Alabama Department of Environmental Management

Basin Assessment Site

Rivers and Streams Monitoring Program

2011 Monitoring Summary

Fair

Aikin Creek at State Highway 225 (Baldwin County) (30.98030/-87.86774)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Aikin Creek watershed for biological and water quality monitoring as part of the 2011 Assessment of the Escatawpa, Mobile, and Tombigbee (EMT) River Basins. The objectives of these monitoring activities were to assess the biological integrity of each sampling location and to estimate overall water quality within the EMT basins.

Aikin Creek at AIKB-2 is located within the Floodplains and Low Terraces ecoregion (75i). However, the majority of the watershed is within the Southern Pine Plains and Hills ecoregion (65f). The watershed is among the least disturbed within these ecoregions, based on landuse, road density, and population density. The 2011 data will be used to evaluate the use of Aikin Creek as a "best attainable" condition reference watershed for comparison with other streams in this area.

Figure 1. Aikin Creek at AIKB-2, August 24, 2011.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		**Mobile River**
Drainage Area (mi^2)		**10**
Ecoregion[a]		**75i**
% Landuse		
Open water		<1
Wetland	Woody	18
	Emergent herbaceous	<1
Forest	Deciduous	<1
	Evergreen	50
	Mixed	3
Shrub/scrub		18
Grassland/herbaceous		4
Pasture/hay		1
Cultivated crops		2
Development	Open space	2
	Low intensity	<1
	Moderate intensity	<1
Barren		<1
Population/km^2[b]		**9**
# NPDES Permits[c]	**TOTAL**	**3**
Construction Stormwater		2
Municipal Individual		1

a. Floodplains and Low Terraces

b. 2000 US Census

c. #NPDES permits downloaded from ADEM's NPDES Management System database, September 1, 2012.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Aikin Creek is a *Fish and Wildlife (F&W)* stream located in Baldwin County in the town of Stockton. Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forest (53%), with some wetland and shrub/scrub areas. As of September 1, 2012, three outfalls were active within the Aikin Creek watershed.

REACH CHARACTERISTICS

General observations (Table 2) and a habitat assessment (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. Aikin Creek at AIKB-2 is a low-gradient, glide-pool stream characterized primarily by a sand substrate (Figure 1). Overall habitat quality was categorized as *marginal* due to a lack of instream habitat.

Table 2. Physical characteristics of Aiken Creek at AIKB-2, May 3, 2011.

Physical Characteristics		
Width (ft)		**18**
Canopy Cover		**Mostly Shaded**
Depth (ft)		
	Run	0.3
	Pool	2.0
% of Reach		
	Run	95
	Pool	5
% Substrate		
	Mud/Muck	5
	Gravel	2
	Sand	81
	Silt	2
	Organic Matter	10

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 the average of all individual metric scores. Metric results indicated the macroinvertebrate community to be in *fair* condition (Table 4).

Table 3. Results of habitat assessment conducted in Aikin Creek at AIKB-2, May 3, 2011.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	23	Poor (<40)
Sediment Deposition	55	Sub-Optimal (53-65)
Sinuosity	40	Poor (<45)
Bank Vegetative Stability	50	Marginal (35-<59)
Riparian Buffer	88	Sub-Optimal (70-90)
Habitat Assessment Score	***100***	
% Maximum Score	***45***	**Marginal (40-<53)**

Table 4. Results of macroinvertebrate bioassessment conducted in Aikin Creek at AIKB-2, May 3, 2011.

Macroinvertebrate Assessment	
	Results
Taxa richness and diversity measures	
# EPT taxa	6
Taxonomic composition measures	
% Non-insect taxa	3
% Plecoptera	2
% Dominant taxon	53
Functional feeding group	
% Predators	21
Community tolerance	
Becks community tolerance index	6
% Nutrient tolerant individuals	56
WMB-I Assessment Score	**37**
WMB-I Assessment Rating	**Fair (37-55)**

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, atrazine, and semi -volatile organics) during April through October of 2011 to help identify any stressors to the biological communities. Although low, stream pH was typical of the Floodplains and Low Terrace ecoregion. Dissolved Thallium exceeded the Human Health criterion on April 20, 2011. The ADEM has not developed reference guidelines for ecoregion 75. Median specific conductance and total iron were higher than expected in the surrounding ecoregions.

SUMMARY

Aikin Creek at AIKB-2 was typical of other streams in the Floodplains and Low Terrace, which are generally low-gradient streams with sand substrates (Griffith et al. 2001). Land use, road density, and population density categorized Aiken Creek among the least-disturbed watersheds in the Floodplains and Low Terrace ecoregion (75i). Overall habitat quality was categorized as *marginal* due to limited instream habitat. The macroinvertebrate community was rated as *fair.* Stream pH was low, but typical of many coastal plain streams.

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Table 5. Summary of water quality data collected April-October, 2011. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL). Median (Med), 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	Med	Avg	SD	E	Q
Physical								
Temperature (°C)	5	15.9	26.3	22.4	22.1	3.9		
Turbidity (NTU)	5	3.1	45.2	4.1	12.4	18.4		
Total Dissolved Solids (mg/L)	4	34.0	86.0	52.0	56.0	22.7		
Total Suspended Solids (mg/L)	4	< 1.0	4.0	2.0	2.1	1.6		
Specific Conductance (µmhos)	5	30.4	36.0	32.5 G	32.7	2.1		
Hardness (mg/L)	4	5.8	7.1	6.1	6.2	0.8		
Alkalinity (mg/L)	4	< 2.4	< 2.4	1.2	1.2	0.0		
Stream Flow (cfs)	5	0.2	2.5	0.8	1.2	1.0		
Chemical								
Dissolved Oxygen (mg/L)	5	8.0	9.7	8.2	8.5	0.7		
pH (su)	5	5.7 C	6.0	5.9	5.9	0.2	3	
Ammonia Nitrogen (mg/L)	4	< 0.005	< 0.005	0.002	0.002	0.000		
J Nitrate+Nitrite Nitrogen (mg/L)	4	0.043	0.077	0.075	0.068	0.016		
J Total Kjeldahl Nitrogen (mg/L)	4	< 0.107	0.314	0.092	0.138	0.123		
J Total Nitrogen (mg/L)	4	< 0.130	0.357	0.187	0.206	0.107		
J Dissolved Reactive Phosphorus (mg/L)	4	0.007	0.008	0.007	0.007	0.000		
J Total Phosphorus (mg/L)	4	0.008	0.009	0.008	0.008	0.001		
J CBOD-5 (mg/L)	4	< 2.0	< 2.0	1.0	1.0	0.0		
Chlorides (mg/L)	4	4.2	5.1	4.8	4.7	0.4		
Atrazine (µg/L)	2	< 0.02	< 0.02	0.01	0.01	0.00		
Total Metals								
J Aluminum (mg/L)	4	0.050	0.211	0.082	0.106	0.073		
Iron (mg/L)	4	1.100	2.370	1.530 M	1.632	0.546		
J Manganese (mg/L)	4	0.020	0.045	0.032	0.032	0.012		
Dissolved Metals								
J Aluminum (mg/L)	4	< 0.043	0.052	0.022	0.029	0.015		
Antimony (µg/L)	4	< 1.9	< 1.9	0.9	0.9	0.0		
Arsenic (µg/L)	4	< 1.4	< 1.4	0.7	0.7	0.0		
J Cadmium (mg/L)	4	< 0.00002	0.00003	0.00003	0.00002	0.000		
Chromium (mg/L)	4	< 0.009	< 0.009	0.004	0.004	0.000		
Copper (mg/L)	4	< 0.020	< 0.020	0.010	0.010	0.000		
Iron (mg/L)	4	0.310	0.889	0.452	0.478	0.159		
Lead (µg/L)	4	< 0.9	< 0.9	0.5	0.5	0.0		
J Manganese (mg/L)	4	0.017	0.038	0.030	0.029	0.010		
Mercury (µg/L)	4	< 0.035	< 0.035	0.018	0.018	0.000		
Nickel (mg/L)	4	< 0.042	< 0.042	0.021	0.021	0.000		
Selenium (µg/L)	4	< 1.3	< 1.3	0.7	0.7	0.0		
Silver (mg/L)	4	< 0.00002	< 0.00002	0.00002	0.00002	0.000		
J Thallium (µg/L)	4	< 1.1	1.2 H	0.5	0.7	0.4	1	
Zinc (mg/L)	4	< 0.012	< 0.012	0.006	0.006	0.000		
Biological								
Chlorophyll a (ug/L)	4	< 0.10	1.60	0.70	0.78	0.83		
E. coli (col/100mL)	4	84	328	154	179	105		

J=estimate; N=# samples; C=value exceeds established criteria for *F&W* water use classification; H=*F&W* human health criterion exceeded; G=value greater than median concentration of all verified reference data collected in ecoregion 65f; M=value > 90% of all verified ecoregional reference reach data collected in the ecoregion 65f; E=# samples that exceed criterion.