Alabama Department of Environmental Management

Basin Assessment Site

Rivers and Streams Monitoring Program

2007 Monitoring Summary

Poor

New River at Marion County Road 30 (33.9732/-87.67793)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the New River watershed 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. While water quality data were collected in 2006, drought conditions prevented the completion of habitat and macroinvertebrate assessments until 2007.

The New River is among the least-disturbed watersheds in the Shale Hills ecoregion (68f) based on landuse, road density, and population density. The 2006 data will be used to evaluate the use of the New River as a "*best attainable*" condition reference watershed for comparison with other Shale Hills streams.

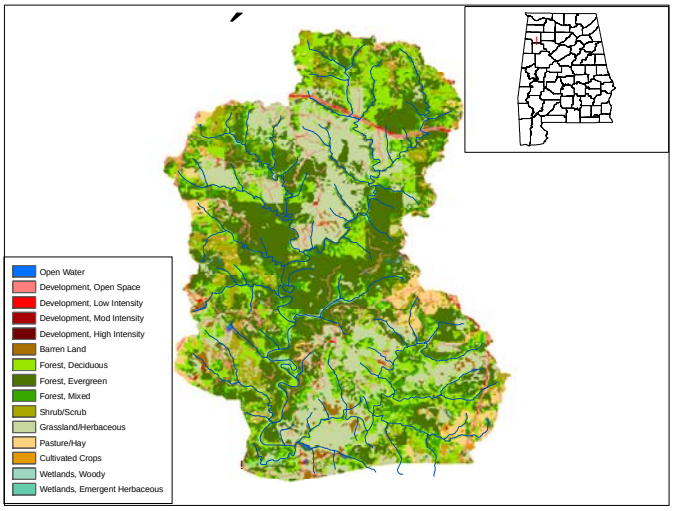

Figure 1. Sampling location and landuse within the New River watershed at NEWM-1.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. The New River is a *Fish & Wildlife (F&W)* stream located in Marion County (Figure 1). Landuse within the watershed is primarily forest (60%), with some shrub and pasture. Population density is relatively low in this area. Images from Google Earth (www.virtual.alabama.gov) on October 5, 2011 showed the presence of a large row crop area immediately north of this station location and logging activity further upstream. As of February 23, 2011, the ADEM has issued seven NPDES permits in this 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. New River at NEWM-1 is a high-gradient, riffle-run stream characterized by bedrock and sand substrates in the Shale Hills ecoregion (68f). In-stream habitat was rated as *marginal*.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Upper Tombibee
Drainage Area (mi^2)		50
Ecoregion[a]		68f
% Landuse		
Open water		<1
Wetland	Woody	1
Forest	Deciduous	20
	Evergreen	32
	Mixed	8
Shrub/scrub		7
Grassland/herbaceous		22
Pasture/hay		4
Cultivated crops		<1
Development	Open space	5
	Low intensity	<1
	Moderate intensity	<1
	High intensity	<1
Barren		1
Population/km^2[b]		4
# NPDES Permits[c]	**TOTAL**	7
401 Water Quality Certification		1
Construction Stormwater		3
Mining		3

a.Shale Hills

b.2000 US Census

c.#NPDES permits downloaded from ADEM's NPDES Management System database, Feb 23, 2011.

Table 2. Physical characteristics of New River at NEWM-1, 06/06/2007.

Physical Characteristics		
Canopy Cover		Estimate 50/50
Depth Ft		
	Riffle	0.2
	Run	1.0
	Pool	3.0
% of Reach		
	Riffle	1
	Run	69
	Pool	30
% Substrate		
	Bedrock	45
	Boulder	5
	Cobble	5
	Mud/Muck	2
	Gravel	5
	Sand	30
	Silt	4
	Organic Matter	4

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Table 3. Results of the habitat assessment conducted on New River at NEWM-1, 06/06/2007.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	49	Marginal (41-58)
Sediment Deposition	63	Sub-optimal (59-70)
Sinuosity	45	Marginal (45-64)
Bank and Vegetative Stability	73	Sub-optimal (60-74)
Riparian Buffer	90	Optimal (90-100)
Habitat Assessment Score	**153**	
% Maximum Score	**64**	Sub-optimal (59-70)

Table 4. Results of the macroinvertebrate bioassessment conducted June 6, 2007.

Macroinvertebrate Assessment			
	Results	**Scores**	**Rating**
Taxa richness measures		**(0-100)**	
# Ephemeroptera (mayfly) genera	7	58	Fair (47-70)
# Plecoptera (stonefly) genera	2	33	Fair (32-49)
# Trichoptera (caddisfly) genera	8	67	Good (67-83)
Taxonomic composition measures			
% Non-insect taxa	14	42	Poor (24.7-49.4)
% Non-insect organisms	8	78	Fair (62.8-93.9)
% Plecoptera	1	3	Very Poor (<6.56)
Tolerance measures			
Beck's community tolerance index	13	46	Fair (40.8-60.7)
WMB-I Assessment Score	**--**	**47**	**Poor (24-48)**

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 *poor* condition (Table 4).

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 March through October of 2006 to help identify any stressors to the biological communities. Dissolved arsenic concentrations exceeded human health criteria during one sampling event. Median total dissolved solids, specific conductance, hardness, alkalinity and dissolved manganese were higher than background levels based on reference reach data collected in this ecoregion.

SUMMARY

Bioassessment results indicated the macroinvertebrate community to be in *poor* condition. Overall habitat quality was categorized as *sub-optimal* due to marginal in-stream habitat quality and sinuosity. Dissolved arsenic and manganese were elevated as compared to data from ADEM's least-impaired reference reaches in ecoregion 68f. Agricultural activity, located just north of this station location, and silviculture, located further upstream, may be contributing to these conditions.

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	Med	Avg	SD
Physical							
Temperature (°C)	9		11.5	26.4	22.6	20.6	5.8
Turbidity (NTU)	9		2.2	8.7	3.6	4.3	2.3
Total Dissolved Solids (mg/L)	8		115.0	401.0	258.0[M]	260.0	85.7
Total Suspended Solids (mg/L)	8		2.0	6.0	3.0	3.6	1.3
Specific Conductance (µmhos)	9		45.0	519.0	350.0[M]	364.0	142.3
Hardness (mg/L)	4		134.0	238.0	215.0[P]	200.5	46.9
Alkalinity (mg/L)	8		66.2	101.8	81.8[P]	83.4	13.0
Stream Flow (cfs)	9		2.7	49.7	9.2	18.9	17.0
Chemical							
Dissolved Oxygen (mg/L)	9		6.3	11.4	7.7	8.4	1.8
pH (su)	9		7.4	7.6	7.6	7.6	0.1
Ammonia Nitrogen (mg/L)	8	<	0.015	0.080	0.008	0.018	0.025
Nitrate+Nitrite Nitrogen (mg/L)	8		0.038	0.250	0.078	0.096	0.067
Total Kjeldahl Nitrogen (mg/L)	8	<	0.150	0.519	0.217	0.279	0.161
Total Nitrogen (mg/L)	8	<	0.143	0.757	0.270	0.375	0.215
Dissolved Reactive Phosphorus (mg/L)	8	<	0.004	0.008	0.003	0.004	0.003
Total Phosphorus (mg/L)	8	<	0.100	0.100	0.050	0.050	0.000
CBOD-5 (mg/L)	8	<	0.1	3.0	0.6	0.7	1.0
Chlorides (mg/L)	8		1.0	1.8	1.5	1.5	0.2
Atrazine (µg/L)	2	<	0.05	<0.05	0.02	0.02	0.00
Total Metals							
Aluminum (mg/L)	3	<	0.050	0.105	0.052	0.061	0.041
Iron (mg/L)	3		0.240	0.648	0.326	0.405	0.215
Manganese (mg/L)	3		0.126	0.145	0.141	0.137	0.010
Dissolved Metals							
Aluminum (mg/L)	4	<	0.050	<0.050	0.025	0.025	0.000
Antimony (µg/L)	4	<	10.0	<10.0	5.0	5.0	0.0
Arsenic (µg/L)	4	<	10.0	11.0[H]	5.0	6.5	3.0
Cadmium (mg/L)	4	<	0.015	<0.015	0.008	0.008	0.000
Chromium (mg/L)	4	<	0.050	<0.050	0.025	0.025	0.000
Copper (mg/L)	4	<	0.050	<0.050	0.025	0.025	0.000
Iron (mg/L)	4	<	0.050	0.149	0.044	0.066	0.058
Lead (µg/L)	4	<	10.0	<10.0	5.0	5.0	0.0
Manganese (mg/L)	4		0.108	0.147	0.112[M]	0.120	0.018
Mercury (µg/L)	3	<	0.01	<0.3	0.2	0.1	0.1
Nickel (mg/L)	4	<	0.050	<0.050	0.025	0.025	0.000
Selenium (µg/L)	4	<	50.0	<50.0	25.0	25.0	0.0
Silver (mg/L)	3	<	0.05	<0.05	0.025	0.0	0.0
Thallium (µg/L)	3	<	10.0	<10.0	5.0	5.0	0.0
Zinc (mg/L)	4	<	0.050	<0.050	0.025	0.025	0.000
Biological							
Chlorophyll a (ug/L)	8	<	1.00	1.28	0.50	0.69	0.35
Fecal Coliform (col/100 mL)	8		1	44	19	22	16

H=F&W human health criterion exceeded; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 68f; N=# samples.

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