream Flow (cfs)	7	13.8	72	31.6	32.7	---
Chemical						
Dissolved oxygen (mg/L)	9	6.8	9.8	7.8	7.9	1.1
pH (su)	9	6.1	7.58	7.0	7.0	0.4
Ammonia Nitrogen (mg/L)	7	< 0.015	0.032	0.015	0.016	0.008
J Nitrate+Nitrite Nitrogen (mg/L)	7	0.021	0.093	0.042	0.050	0.023
Total Kjeldahl Nitrogen (mg/L)	7	< 0.150	0.428	0.198	0.213	0.155
Total nitrogen (mg/L)	7	0.096	0.477	0.240	0.228	0.138
Dissolved reactive phosphorus (mg/L)	7	< 0.004	0.005	0.002	0.003	0.001
Total phosphorus (mg/L)	7	0.016	0.082	0.040	0.047	0.023
CBOD-5 (mg/L)	7	< 1.0	4.9	2.0	2.5	1.6
JH Chlorides (mg/L)	7	3.6	95.9	3.8	17.1	34.8
Atrazine (µg/L)	2	< 0.05	< 0.05	0.03	0.03	0.00
Total Metals						
Aluminum (mg/L)	4	0.074	0.213	0.1505	0.147	0.1
Iron (mg/L)	4	0.931	1.03	0.9815	0.981	0.1
Manganese (mg/L)	4	0.034	0.083	0.065	0.062	0.0
Dissolved Metals						
Aluminum (mg/L)	4	< 0.015	0.163	0.0075	0.046	0.1
Antimony (µg/L)	4	< 2	< 2	1	1	0.0
Arsenic (µg/L)	4	< 10	< 10	5	5	0.0
Cadmium (mg/L)	4	< 0.005	< 0.005	0.0025	0.0025	0.0
Chromium (mg/L)	4	< 0.004	< 0.004	0.002	0.002	0.0
Copper (mg/L)	4	< 0.005	< 0.005	0.0025	0.003	0.0
Iron (mg/L)	4	0.182	0.331	0.2645	0.2605	0.1
Lead (µg/L)	4	< 2	< 2	1	1	0.0
Manganese (mg/L)	4	< 0.005	0.051	0.0153	0.021	0.0
Mercury (µg/L)	4	< 0.3	< 0.3	0.15	0.15	0.0
Nickel (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.0
Selenium (µg/L)	4	< 10	< 10	5	5	0.0
Silver (mg/L)	4	< 0.003	< 0.003	0.0015	0.0015	0.0
Thallium (µg/L)	4	< 1	< 1	0.5	0.500	0.0
Zinc (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.0
Biological						
J Chlorophyll a (µg/L)	7	0.53	3.74	1.60	1.68	1.1
J Fecal Coliform (col/100 mL)	7	47	470	120	187	148

J=estimate; N=# samples.