

2019 Monitoring Summary



Joe's Branch at I-10 westbound off ramp (Exit 35) in Baldwin County. (30.65702/-87.909054)

BACKGROUND

Joe's Branch was placed on Alabama's 2008 CWA section 303(d) list for impairment caused by siltation. The stream was sampled in 2016 and 2017 to establish baseline conditions before the initiation of a non-point source restoration project conducted by the Mobile Bay National Estuary Program in the D'Olive Creek watershed. The Alabama Department of Environmental Management (ADEM) monitored Joe's Branch at JOBB-2 in 2019 to document conditions following stream restoration and implementation of best management practices in this watershed and for the purpose of developing a TMDL for siltation in order to delist this stream.



Figure 1. Joe's Branch at JOBB-2, April 25, 2019.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Joe's Branch is a *Fish & Wildlife (F&W)* stream located in the Gulf Coast Flatwoods ecoregion of Baldwin County. Based on the 2011 National Land Cover Dataset, landuse within the watershed is primarily developed land (65%) and forest (22%). Population is relatively dense with plenty of roads and commercial developments.

REACH CHARACTERISTICS

General observations (Table 2) and a habitat survey (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. Joe's Branch at JOBB-2 (Figure 1) is a low-gradient, sand-bottomed stream. Habitat quality and availability was rated as *marginal/sub-optimal* for supporting diverse aquatic macroinvertebrate communities due to sediment deposition and channelization.

BIOASSESSMENT RESULTS

The benthic macroinvertebrate community was sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). Measures of taxonomic richness, community composition and pollution tolerance were used to assess the overall health of the macroinvertebrate community in comparison to conditions expected in north Alabama streams and rivers. Each site is placed in one of six levels ranging from 1, or natural, to 6, or highly altered.

While the 2019 habitat surveys conducted for the MBNEP documented improved habitat conditions at and downstream of most restoration areas from 2016 to 2019, there was little change in habitat survey results conducted at JOBB-2, downstream of all restoration sites within the Joe's Branch watershed. ADEM's macroinvertebrate survey indicated the community to be in very poor condition, with pollution-tolerant organisms comprising 73% of the total organisms collected, and tolerant taxa comprising 27% of the 22 total taxa collected. Metric results indicated the macroinvertebrate community to be in *very poor* condition (Table 4).

Table 1. Summary of general watershed characteristics: JOBB-2

Watershed Characteristics	
Basin	Mobile
Drainage Area (mi²)	0.9
Ecoregion^o	75a
Assessment Unit	AL03160204-0505-800
Use Class	F&W
AU Category	5
12-digit Hydrologic Unit Code (HUC)[†]	031602040505
Conservation Status	
Strategic Habitat Unit	58 Mobile-Tensaw River Delta
HUC Watershed Condition[±]	
CWP Aquatic Resource Concerns	100
CWP Urban	87
Landuse Categories (2011 National Land Cover Dataset)	
Wetland, Total (%)	6.3
Wetlands, Woody (%)	5.9
Wetlands, Emergent Herbaceous (%)	0.3
Forested, Total (%)	22.4
Forested, Deciduous (%)	0.2
Forested, Evergreen (%)	19.6
Forested, Mixed (%)	2.6
Shrub/Scrub (%)	2.8
Grassland/Herbaceous (%)	1.6
Developed, Total (%)	65.2
Developed, Open Space (%)	22.9
Developed, Low Intensity (%)	18.3
Developed, Medium Intensity (%)	15.6
Developed, High Intensity (%)	8.4
Barren Land (Rock, Sand, Clay) (%)	1.7
Population/km (2010 US Census)	213
Roads	
Road Density	5.9

^o Gulf Coast Flatwoods

[†] 12-digit HUC located in a Strategic Habitat Unit.

[±] 12-digit HUC identified as Clean Water Partnership priority watershed.

Table 2. Physical characteristics of Joes Branch at JOBB-2, April 25, 2019.

Physical Characteristics	
Width (ft)	30
Canopy Cover	Mostly Shaded
Depth (ft)	
Run	1.5
Pool	4.0
% of Reach	
Run	80
Pool	20
% Substrate	
Clay	2
Sand	84
Silt	10
Organic Matter	4

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Table 3. Results of the habitat assessment survey conducted on Joes Branch at JOBB-2, April 25, 2019.

Habitat Survey	% Max Score	Rating
Instream Habitat Quality	40	Marginal (30-49.999)
Sediment Deposition	35	Marginal (30-49.999)
Sinuosity	30	Marginal (30-49.999)
Bank Vegetative Stability	69	Sub-optimal (55-74.999)
Riparian Zone Measurements	78	Sub-optimal/Optimal (75-79.999)
Habitat Assessment Score	96	
% Maximum Score	53	Marginal/Sub-optimal (40-54.999)

Table 4. Results of the macroinvertebrate bioassessment conducted on Joes Branch at JOBB-2, April 25, 2019.

Macroinvertebrate Assessment	Results	Scores
Taxonomic richness and diversity metrics		
Taxa Count	22	22
# rare and highly sensitive taxa	0	0
# sensitive taxa	1	1
# sensitive EPT taxa	0	0
Percent taxon metrics		
% rare and highly sensitive taxa	0	0
% sensitive taxa	5	5
% sensitive EPT taxa	0	0
% highly tolerant taxa	27	27
Percent individual metrics		
% rare and highly sensitive individuals	0	0
% sensitive individuals	0	0
% sensitive EPT individuals	0	0
% tolerant individuals	73	73
WMB-I Survey Score		6.0
WMB-I Survey Rating		Very Poor (5.75-6)

WATER CHEMISTRY

Results of water chemistry are presented in Table 5. In situ measurements and water samples were collected monthly from March to September of 2019 to help identify any stressors to the biological communities.

Dissolved oxygen exceeded the criterion for the *Fish & Wildlife* use classification during two sampling events. Enterococci exceeded the criterion for the *Fish & Wildlife* use classification during one sampling event. Median specific conductance, alkalinity, ammonia nitrogen, total phosphorus, and chlorophyll a values were higher than the median concentration of all verified ecoregional reference reach data collected in ecoregion 75a. The water temperature was higher than 90% of all verified ecoregional reference reach data collected in the ecoregion 75a during one sam-

Table 5. Summary of water quality data collected March-September, 2019. 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.

JOBB-2 AL03160204-0505-800	N	Min	Max	Med	Avg	SD	E	10thP	90thP
Physical									
Temperature (°C)	9	18.4	28.0 ^D	25.9	23.9	3.5		18.4	28.0
Turbidity (NTU)	8	6.6	29.2	17.4	16.4	8.5		6.6	29.2
Total Dissolved Solids (mg/L)	7	61.0	88.0	70.0	72.8	9.2		61.0	88.0
Total Suspended Solids (mg/L)	7	2.0	17.0	7.0	8.0	5.4		2.0	17.0
Specific Conductance (µmhos/cm)	9	88.0	139.9	125.8 ^G	122.7	17.4		88.0	139.9
Alkalinity (mg/L)	7	35.3	56.9	52.2 ^G	49.0	7.6		35.3	56.9
Color (CU)	7	20	60	40	37	13		20	60
Measured Stream Flow (cfs)	9	0.1	1.1	0.4	0.5	0.3		0.0	1.1
Chemical									
Dissolved Oxygen (mg/L)	9	2.8 ^C	6.8	5.8	5.4	1.3	2	2.8	6.8
pH (SU)	7	6.5	6.8	6.6	6.6	0.1		6.5	6.8
Ammonia Nitrogen (mg/L)	7	<0.029	<0.090 ^D	0.045	0.032	0.016		0.014	0.045
Nitrate+Nitrite Nitrogen (mg/L)	7	<0.020	<0.039	0.010	0.014	0.005		0.010	0.020
Total Kjeldahl Nitrogen (mg/L)	7	<0.120	0.600	0.260	0.293	0.169		0.060	0.600
Total Nitrogen (mg/L)	7	<0.070	0.610	0.280	0.307	0.169		0.070	0.610
Dis Reactive Phosphorus (mg/L)	7	<0.005	<0.006	0.002	0.003	0.000		0.002	0.003
Total Phosphorus (mg/L)	7	<0.020	0.029	0.022 ^M	0.020	0.006		0.013	0.029
Dissolved Organic Carbon (mg/L)	7	2.6	4.9	3.5	3.5	0.7		2.6	4.9
CBOD-5 (mg/L)	7	<2.0	<2.0	1.0	1.0	0.0		1.0	1.0
Chlorides (mg/L)	7	4.5	9.7	4.6	5.6	1.9		4.5	9.7
Sulfate (mg/L)	7	<1.53	5.00	1.27	2.15	1.97		0.76	5.00
Biological									
Chlorophyll a (mg/m³)	7	<1.00	2.30	1.40 ^M	1.26	0.76		0.50	2.30
E. coli (MPN/DL)	1				180.0			180.0	180.0
Enterococci (MPN/DL)	7	15	230 ^H	20	53	78	1	15	230

C=F&W criterion violated; D=an individual value >90% of all verified ecoregional reference reach data collected in the ecoregion 75a; E=# samples that exceeded criteria; G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 75a; H=F&W human health criterion exceeded; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 75a; N=# samples.

SUMMARY

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

Bioassessment results indicated the macroinvertebrate community to be in *very poor* condition. Overall habitat quality was categorized as *marginal/sub-optimal*. Results from water quality sampling indicated that dissolved oxygen exceeded the criterion for the *Fish & Wildlife* use classification during two sampling events. Enterococci exceeded the criterion for the *Fish & Wildlife* use classification during one sampling event. Median specific conductance, alkalinity, total phosphorus and chlorophyll a values were higher than the median concentration of all verified ecoregional reference reach data collected in ecoregion 75a. The water temperature was higher than 90% of all verified ecoregional reference reach data collected in the ecoregion 75a during one sampling event.

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