

2005 Monitoring Summary



Walnut Creek at Chilton County Road 32 (32.89420/-86.56690)

BACKGROUND

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

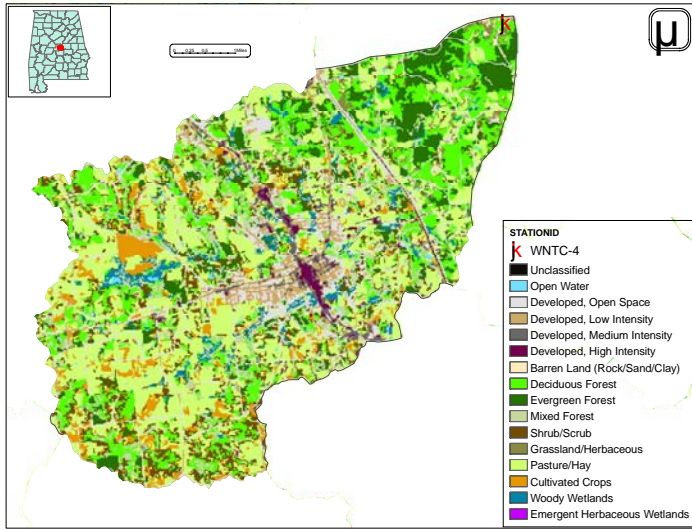


Figure 1. Sampling location and landuse within the Walnut Creek watershed at WNTC-4.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Walnut Creek is a small *Fish & Wildlife (F&W)* stream that runs through the city of Clanton (Fig. 1). Landuse within the watershed is primarily forest (38%), agriculture (35%), and urban (16%) areas. A portion of Interstate 65 is located in the watershed. Population density is moderate for the 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. Walnut Creek at WNTC-4 is a moderate-gradient, cobble-gravel bottomed stream in the Coosa River basin. Habitat quality and availability was rated as *optimal* for supporting diverse aquatic macroinvertebrate communities.

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 in *fair* condition (Table 4).

Table 1. Summary of watershed characteristics.

Physical Characteristics	
Drainage Area (mi ²)	36
Ecoregion ^a	45a
% Landuse	
Open water	<1
Wetland	Woody 3
	Emergent herbaceous <1
Forest	Deciduous 17
	Evergreen 10
	Mixed 9
Shrub/scrub	9
Grassland/herbaceous	2
Pasture/hay	30
Cultivated crops	5
Development	Open space 9
	Low intensity 4
	Moderate intensity 2
	High intensity 1
Barren	<1
Population/km ² ^b	72
# NPDES Permits ^c	TOTAL 28
	Construction Stormwater 19
	Mining General Permit (old) 8
	Industrial General 1

a. Southern Inner Piedmont

b. 2000 U.S. Census data

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

Table 2. Summary of Reach characteristics at WNTC-4 on June 12, 2005

Physical Characterization	
Width (ft)	30
Canopy cover	Mostly Open
Depth (ft)	Riffle 0.5
	Run 1.0
	Pool 1.5
% of Reach	Riffle 5
	Run 85
	Pool 10
% Substrate	Bedrock 3
	Boulder 5
	Cobble 35
	Gravel 47
	Sand 3
	Silt 2
	Organic Matter 3
	Mud/Muck 2

Table 3. Results of the habitat assessment conducted June 12, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	79	Optimal (> 70)
Sediment deposition	78	Optimal (> 70)
Sinuosity	68	Sub-optimal (65-84)
Bank and vegetative stability	68	Sub-optimal (60-74)
Riparian buffer	90	Sub-optimal (70-90)
Habitat assessment score	187	
% Maximum score	78	Optimal (> 70)

Table 4. Results of the macroinvertebrate bioassessment conducted June 12, 2005.

Macroinvertebrate Assessment Results			
	Results	Scores	Rating
		(0-100)	
Taxa richness measures			
# Ephemeroptera (mayfly) genera	8	67	Fair (47-70)
# Plecoptera (stonefly) genera	1	17	Poor (16-31)
# Trichoptera (caddisfly) genera	9	75	Good (67-83)
Taxonomic composition measures			
% Non-insect taxa	6	77	Good (74.1-87.1)
% Non-insect organisms	4	90	Fair (62.7-93.9)
% Plecoptera	2	11	Poor (6.56-13.1)
Tolerance measures			
Beck's community tolerance index	10	36	Poor (20.2-40.7)
WMB-I Assessment Score	---	53	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. Median nutrient (nitrate+nitrite-nitrogen, total nitrogen), hardness, chloride and atrazine concentrations were above values expected in the Southern Inner Piedmont ecoregion. Conductivity was also higher than expected.

CONCLUSIONS

Bioassessment results indicated the macroinvertebrate community to be in *fair* condition. Results of other data collected at the site suggest nutrient enrichment to be a potential cause of the degraded biological conditions at this location.

FOR MORE INFORMATION, CONTACT:
Brien Diggs, ADEM Aquatic Assessment Unit
1350 Coliseum Boulevard Montgomery, AL 36110
(334) 260-2750 lod@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). 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	18.0	28.0	23.0	22.5	3.7
Turbidity (NTU)	9	3.3	33.8	7.2	11.4	10.0
Total dissolved solids (mg/L)	6	55.0	126.0	68.5	76.5	25.8
Total suspended solids (mg/L)	6	2.0	57.0	7.5	20.7	23.9
Specific conductance (µmhos)	9	71.6	190	93.4 ^M	103.5	37.5
Hardness (mg/L)	4	19.9	45.9	29.6 ^M	31.3	11.6
Alkalinity (mg/L)	6	14.2	34.2	22.3	23.7	8.4
Stream Flow (cfs)	9	8.5	145.4	26.6	39.5	---
Chemical						
Dissolved oxygen (mg/L)	9	7.5	10.4	8.8	8.7	0.9
pH (su)	9	6.8	8.42	7.3	7.5	0.5
Ammonia Nitrogen (mg/L)	6	< 0.015	< 0.015	0.008	0.009	0.000
Nitrate+Nitrite Nitrogen (mg/L)	6	0.335	1.379	0.432 ^M	0.588	0.398
Total Kjeldahl Nitrogen (mg/L)	6	< 0.150	0.483	0.184	0.234	0.172
Total nitrogen (mg/L)	6	0.441	1.586	0.737 ^M	0.822	0.408
Dissolved reactive phosphorus (mg/L)	6	0.010	0.019	0.012	0.013	0.003
Total phosphorus (mg/L)	6	0.012	0.074	0.062	0.054	0.023
CBOD-5 (mg/L)	6	< 1.0	3.4	1.8	1.9	0.9
Chlorides (mg/L)	6	5.9	15.3	8.3 ^M	9.6	3.8
Atrazine (µg/L)	2	< 0.05	0.10	0.06 ^M	0.06	0.05
Total Metals						
Aluminum (mg/L)	4	< 0.015	0.093	0.0233	0.037	0.04
Iron (mg/L)	4	0.454	0.983	0.749	0.734	0.2
Manganese (mg/L)	4	< 0.005	0.033	0.014	0.016	0.01
Dissolved Metals						
Aluminum (mg/L)	4	< 0.015	0.038	0.008	0.015	0.02
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	0.0
Chromium (mg/L)	4	< 0.004	< 0.004	0.002	0.002	0.0
Copper (mg/L)	4	< 0.005	< 0.005	0.003	0.003	0.0
Iron (mg/L)	4	0.079	0.382	0.297	0.264	0.1
Lead (µg/L)	4	< 2	< 2	1	1	0
Manganese (mg/L)	4	< 0.005	0.025	0.003	0.008	0.01
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
Silver (mg/L)	4	< 0.003	< 0.003	0.002	0.002	0.0
Thallium (µg/L)	4	< 1	< 1	0.5	0.5	0
Zinc (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.0
Biological						
↓ Chlorophyll a (µg/L)	6	0.53	2.14	1.07	1.16	0.6
↓ Fecal Coliform (col/100 mL)	6	47	590	75	157	213

J=estimate; N=# samples; M=value > 25th percentile of all data collected within ecoregion 45a.