

2005 Monitoring Summary



Wolf Creek at AL State Highway 21 in Wilcox County (31.99217/-86.91096)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Wolf 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 each monitoring site and to estimate overall water quality within the ACT basin group.

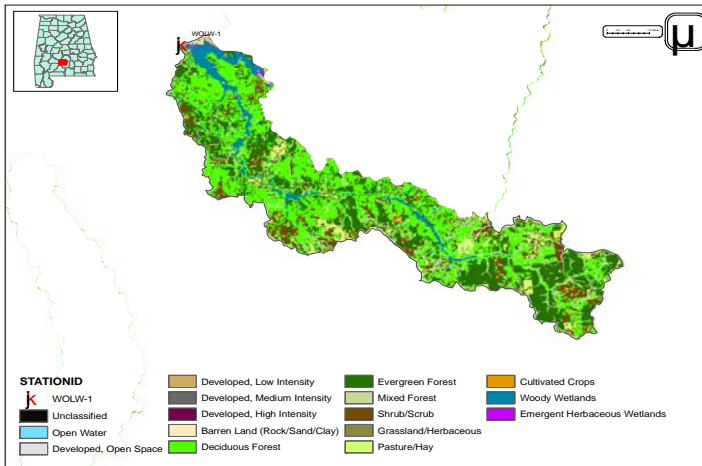


Figure 1. Sampling location and landuse within the Wolf Creek watershed at WOLW-1.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Wolf Creek is a *Fish & Wildlife (F&W)* stream located in Wilcox County in the Southern Hilly Gulf Coastal Plains ecoregion (65d). Landuse within the watershed is primarily forest (74%; Fig. 1). There are 3 permitted discharges located along 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. Wolf Creek at WOLW-1 was a low-gradient, sand-bottomed stream in the Alabama River Basin. Overall habitat quality was categorized as *sub-optimal* due to poor in stream habitat cover, reduced sinuosity and a lack of pool habitat. Marginal bank stability also lowered the overall habitat score.

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 *good* community condition.

Table 1. Summary of watershed characteristics at Wolf Creek..

Watershed Characteristics		
Drainage Area (mi ²)		36
Ecoregion ^a		65d
% Landuse		
Open water		<1
Wetland	Woody	7
	Emergent herbaceous	<1
Forest	Deciduous	40
	Evergreen	26
	Mixed	8
Shrub/scrub		11
Grassland/herbaceous		<1
Pasture/hay		5
Cultivated crops		1
Development	Open space	2
	Low intensity	<1
Population/km ^{2b}		4
# NPDES Permits ^c	TOTAL	3
Mining General Permit (old)		3

a.Southern Hilly Gulf Coastal Plains

b.2000 U.S. Census Data

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

Table 2. Physical characteristics of Wolf Creek at WOLW-1 on May 27, 2005.

Physical characteristics		
Width (ft)		20
Canopy cover		Mostly Shaded
Depth (ft)	Run	0.6
% of Reach	Run	100
% Substrate	Gravel	2
	Sand	87
	Organic Matter	11

Table 3. Results of the habitat assessment conducted on Wolf Creek at WOLW-1 on May 27, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	36	Poor (<40)
Sediment deposition	55	Sub-optimal (53-65)
Sinuosity	35	Poor (<45)
Bank and vegetative stability	44	Marginal (35-59)
Riparian buffer	90	Sub-optimal (70-90)
Habitat assessment score	120	
% Maximum score	55	Sub-optimal (53-65)

Table 4. Results of the macroinvertebrate bioassessment conducted on Wolf Creek at WOLW-1 on May 27, 2005.

Macroinvertebrate Assessment			
	Results	Scores	Rating
Taxa richness measures			
# EPT genera	14	56	Fair (37-56)
Taxonomic composition measures			
% Non-insect taxa	5	100	Excellent (>96.34)
% Plecoptera	5	100	Excellent (>52.8)
% Dominant taxa	12	95	Excellent (>85.2)
Functional composition measures			
% Predators	24	74	Excellent (>72.1)
Tolerance measures			
Beck's community tolerance index	11	50	Good (31.8-65.9)
% Nutrient tolerant organisms	28	69	Fair (50.8-76.2)
WMB-I Assessment Score	---	78	Good (56-78)

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 nutrients and metals collected during this period were within normal ranges or below detection limits (Table 5).

CONCLUSIONS

Bioassessment results indicated the macroinvertebrate community to be in *good* condition. Intensive water quality sampling indicated nutrient and metals concentrations to be similar to least impaired reference reaches in Ecoregion 65d. However, overall habitat quality was categorized as *sub-optimal* due to poor in stream habitat cover, reduced sinuosity, lack of pool habitat and marginal bank stability.

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.

Parameter	N	Min	Max	Median	Avg	SD
Physical						
Temperature (°C)	8	20.0	27.0	21.3	22.1	2.5
Turbidity (NTU)	8	14.6	74.7	39.3	41.7	21.0
Total Dissolved Solids (mg/L)	7	71.0	108.0	101.0	94.7	13.6
Total Suspended Solids (mg/L)	7	17.0	100.0	49.0	59.3	33.0
Specific Conductance (µmhos)	8	49.7	180.5	78.3	94.6	41.1
Hardness (mg/L)	4	27.6	81.7	37.0	45.8	24.5
Alkalinity (mg/L)	7	25.3	79.6	39.6	46.2	17.8
Stream Flow (cfs)	9	11.9	138.4	30.9	49.7	---
Chemical						
Dissolved Oxygen (mg/L)	8	5.5	12.4	8.3	8.4	2.0
pH (su)	8	7.3	7.8	7.6	7.6	0.2
Ammonia Nitrogen (mg/L)	7	< 0.015	< 0.015	0.008	0.008	0.000
Nitrate+Nitrite Nitrogen (mg/L)	7	< 0.003	0.146	0.117	0.103	0.049
Total Kjeldahl Nitrogen (mg/L)	7	0.161	0.581	0.289	0.328	0.153
Total Nitrogen (mg/L)	7	0.290	0.727	0.413	0.432	0.164
Dissolved Reactive Phosphorus (mg/L)	7	< 0.004	0.038	0.007	0.013	0.012
Total Phosphorus (mg/L)	7	< 0.004	0.065	0.059	0.048	0.023
CBOD-5 (mg/L)	7	0.8	2.8	1.0	1.3	0.8
Chlorides (mg/L)	7	4.1	5.9	4.7	4.9	0.6
Atrazine (µg/L)	2	< 0.05	0.05	0.04	0.04	0.002
Total Metals						
Aluminum (mg/L)	4	< 0.015	1.39	0.126	0.412	0.7
Iron (mg/L)	4	1.98	5.1	2.0	2.8	1.5
Manganese (mg/L)	4	0.057	0.193	0.061	0.093	0.1
Dissolved Metals						
Aluminum (mg/L)	4	< 0.015	0.081	0.008	0.026	---
Antimony (µg/L)	4	< 2	< 2	1	1	---
Arsenic (µg/L)	4	< 10	< 10	5	5	---
Cadmium (mg/L)	4	< 0.005	< 0.005	0.003	0.003	---
Chromium (mg/L)	4	< 0.004	< 0.004	0.002	0.002	---
Copper (mg/L)	4	< 0.005	< 0.005	0.003	0.003	---
Iron (mg/L)	4	0.111	0.31	0.174	0.192	0.1
Lead (µg/L)	4	2	6.33	1	2.333	2.7
Manganese (mg/L)	4	< 0.005	0.023	0.003	0.008	---
Mercury (µg/L)	4	< 0.3	< 0.3	0.15	0.15	---
Nickel (mg/L)	4	< 0.006	< 0.006	0.003	0.003	---
Selenium (µg/L)	4	< 10	< 10	5	5	---
Silver (mg/L)	4	< 0.003	< 0.003	0.002	0.002	---
Thallium (µg/L)	4	< 1	< 1	0.5	0.500	---
Zinc (mg/L)	4	< 0.006	< 0.006	0.003	0.003	---
Biological						
^J Chlorophyll a (µg/L)	7	0.53	11.21	2.14	3.36	3.8
^J Fecal Coliform (col/100 mL)	7	170	1700	370	541	531

J=estimate; N=# samples.

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