ADEM
Alabama Department of Environmental Management

Ambient Monitoring Site

2006 Monitoring Summary

™

Good

Fish River at AL Hwy 104 in Baldwin County (30.5458/-87.7983)

BACKGROUND

Fish River at FI-1 is one of a network of 94 sites monitored annually by the Alabama Department of Environmental Management (ADEM) to identify long-term trends in water quality and to provide data for the development of TMDLs and water quality criteria. Habitat and macroinvertebrate assessments were conducted in 2006 to assess the biological integrity of the site.

Additionally, Fish River was selected for biological and water quality monitoring as part of the 2006 Assessment of the Escatawpa, Mobile, and Tombigbee (EMT) River Basins. The objectives of the EMT Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the EMT basin group.

Since 1996, Fish River has been on Alabama's Clean Water Act (CWA) §303(d) list of impaired waters for not meeting its *Swimming*/*Fish and Wildlife* (*S/F&W*) water use classifications. It is listed for pathogens from pasture, grazing and mercury from unknown sources.

Legend
- FI1_NHD
- Open Water
- Development, Open Space
- Development, Low Intensity
- Development, Mod Intensity
- Development, High Intensity
- Barren Land
- Forest, Deciduous
- Forest, Evergreen
- Forest, Mixed
- Shrub/Scrub
- Grassland/Herbaceous
- Pasture/Hay
- Cultivated Crops
- Wetlands, Woody
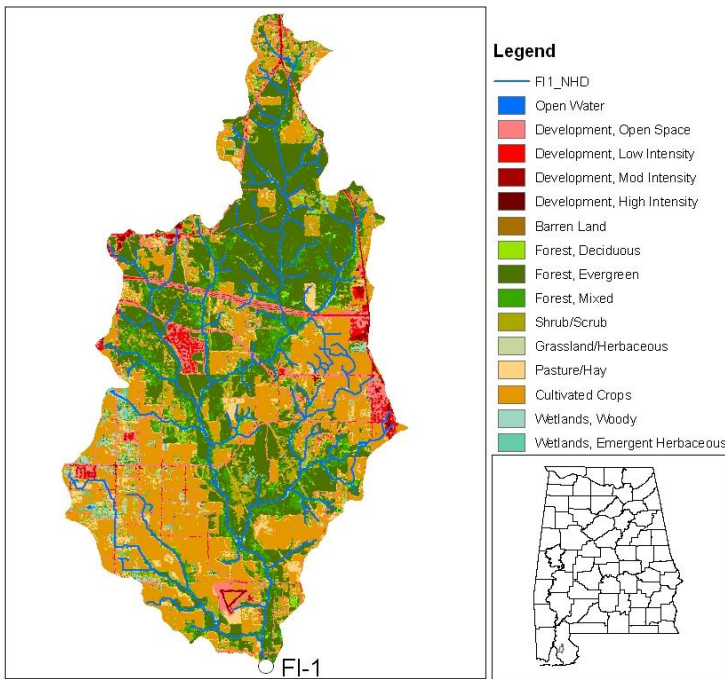- Wetlands, Emergent Herbaceous

FI-1

Figure 1. Sampling location and landuse within the Fish River watershed at FI-1.

WATERSHED CHARACTERISTICS

Table 1 summarizes the characteristics of the watershed upstream of Fish River at FI-1, which is located within the Southern Pine Plains and Hills (65f) ecoregion *(Griffith et al. 2001)* in Baldwin County. About 45% of the watershed is comprised of forest and wooded wetlands. Thirty-six percent of the land cover is composed of cultivated crops and pasture lands. Development accounted for 11% of land cover (Figure 1). As of 18 September 2009, there are 158 NPDES discharges within the watershed. Interstate 10 crosses the watershed approximately 7 miles upstream of the station.

REACH CHARACTRISTICS

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. Fish River at FI-1 is a tannic, low-gradient, sand bottomed, glide/pool stream characteristic of Alabama's coastal streams. Overall habitat quality was categorized as *optimal*.

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Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Mobile Bay Area
Drainage Area (mi^2)		56
Ecoregion[a]		65f
% Landuse		
Open water		<1
Wetland	Woody	2
	Emergent herbaceous	1
Forest	Deciduous	2
	Evergreen	32
	Mixed	8
Shrub/scrub		8
Grassland/herbaceous		<1
Pasture/hay		7
Cultivated crops		29
Development	Open space	7
	Low intensity	3
	Moderate intensity	1
	High intensity	<1
Population/km^2 [b]		46
# NPDES Permits[c]	**TOTAL**	158
Construction Stormwater		143
Mining		11
Industrial Individual		1
Municipal Individual		2
Underground Injection Control		1

a. Southern Pine Plains & Hills
b. 2000 US Census
c. #NPDES permits downloaded from ADEM's NPDES Management System database, 18 Sept. 2009

Table 2. Physical characteristics of Fish River at FI-1, May 17, 2006.

Physical Characteristics		
Width (ft)		35
Canopy cover		Mostly Shaded
Depth (ft)	Run	1.5
	Pool	4.0
% of Reach	Run	75
	Pool	25
% Substrate	Sand	85
	Silt	3
	Organic Matter	12

Table 3. Results of the habitat assessment conducted on Fish River at FI-1, May 17, 2006.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	51	Marginal (40-52)
Sediment deposition	73	Optimal (>65)
Sinuosity	35	Poor (<45)
Bank and vegetative stability	65	Sub-optimal (60-74)
Riparian buffer	91	Optimal (>90)
Habitat assessment score	146	
% Maximum score	**66**	**Optimal (>65)**

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. The relatively high taxa richness of mayflies, stoneflies and caddisflies, three pollution-intolerant groups, indicated the macroinvertebrate community to be in *good* condition (Table 4).

Table 4. Results of the macroinvertebrate bioassessment conducted in Fish River at FI-1, May 17, 2006.

Macroinvertebrate Assessment			
	Results	Scores	Rating
Taxa richness measures			
# EPT genera	17	68	Good (57-78)
Taxonomic composition measures			
% Non-insect taxa	6	93	Good (92.8-96.3)
% Plecoptera	8	38	Good (5.7-52.8)
% Dominant taxa	13	92	Excellent (>85.2)
Functional composition measures			
% Predators	22	77	Excellent (>72.1)
Tolerance measures			
Beck's community tolerance index	12	55	Good (31.9-65.9)
% Nutrient tolerant organisms	21	82	Good (76.3-88.1)
WMB-I Assessment Score	---	**72**	**Good (57-78)**

WATER CHEMISTRY

Results of water chemistry analyses are summarized 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 2006 to help identify any stressors to the biological communities. Fish River at FI-1 is meeting its use classification for temperature, turbidity and dissolved oxygen. Stream pH values were below 6.0 standard units (s.u) in three of nine samples collected, but streams in this region of the state are naturally acidic. Median nutrient concentrations (total nitrogen, nitrate-nitrite-nitrogen, total phosphorus and dissolved reactive phosphorus) were higher than expected based on the 90th percentile of reference reaches in this ecoregion.

SUMMARY

As part of the assessment process, ADEM will review the monitoring information presented in this report, along with all other available data.

The 2006 habitat and bioassessment studies indicated the macroinvertebrate community in Fish River at FI-1 to be in *good* condition. However, the results of water quality sampling showed nutrient concentrations to be a concern within this reach.

Table 5. Summary of water quality data collected March-October, 2006. 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)	9		19.0		23.3	22.0	21.5	1.7
Turbidity (NTU)	9		3.3		90.6	4.8	15.0	28.5
Total Dissolved Solids (mg/L)	8		30.0		77.0	45.5	51.1	19.1
Total Suspended Solids (mg/L)	8		3.0		52.0	5.5	12.0	16.5
Specific Conductance (µmhos)	9		45.6		71.2	52.0	53.4	7.2
Hardness (mg/L)	3		14.0		34.0	33.0	27.0	11.3
Alkalinity (mg/L)	8	<	1.0		13.0	4.7	5.7	4.6
Stream Flow (cfs)	9		53.0		105.0	65.0	69.9	17.6
Chemical								
Dissolved Oxygen (mg/L)	9		7.4		8.3	7.9	7.8	0.4
pH (su)	9		5.6^C		6.1	6.0	5.9	0.2
Ammonia Nitrogen (mg/L)	8	<	0.010		0.096	0.019	0.036	0.039
Nitrate+Nitrite Nitrogen (mg/L)	8		0.866		2.030	1.554^M	1.473	0.408
Total Kjeldahl Nitrogen (mg/L)	8	<	0.150		0.610	0.375	0.345	0.172
Total Nitrogen (mg/L)	8		1.336		2.240	1.808^M	1.818	0.327
Dissolved Reactive Phosphorus (mg/L)	8		0.018		0.058	0.036^M	0.036	0.013
Total Phosphorus (mg/L)	8		0.061		0.140	0.086^M	0.090	0.023
CBOD-5 (mg/L)	8	<	1.0		2.4	1.3	1.3	0.6
Chlorides (mg/L)	8		1.6		9.8	6.6	5.7	3.3
Atrazine (µg/L)	2	<	0.05	<	0.05	0.03	0.03	0.00
Total Metals								
Aluminum (mg/L)	3		0.22		0.61	0.390	0.407	0.196
Iron (mg/L)	3		0.494		0.943	0.742	0.726	0.225
Manganese (mg/L)	3		0.028		0.045	0.043	0.039	0.009
Dissolved Metals								
Aluminum (mg/L)	3		0.11		0.18	0.120	0.137	0.038
Antimony (µg/L)	3	<	7.5	<	7.5	3.8	3.8	0.0
Arsenic (µg/L)	3	<	5	<	5	2.5	2.5	0.0
Cadmium (mg/L)	3	<	0.0003	<	0.0003	0.0001	0.0001	0.000
Chromium (mg/L)	3	<	0.005	<	0.005	0.003	0.003	0.000
Copper (mg/L)	3	<	0.005	<	0.005	0.003	0.003	0.000
Iron (mg/L)	3		0.110		0.197	0.181	0.163	0.046
Lead (µg/L)	3	<	5	<	5	2.5	2.5	0.0
Manganese (mg/L)	3		0.017		0.024	0.020	0.020	0.004
Mercury (µg/L)	3	<	0.5	<	0.5	0.3	0.3	0.0
Nickel (mg/L)	3	<	0.005		0.011	0.003	0.005	0.005
Selenium (µg/L)	3	<	7.5	<	7.5	3.8	3.8	0.0
Silver (mg/L)	3	<	0.001	<	0.001	0.0004	0.0004	0.000
Thallium (µg/L)	3	<	2.5		9	4.5	3.4	1.9
Zinc (mg/L)	3	<	0.005		0.007	0.003	0.004	0.003
Biological								
Chlorophyll a (µg/L)	8	<	1.00		6.23	1.19	2.07	1.88
^{J} Fecal Coliform (col/100 mL)	5		23		520	35	146	212

J=Estimate; N= # samples; C= value exceeds established criteria for *S/F&W* water use classification; M= value>90% of all verified ecoregional refernce reach data collected in the sub-ecoregion/ecoregion 65f.