ADEM
Alabama Department of Environmental Management
Basin Assessment Site

Rivers and Streams Monitoring Program

2005 Monitoring Summary

Good ™

Jacks Creek at Coosa County Road 40 (32.91720/-86.13375)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected Jacks Creek 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 assessments were to assess the biological integrity each monitoring site and to estimate overall water quality within the ACT basin.
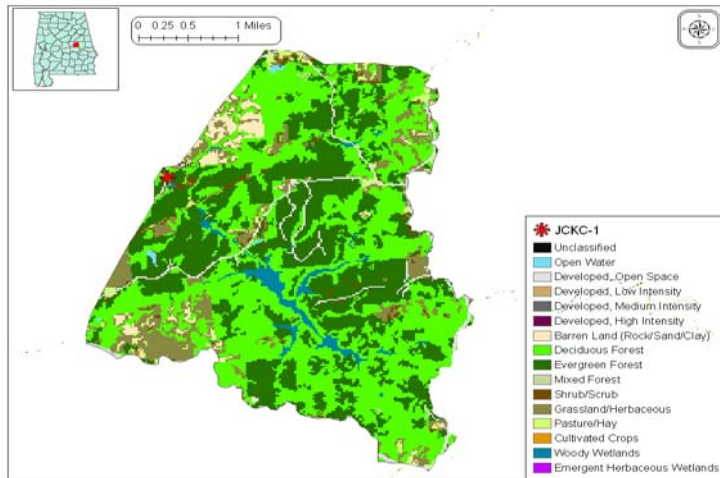

Figure 1. Sampling location and landuse of Jacks Creek at JCKC-1

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Jacks Creek at JCKC-1 is a small *Fish and Wildlife (F&W)* stream in the Southern Inner Piedmont ecoregion within Coosa County (Fig. 1). It is composed primarily of forests (80%) and grasslands. As of June 9th, 2008, ADEM's NPDES Management System database did not show any permitted discharges located within the watershed.

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. Jacks Creek at JCKC-1 is a medium gradient, riffle/run stream with a substrate consisting mostly of sand, gravel, and cobble substrates. Habitat quality and availability were rated as *sub-optimal* for supporting diverse aquatic macroinvertebrates due to sediment deposition and bank instability.

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 score is based on a 100 point scale with the final score comprising of the average of each metric score. The metric results indicated the macroinvertebrate community to be in *good* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Drainage Area (mi^2)		11
Ecoregion[a]		45a
% Landuse		
Open water		<1
Wetland	Woody	2
Forest	Deciduous	46
	Evergreen	34
	Mixed	<1
Shrub/scrub		1
Grassland/herbaceous		10
Pasture/hay		1
Cultivated crops		<1
Development	Open space	3
Barren		3
Population/km^2 [b]		9

a. Southern Inner Piedmont
b. 2000 US Census data

Table 2. Physical characteristics of Jack's Creek at JCKC-1, May 2, 2005.

Physical characteristics		
Width (ft)		30
Canopy cover		Mostly Shaded
Depth (ft)		
	Riffle	0.8
	Run	1.5
	Pool	2.5
% of Reach		
	Riffle	5
	Run	85
	Pool	10
% Substrate		
	Boulder	1
	Cobble	8
	Gravel	15
	Sand	60
	Silt	5
	Clay	3
	Organic Matter	8

Table 3. Results of habitat assessment of Jack's Creek at JCKC-1, May 2, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	58	Sub-optimal (53-65)
Sediment deposition	48	Marginal (40-52)
Sinuosity	50	Marginal (45-64)
Bank and vegetative stability	40	Marginal (35-59)
Riparian buffer	85	Sub-optimal (70-90)
Habitat assessment score	140	
% Maximum score	**58**	**Sub-optimal (53-65)**

Table 4. Results of macroinvertebrate assessment conducted at JCKC-1 May 2,

Macroinvertebrate Assessment Results			
	Results	Scores	Rating
Taxa richness measures		**(0-100)**	
# Ephemeroptera (mayfly) genera	9	75	Good (71-85)
# Plecoptera (stonefly) genera	7	100	Excellent (>75)
# Trichoptera (caddisfly) genera	4	33	Poor (22-44)
Taxonomic composition measures			
% Non-insect taxa	4	85	Good (74.1-87.1)
% Non-insect organisms	1	97	Excellent (>97)
% Plecoptera	12	62	Excellent (>59.8)
Tolerance measures			
Beck's community tolerance index	22	79	Good (60.7-80.4)
WMB-I Assessment Score	**---**	**76**	**Good (72-86)**

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* measurements indicated that Jacks Creek at JCKC-1 was meeting water quality criteria for its *F&W* use classification. Median concentrations of nutrients, total and dissolved sediments, and chlorides were all well within the expected limit for the Southern Inner Piedmont sub-ecoregion streams. Collected metals generally tested below detection limits. Pesticides, semi-volatile organics and atrazine were not detected in the samples collected.

CONCLUSION

Results of data collected during 2005 suggest that Jacks Creek at JCKC-1 may meet ADEM's requirements as a least disturbed ecoregion reference reach in ecoregion 45a. The reach was typical of other streams in the Southern Inner Piedmont, which are generally low to moderate gradient streams with mostly cobble, gravel and sandy substrates. Additionally, landuse and population density categorized Jacks Creek was among the least disturbed watersheds in the ACT basin group. Bioassessment and water quality data indicate the reach to be in *good* condition and generally unaffected by the small residential areas in the watershed. However, sedimentation was found to be a factor that affected the overall score of the habitat assessment.

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	11.0	28.0	16.0	18.1	5.7
Turbidity (NTU)	8	5.7	24.2	16.9	17.4	5.8
Total dissolved solids (mg/L)	7	17.0	65.0	46.0	45.7	16.0
Total suspended solids (mg/L)	7	4.0	21.0	15.0	13.3	6.7
Specific conductance (μmhos)	8	41.3	53.2	48.2	47.3	4.4
Hardness (mg/L)	5	9.6	12.4	11.3	10.9	1.2
Alkalinity (mg/L)	7	14.8	21.3	17.8	17.9	2.6
Stream Flow (cfs)	7	7.5	37.3	22.5	21.9	---
Chemical						
Dissolved oxygen (mg/L)	7	7.9	10.1	9.5	9.2	0.8
pH (su)	8	6.5	7.9	7.4	7.4	0.4
Ammonia Nitrogen (mg/L)	7	< 0.015	< 0.015	0.008	0.008	0.000
Nitrate+Nitrite Nitrogen (mg/L)	7	< 0.003	0.074	0.038	0.040	0.026
Total Kjeldahl Nitrogen (mg/L)	7	< 0.150	0.272	0.075	0.115	0.076
Total nitrogen (mg/L)	7	0.076	0.346	0.121	0.155	0.091
Dissolved reactive phosphorus (mg/L)	7	0.008	0.014	0.011	0.010	0.002
Total phosphorus (mg/L)	7	< 0.004	0.079	0.044	0.045	0.025
CBOD-5 (mg/L)	7	< 1.0	4.6	1.4	1.8	1.3
COD (mg/L)	1	< 2.0	< 2.0	1.0	1.0	0
J Chlorides (mg/L)	6	4.1	2.0	4.3	4.6	0.8
Atrazine (μg/L)	2	0.05	0.05	0.03	0.03	0.00
Total Metals						
Aluminum (mg/L)	4	< 0.015	0.389	0.267	0.232	0.2
Iron (mg/L)	4	0.793	1.51	1.1	1.126	0.3
Manganese (mg/L)	4	0.02	0.108	0.056	0.060	0.0
Dissolved Metals						
Aluminum (mg/L)	4	< 0.015	< 0.015	0.008	0.008	0
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
Chromium (mg/L)	4	< 0.004	< 0.004	0.002	0.002	0
Copper (mg/L)	4	< 0.005	< 0.005	0.003	0.003	0
Iron (mg/L)	4	< 0.005	0.232	0.102	0.109	0.1
Lead (μg/L)	4	< 2	< 2	1	1	0
Manganese (mg/L)	4	< 0.005	0.034	0.022	0.020	0
J Mercury (μg/L)	4	< 0.3	< 0.3	0.15	0.188	0
Nickel (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0
Selenium (μg/L)	4	< 10	< 10	5	5	0
Silver (mg/L)	4	< 0.003	< 0.003	0.002	0.002	0
Thallium (μg/L)	4	< 1	< 1	0.5	0.500	0
Zinc (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0
Biological						
J Chlorophyll a (μg/L)	7	0.53	5.34	1.07	2.14	1.8
J Fecal Coliform (col/100 mL)	7	33	340	120	149	96

J=estimate; N= # of samples.