Total Maximum Daily Load

Evaluation

for

Forty-One Stream Segments

in the

Ocmulgee River Basin

For Sediment

(Biota Impacted)

Submitted to:

The U.S. Environmental Protection Agency
Region 4
Atlanta, Georgia

Submitted by:
The Georgia Department of Natural Resources
Environmental Protection Division
Atlanta, Georgia

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EXECUTIVE SUMMARY

The State of Georgia assesses its water bodies for compliance with water quality standards criteria established for their designated uses as required by the Federal Clean Water Act (CWA). Assessed water bodies are placed into three categories, supporting, partially supporting, or not supporting their designated uses depending on water quality assessment results. These water bodies are found on Georgia's 305(b) list as required by that section of the CWA that defines the assessment process, and are published in *Water Quality in Georgia* every two years.

Some of the 305(b) partially and not supporting water bodies are also assigned to Georgia's 303(d) list, also named after that section of the CWA. Water bodies on the 303(d) list are required to have a Total Maximum Daily Load (TMDL) evaluation for the water quality constituent(s) in violation of the water quality standard. The TMDL process establishes the allowable pollutant loadings or other quantifiable parameters for a water body based on the relationship between pollutant sources and in-stream water quality conditions. This allows water quality-based controls to be developed to reduce pollution and restore and maintain water quality.

The State of Georgia has identified forty-one (41) stream segments located in the Ocmulgee River Basin as water quality limited (i.e. 303(d) listed as Biota Impacted) due to sedimentation. The water use classification of all of the impacted streams is Fishing. The general water quality criteria not being met states:

> All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses..

The Biota Impacted designation indicates that studies have shown a modification of the biological community, more specifically, fish. In 1990, 1998, and 1999, the Department of Natural Resources (DNR) Wildlife Resources Division (WRD) conducted studies of fish populations. WRD used the Index of Biotic Integrity (IBI) and modified Index of Well-Being (IWB) to identify affected fish populations. The IBI and IWB values were used to classify the population as Excellent, Good, Fair, Poor, or Very Poor. Stream segments with fish populations rated as Poor or Very Poor were included in the partially supporting list. As a result, 42 stream segments in the Ocmulgee River Basin were added to the State's 303(d) list and scheduled for a TMDL evaluation. Thirty-eight stream segments, assessed and rated as Excellent, Good, and/or Fair, were considered as supporting uses.

The general cause of low IBI scores is the lack of fish habitat due to stream sedimentation. To determine the relationship between the in-stream water quality and the source loadings, each watershed was modeled. The analysis performed to develop sediment TMDLs for the 303(d) listed watersheds utilized the Universal Soil Loss Equation (USLE). The USLE predicts the average annual soil loss caused by erosion. The USLE method considered the characteristics of the watershed including land use, soil type, ground slope, and road surface. National Pollutant Discharge Elimination System (NPDES) permitted discharges were also considered. Modeling assumptions were considered conservative and provide the necessary implicit margin of safety for the TMDL.

The USLE was applied to both the 303(d) listed watersheds and those not biologically impacted to determine both the existing sediment loading rates and the sediment load reductions needed to support beneficial use (i.e. unimpacted conditions). The average sediment load in those

watersheds on the 303(d) list is 0.70 tons/acre/yr, ranging from 0.04 to 9.53 tons/acre/yr. The average sediment load in the watersheds not on the 303(d) list is 0.54 tons/acre/yr, ranging from 0.01 to 2.31 tons/acre/yr. These values represent sediment load contributions from all land uses within unimpaired watersheds. Note that the average annual sediment loads for both watershed groups are generally within the same range.

Table 1 shows that approximately 74.1 percent of the average sediment load in the Ocmulgee River Basin results from row crops having an average sediment load of 6.67 tons/acre/yr. Approximately 4.2 percent of the total sediment load is from pastureland with an average load on 0.17 tons/acre/yr. In the Ocmulgee River Basin, mining activities contribute approximately 11.0 percent of the total sediment load with an average load of 28.66 tons/acre/yr. Roads contribute approximately 10.7 percent of the total sediment load, forests make up about 1.2 percent of the total load with an average load of 0.01 tons/acre/year, and urban land contributes approximately 1.6 percent of the total sediment load with an average load of 0.35 tons/acre/yr. Estimates of the sediment contribution from construction are not available, but could represent a relatively high sediment load per acre.

Table 1. Summary of Current Conditions in the Ocmulgee River Basin

Land Use	Average Percent Land Use	Average Percent Sediment Load	Average Sediment Load (tons/acre/yr)
Open Water	0.5%	0.0%	0.00
Urban	2.4%	1.6%	0.35
Bare Rock, Sand and Clay	0.0%	0.0%	0.00
Quarries, Strip Mines, Gravel Pits	0.2%	11.0%	28.66
Transitional Land	1.3%	0.1%	0.06
Forest	74.1%	1.2%	0.01
Pasture/Hay	12.7%	4.2%	0.17
Row Crops	5.5%	70.1%	6.67
Grasses, Wetland	3.3%	1.8%	0.29
Roads		10.7%	

These data indicate that row crops are the major source of sediment to our rivers and streams. However, over the last century there has been a dramatic decrease in the amount of land farmed in Georgia. Since 1950, there has been a 57 percent reduction in farmland. With the reduction in farmland, there has also been a decrease in the amount of soil erosion. This suggests that the sedimentation observed in the impaired stream segments may be legacy sediment resulting from past land use practices. It is believed that if sediment loads are maintained at acceptable levels, streams will repair themselves over time.

This TMDL determines the sediment loads that can enter the impaired Ocmulgee River Basin streams without causing sediment impairment to the streams. This is based on the hypothesis that if an impaired watershed has an annual average sediment loading rate similar to a biologically unimpaired watershed, then the receiving stream will remain stable and not be biologically impaired due to sediment. The average annual sediment load in the Ocmulgee River Basin watersheds not on the 303(d) list is 0.54 tons/acre/yr. The annual average sediment loads for each of the impaired watersheds are summarized in the table below with any required sediment load reductions.

Management practices that may be used to help maintain the average annual sediment loads at current levels include:

- Compliance with the requirements of the NPDES permit program
- Implementation of GFC Best Management Practices for forestry
- Adoption of NRCS Conservation Practices
- Adherence to the Mined Land Use Plan prepared as part of the Surface Mining Permit Application
- Adoption of proper unpaved road maintenance practices
- Implementation of Erosion and Sedimentation Control Plans for land disturbing activities
- Evaluation of the effects of increased flow due to urban runoff on stream bank erosion

Although the measurement of sediment delivered to a stream is difficult to determine, by monitoring the implementation of these practices, their anticipated effects will contribute to improving stream habitats and water quality, and thus be an indirect measurement of the TMDLs.

Total Annual Sediment Loads and the Required Sediment Reduction

Name	Current Load (tons/yr)	WLA (tons/yr)	LA (tons/yr)	Total Load (tons/yr)	% Reduction
Bay Creek	988	100	597	697	29.5%
Big Sandy Creek	1,507	0	1,507	1,507	0.0%
Browns Branch	3,224	0	1,664	1,664	48.4%
Bulters Creek	270	0	270	270	0.0%
Cabin Creek	4,889	257	3,893	4,150	15.1%
Calaparchee Creek	2,382	0	1,331	1,331	44.1%
Cole Creek	637	0	484	484	24.1%
Eightmile Creek	92	0	92	92	0.0%
Gladesville Creek	656	0	656	656	0.0%
Hansford Branch	28	0	28	28	0.0%
Harmon Pye Branch	337	0	337	337	0.0%
Hartley Branch	2,057	0	1,420	1,420	30.9%
Herds Creek	1,370	0	1,370	1,370	0.0%
Little Chehaw Creek	1,991	0	1,048	1,048	47.4%
Little Deer Creek Trib	6,805	38	345	383	94.4%
Little Deer Creek	9,207	40	3,035	3,075	66.6%
Little Shellstone Creek	151	0	151	151	0.0%
Long Branch	491	0	491	491	0.0%
Malholms Creek	1,079	0	755	755	30.0%
Mill Dam Creek	225	0	225	225	0.0%
Phinazee Creek	382	0	382	382	0.0%
Red Creek	1,226	0	1,226	1,226	0.0%
Rock Creek	1,909	90	368	458	76.0%
Rocky Creek – Jasper	252	0	252	252	0.0%
Rocky Creek – Butts	346	0	346	346	0.0%
Rocky Creek – Bibb	1,613	0	1,613	1,613	0.0%
Rocky Creek – Monroe	1,283	0	1,283	1,283	0.0%
Rum Creek	2,962	64	2,898	2,962	0.0%
Sand Branch	51	0	51	51	0.0%
Scoggins Creek	535	0	535	535	0.0%
Shellstone Creek	16,223	0	14,991	14,991	7.6%
Third Branch	72	0	72	72	0.0%
Trib Tobesofkee Creek	571	0*	358	358	37.3%
Tobesofkee Creek	9,260	43*	9,217	9,260	0.0%
Tobler Creek	2,271	0	2,271	2,271	0.0%
Town Branch	290	21	269	290	0.0%
Walnut Creek - Crawford	2,758	0	2,758	2,758	0.0%
Walnut Creek - Jones/Bibb	12,951	0	10,551	10,551	18.5%
White Creek	438	0	438	438	0.0%
Wise Creek	1,769	0	1,769	1,769	0.0%
Wood Creek	649	0	634	634	2.3%

*Note: that there is no wasteload allocation since the William Carter Company is scheduled for closure in the summer of 2001.

1.0 INTRODUCTION

1.1 Background

The State of Georgia assesses its water bodies for compliance with water quality standards criteria established for their designated uses as required by the Federal Clean Water Act (CWA). Assessed water bodies are placed into three categories, supporting, partially supporting, or not supporting their designated uses depending on water quality assessment results. These water bodies are found on Georgia's 305(b) list as required by that section of the CWA that addresses the assessment process, and are published in *Water Quality in Georgia* every two years.

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In 1990, 1998, and 1999, the Department of Natural Resources (DNR) Wildlife Resources Division (WRD) conducted studies of fish populations at a number of monitoring sites in the Ocmulgee River Basin. WRD used the Index of Biotic Integrity (IBI) and modified Index of Well-Being (IWB) to identify affected fish populations. The IBI and IWB values were used to classify the populations as Excellent, Good, Fair, Poor, or Very Poor. Stream segments with fish populations rated as Poor or Very Poor were listed as Biota Impacted. The Biota Impacted designation indicates that studies have shown a significant modification of the biological community. Forty-one stream segments (see Table 2) were rated as Poor or Very Poor, placed on the 303(d) list as partially supporting their designated water use, and scheduled for TMDL evaluation. Thirty-eight stream segments were rated as Excellent, Good, or Fair and assessed as supporting their designated water use.

1.2 Watershed Description

The 49 impaired monitor sites and their watersheds are located in the Ocmulgee River Basin in middle Georgia in Bibb, Bleckley, Butts, Crawford, Henry, Jasper, Jones, Lamar, Monroe, Spaulding and Twiggs Counties (see Figure 1). The 38 unimpaired monitoring sites and their watersheds are located in Bibb, Butts, Gwinnett, Henry, Jasper, Jones, Lamar, Monroe, Newton, Spaulding, and Walton Counties.

The land use characteristics of the Ocmulgee River Basin watersheds were determined using data from Georgia's Multiple Resolution Land Coverage (MRLC). This coverage is based on Landsat Thematic Mapper digital images developed in 1995. The classification is based on a modified Anderson level one and two system. Table 3 lists the land use distribution of the 87 watersheds WRD monitored in 1990, 1998, and 1999. The watersheds are grouped by: those that are not on the 303(d) list (unimpaired) and those that are on the 303(d) list (impaired). Table 4 lists the land use percentages for all the Ocmulgee River Basin watersheds monitored. The data show that the watersheds are predominately forested with approximately 74.2 percent (ranging from 12.2 to 98.8 percent) in forest use. Agriculture is the next predominate land use with

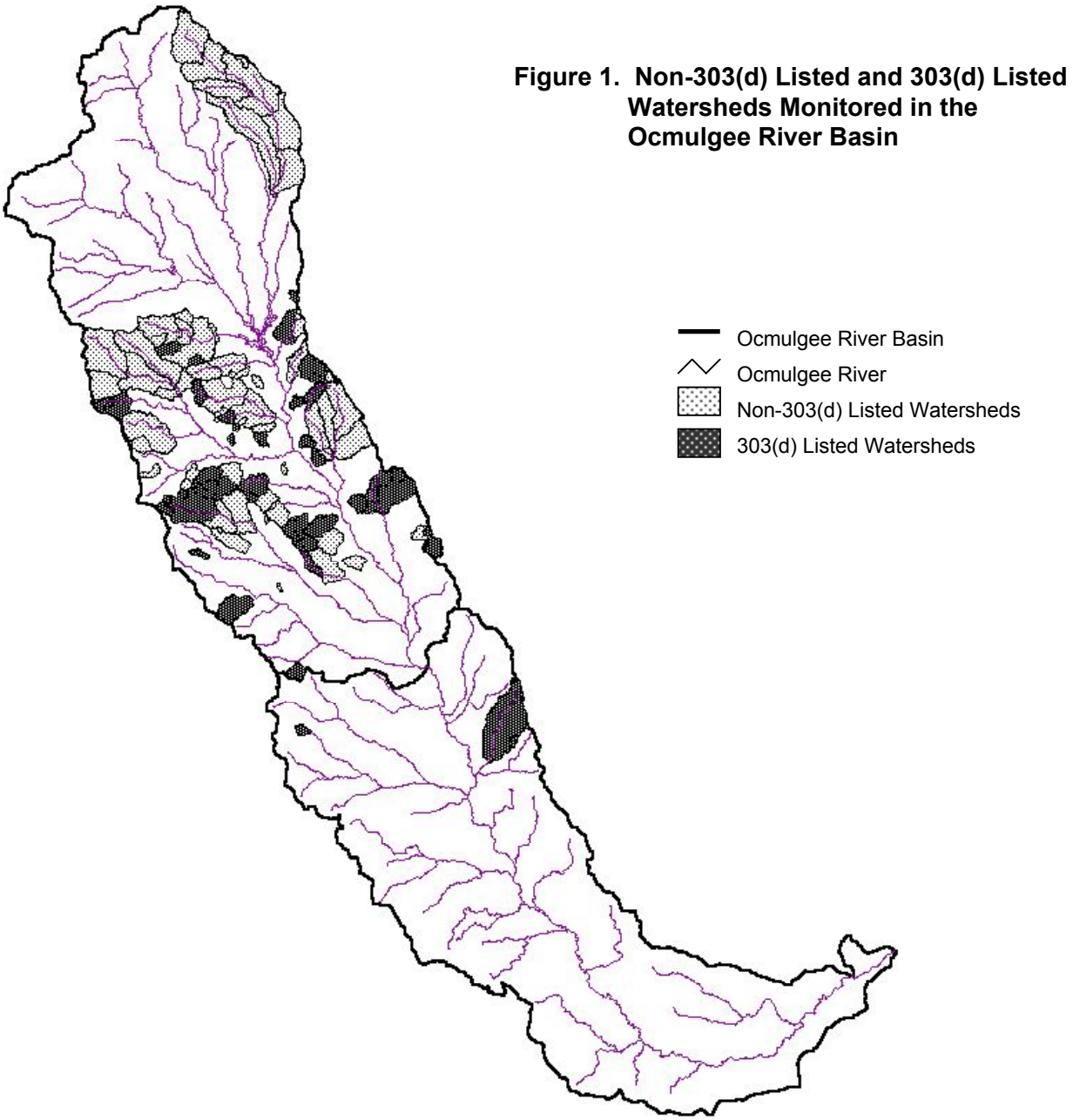

Figure 1. Non-303(d) Listed and 303(d) Listed Watersheds Monitored in the Ocmulgee River Basin

Table 2. 303(d) Listed Stream Segments located in the Ocmulgee River Basin

BASIN/STREAM	STATUS	LOCATION	MILES
Bay Creek	Not Supporting	Headwaters to Beaver Creek - Peach and Houston Counties	9
Big Sandy Creek	Partially Supporting	Upstream Indian Springs - Butts County	8
Browns Branch	Partially Supporting	Headwaters (Locust Grove) to Wolf Creek - Henry County	5
Butlers Creek	Partially Supporting	Tributary to Ocmulgee River - Jones County	5
Cabin Creek	Not Supporting	Headwaters (Griffin) to Towaliga River - Spalding County	16
Calaparchee Creek	Partially Supporting	Upstream Lake Wildwood - Monroe and Bibb Counties	13
Cole Creek	Partially Supporting	Tributary to Tobesofkee Creek - Lamar and Monroe Counties	6
Eightmile Creek	Partially Supporting	Tributary to Towaliga River - Monroe County	5
Gladesville Creek	Partially Supporting	Headwaters to Little Falling Creek - Jasper County	9
Hansford Branch	Partially Supporting	Monroe County	2
Harmon Pye Branch	Partially Supporting	Tributary to Wise Creek - Jasper County	1
Hartley Branch	Partially Supporting	Tributary to Deep Creek - Crawford County	1
Herds Creek	Partially Supporting	Downstream from GA Hwy 212 to Ocmulgee River - Jasper County	6
Little Chehaw Creek	Partially Supporting	Headwaters to Chehaw Creek - Jones County	3
Little Deer Creek	Partially Supporting	Headwaters to Deer Creek - Monroe County	6
Little Deer Creek Tributary	Partially Supporting	Headwaters to Little Deer Creek - Monroe County	1
Little Shellstone Creek	Partially Supporting	Bleckley County	4
Long Branch	Partially Supporting	Tributary to Ocmulgee River - Jasper County	3
Malholms Creek	Partially Supporting	Headwaters (Jenkinsburg) to Tussahaw Creek - Butts County	6
Mill Dam Creek	Partially Supporting	Monroe County	4
Phinazee Creek	Partially Supporting	Lamar and Monroe Counties	6
Red Creek	Partially Supporting	Tributary to Rocky Creek - Monroe County	3
Rock Creek	Partially Supporting	Upstream from Lite-N-Tie Road - Jones County	1
Rocky Creek - Jasper	Partially Supporting	Jasper County	5
Rocky Creek - Butts	Partially Supporting	Upstream from Big Sandy Creek - Monroe and Butts Counties	6
Rocky Creek - Bibb	Partially Supporting	Upstream from Lake Wildwood - Monroe and Bibb Counties	7
Rocky Creek - Monroe	Partially Supporting	Downstream from English Road (CR 152) to Towaliga River - Monroe County	4
Rum Creek	Partially Supporting	Rum and Town Creeks, upstream from Lake Juliette - Monroe County	6
Sand Branch	Partially Supporting	Tributary to Towaliga River - Monroe County	2
Scoggins Creek	Partially Supporting	Tributary to Ocmulgee River - Jones County	2
Shellstone Creek	Partially Supporting	US Hwy 23 to Ocmulgee River - Bleckley and Twiggs Counties	8
Third Branch	Partially Supporting	Tributary to Ocmulgee River - Jones County	3
Tobesofkee Creek	Partially Supporting	Barnesville to Cole Creek - Lamar and Monroe Counties	8
Tobler Creek	Partially Supporting	Tributary to Ocmulgee River - Monroe County	6
Tributary to Tobesofkee Ck	Partially Supporting	Barnesville - Lamar County	2
Town Branch	Not Supporting	Downstream from Jackson South WPCP to Aboothlacoosta Creek - Butts County	3
Walnut Creek - Crawford	Partially Supporting	Downstream Hwy 42 - Crawford County	4
Walnut Creek – Jones	Not Supporting	Headwaters to Ocmulgee River - Jones and Bibb Counties	20
White Creek	Partially Supporting	Lamar and Monroe Counties	4
Wise Creek	Not Supporting	Headwaters to Kinnard Creek - Jasper County	6
Wood Creek	Partially Supporting	Headwaters to downstream from GA Hwy 83 - Lamar and Monroe Counties	3

Source: GAEPD, 1998-1999. *Water Quality in Georgia, 1998-1999,* Georgia Department of Natural Resource, Environmental Protection Division.

approximately 12.1 percent pasture land (ranging from 0 – 73.4 percent) and approximately 5.0 percent cropland (ranging from 0 to 21.7 percent).

The soil characteristics of the Ocmulgee River Basin watersheds were determined using data from the State Soil Geographic (STATSGO) coverage. This coverage provides major soil type classifications. Table 5 lists the soil type distribution of the monitored watersheds.

1.3 Water Quality Standard

The water use classification for the impaired watersheds in the Ocmulgee River Basin is Fishing. The criterion violated is listed as Biota Impacted, which indicates studies have showed a significant modification of the fish community. The potential cause(s) listed include urban runoff, nonpoint sources, unknown sources, and industrial facilities. The narrative standard is to maintain the biological integrity of the waters of the State, as stated in Georgia's Rules and Regulations for Water Quality Control Chapter 391-3-6-.03(2)(c):

> All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses..

Table 3. Land Use Distribution (Unimpaired)

	Area (acres)															
Name	Open Water	Low Intensity Residential	High Intensity Residential	High Intensity Commercial Industrial Transportation	Bare Rock Sand and Clay	Quarries Strip Mines Gravel Pits	Transitional	Deciduous Forest	Evergreen Forest	Mixed Forest	Pasture/Hay	Row Crops	Other Grasses Urban Recreational)	Woody Wetland	Emergent Herbaceous Wetlands	Total
Alcovy River	703.4	1647.7	421.6	1426.4	2.2	165.9	751.7	41127.1	17788.3	22061.0	16672.1	4734.8	963.2	5925.3	197.9	114588.7
Beaverdam Creek	35.4	206.2		128.1	22.0		170.8	2774.9	1047.7	928.7	32.7	318.2	70.3	16.5	3.8	5755.2
Big Sandy Creek	554.2	538.2	88.3	507.0	0.4	71.4	1144.6	28930.3	18733.7	19750.6	13112.6	4687.9	323.4	3593.1	137.4	92173.2
Buck Creek	171.9	30.5	3.6	47.4			10.0	5827.4	2929.9	4636.5	4441.3	1170.4	27.8	1120.4	8.0	20425.1
Chambliss Creek	13.1	52.3	35.6	86.3				1181.1	825.5	423.9	629.4	205.3	83.8			3536.2
Deer Creek U/S	35.1	0.7		43.4				1435.3	858.9	521.7	1174.0	260.2	0.9			4330.1
Deer Creek D/S	36.2	0.7		50.0				1526.7	955.8	564.6	1225.1	263.5	0.9			4623.6
Douglas Creek	4.4	2.2		4.2				560.6	258.9	273.5	116.3	62.7		2.9		1285.8
Falling Creek	126.8	29.4		6.4	13.8	48.5	410.3	16754.4	20686.7	6473.2	641.4	403.6	8.5	365.4	5.6	45973.8
Herds Creek at CR 198	2.0			0.7				286.9	80.1	80.3	74.5	14.5				538.8
Herds Creek at GA 212	2.2			0.7			3.8	987.0	1039.7	522.2	451.4	78.1		2.7		3087.6
Kinnard Creek	2.2			0.4	0.4		2.9	2008.4	1297.0	831.7	597.3	277.5		6.0	0.4	5024.4
Lee Creek							584.9	572.6	558.6	276.9	12.2	13.3				2018.6
Little Buck Creek	18.0	1.6		7.6				775.9	451.9	498.6	700.3	220.4		238.0	4.2	2916.4
Little Deer Creek D/S DOT	7.8			7.3	0.7	125.9	10.7	1415.5	1189.3	487.9	155.7	251.3	0.4	127.0	1.1	3780.6
Little Falling Creek	53.6				2.7	1.8	68.3	4776.0	4411.5	2338.6	191.9	115.0		270.6	1.8	12231.7
Long Branch	9.3	0.4		2.0			3.1	330.0	243.3	143.4	96.3	20.2		2.2		850.4
Panther Creek	7.3	11.8	0.7	2.7				373.8	153.2	183.9	221.1	43.4	7.8	7.3		1013.0
Peeksville Creek	9.1	0.2		3.3				729.4	325.4	374.1	340.3	126.1		32.0		1939.9
Prairie Creek	6.2	2.0		6.0				429.7	420.3	436.1	330.2	78.3	6.4	19.3		1734.6
Rock Creek	13.8	10.9		5.3	13.6	205.3	268.4	939.6	1038.8	302.2	28.2	82.3		11.8	1.1	2921.3
Rocky Creek - Bibb	260.9	656.7	141.0	248.6	63.2		571.1	4853.4	2625.9	2695.3	521.3	1158.9	109.9	215.0	10.2	14131.4
Rocky Creek - Monroe	60.3	10.2	0.0	112.8		4.2	168.6	6352.9	3670.5	3869.3	1389.5	311.3	24.7	203.9		16178.2
Sabbath Creek	6.7	976.7	172.6	82.1	26.2		129.2	362.9	443.9	401.9	30.7	106.1	15.1	10.2	1.3	2765.6
Swan Creek - U/S	2.4	0.2		1.6				277.8	74.7	236.6	436.1	62.5		27.6		1119.5
Swan Creek -D/S	3.6	0.2		2.2				770.8	638.3	694.3	563.3	78.3		242.4		2993.3
Tobesofkee Creek lower	206.6	527.3	98.5	189.7		258.0	291.5	10602.3	8030.8	6923.4	5158.0	1463.1	197.9	429.9	0.2	34377.2
Towaliga River	475.2	443.0	41.4	457.2	0.4	71.4	265.3	17616.4	12893.8	15749.0	11613.5	4257.8	280.9	2519.4	84.3	66769.0
Town Branch U/S Jackson WPCP	3.1	163.7	33.1	68.3				438.1	271.1	283.1	10.0	20.5	57.2	2.9		1351.0
Troublesome Creek	88.5	205.3	11.3	74.3				1937.2	2456.0	2577.7	998.5	328.7	91.2	69.6	0.7	8839.0
Tussahaw Creek Trib	6.0	1.8		1.8				354.3	206.6	330.5	481.0	228.8	0.7	4.0		1615.4
Tussahaw Creek upper	67.2	46.5	7.3	81.2		50.0		2998.7	1878.9	2463.2	2803.0	1187.1	46.9	212.4	2.7	11845.0
Tussahaw Creek lower	165.0	139.9	32.2	125.6	0.4	50.0	387.8	10008.7	8017.9	7635.0	6884.7	2946.6	143.4	1530.5	6.7	38074.6
Yellow Creek	47.8			10.2			294.7	1918.5	1236.9	645.4	1175.8	242.8		205.5	1.6	5779.2
Yellow Water Creek Trib D/S	0.2	29.1	4.0	4.4				141.9	95.6	76.5	26.9	16.7	14.9			410.3
Yellow Water Creek U/S	21.3	192.6	23.1	30.9			0.4	1440.0	822.4	1204.9	1289.4	424.8	60.7	83.8	3.3	5597.7
Yellow Water Creek D/S	21.3	193.9	23.1	31.6			0.4	1448.4	823.9	1206.2	1301.2	424.8	60.7	83.8	3.3	5622.8
Yellow Water Creek lower	107.4	399.2	79.6	234.8	0.4		1.3	5808.5	2800.1	3142.3	4894.7	1623.6	106.7	412.3	3.3	19614.5

Table 3. Land Use Distribution (Impaired)

Name	Area (acres)															
	Open Water	Low Intensity Residential	High Intensity Residential	High Intensity Commercial Industrial Transportation	Bare Rock Sand and Clay	Quarries Strip Mines Gravel Pits	Transitional	Deciduous Forest	Evergreen Forest	Mixed Forest	Pasture/Hay	Row Crops	Other Grasses Urban Recreational)	Woody Wetland	Emergent Herbaceous Wetlands	Total
Bay Creek		268.4	118.5	262.4	4.4		33.8	83.8	51.1	24.0	117.9	279.5	34.5	10.5	1.6	1290.5
Big Sandy Creek	10.0			2.2				765.9	673.6	679.2	842.4	221.9		3.8		3199.0
Browns Branch	9.8	10.7	0.7	5.8				685.4	358.9	626.0	883.8	479.9	17.8	2.2		3080.9
Butlers Creek	2.7				2.9		52.9	861.5	1782.9	288.2	5.1			2.0	0.4	2998.7
Cabin Creek - upper		318.0	48.5	89.2				149.7	100.1	182.8	4.0	18.0	57.4			967.6
Cabin Creek - middle	12.9	709.0	125.6	124.5				347.1	384.7	526.6	72.1	43.8	161.2			2507.6
Cabin Creek	90.1	974.5	160.8	202.6	0.2			1600.1	1188.9	1727.9	1140.4	302.7	287.1	10.5		7685.7
Calaparchee Creek	31.6	50.0		100.1	7.6		95.4	975.8	309.8	305.3	210.4	336.0	26.9	15.6	1.1	2465.6
Cole Creek	0.9	0.2						287.3	97.4	197.3	238.8	72.7		0.9		895.6
Eightmile Creek	4.7	0.7		0.2				285.5	117.4	93.4	70.7	9.1				581.8
Gladesville Creek	11.1				2.7		29.1	1373.5	1071.9	832.6	171.7	90.1		24.9	0.9	3608.5
Hansford Branch								313.6	132.3	118.8	5.1	0.9				570.6
Harmon Pye Branch		1.8			0.4		9.8	785.0	489.5	418.3	8.5	20.2		1.1		1734.6
Hartley Branch	24.7				0.2	0.7	143.9	1234.0	437.0	406.7	132.8	240.0		10.2		2630.2
Herds Creek at CR 159	10.9	0.7		3.8			53.4	3227.3	3070.9	1443.1	773.5	149.4		90.3	4.2	8827.4
Little Chehaw Creek	16.9	13.8		12.2	3.1		75.4	603.1	571.3	231.1	156.8	246.4	0.7	9.8	0.2	1940.8
Little Deer Creek trib				0.4	0.7	125.9	7.8	241.5	194.4	48.9	21.6	68.5		0.2		709.9
Little Deer Creek U/S DOT	7.8			6.4	0.7	125.9	9.6	1398.8	1171.8	483.9	154.6	240.2	0.2	119.2	0.2	3719.2
Little Deer Creek	7.8			7.3	0.9	125.9	17.6	2372.9	1835.8	731.0	160.1	282.7	0.4	149.9	1.6	5693.8
Little Shellstone Creek							24.5	411.6	141.9	99.9		35.1		18.7		731.7
Long Branch							35.4	654.0	548.6	354.5	0.7	17.6		0.2		1611.0
Malholms Creek	12.7	5.6		7.3				297.3	210.8	310.5	410.7	123.4	13.1	6.7		1398.1
Mill Dam Creek	0.2			0.4				435.4	514.4	207.0	115.0	19.1				1291.6
Phinazee Creek	3.1	0.4		2.9			163.7	851.1	261.1	346.0	76.9	57.4		28.5		1791.1
Red Creek	6.4	0.4		67.6		4.2	167.2	2594.4	2257.0	2112.9	320.5	109.6	2.4	94.5		7737.3
Rock Creek	9.1				6.7	90.1	64.0	264.0	235.3	84.7	4.9	82.3		6.0	0.4	847.5
Rocky Creek - Jasper	1.6	0.2		1.3				333.4	192.6	140.1	234.8	76.3				980.3
Rocky Creek - Butts	3.6	0.2		2.4			4.0	934.5	498.8	413.2	262.0	28.2		3.1		2150.0
Rocky Creek - Bibb	10.5	1.8		0.7	3.8		68.5	1387.7	860.6	862.6	125.9	247.3	62.9	120.1	5.1	3757.5
Rocky Creek - Monroe	40.3			31.4			0.2	1458.4	614.0	1135.7	648.5	140.8	2.2			4071.5
Rum Creek	20.7	188.8	47.1	176.8			118.1	3052.7	1555.6	1003.2	548.9	262.4	56.5			7030.8
Sand Branch								227.7	318.9	157.9	6.2	3.6				714.3
Scoggins Creek	4.9					2.2	179.2	1039.9	576.4	330.5	6.9			2.2	0.9	2143.1
Shellstone Creek	155.2	2.4		2.4	34.7		1738.4	11510.7	4680.6	2049.1	969.4	5257.7	38.5	1315.2	6.2	27760.6
Third Branch	7.3			2.0			26.0	687.6	579.5	550.9	1.3	0.2		88.3		1943.2
Tobesofkee Creek U/S confluence		35.4	8.7	18.7				212.8	82.1	137.9	96.3	51.8	20.0	0.2		663.8
Tobesofkee Creek D/S confluence	2.0	205.5	67.4	53.6				216.8	297.1	330.7	84.3	67.6	88.5	48.3		1461.7
Tobesofkee Creek	2.0	243.7	76.3	72.7			0.2	545.3	442.3	562.2	198.4	138.8	109.0	48.5		2439.4
Tobler Creek	56.7	246.2	76.7	90.3			177.0	5763.4	2860.1	3880.9	2943.5	922.7	109.0	140.1		17266.6
Trib Tobesofkee Creek	2.9	35.8		23.4	10.9	0.2	194.6	2266.3	2455.8	738.8	14.0	161.7	0.4	9.1	1.6	5915.5
Town Branch D/S Jackson WPCP	3.1	163.7	33.1	68.3				461.0	274.9	295.3	12.2	21.1	57.2	2.9		1392.8
Town Branch - Rum Creek U/S Forsyth	4.2	132.8	39.8	148.1				251.7	95.4	158.1	55.8	30.5	43.8			960.3
Town Branch - Rum Creek D/S Forsyth	4.2	132.8	39.8	148.1				260.4	96.3	167.9	59.6	30.7	43.8			983.6
Walnut Creek - Crawford	28.9	0.9	0.7	21.1			268.4	3877.3	2295.9	968.7	483.5	161.7		29.4		8136.5
Walnut Creek - upper	18.5	24.2		2.2	2.4		128.5	1924.5	2162.7	660.0	186.1	299.3	4.0	8.5	0.2	5421.3
Walnut Creek –Jones	82.5	221.3	34.7	70.1	20.2		610.5	6600.0	6403.0	2317.7	1614.3	1501.6	14.2	45.4	3.1	19538.5
White Creek	2.7			0.9			3.6	448.1	596.2	440.5	187.7	29.1		5.8		1714.6
Wise Creek	7.6	1.8		2.9	2.7		34.9	2648.0	2050.2	1529.6	477.9	321.6		8.7	0.4	7086.1
Wood Creek	6.4			1.3			128.1	407.9	96.1	121.6	371.6	40.9				1174.0

Table 4. Land Use Percentage (Unimpaired)

Name	Open Water	Low Intensity Residential	High Intensity Residential	High Intensity Commercial Industrial Transportation	Bare Rock Sand and Clay	Quarries Strip Mines Gravel Pits	Transitional	Deciduous Forest	Evergreen Forest	Mixed Forest	Pasture/Hay	Row Crops	Other Grasses Urban Recreational)	Woody Wetland	Emergent Herbaceous Wetlands
Alcovy River	0.61%	1.44%	0.37%	1.24%	0.00%	0.14%	0.66%	35.89%	15.52%	19.25%	14.55%	4.13%	0.84%	5.17%	0.17%
Beaverdam Creek	0.61%	3.58%		2.23%	0.38%		2.97%	48.22%	18.20%	16.14%	0.57%	5.53%	1.22%	0.29%	0.07%
Big Sandy Creek	0.60%	0.58%	0.10%	0.55%	0.00%	0.08%	1.24%	31.39%	20.32%	21.43%	14.23%	5.09%	0.35%	3.90%	0.15%
Buck Creek	0.84%	0.15%	0.02%	0.23%			0.05%	28.53%	14.34%	22.70%	21.74%	5.73%	0.14%	5.49%	0.04%
Chambliss Creek	0.37%	1.48%	1.01%	2.44%				33.40%	23.34%	11.99%	17.80%	5.80%	2.37%		
Deer Creek U/S	0.81%	0.02%		1.00%				33.15%	19.83%	12.05%	27.11%	6.01%	0.02%		
Deer Creek D/S	0.78%	0.01%		1.08%				33.02%	20.67%	12.21%	26.50%	5.70%	0.02%		
Douglas Creek	0.35%	0.17%		0.33%				43.60%	20.13%	21.27%	9.05%	4.88%		0.22%	
Falling Creek	0.28%	0.06%		0.01%	0.03%	0.11%	0.89%	36.44%	45.00%	14.08%	1.40%	0.88%	0.02%	0.79%	0.01%
Herds Creek at CR 198	0.37%			0.12%				53.24%	14.86%	14.90%	13.83%	2.68%			
Herds Creek at GA 212	0.07%			0.02%			0.12%	31.96%	33.67%	16.91%	14.62%	2.53%		0.09%	
Kinnard Creek	0.04%			0.01%	0.01%		0.06%	39.97%	25.81%	16.55%	11.89%	5.52%		0.12%	0.01%
Lee Creek							28.97%	28.37%	27.67%	13.72%	0.61%	0.66%			
Little Buck Creek	0.62%	0.05%		0.26%				26.61%	15.49%	17.10%	24.01%	7.56%		8.16%	0.14%
Little Deer Creek D/S DO	0.21%			0.19%	0.02%	3.33%	0.28%	37.44%	31.46%	12.91%	4.12%	6.65%	0.01%	3.36%	0.03%
Little Falling Creek	0.44%				0.02%	0.01%	0.56%	39.05%	36.07%	19.12%	1.57%	0.94%		2.21%	0.01%
Long Branch	1.10%	0.05%		0.24%			0.37%	38.81%	28.61%	16.87%	11.32%	2.38%		0.26%	
Panther Creek	0.72%	1.16%	0.07%	0.26%				36.90%	15.13%	18.16%	21.82%	4.28%	0.77%	0.72%	
Peeksville Creek	0.47%	0.01%		0.17%				37.60%	16.77%	19.28%	17.54%	6.50%		1.65%	
Prairie Creek	0.36%	0.12%		0.35%				24.77%	24.23%	25.14%	19.04%	4.51%	0.37%	1.12%	
Rock Creek	0.47%	0.37%		0.18%	0.46%	7.03%	9.19%	32.16%	35.56%	10.35%	0.97%	2.82%		0.40%	0.04%
Rocky Creek - Bibb	1.85%	4.65%	1.00%	1.76%	0.45%		4.04%	34.34%	18.58%	19.07%	3.69%	8.20%	0.78%	1.52%	0.07%
Rocky Creek - Monroe	0.37%	0.06%	0.00%	0.70%		0.03%	1.04%	39.27%	22.69%	23.92%	8.59%	1.92%	0.15%	1.26%	
Sabbath Creek	0.24%	35.32%	6.24%	2.97%	0.95%		4.67%	13.12%	16.05%	14.53%	1.11%	3.84%	0.55%	0.37%	0.05%
Swan Creek - U/S	0.22%	0.02%		0.14%				24.81%	6.67%	21.14%	38.96%	5.58%		2.46%	
Swan Creek -D/S	0.12%	0.01%		0.07%				25.75%	21.32%	23.19%	18.82%	2.62%		8.10%	
Tobesofkee Creek lower	0.60%	1.53%	0.29%	0.55%		0.75%	0.85%	30.84%	23.36%	20.14%	15.00%	4.26%	0.58%	1.25%	0.00%
Towaliga River	0.71%	0.66%	0.06%	0.68%	0.00%	0.11%	0.40%	26.38%	19.31%	23.59%	17.39%	6.38%	0.42%	3.77%	0.13%
Town Branch U/S Jackson	0.23%	12.12%	2.45%	5.05%				32.43%	20.07%	20.95%	0.74%	1.51%	4.23%	0.21%	
Troublesome Creek	1.00%	2.32%	0.13%	0.84%				21.92%	27.79%	29.16%	11.30%	3.72%	1.03%	0.79%	0.01%
Tussahaw Creek Trib	0.37%	0.11%		0.11%				21.93%	12.79%	20.46%	29.78%	14.17%	0.04%	0.25%	
Tussahaw Creek upper	0.57%	0.39%	0.06%	0.69%		0.42%		25.32%	15.86%	20.79%	23.66%	10.02%	0.40%	1.79%	0.02%
Tussahaw Creek lower	0.43%	0.37%	0.08%	0.33%	0.00%	0.13%	1.02%	26.29%	21.06%	20.05%	18.08%	7.74%	0.38%	4.02%	0.02%
Yellow Creek	0.83%			0.18%			5.10%	33.20%	21.40%	11.17%	20.34%	4.20%		3.56%	0.03%
Yellow Water Creek Trib D/S	0.05%	7.10%	0.98%	1.08%				34.58%	23.31%	18.64%	6.56%	4.07%	3.63%		
Yellow Water Creek U/S	0.38%	3.44%	0.41%	0.55%			0.01%	25.72%	14.69%	21.52%	23.03%	7.59%	1.08%	1.50%	0.06%
Yellow Water Creek D/S	0.38%	3.45%	0.41%	0.56%			0.01%	25.76%	14.65%	21.45%	23.14%	7.55%	1.08%	1.49%	0.06%
Yellow Water Creek lower	0.55%	2.04%	0.41%	1.20%	0.00%		0.01%	29.61%	14.28%	16.02%	24.95%	8.28%	0.54%	2.10%	0.02%

Table 4. Land Use Percentage (Impaired)

Name	Open Water	Low Intensity Residential	High Intensity Residential	High Intensity Commercial Industrial Transportation	Bare Rock Sand and Clay	Quarries Strip Mines Gravel Pits	Transitional	Deciduous Forest	Evergreen Forest	Mixed Forest	Pasture/Hay	Row Crops	Other Grasses Urban Recreational)	Woody Wetland	Emergent Herbaceous Wetlands
Bay Creek		20.80%	9.18%	20.33%	0.34%		2.62%	6.50%	3.96%	1.86%	9.13%	21.66%	2.67%	0.81%	0.12%
Big Sandy Creek	0.31%			0.07%				23.94%	21.06%	21.23%	26.33%	6.94%		0.12%	
Browns Branch	0.32%	0.35%	0.02%	0.19%				22.25%	11.65%	20.32%	28.68%	15.58%	0.58%	0.07%	
Butlers Creek	0.09%				0.10%		1.77%	28.73%	59.46%	9.61%	0.17%			0.07%	0.01%
Cabin Creek - upper		32.87%	5.01%	9.22%				15.47%	10.34%	18.89%	0.41%	1.86%	5.93%		
Cabin Creek - middle	0.51%	28.27%	5.01%	4.97%				13.84%	15.34%	21.00%	2.87%	1.75%	6.43%		
Cabin Creek	1.17%	12.68%	2.09%	2.64%	0.00%			20.82%	15.47%	22.48%	14.84%	3.94%	3.74%	0.14%	
Calapparchee Creek	1.28%	2.03%		4.06%	0.31%		3.87%	39.58%	12.56%	12.38%	8.53%	13.63%	1.09%	0.63%	0.05%
Cole Creek	0.10%	0.02%						32.08%	10.88%	22.03%	26.67%	8.12%		0.10%	
Eightmile Creek	0.80%	0.11%		0.04%				49.08%	20.18%	16.06%	12.16%	1.57%			
Gladesville Creek	0.31%				0.07%		0.81%	38.06%	29.71%	23.07%	4.76%	2.50%		0.69%	0.02%
Hansford Branch								54.95%	23.19%	20.81%	0.90%	0.16%			
Harmon Pve Branch		0.10%			0.03%		0.56%	45.26%	28.22%	24.12%	0.49%	1.17%		0.06%	
Hartley Branch	0.94%				0.01%	0.03%	5.47%	46.92%	16.61%	15.46%	5.05%	9.12%		0.39%	
Herds Creek at CR 159	0.12%	0.01%		0.04%			0.60%	36.56%	34.79%	16.35%	8.76%	1.69%		1.02%	0.05%
Little Chehaw Creek	0.87%	0.71%		0.63%	0.16%		3.88%	31.08%	29.44%	11.91%	8.08%	12.70%	0.03%	0.50%	0.01%
Little Deer Creek trib				0.06%	0.09%	17.73%	1.10%	34.02%	27.38%	6.89%	3.04%	9.65%		0.03%	
Little Deer Creek U/S DOT	0.21%			0.17%	0.02%	3.38%	0.26%	37.61%	31.51%	13.01%	4.16%	6.46%	0.01%	3.20%	0.01%
Little Deer Creek	0.14%			0.13%	0.02%	2.21%	0.31%	41.67%	32.24%	12.84%	2.81%	4.96%	0.01%	2.63%	0.03%
Little Shellstone Creek							3.34%	56.26%	19.39%	13.65%		4.80%		2.55%	
Long Branch							2.19%	40.60%	34.06%	22.00%	0.04%	1.09%		0.01%	
Malholms Creek	0.91%	0.40%		0.52%				21.27%	15.08%	22.20%	29.38%	8.83%	0.94%	0.48%	
Mill Dam Creek	0.02%			0.03%				33.71%	39.82%	16.03%	8.90%	1.48%			
Phinazee Creek	0.17%	0.02%		0.16%			9.14%	47.52%	14.58%	19.32%	4.30%	3.20%		1.59%	
Red Creek	0.08%	0.01%		0.87%		0.05%	2.16%	33.53%	29.17%	27.31%	4.14%	1.42%	0.03%	1.22%	
Rock Creek	1.08%				0.79%	10.63%	7.56%	31.15%	27.76%	10.00%	0.58%	9.71%		0.71%	0.05%
Rocky Creek - Jasper	0.16%	0.02%		0.14%				34.01%	19.65%	14.29%	23.96%	7.78%			
Rocky Creek - Butts	0.17%	0.01%		0.11%			0.19%	43.46%	23.20%	19.22%	12.18%	1.31%		0.14%	
Rocky Creek - Bibb	0.28%	0.05%		0.02%	0.10%		1.82%	36.93%	22.90%	22.96%	3.35%	6.58%	1.67%	3.20%	0.14%
Rocky Creek - Monroe	0.99%			0.77%			0.01%	35.82%	15.08%	27.89%	15.93%	3.46%	0.05%		
Rum Creek	0.29%	2.69%	0.67%	2.51%			1.68%	43.42%	22.13%	14.27%	7.81%	3.73%	0.80%		
Sand Branch								31.88%	44.65%	22.10%	0.87%	0.50%			
Scoggins Creek	0.23%					0.10%	8.36%	48.52%	26.90%	15.42%	0.32%			0.10%	0.04%
Shellstone Creek	0.56%	0.01%		0.01%	0.12%		6.26%	41.46%	16.86%	7.38%	3.49%	18.94%	0.14%	4.74%	0.02%
Third Branch	0.38%			0.10%			1.34%	35.39%	29.82%	28.35%	0.07%	0.01%		4.54%	
Tobesofkee Creek U/S confluence		5.33%	1.31%	2.81%				32.06%	12.36%	20.77%	14.51%	7.81%	3.02%	0.03%	
Tobesofkee Creek D/S confluence	0.14%	14.06%	4.61%	3.67%				14.83%	20.33%	22.62%	5.77%	4.62%	6.06%	3.30%	
Tobesofkee Creek	0.08%	9.99%	3.13%	2.98%			0.01%	22.35%	18.13%	23.05%	8.13%	5.69%	4.47%	1.99%	
Tobler Creek	0.33%	1.43%	0.44%	0.52%			1.03%	33.38%	16.56%	22.48%	17.05%	5.34%	0.63%	0.81%	
Trib Tobesofkee Creek	0.05%	0.61%		0.39%	0.18%	0.00%	3.29%	38.31%	41.52%	12.49%	0.24%	2.73%	0.01%	0.15%	0.03%
Town Branch D/S Jackson WPCP	0.22%	11.75%	2.38%	4.90%				33.10%	19.73%	21.20%	0.88%	1.52%	4.10%	0.21%	
Town Branch - Rum Creek U/S Forsyth	0.44%	13.83%	4.15%	15.42%				26.22%	9.94%	16.47%	5.81%	3.17%	4.56%		
Town Branch - Rum Creek D/S Forsyth	0.43%	13.50%	4.05%	15.06%				26.48%	9.79%	17.07%	6.06%	3.12%	4.45%		
Walnut Creek - Crawford	0.36%	0.01%	0.01%	0.26%			3.30%	47.65%	28.22%	11.91%	5.94%	1.99%		0.36%	
Walnut Creek - upper	0.34%	0.45%		0.04%	0.05%		2.37%	35.50%	39.89%	12.17%	3.43%	5.52%	0.07%	0.16%	0.00%
Walnut Creek –Jones	0.42%	1.13%	0.18%	0.36%	0.10%		3.12%	33.78%	32.77%	11.86%	8.26%	7.69%	0.07%	0.23%	0.02%
White Creek	0.16%			0.05%			0.21%	26.13%	34.77%	25.69%	10.95%	1.70%		0.34%	
Wise Creek	0.11%	0.03%		0.04%	0.04%		0.49%	37.37%	28.93%	21.59%	6.74%	4.54%		0.12%	0.01%
Wood Creek	0.55%			0.11%			10.91%	34.74%	8.18%	10.36%	31.65%	3.49%			

Table 5. Soil Type Distribution (Unimpaired)

NAME	Drainage Area upstream from the monitoring point (sq mile)	Soil Types (acres)															
		GA101	GA056	GA051	GA050	GA046	GA041	GA040	GA039	GA038	GA036	GA035	GA032	GA031	GA030	GA026	GA025
K-Factor		0.25	0.15	0.12	0.15	0.16	0.17	0.14	0.13	0.15	0.26	0.24		0.24	0.27	0.25	0.27
Alcovy River	180.20										40817.6	2541.2				31211.8	40995.9
Beaverdam Creek	9.22													31.6	1425.1		4390.8
Big Sandy Creek	54.78													1641.0		4218.0	29916.4
Buck Creek	32.35															2982.4	17750.3
Chambliss Creek	5.84															52.5	3571.1
Deer Creek U/S	7.31															1570.9	2876.6
Deer Creek D/S	7.79															1577.8	3176.8
Douglas Creek	2.21															324.5	996.7
Falling Creek	72.35													1361.9	2193.8	28117.5	14694.0
Herds Creek at CR 198	4.97															261.5	301.1
Herds Creek at GA 212	5.85															1846.9	1321.0
Kinnard Creek	7.93													76.3		3571.3	1448.4
Lee Creek	3.23															972.5	1092.4
Little Buck Creek	4.68																3011.3
Little Deer Creek D/S DOT	6.17															79.8	3850.4
Little Falling Creek	18.94													612.0	1423.1	5988.7	4434.0
Long Branch	1.40													1641.0			
Panther Creek	1.77																1089.9
Peeksville Creek	3.20															922.9	1105.5
Prairie Creek	2.91															52.7	1774.0
Rock Creek	4.72						179.7	898.7	572.4					784.1	53.6		505.9
Rocky Creek - Bibb	22.72	385.0														12650.9	15981.2
Rocky Creek - Monroe	26.02													957.6	2760.5	525.7	10309.4
Sabbath Creek	4.47								76.7					70.9			2718.0
Swan Creek - U/S	6.69															510.2	670.5
Swan Creek -D/S	1.83	46.3														510.2	670.5
Tobesofkee Creek lower	4.86															11871.0	23277.0
Towaliga River	4.86															27376.3	40059.0
Town Branch U/S Jackson WPCP	54.91																1427.1
Troublesome Creek	105.42															3707.6	5279.7
Tussahaw Creek Trib	2.24															306.0	1399.5
Tussahaw Creek upper	13.91															4257.2	6211.9
Tussahaw Creek lower	2.60															17638.2	21444.3
Yellow Creek	19.10															2480.3	3505.5
Yellow Water Creek Trib	61.16																411.6
Yellow Water Creek U/S	9.34																5769.4
Yellow Water Creek D/S	0.71																5818.8
Yellow Water Creek lower	9.12																13184.2

Table 5. Soil Type Distribution (Impaired)

NAME	Drainage Area upstream from the monitoring point (sq mile)	Soil Types (acres)															
		GA101	GA056	GA051	GA050	GA046	GA041	GA040	GA039	GA038	GA036	GA035	GA032	GA031	GA030	GA026	GA025
K-Factor		0.25	0.15	0.12	0.15	0.16	0.17	0.14	0.13	0.15	0.26	0.24		0.24	0.27	0.25	0.27
Bay Creek	2.30					1474.4											
Big Sandy Creek	5.11																3286.7
Browns Branch	5.00															1073.5	2129.6
Butlers Creek	4.62															1639.0	1397.3
Cabin Creek - upper	1.63															426.3	596.2
Cabin Creek - middle	4.18															942.7	1699.7
Cabin Creek	12.53															2056.0	5885.7
Calaparchee Creek	4.14																2561.2
Cole Creek	1.51															330.9	596.4
Eightmile Creek	1.01															13.3	598.9
Gladesville Creek	5.53													244.4	514.6	1977.7	960.3
Hansford Branch	0.97															11.8	587.3
Harmon Pye Branch	2.78													583.8		727.4	468.1
Hartley Branch	4.29													5253.7	2285.5		737.0
Herds Creek at CR 159	14.00															5748.5	3268.4
Little Chehaw Creek	3.07																1979.5
Little Deer Creek Trib	1.20																742.8
Little Deer Creek U/S DOT	6.07															48.0	3806.6
Little Deer Creek	9.22															1092.6	4810.5
Little Shellstone Creek	1.22		93.6			687.4											
Long Branch	2.62																899.3
Malholms Creek	2.33															571.5	898.2
Mill Dam Creek	2.12															424.3	900.0
Phinazee Creek	2.87															835.3	1041.4
Red Creek	12.39															8595.9	11780.3
Rock Creek	1.36							383.0	412.3					2.4			71.4
Rocky Creek - Jasper	1.60															461.7	577.8
Rocky Creek - Butts	3.44															209.9	1989.9
Rocky Creek - Bibb	6.23															1690.6	2467.2
Rocky Creek - Monroe	6.60														209.7	525.7	3145.7
Rum Creek	11.36															2088.0	5612.4
Sand Branch	1.14															201.0	542.2
Scoggins Creek	3.51	326.0												1063.0	556.4		251.3
Shellstone Creek	42.82		12832.4		7990.8	7361.7											0.0
Third Branch	3.17													1849.4	62.0		56.9
Tobesofkee Creek U/S confluence	2.42																1556.3
Tobesofkee Creek D/S confluence	4.13																2610.8
Tobesofkee Creek	27.72															6328.0	11350.6
Tobler Creek	9.34														3154.3		2884.1
Trib Tobesofkee Creek	1.13																704.1
Town Branch D/S Jackson WPCP	2.32																1505.6
Town Branch - Rum Creek U/S Forsyth	1.62															2.0	1002.5
Town Branch - Rum Creek D/S Forsyth	1.65															2.0	1034.1
Walnut Creek - Crawford	12.99													5253.7	2285.5		737.0
Walnut Creek - upper	8.53															3465.0	2075.8
Walnut Creek –Jones	31.01													1804.9		7795.3	10327.2
White Creek	2.81															106.1	1699.9
Wise Creek	11.31													1744.8		3598.2	1885.2
Wood Creek	1.96															556.6	713.2

2.0 WATER QUALITY ASSESSMENT

2.1 Fish Sampling

In 1990, the Department of Natural Resources (DNR) Wildlife Resources Division (WRD) conducted studies of fish communities in the Piedmont ecoregion. Biological monitoring is a method used to evaluate the health of a biological system in order to assess degradation from various sources. It is based on direct observations of aquatic communities. The results of these studies were the basis for the original listing of Biota Impacted stream segments on Georgia's 1996 303(d) list. In 1998 and 1999, WRD re-evaluated the stream segments in the Piedmont ecoregion. Four of the segments (Bay Creek, Hartley Branch, Little Shellstone Creek, and Shellstone Creek) are in the Southeastern Plains ecoregion. Biological monitoring protocols have not been developed for this area, so these segments have not been scored.

The work performed by the WRD looked at patterns of fish communities within the various ecoregions. An ecoregion is a region of relative homogeneity in ecological systems or in relationships between organisms and their environment. Seven major ecoregions have been identified in Georgia based upon the soil types, potential natural vegetation, land surface form, and predominant land uses. These include the Blue Ridge Mountains, Ridge and Valley, Southwestern Appalachians, Piedmont, Middle Atlantic Coastal Plain, Southeastern Plains, and Southern Coastal Plain.

Reference sites within the Piedmont ecoregion were established. These sites represented the least impacted sites that exist given the prevalent land use within the ecoregion. Eighty-seven sites were sampled within the Ocmulgee River Basin (see Tables 6, 7, and 8). These sites had to be accessible, wadeable, and representative of the stream under investigation. The length of the fish sampling site was thirty-five times the mean stream width up to 500 meters. This sampling length was found to be long enough to include the major habitat types present. Electrofishing and seining techniques were used for sampling the fish population (GAWRD, 2000).

Two indices of fish community health were used to assess the biotic integrity of the aquatic systems: the modified Index of Well-Being (IWB) and the Index of Biotic Integrity (IBI). The IWB and IBI scores were classified as Excellent, Good, Fair, Poor, or Very Poor. Segments with fish populations rated as Poor or Very Poor were listed as Biota Impacted.

The modified IWB measures the health of the aquatic community based on the density and diversity or structural attributes of the fish community. The IWB is calculated based on four parameters: the relative density of fish, the relative biomass of fish, the Shannon-Wiener Index of Diversity based on number, and the Shannon-Wiener Index of Diversity based on biomass.

The IBI assesses the biotic integrity of aquatic communities based on the functional and compositional attributes of the fish community. The IBI consists of twelve measurements or metrics, which assess three facets of the fish population: species richness and composition, trophic composition and dynamics, and fish abundance and condition. Each metric is scored by comparing its value to the value of the regional reference site. Factors that affect the structure and function of a fish community include stream location and size. Thus, the metrics were developed for regional drainage basins, e.g. the Atlantic Slope Drainage Basin, which includes the Ocmulgee, Ocmulgee, Ogeechee, and Savannah River Basins. To account for the fact that streams with larger drainage basins normally have greater species richness, Maximum Species Richness plots were developed for the species richness metric (GAWRD, 2000).

To supplement the findings of the fish community data, habitat assessments were performed at each sampling site. Habitat scores evaluate the physical surroundings of a stream as they affect and influence the quality of the water resource and its resident aquatic community. These data may also help clarify the results of the biotic indices. The habitat assessment used was developed by personnel with the Water Protection Branch (WPB) of the Georgia Environmental Protection Division and is a modification of the EPA Rapid Bioassessment Protocol III (GAWPB, 2000). It incorporates different assessment parameters for riffle/run prevalent streams. The habitat assessment evaluates the stream's physical parameters and is broken into three levels. Level one describes in-stream characteristics that directly affect biological communities (in-stream cover, epifaunal substrate, embeddedness, and riffle frequency). Level two describes the channel morphology (channel alteration, sediment deposition and channel flow status). Level three describes the riparian zone surrounding the stream, which indirectly affects the type of habitat and food resources available in the stream (bank vegetation, bank stability, and riparian zone width). The total habitat scores obtained for each sampling station are compared to a site-specific control or regional reference site. The ratio between the station of interest and the reference site provides a percent comparability that can be used to classify the stream.

Table 6 summaries WRD's study scores. The IBI, IWB, and Habitat Assessment scores are listed and the watersheds are grouped by those that were not 303(d) listed and those that were. In addition, the table includes the drainage areas upstream of the monitoring points, the county in which the monitoring points are located, and the pollutant source (nonpoint source NPS, or point source PS) or stream type (reference REF). Table 7 provides the detailed habitat assessment scores.

During the fish community studies, physical characteristics of the stream were measured at the monitoring sites. These characteristics included the number of pools, depth of the deepest pool, number of riffles, average stream depth, and average stream width. In addition, stream water quality measurements were taken at the time of the fish sampling. The parameters measured included water temperature, dissolved oxygen, conductivity, pH, turbidity, total hardness and alkalinity. Table 8 provides a summary of these field measurements.

2.2 Macroinvertebrate Sampling

In February 1999, the Department of Natural Resources (DNR) Environmental Protection Division (EPD) collected water quality samples at a number of locations monitored by WRD including all the 303(d) listed waters. Samples were analyzed to provide data to assess for the presence or absence of chemical pollution. The following analyses were conducted on each sample: dissolved oxygen (DO), temperature, conductivity, pH, turbidity, 5-day biochemical oxygen demand (BOD_5), nitrate-nitrite, ammonia, total phosphorus, total alkalinity, total suspended solids (TSS), total organic carbon (TOC), metals, semi-volatile organics, pesticides, and PCBs. The results are summarized in Table 9. The watersheds are grouped by those that were not 303(d) listed and those that were, including those located in the Southeastern Plains ecoregion.

Table 6. 1998-1999 WRD's Fish Community Study Scores (Unimpaired)

Name	Drainage Area (sq mile)	County	Source/Type	IBI Score	IBI Category	IWB Score	IWB Category	Habitat Total
Alcovy River	180.20	Newton	REF	42	Fair	8.7	Good	78
Beaverdam Creek	9.22	Bibb	NPS	34	Fair	7.2	Fair	106.9
Big Sandy Creek	54.78	Butts/Monroe	PS	42	Fair			75.7
Buck Creek	32.35	Lamar	NPS	44	Good	8.8	Good	82
Chambliss Creek	5.84	Monroe	NPS	42	Fair	6.4	Fair	57.3
Deer Creek U/S	7.31	Monroe	NPS	50	Good	8.1	Good	66.3
Deer Creek D/S	7.79	Monroe	NPS	34	Fair	5.5	Poor	84.7
Douglas Creek	2.21	Butts	NPS	36	Fair	7.7	Good	91.7
Falling Creek	72.35	Jones	PS	44	Good	7.5	Fair	51.2
Herds Creek at GA 212	4.97	Jasper	NPS	40	Fair	6.6	Fair	47
Herds Creek at CR 198	5.85	Jasper	NPS	40	Fair	5.1	Poor	112.7
Kinnard Creek	7.93	Jasper	NPS	36	Fair	6.2	Fair	70
Lee Creek	3.23	Monroe	NPS	38	Fair	6.8	Fair	74.7
Little Buck Creek	4.68	Lamar	NPS	44	Good	6.7	Fair	74
Little Deer Creek D/S DOT	6.17	Monroe	PS	36	Fair	7.4	Good	88
Little Falling Creek	18.94	Jones	NPS	36	Fair	7.4	Fair	56.3
Long Branch	1.40	Butts	NPS	46	Good	7.1	Fair	86.3
Panther Creek	1.77	Butts	NPS	34	Fair	6.9	Fair	111.3
Peeksville Creek	3.20	Henry	NRCS	34	Fair	6.4	Fair	57.5
Prairie Creek	2.91	Lamar	NPS	34	Fair	7.1	Fair	59.7
Rock Creek	4.72	Jones	NPS	34	Fair	6.4	Fair	56.7
Rocky Creek - Bibb	22.72	Bibb	PS	38	Fair	7.1	Fair	95.5
Rocky Creek - Monroe	26.02	Monroe	NPS	36	Fair	8	Fair	71.3
Sabbath Creek	4.47	Bibb	NPS	42	Fair	8	Good	118.8
Swan Creek U/S	6.69	Lamar	REF	38	Fair	6.6	Fair	103.2
Swan Creek U/S	1.83	Lamar	REF	44	Good	7.2	Fair	152
Swan Creek D/S	4.86	Lamar	REF	54	Excellent	7.3	Excellent	70.2
Swan Creek D/S	4.86	Lamar	REF	54	Excellent	8.3	Excellent	92
Tobesofkee Creek lower	54.91	Monroe	PS	44	Good	8.2	Fair	76.9
Towaliga River	105.42	Butts	PS	36	Fair	7.6	Fair	68.5
Town Branch U/S Jackson WPCP	2.24	Butts	PS	38	Fair	6.6	Fair	94
Troublesome Creek	13.91	Spalding	PS	48	Good	7.1	Fair	53.2
Tussahaw Creek Trib	2.60	Henry	NRCS	36	Fair	7.1	Fair	81.1
Tussahaw Creek upper	19.10	Henry	NRCS	42	Fair			78.2
Tussahaw Creek lower	61.16	Butts	NPS/NRCS	42	Fair	8.5	Fair	66.9
Yellow Creek	9.34	Monroe	NPS	44	Good	7.1	Fair	59
Yellow Water Creek Trib D/S	0.71	Butts	PS	38	Fair	6.8	Fair	64.7
Yellow Water Creek U/S	9.12	Butts	PS	44	Good	8.2	Excellent	57.2
Yellow Water Creek D/S	9.17	Butts	PS	38	Fair	7.5	Good	51.1
Yellow Water Creek	20.71	Butts	PS	36	Fair	7.8	Fair	85.3

Table 6. 1998-1999 WRD's Fish Community Study Scores (Impaired)

Name	Drainage Area (sq mile)	County	Source/Type	IBI Score	IBI Category	IWB Score	IWB Category	Habitat Total
Big Sandy Creek	5.11	Butts	NPS	24	Very Poor	4.9	Very Poor	52.3
Brown Branch	5.00	Henry	NRCS	36	Fair	3.8	Very Poor	101.7
Butlers Creek	4.62	Jones	NPS	22	Very Poor	4.7	Very Poor	64.7
Cabin Creek upper	1.63	Spalding	PS	12	Very Poor	4.2	Very Poor	47.4
Cabin Creek middle	4.18	Spalding	PS	16	Very Poor	4.4	Very Poor	51.5
Cabin Creek	12.53	Spalding	PS	24	Very Poor	6.5	Poor	62.4
Calaparchee Creek	4.14	Monroe	NPS	20	Very Poor	4.7	Very Poor	38.2
Cole Creek	1.51	Lamar	NPS	28	Poor	5.4	Poor	64.4
Eightmile Creek	1.01	Monroe	NPS	30	Poor	5.7	Poor	92.6
Gladesville Creek	5.53	Jasper	NPS	22	Very Poor			45.3
Hansford Branch	0.97	Monroe	NPS	22	Very Poor	5	Poor	98.4
Harmon Pye Branch	2.78	Jasper	NPS	32	Poor	5.4	Poor	57.6
Herds Creek at CR 159	14.00	Jasper	NPS	32	Poor	6.6	Poor	86.3
Little Chehaw Creek	3.07	Jones	PS	22	Very Poor	5.4	Poor	52.8
Little Deer Creek Tributary	1.20	Monroe	PS	30	Poor	5.2	Poor	96.4
Little Deer Creek U/S DOT	6.07	Monroe	PS	30	Poor	5.9	Fair	62.7
Little Deer Creek	9.22	Monroe	PS	28	Poor	6.2	Fair	53.4
Long Branch	2.62	Jasper	NPS	30	Poor	6.3	Fair	92.7
Malholms Creek	2.33	Butts	NRCS	26	Poor	4.9	Very Poor	72.6
Mill Dam Creek	2.12	Monroe	NPS	24	Very Poor	6.1	Fair	108.8
Phinazee Creek	2.87	Monroe	NPS	26	Poor	4.9	Very Poor	107.5
Red Creek	12.39	Monroe	NPS	30	Poor	5.7	Very Poor	44.9
Rock Creek	1.36	Jones	NPS	34	Fair	5.6	Poor	79.6
Rocky Creek - Jasper	1.60	Jasper	NPS	32	Poor	5.5	Poor	67.6
Rocky Creek - Butts	3.44	Butts	NPS	26	Poor	4.5	Very Poor	64.4
Rocky Creek -Bibb	6.23	Bibb	NPS	28	Poor	5.5	Poor	71.9
Rocky Creek - Monroe	6.60	Monroe	NPS	20	Very Poor	4.8	Very Poor	63.6
Rum Creek	11.36	Monroe	PS	32	Poor	6.6	Poor	65.6
Sand Branch	1.14	Monroe	PS	30	Poor	6.5	Fair	128.6
Scoggins Creek	3.51	Jones	NPS	20	Very Poor			41.6
Third Branch	3.17	Jones	NPS	32	Poor	6	Fair	39.3
Tobesofkee Creek U/S confluence	2.42	Lamar	PS	28	Poor	6.1	Fair	61.2
Tobesofkee Creek D/S confluence	4.13	Lamar	PS	30	Poor	6.4	Fair	80.1
Tobesofkee Creek	27.72	Monroe	PS	34	Fair	6.8	Poor	53.5
Tobler Creek	9.34	Monroe	NPS	22	Very Poor	4.8	Very Poor	39.8
Trib Tobesofkee Creek	1.13	Lamar	PS	16	Very Poor	2.9	Very Poor	75.7
Town Branch D/S Jackson WPCP	2.32	Butts	PS	24	Very Poor	4.8	Very Poor	60.5
Town Branch - Rum Creek U/S Forsyth	1.62	Monroe	PS	18	Very Poor	5.4	Poor	60.2
Town Branch - Rum Creek D/S Forsyth	1.65	Monroe	PS	22	Very Poor	4.1	Very Poor	108.3
Walnut Creek - Crawford	12.99	Crawford	NPS	30	Poor	5.3	Very Poor	61
Walnut Creek - upper	8.53	Jones	NPS	24	Very Poor	4.6	Very Poor	48.3
Walnut Creek – Jones	31.01	Jones	PS	32	Poor	6.7	Poor	55.4
White Creek	2.81	Monroe	NPS	28	Poor	6.1	Fair	65.4
Wise Creek	11.31	Jasper	NPS	34	Fair	6.1	Very Poor	58
Wood Creek	1.96	Monroe	REF	28	Poor	6.5	Fair	121.9

Table 7. 1998-1999 WRD's Habitat Assessment Scores (Unimpaired)

Name	Instream Cover	Epifaunal Substrate	Embeddedness	Channel Alteration	Sediment Deposition	Riffle Frequency	Channel Flow Status	Bank Vegetation (Left)	Bank Vegetation (Right)	Bank Stability (Left)	Bank Stability (Right)	Riparian Zone (Left)	Riparian Zone (Right)	Habitat Total
Alcovy River	10.9	2.7	1	16.7	2.6	0	5.5	5.8	6.1	5.3	6.4	7.2	7.8	78
Beaverdam Creek	8.5	13.5	8.4	13.1	6.4	12.5	8.2	6.3	5.7	6.4	6.8	6.5	4.7	106.9
Big Sandy Creek	9.7	3.7	2.7	7	6.7	1.7	11.3	3.7	4	2.7	2.7	10	10	75.7
Buck Creek	7.7	2.5	2.3	16.7	4.4	0	10.3	6.7	6.3	5.3	5.1	6.2	8.8	82
Chambliss Creek	6.3	2	2.7	5.7	3.3	0.7	8.3	1.7	3.3	2.7	3	8.7	9	57.3
Deer Creek U/S	6.3	5	2.7	4.3	2.3	2	8.3	5.3	3.7	6	5	9.3	6	66.3
Deer Creek D/S	12.7	15.3	8.7	8.7	11.3	15	12.7	6.3	5	4.7	4	8.3	9	121.7
Douglas Creek	8.7	8.7	5.3	11.3	10	6	12.7	5.3	4.7	5.3	4.3	8.3	1	91.7
Falling Creek	3.3	2.3	1.3	13	0.7	0	7.1	3	2.8	2.5	1.9	6.7	6.7	51.2
Herds Creek at GA 212	7.3	15.3	12.3	5.7	11.3	16.7	12	3.7	4	2.7	3.7	9	9	112.7
Herds Creek at CR 198	5	13	5	11.3	6.7	11.7	13.3	5.7	6	4.7	4.7	9.3	9.3	105.7
Kinnard Creek	4.3	3.3	1	5.7	1.7	0.3	15	2.7	3.3	2	2.7	2	3	47
Lee Creek	5.3	4.3	3	6.7	3.3	0.7	15.3	5.3	6	3.3	3.3	8	5.3	70
Little Buck Creek	5.3	3.3	4.3	7	2	1.3	15	6	6	3.3	3.3	8.7	9	74.7
Little Deer Creek D/S DOT	4.4	7.6	1.7	11	2	16	9.1	4.8	5	2.8	3.6	3	3	74
Little Falling Creek	8	7.3	4	4.7	2.3	9.3	12.7	7.7	7	4.7	4	9.7	6.7	88
Long Branch	8	2.3	2.3	5.3	3	0	9.7	3	3.3	2.7	2.7	7	7	56.3
Panther Creek	7.7	10	6	9.7	4	4.7	17	4	3.7	3.7	3.7	6	6.3	86.3
Peeksville Creek	10.3	10.3	7	10	9.3	12.3	13.3	6.3	5.7	4.3	4.3	9	9	111.3
Prairie Creek	4	3.77	2.1	17.1	0.77	0	8.17	3.7	2.3	3.9	2.4	1.7	9.1	57.5
Rock Creek	11	1.7	3	4.3	5	0	9.3	4	4	5	5	3.7	3.7	59.7
Rocky Creek - Bibb	6.3	9.3	3.3	5	2.3	12.3	11.3	1.7	1.7	1.7	1.7	0	0	56.7
Rocky Creek - Monroe	10.3	7.7	3.2	14.7	4.9	16	9.3	3.6	4.7	3.3	4.4	4.3	9.1	95.5
Sabbath Creek	5.5	7.8	3.2	14.8	2.7	0	5.8	5.2	4.5	3.8	3.5	5.6	8.9	71.3
Swan Creek U/S	13.6	11.1	8.1	16	7.5	15.5	13.4	3.5	4	4	3.5	9.2	9.3	118.8
Swan Creek U/S	5.7	7.8	7.2	16.3	6.1	14.5	10.2	4.9	3.5	5.3	4.6	9	8	103.2
Swan Creek D/S	14.3	17.3	13	14.3	13	15	12	8.7	8.7	8.7	8.3	9.3	9.3	152
Swan Creek D/S	7.8	3.3	3.7	19.3	3.7	0	4.7	2.6	2.3	2.4	1.9	9.3	9.3	70.2
Tobesofkee Creek lower	11.3	9.3	3.7	11.7	6	11.3	9.3	2.7	2.7	2.3	2.3	9.7	9.7	92
Towaliga River	5.8	3	3.5	16.1	2.8	0	7.1	5.8	5.7	5.1	4.5	9	8.6	76.9
Town Branch U/S Jackson WPCP	6.4	1.4	1.1	16.2	2.5	0	6.7	5.7	4.3	5.2	4.5	7.4	7.1	68.5
Troublesome Creek	9	9.3	6	7.3	5	11.3	9	5.3	5.3	4	4.3	9	9	94
Tussahaw Creek Trib	4.9	2.5	3	13.4	2.3	0	7	4.3	2	3.6	2.2	7.3	0.7	53.2
Tussahaw Creek upper	5.1	9.4	5.3	16.7	4.4	0.7	11	4.3	3.8	4.2	3.6	3.8	8.8	81.1
Tussahaw Creek lower	8.4	7.5	4.8	12.7	5.7	15.5	10.4	1.5	2.9	0.8	1.6	0.7	5.7	78.2
Yellow Creek	6.9	2.4	1.2	16	2.9	0	8	4.2	3.5	3.9	3.4	5.6	8.9	66.9
Yellow Water Creek Trib D/S	9.7	6.3	4.3	6.7	6	3.3	7	2.7	3.3	2.3	3	1.3	3	59
Yellow Water Creek U/S	5.3	7.3	3.3	5	4.3	8	9	4	4.3	2.3	2.7	6	3	64.7
Yellow Water Creek D/S	5.2	2	1.3	16	5.2	0	10.3	4	3.2	4.2	2	2.3	1.5	57.2
Yellow Water Creek	6.8	1.9	1	17.4	2.6	0	7.3	3.2	3.4	2.6	2.8	0.9	1.2	51.1

Table 7. 1998-1999 WRD's Habitat Assessment Scores (Impaired)

Name	Instream Cover	Epifaunal Substrate	Embeddedness	Channel Alteration	Sediment Deposition	Riffle Frequency	Channel Flow Status	Bank Vegetation (Left)	Bank Vegetation (Right)	Bank Stability (Left)	Bank Stability (Right)	Riparian Zone (Left)	Riparian Zone (Right)	Habitat Total
Big Sandy Creek	5	2	1	5.7	2.3	0	9.3	4.3	4.3	1.7	1.7	8.3	6.7	52.3
Brown Branch	6.4	12.1	8.4	14.3	8.1	17	9.2	3.6	3.7	4	4.2	7.6	3.1	101.7
Butlers Creek	6	9.3	1.7	5.7	2.3	7	7	2	2.3	2	2	8.7	8.7	64.7
Cabin Creek upper	3.5	2	2.3	15	1.7	0	7.1	1.5	1.3	0.8	0.7	6.3	5.2	47.4
Cabin Creek middle	4.1	2.2	1.3	12.3	1.2	0	6.9	1.1	1.2	2.4	0.8	9	9	51.5
Cabin Creek	7.3	1.2	0.2	14.3	3.9	0	8.6	3.7	3.6	2.2	2.6	7.6	7.2	62.4
Calaparchee Creek	3	2.3	1.3	6.3	3.3	0	7	2.7	2.7	1.3	1.3	2	5	38.2
Cole Creek	5.7	4.7	4.3	5.3	3.7	2	7.7	4	4	4	3.7	9	6.3	64.4
Eightmile Creek	6.7	10.3	7.3	6	6.3	11.3	10	5	4.3	4	4	8.7	8.7	92.6
Gladesville Creek	3	1.3	0.7	4	2	0.3	9.7	2.3	3.3	1.3	2	7.7	7.7	45.3
Hansford Branch	8.3	10	6.7	10.7	6	4.7	13	4.7	4.7	5.7	5.3	9.3	9.3	98.4
Harmon Pye Branch	7	2.3	1.3	4.7	4	0	14.3	3	2.7	2.3	2	7	7	57.6
Herds Creek at CR 159	8.3	7.7	5	6.3	5.3	5.7	16.3	4.3	4	2.7	2.7	9	9	86.3
Little Chehaw Creek	3.3	3	2	16	1.3	0	7.5	3.8	3.5	3.2	3.2	4	2	52.8
Little Deer Creek Tributary	5	13	6	5	6	14.3	9.7	5.7	5.3	4	3	9.7	9.7	96.4
Little Deer Creek U/S DOT	5	2.7	1.7	5	1	0.7	10.3	5.7	6.3	4.3	4	8.3	7.7	62.7
Little Deer Creek	1.8	2.3	2.5	12.3	1.3	0	5.5	4.3	3.5	3.7	2.2	9	5	53.4
Long Branch	6.3	8	9.7	7.7	6.7	9	11.3	5	4.7	3.3	4	8.7	8.3	92.7
Malholms Creek	4.7	6.1	4.7	14.7	4.7	0	7.7	3.7	4.6	4.2	4.7	3.8	9	72.6
Mill Dam Creek	5.7	8.3	8.7	8.7	9	9	16.3	7	7.3	4.7	4.7	9.7	9.7	108.8
Phinazee Creek	8.7	9.7	7.3	13	6.7	13.7	11.7	5.7	5	3.7	3.7	9.3	9.3	107.5
Red Creek	2.3	1	1.3	4.3	1.3	0	6.7	3.7	4.3	3	2.7	6	8.3	44.9
Rock Creek	4.3	11.3	6.7	6	6	11	9.3	3.7	3.3	3	3	3	9	79.6
Rocky Creek - Jasper	5.7	4	4.3	11.3	2.3	0	13	5	5	3.7	4.3	4	5	67.6
Rocky Creek - Butts	4.7	10.3	4	5.3	2.7	9.7	15.3	3.7	3.7	2.7	2.3	0	0	64.4
Rocky Creek -Bibb	5.1	4	5	13.6	5.7	3	9.4	3	3.5	3.2	4.4	4.3	7.7	71.9
Rocky Creek - Monroe	5.3	2.7	2.3	7.3	3.3	0	8.3	5.7	5.7	4	4	6.3	8.7	63.6
Rum Creek	6.3	9.3	2.3	7	4.3	7	6.3	2	2	1.7	1.7	8	7.7	65.6
Sand Branch	12.7	13.7	10	6.7	11.7	14.3	15.3	7.3	7.3	7	7	7.3	8.3	128.6
Scoggins Creek	1	2.3	3.3	5	0.3	0	7	1.3	2	0.7	1.3	8.7	8.7	41.6
Third Branch	2.3	2	1.3	4.3	2	0	6	1.3	1.3	0.7	0.7	8.7	8.7	39.3
Tobesofkee Creek U/S confluence	6.3	5.3	8	4.3	7.3	1.3	8	1.7	1.7	2	1.7	5.3	8.3	61.2
Tobesofkee Creek D/S confluence	7.7	9	3.7	3.7	5	13	12.7	3	3	0.7	1.3	8.3	9	80.1
Tobesofkee Creek - middle	4	3.3	1.9	15.7	2.2	0	7.5	4.4	3.5	2.8	2.7	0.8	4.7	53.5
Tobler Creek	1.3	0.7	1	7.3	0.3	0	4.3	2.7	3	1.3	1.3	8.3	8.3	39.8
Trib Tobesofkee Creek	5.3	8	5.7	4.3	3.3	13.7	9.7	5	4	4	3.7	7.7	1.3	75.7
Town Branch D/S Jackson WPCP	3.7	2.3	2.7	3.7	1.7	0	8	6	5.7	6	5.7	6	9	60.5
Town Branch - Rum Creek U/S Forsyth	5	4.3	2	6.7	6	0.7	8.7	4.7	4.7	3.7	3.7	3	7	60.2
Town Branch - Rum Creek D/S Forsyth	8	17.7	8.7	5.3	9	16	9	5.3	5.3	5.3	5.3	4.7	8.7	108.3
Walnut Creek - Crawford	2.3	2.3	2	16	1.7	0	7.3	3.1	2.7	3.3	2.3	9	9	61
Walnut Creek - upper	3	1	1	4.7	0.7	0	7.3	3.3	3.3	2.7	2.7	9.3	9.3	48.3
Walnut Creek – Jones	4.7	2.7	1.3	6.7	2	0	7.7	5.6	4.7	5.3	4.6	7.8	2.3	55.4
White Creek	4.7	3	1	6.7	1.7	2	9.3	6	6	3.3	4	9	8.7	65.4
Wise Creek	6.3	1.3	1.3	5.7	1	0.7	9.7	6	6	3	4	4	9	58
Wood Creek	10	11	9	5	10.3	11	15	7.7	7.7	8.3	8.3	9.3	9.3	121.9

Table 8. 1998-1999 WRD's Field Measurements (Unimpaired)

Name	Number of Pools	Deepest Pool (m)	Number of Riffles	Average Stream Depth (m)	Average Stream Width (m)	Dissolved Oxygen (mg/L)	Water Temperature (deg C)	pH	Conductivity (uS)	Turbidity (NTU)	Total Hardness (mg/L)	Alkalinity (mg/L)
Alcovy River	16	1.15	0	0.10	15.0	7.67	22.4	7.26	68.9	12.80	22.0	35
Beaverdam Creek	1	0.53	3	0.10	4.7	9.16	12.7		86.3	6.11	39.0	45
Big Sandy Creek	9	0.95	0	0.20	8.7	7.13	25.4	7.46	70.3	11.30		
Buck Creek	13	1.40	1	0.27	10.2	7.05	21.6	7.01	52.5	14.10	15.0	20
Chambliss Creek	6	0.68	0	0.70	5.0	8.12	19.8	7.35	71.9	16.40		
Deer Creek U/S	4	0.64	3	0.10	4.3	9.05	19.0	6.68	67.6	5.48		
Deer Creek D/S	5	0.95	4	0.10	2.4	9.45	18.8	7.12	46.7			
Douglas Creek	5	0.70	1	0.10	2.5	9.66	18.3	7.03	53.8			
Falling Creek	1	0.55	0	0.13	8.4	7.35	24.8	7.76	136.2	9.62	55.0	65
Herds Creek at GA 212	5	0.55	6	0.10	2.9	8.20	22.4	7.29	62.0	5.96		
Herds Creek at CR 198	2	0.40	5	0.00	1.3	9.32	18.4	6.95	34.2	14.80		
Kinnard Creek	3	0.58	1	0.10	4.3	7.39	23.7	7.03	-	5.59		
Lee Creek	0	0.00	0	0.10	3.8	8.25	21.7	7.09	64.7	15.50		
Little Buck Creek	0	0.50	0	0.10	3.4	10.20	16.8	7.22	43.5	16.90		
Little Deer Creek D/S DOT	2	0.70	2	0.09	2.9	8.04	14.0		37.6	28.70	16.0	20
Little Falling Creek	1	0.95	0	0.15	4.0	9.30	15.2					
Long Branch	7	0.65	0	0.10	4.3	6.64	24.6	7.18	123.8	10.80		
Panther Creek	6	0.70	0	0.20	2.5	10.64	20.2	6.65	38.2	6.94		
Peeksville Creek	3	0.60	3	0.10	3.1	9.04	19.4	-	36.7	-		
Prairie Creek	0	0.00	0	0.08	2.7	8.21	17.6	6.88	40.3	10.70	15.0	20
Rock Creek	14	0.99	0	0.30	5.2	6.93	22.8	6.80	47.0	12.80	-	-
Rocky Creek - Bibb	3	0.46	2	0.00	3.2	7.87	20.6	5.90	311.4	7.76		
Rocky Creek - Monroe	7	1.00	3	0.31	5.8	7.29	13.9		89.6	5.83	37.0	50
Sabbath Creek	1	0.50	2	0.10	8.0	8.15	25.4	7.52	50.7	6.50	14.0	25
Swan Creek U/S	8	1.30	4	0.22	4.8	6.80	13.7		186.1	3.65	83.0	70
Swan Creek U/S	0	0.00	5	0.17	2.8	8.55	21.9	6.87	46.8	8.53	13.0	20
Swan Creek D/S	5	0.46	3	0.12	3.5	7.93	22.9		38.3	6.14		
Swan Creek D/S	13	0.95	1	0.29	5.8	6.74	20.0	6.90	42.7	8.70	12.0	25
Tobesofkee Creek lower	17	1.20	1	0.26	7.3	6.59	23.1	7.21	54.7	11.30		
Towaliga River	4	0.75	0	0.17	9.8	6.92	23.0	7.49	188.1	13.10	20.0	45
Town Branch U/S Jackson WPCP	15	1.05	0	0.25	12.5	6.70	21.4	6.28	57.8	13.80	22.0	35
Troublesome Creek	4	0.68	3	0.80	2.9	7.74	22.1	7.31	56.0	7.14		
Tussahaw Creek Trib	1	0.70	0	0.09	6.3	8.52	22.5	7.11	67.3	16.30	28.0	40
Tussahaw Creek upper	3	1.20	3	0.22	4.0	7.01	22.8	6.86	35.7	16.00	8.0	5
Tussahaw Creek lower	8	1.40	5	0.43	4.8	6.66	23.9	6.84	46.3	31.40	13.0	20
Yellow Creek	13	1.50	0	0.34	9.2	7.17	20.6		49.8	15.80	13.0	20
Yellow Water Creek Trib D/S	10	0.59	1	0.10	5.2	6.29	24.3	7.11	51.5	10.70		
Yellow Water Creek U/S	1	0.79	3	0.07	2.0	7.26	22.9	6.99	197.9	40.30		
Yellow Water Creek D/S	3	1.50	0	0.23	4.6	7.60	25.4	7.02	74.3	17.60	21.0	45
Yellow Water Creek	3	1.30	0	0.25	4.6	7.08	24.5	6.71	130.1	20.20	27.0	45

Table 8. 1998-1999 WRD's Field Measurements (Impaired)

Name	Number of Pools	Deepest Pool (m)	Number of Riffles	Average Stream Depth (m)	Average Stream Width (m)	Dissolved Oxygen (mg/L)	Water Temperature (deg C)	pH	Conductivity (uS)	Turbidity (NTU)	Total Hardness (mg/L)	Alkalinity (mg/L)
Big Sandy Creek	1	0.50	0	0.10	5.3	7.43	22.7	6.63	50.4	17.30		
Brown Branch	0	0.00	6	0.10	3.8	7.90	18.3	6.78	34.3	18.90	11.0	15
Butlers Creek	2	0.30	2	0.39	4.1	6.94	26.1	7.30	79.1	5.78		
Cabin Creek upper	2	0.78	0	0.10	2.4	5.36	24.3	8.30	3061.0	2.70	68.4	900
Cabin Creek middle	6	0.74	0	0.98	6.2	4.70	21.2	8.09	1909.0	3.10	68.4	560
Cabin Creek	7	1.30	0	0.30	6.8	5.91	19.7	7.91	1325.0	4.20	51.3	350
Calaparchee Creek	0	0.00	0	0.71	1.8	5.99	26.3	7.25	97.8	20.10		
Cole Creek	2	0.43	3	0.75	2.2	7.80	18.4	7.02	33.9	15.80		
Eightmile Creek	5	0.95	2	0.10	2.6	9.18	18.7	6.88	41.7	8.10		
Gladesville Creek	5	0.70	1	0.20	3.5		24.6	7.65	132.8	16.00		
Hansford Branch	3	0.40	2	0.10	1.4	8.64	16.5	7.17	44.3	27.90		
Harmon Pye Branch	8	0.55	0	0.10	3.2	10.51	22.7	7.66	130.9	5.63		
Herds Creek at CR 159	9	0.97	2	0.20	6.2	6.98	23.0	6.80	66.5	16.40		
Little Chehaw Creek	0	0.00	0	0.71	2.6	4.09	16.6	7.30	77.8	19.10	27.0	40
Little Deer Creek Tributary	3	0.55	2	0.20	2.4	8.50	18.0		185.1			
Little Deer Creek U/S DOT	3	0.70	0	0.10	5.5	9.04	17.3	7.42	97.2	19.40		
Little Deer Creek	0	0.00	0	0.61	2.8	7.70	23.0	7.35	124.4	8.31	50.0	65
Long Branch	5	0.45	3	0.00	3.3	8.14	21.1	7.50	127.9	5.36		
Malholms Creek	2	0.72	0	0.20	2.4	6.97	24.9	6.89	44.7	35.90	26.0	60
Mill Dam Creek	5	0.80	2	0.10	3.1	8.30	18.6		45.9	11.70		
Phinazee Creek	13	0.75	7	0.10	4.0	9.09	20.2	6.72	25.9	8.97		
Red Creek	0	0.00	0	0.30	6.3	7.95	23.6	6.78	44.1	14.00		
Rock Creek	1	0.28	3	0.00	2.0	7.91	21.8	7.79	382.8	20.30		
Rocky Creek - Jasper	1	0.30	0	0.85	2.1	9.15	18.5	6.62	38.7	7.10		
Rocky Creek - Butts	1	0.30	1	0.10	3.0	10.48	21.3	6.74	48.3	4.14		
Rocky Creek -Bibb	4	1.15	1	0.10	4.3	8.13	12.7		61.2	11.60	23.0	35
Rocky Creek - Monroe	8	0.65	1	0.10	4.6	7.76	24.0	6.81	38.2	6.51		
Rum Creek	5	0.42	2	0.10	3.8	7.36	20.6	7.39	129.8	7.85		
Sand Branch	5	0.00	5	0.10	2.7	9.76	16.8	7.10	35.8	19.70		
Scoggins Creek	0	0.00	0	0.00	2.4	7.24	24.4	7.41	142.1	16.80		
Third Branch	2	0.66	0	0.10	2.2	4.67	23.5	6.96	129.1	21.40		
Tobesofkee Creek U/S confluence	10	0.50	1	0.30	4.2	7.22	18.7	6.89	53.3	14.90		
Tobesofkee Creek D/S confluence	4	0.75	1	0.10	3.6	6.61	24.3	7.64	282.4	17.80		
Tobesofkee Creek - middle	1	0.65	0	0.10	5.2	6.76	20.6	7.48	262.4	14.60	16.0	65
Tobler Creek	0	0.00	0	0.32	5.3	6.15	27.4	7.50	82.0	2.73		
Trib Tobesofkee Creek	3	0.42	2	0.10	2.2	6.87	25.3	7.54	412.0	13.40		
Town Branch D/S Jackson WPCP	1	0.70	0	0.83	2.9	7.44	24.1	7.28	437.7	5.66		
Town Branch - Rum Creek U/S Forsyth	12	1.00	1	0.20	2.9	6.35	23.0	7.01	114.5	7.64		
Town Branch - Rum Creek D/S Forsyth	4	0.53	6	0.10	3.8	6.51	24.9	6.84	208.3	27.50		
Walnut Creek - Crawford	0	0.00	0	0.95	4.2	8.39	16.5	7.35	64.2	8.63	24.0	40
Walnut Creek - upper	0	0.00	0	0.45	2.8	7.96	19.9		68.1	9.77		
Walnut Creek – Jones	0	0.00	0	0.78	8.5	4.79	17.0	7.72	82.2	8.76	31.0	50
White Creek	6	0.50	3	0.10	4.3	7.90	21.3	6.71	42.9	21.00		
Wise Creek	1	0.43	0	0.93	7.7	7.92	26.1	7.45	110.6			
Wood Creek	2	0.35	4	0.10	3.1	7.99	22.4	7.20	41.8	8.68		

Table 9. 1999 EPD's Field Measurements and Water Chemistry (Unimpaired)

Name	Depth (m)	Width (m)	DO (mg/L)	Water Temperature (deg C)	pH	Conductivity (umohs/cm)	Turbidity (NTU)	TSS (mg/L)	Chemical Violations
Beaverdam Creek	0.25	5.29	9.45	13.44	7.01	77	33	9	none
Big Sandy Creek	0.30	8.70	10.21	10.39	6.08	36	54	100	none
Buck Creek	0.34	13.30	8.82	13.49	7.16	44	7	3	none
Chambliss Creek	0.11	3.38	9.56	13.72	7.00	65	8	3	none
Deer Creek U/S	0.18	4.55	10.23	12.42	6.96	60	9	24	none
Deer Creek D/S Bunn Rd	0.16	3.26	9.18	15.12	6.68	45	5	1	none
Douglas Creek	0.23	2.31	na	10.91	7.26	80	4	1	none
Falling Creek	0.39	10.11	11.52	6.61	7.33	103	2	2	none
Herds Creek at CR 198	0.11	2.05	10.29	12.44	7.33	53	7	8	none
Herds Creek at GA 212	0.37	6.35	8.98	15.31	6.97	55	7	3	none
Kinnard Creek	0.22	3.27	9.32	14.83	7.08	48	11	8	none
Lee Creek	0.18	0.46	10.02	11.39	6.44	36	39	35	none
Little Buck Creek	0.33	4.70	9.40	12.62	6.77	33	9	4	none
Little Falling Creek	1.25	10.50	10.20	7.32	7.21	94	11	3	none
Long Branch	0.34	3.43	9.11	8.11	7.14	307	4	3	none
Panther Creek	0.125	2.03	7.64	19.27	6.35	44	6	3	none
Prairie Creek	0.47	5.53	8.80	14.11	7.04	39	9	6	none
Rock Creek	0.11	0.45	9.60	11.90	7.43	248	4	5	none
Rocky Creek - Bibb	0.35	5.03	10.29	11.07	6.85	59	52	34	none
Rocky Creek - Monroe	-	-	10.00	9.50	7.21	34	9	8	none
Sabbath Creek	0.38	5.17	9.60	12.85	7.02	165	7	1	none
Swan Creek U/S	0.18	2.02	8.5	15.45	6.8	48	No sample taken		
Tobesofkee Creek lower	0.18	4.58	8.50	14.37	7.24	222	11	13	none
Towaliga River	0.35	13.05	11.42	4.31	7.26	47	10	4	none
Troublesome Creek	0.19	6.46	na	8.90	7.13	66	7	4	none
Tussahaw Creek lower	0.47	8.89	na	9.62	7.26	39	6	2	none
Yellow Creek	0.25	6.44	9.38	13.57	7.13	40	16	4	none
Yellow Water Creek Trib D/S	0.095	1.62	6.41	22.24	6.92	426	24	25	none
Yellow Water Creek U/S	0.45	5.46	9.73	7.85	7.37	59	No sample taken		
Yellow Water Creek	0.31	6.67	-	n/a	7.19	96	8	2	none

Table 9. 1999 EPD's Field Measurements and Water Chemistry (Impaired)

Name	Depth (m)	Width (m)	DO (mg/L)	Water Temperature (deg C)	pH	Conductivity (umohs/cm)	Turbidity (NTU)	TSS (mg/L)	Chemical Violations
Big Sandy Creek	0.12	1.84	7.55	5.35	6.86	315	8	4	none
Butlers Creek	0.14	1.03	12.18	4.09	7.18	63	10	1	none
Calaparchee Creek	0.07	1.89	9.13	11.91	6.91	58	10	6	none
Cole Creek	0.14	2.59	8.66	14.10	6.57	27	10	6	none
Eightmile Creek	0.75	5.00	8.63	9.00	6.86	50	7	7	none
Galdesville Creek	0.35	3.40	8.64	14.68	7.23	75	12	3	none
Hansford Branch	0.08	0.73	9.57	11.74	6.34	52	23	11	none
Harmon Pye Branch	1.00	5.50	7.40	17.18	7.06	98	29	5	none
Herds Creek at CR 159	0.30	7.85	9.44	13.90	7.13	48	10	12	none
Little Chehaw Creek	0.11	1.87	8.75	13.08	7.10	110	4	2	none
Little Deer Creek Tributary	0.13	4.60	9.08	12.69	7.44	121	no sample taken		
Little Deer Creek U/S DOT	0.12	2.40	7.03	17.09	7.16	133	2	4	none
Little Deer Creek	0.10	4.70	9.96	13.23	7.10	107	10	1	none
Long Branch	0.12	1.71	7.92	18.85	7.32	179	20	2	none
Malholms Creek	0.19	2.15	8.12	11.41	6.93	67	7	4	none
Mill Dam Creek	0.04	1.33	9.73	11.60	6.35	41	24	21	none
Phinazee Creek	0.14	2.20	9.22	13.92	6.82	32	8	5	none
Red Creek	0.19	6.44	10.07	11.26	7.08	37	8	6	none
Rock Creek	0.11	4.50	8.85	13.06	7.16	332	10	20	none
Rocky Creek - Jasper	0.15	1.35	9.84	13.00	7.01	43	10	8	none
Rocky Creek - Butts	0.16	2.26	9.59	9.61	7.33	48	3	1	none
Rocky Creek - Bibb	0.32	3.61	10.45	11.44	6.73	44	22	12	none
Rocky Creek - Monroe	0.13	3.71	9.96	10.04	7.09	39	6	2	none
Rum Creek	0.11	3.90	8.78	14.80	6.84	103	8	4	none
Sand Branch	0.08	1.85	8.47	14.99	7.04	45	24	4	none
Scoggins Creek	0.09	1.80	10.10	14.00	7.20	145	20	2	none
Third Branch	0.27	2.82	10.73	9.94	7.04	104	20	2	none
Tobesofkee Creek U/S confluence	3.34	7.22	18.70	6.89	53	3.34	no sample taken		
Tobesofkee Creek D/S confluence	5.63	6.61	24.30	7.64	282	5.63	no sample taken		
Tobesofkee Creek	0.34	6.79	9.62	10.51	7.23	171	8	9	none
Tobler Creek	0.04	1.90	9.53	12.82	7.33	71	26	7	none
Trib Tobesofkee Creek	-	6.87	25.30	7.54	412	-	no sample taken		
Town Branch D/S Jackson WPCP	0.11	1.50	8.45	16.13	7.23	179	19	20	none
Town Branch - Rum Ck U/S Forsyth	0.28	2.76	5.39	16.19	6.89	136	11	19	none
Town Branch - Rum Ck D/S Forsyth	0.17	3.42	7.82	20.08	6.96	385	3	3	none
Walnut Creek – Crawford	0.40	5.00	9.43	13.91	6.94	50	28	10	none
Walnut Creek - upper	0.07	1.86	11.84	5.29	7.02	59	10	3	none
White Creek – Jones	0.21	6.65	8.97	11.91	7.20	82	13	7	none
Wise Creek	0.14	2.25	10.0.4	9.93	6.85	37	14	13	none
Wood Creek	0.23	7.42	8.47	17.37	7.26	81	29	16	none
Bay Creek	0.17	3.26	8.19	13.90	6.65	694	4	11	none
Hartley Branch	-	3.00	9.23	15.66	6.23	13	5	3	none
Little Shellstone Creek	0.12	1.68	9.52	14.73	6.95	48	9	6	none
Sandy Run Creek	0.00	4.00	7.53	16.78	6.86	84	9	7	none
Shellstone Creek	0.75	9.00	8.69	13.67	6.95	76	15	6	none

EPD also conduct macroinvertebrate sampling at several of the locations to provide additional information and/or insights to water quality conditions. Macroinvertebrate sampling was conducted using a modified version of EPA's Rapid Bioassessment Protocol III. Macroinvertebrate data results were evaluated using seven metrics as a measure of diversity, community composition (e.g., prevalence of tolerant or intolerant organisms), and environmental stress from a variety of possible sources. These data and metric calculation results were compared to those from five reference streams located in the Piedmont ecoregion (GAWPB, 2000). In conjunction with macroinvertebrate sampling, habitat assessments were performed. The habitat assessments were conducted using the same procedures described in the previous section.

Since WRD and EPD were conducting field sampling simultaneously, not all WRD impaired sites were monitored by EPD. Table 10 summaries EPD's macroinvertebrate study scores and includes the IBI, IBW, Benthic and Habitat Assessment scores. The watersheds are grouped by those that were not 303(d) listed and those that were. Table 11 provides EPD's detailed habitat assessment scores. Habitat scores are subjective measurements that can vary between evaluators, as well as temporally and spatially. In general, each habitat assessment score is the average of three independent values that are determined on the same day. WRD performed their habitat assessments from April through September. EPD performed their assessment from mid-August through early October. The correlation between WRD and EPD habitat scores is 29.0 percent. It should be noted that in 1999, WRD modified how it scored channel alteration based on comparative field scoring methods conducted between WRD and EPD.

Field personnel also performed a pebble count at those sampling locations where macroinvertebrate samples were collected. Pebble counts were conducted to document streambed particle-size distribution. The modified Wolman Pebble Count procedure was used, where 100 random particle samples are measured. A zig-zag collection technique was used that allows a longitudinal stream reach, incorporating pools and riffles, to be collected along a continuum instead of individual cross-sections (GAWPB, 2000). The results of the Pebble Count are given in Table 12.

Visual observations of the stream and watershed were also made by EPD personnel. The type of land use and the extent of land-disturbing activities and other pertinent features of the watershed were systematically observed from all available road accesses and were recorded. This information was used to determine the possible sources of eroded soils and other possible contaminants.

Table 10. 1999 EPD's Macroinvertebrate Community Study Scores (Unimpaired)

Name	County	IBI Score	IBI Category	IWB Score	IWB Category	Benthic Score	Rank	Habitat Total
Deer Creek D/S Bunn Rd	Monroe	34	Fair	5.5	Poor	0	Very poor	94.50
Douglas Creek	Butts	36	Fair	7.7	Good	72	Good/Fair	100.00
Panther Creek	Butts	34	Fair	6.9	Fair	46.6	Poor	127.00
Rocky Creek - Bibb	Bibb	38	Fair	7.1	Fair			120.00
Rocky Creek - Monroe	Monroe	36	Fair	8	Fair			
Swan Creek U/S	Lamar	54	Excellent	8.3	Excellent	70.6	Fair	110.00
Towaliga River	Butts	36	Fair	7.6	Fair			90.90
Troublesome Creek	Spalding	48	Good	7.1	Fair			83.60
Yellow Water Creek Trib D/S	Butts	38	Fair	6.8	Fair	**0**	Very Poor	87.50
Yellow Water Creek U/S	Butts	44	Good	8.2	Excellent	In field rapid survey.		55.60
Yellow Water Creek	Butts	36	Fair	7.8	Fair	In field rapid survey.		85.00

Table 10. 1999 EPD's Macroinvertebrate Community Study Scores (Impaired)

Name	County	IBI Score	IBI Category	IWB Score	IWB Category	Benthic Score	Rank	Habitat Total
Big Sandy Creek	Butts	24	Very Poor	4.9	Very Poor	39	Poor	79.50
Butlers Creek	Jones	22	Very Poor	4.7	Very Poor	58	Fair	78.25
Calaparchee Creek	Monroe	20	Very Poor	4.7	Very Poor	0	Very poor	62.50
Cole Creek	Lamar	28	Poor	5.4	Poor	no water in creek		
Eightmile Creek	Monroe	30	Poor	5.7	Poor	too deep to sample		
Galdesville Creek	Jasper	22	Very Poor			diverged creek for bridge construction.		
Hansford Branch	Monroe	22	Very Poor	5	Poor	87	Good	82.30
Little Chehaw Creek	Jones	22	Very Poor	5.4	Poor	28	Poor	66.75
Little Deer Creek Tributary	Monroe	30	Poor	5.2	Poor	too small to sample		
Little Deer Creek U/S DOT	Monroe	30	Poor	5.9	Fair	47	Poor	78.50
Little Deer Creek	Monroe	28	Poor	6.2	Fair			104.00
Long Branch	Jasper	30	Poor	6.3	Fair	66	Good/Fair	114.78
Malholms Creek	Butts	26	Poor	4.9	Very Poor	0	Very poor	89.30
Mill Dam Creek	Monroe	24	Very Poor	6.1	Fair	60	Fair	74.94
Phinazee Creek	Monroe	26	Poor	4.9	Very Poor	56	Fair	103.61
Rocky Creek - Butts	Butts	26	Poor	4.5	Very Poor	71	Good/Fair	83.25
Rocky Creek - Bibb	Bibb	28	Poor	5.5	Poor	0	Very poor	71.00
Rocky Creek - Monroe	Monroe	20	Very Poor	4.8	Very Poor	79	Good	117.30
Rum Creek	Monroe	32	Poor	6.6	Poor	49	Fair	105.00
Sand Branch	Monroe	30	Poor	6.5	Fair	54	Fair	91.63
Scoggins Creek	Jones	20	Very Poor			39	Poor	78.00
Third Branch	Jones	32	Poor	6	Fair			
Tobesofkee Creek U/S confluence	Lamar	28	Poor	6.1	Fair	46	Poor	101.00
Tobesofkee Creek D/S confluence	Lamar	30	Poor	6.4	Fair	49	Fair	98.00
Tobesofkee Creek	Monroe	34	Fair	6.8	Poor			
Tobler Creek	Monroe	22	Very Poor	4.8	Very Poor	0	Very poor	58.50
Trib Tobesofkee Creek	Lamar	16	Very Poor	2.9	Very Poor	10	Very Poor	118.50
Town Branch D/S Jackson WPCP	Butts	24	Very Poor	4.8	Very Poor	0	Very poor	83.50
Town Branch - Rum Ck U/S	Monroe	18	Very Poor	5.4	Poor	42	Fair	122.75
Town Branch - Rum Ck D/S	Monroe	22	Very Poor	4.1	Very Poor	60	Fair	122.08
Walnut Creek - Crawford	Crawford	30	Poor	5.3	Very Poor			
Walnut Creek - upper	Jones	24	Very Poor	4.6	Very Poor	46	Poor	75.00
Walnut Creek – Jones	Jones	32	Poor	6.7	Poor	57	Fair	72.25
White Creek	Monroe	28	Poor	6.1	Fair	61	Fair	92.31
Wise Creek	Jasper	34	Fair	6.1	Very Poor			
Wood Creek	Monroe	28	Poor	6.5	Fair	75	Good/Fair	132.00
Bay Creek	Peach	WDR did not sample						79.60

Table 11. 1999 EPD's Habitat Assessment Scores (Unimpaired)

Name	Instream Cover	Epifaunal Substrate	Embedded-ness	Channel Alteration	Sediment Deposition	Riffle Frequency	Channel Flow Status	Bank Vegetation (Left)	Bank Vegetation (Right)	Bank Stability (Left)	Bank Stability (Right)	Riparian Zone (Left)	Riparian Zone (Right)	Habitat Assessment Score
Deer Creek D/S Bunn Rd	9.75	4.00	4.75	17.50	5.75	3.75	7.25	8.00	7.75	4.25	4.50	8.00	9.25	94.50
Douglas Creek	13.67	7.33	9.33	16.67	9.00	8.00	9.00	6.67	5.67	4.33	4.67	5.00	0.67	100.00
Panther Creek	14.25	9.25	12.50	17.25	12.25	11.25	9.50	7.00	7.25	4.75	5.00	8.50	8.25	127.00
Rocky Creek - Bibb	16.00	6.00	13.00	17.00	14.00	9.00	10.00	7.00	4.00	6.00	4.00	6.00	8.00	120.00
Swan Creek U/S	11	9	12.5	12.5	12.5	12.5	9	7	7	4.5	6	3.5	3	110
Towaliga River	8.60	4.80	1.30	16.00	3.00	5.20	11.60	7.20	7.60	7.00	6.40	4.40	7.80	90.90
Troublesome Creek	12.40	5.40	3.40	16.40	5.40	5.00	9.60	6.20	4.00	5.00	3.20	6.60	1.00	83.60
Yellow Water Creek Trib D/S	9.25	8	7.5	16	8.25	4.5	8.75	4.75	4	3.25	3.5	5.5	4.25	87.5
Yellow Water Creek U/S	7.2	2.8	0.8	10.2	1.2	4	11.8	4	4.2	4.2	4.4	0.2	0	55
Yellow Water Creek	10.80	2.20	2.60	18.20	5.00	5.80	8.80	4.40	4.20	3.00	3.20	9.00	8.40	85.60

Table 11. 1999 EPD's Habitat Assessment Scores (Impaired)

Name	Instream Cover	Epifaunal Substrate	Embedded-ness	Channel Alteration	Sediment Deposition	Riffle Frequency	Channel Flow Status	Bank Vegetation (Left)	Bank Vegetation (Right)	Bank Stability (Left)	Bank Stability (Right)	Riparian Zone (Left)	Riparian Zone (Right)	Habitat Assessment Score
Big Sandy Creek	9.75	1.75	4.75	17.25	5.25	0.75	8.00	3.75	4.00	4.00	4.00	7.50	8.75	79.50
Butlers Creek	9.50	7.00	6.75	16.75	6.75	3.50	5.75	1.75	2.25	0.50	0.75	8.25	8.75	78.25
Calaparchee Creek	6.75	1.75	2.75	16.00	4.50	0.75	5.00	3.25	2.75	1.50	1.25	6.25	9.50	62.00
Cole Creek	no water in creek													
Eightmile Creek	8.00	0.00	0.00	16.00	1.00	0.00	13.00	8.75	8.75	4.50	5.25	9.25	9.25	83.75
Galdesville Creek	diverged creek for new bridge construction.													
Hansford Branch	7.33	4.00	3.33	18.33	3.00	3.66	7.00	6.00	6.00	2.66	2.66	9.00	9.33	82.30
Little Chehaw Creek	9.50	2.00	4.25	16.50	4.00	0.25	7.75	6.50	5.25	3.25	3.25	3.25	1.00	66.75
Little Deer Creek Tributary	too small to sample													
Little Deer Creek U/S DOT	4.50	3.00	2.50	16.00	3.50	4.50	6.00	6.00	6.50	5.50	4.00	9.00	7.50	78.50
Little Deer Creek	14.60	10.20	4.40	16.80	7.00	7.00	9.20	7.20	5.80	5.40	3.80	7.60	5.00	104.00
Long Branch	13.66	7.00	15.00	17.66	10.66	8.33	8.50	4.66	4.66	3.66	2.33	9.33	9.33	114.78
Malholms Creek	10.00	1.70	3.30	17.30	5.00	0.00	7.30	7.00	7.00	7.00	6.00	8.70	9.00	89.30
Mill Dam Creek	7.00	1.66	3.66	17.00	3.00	1.66	6.33	5.66	6.33	2.66	2.66	8.66	8.66	74.94
Phinazee Creek	11.33	7.66	5.66	18.00	6.66	10.66	7.00	6.66	6.33	3.66	2.66	9.00	8.33	103.61
Rocky Creek - Butts	12.00	6.50	5.50	17.75	6.75	12.25	6.75	5.00	2.25	4.50	4.00	0.00	0.00	83.25
Rocky Creek - Bibb	6.75	1.75	6.00	16.75	6.00	0.25	7.50	3.25	3.50	4.75	5.50	4.50	4.50	71.00
Rocky Creek - Monroe	11.66	6.00	7.66	16.66	8.33	15.00	7.66	8.00	8.00	5.33	5.00	9.00	9.00	117.30
Rum Creek	8.00	7.00	8.00	18.00	6.00	14.00	8.00	4.00	4.00	4.00	4.00	10.00	10.00	105.00
Sand Branch	8.66	7.66	6.00	15.00	6.00	8.33	7.66	6.00	6.66	4.33	5.00	4.33	6.00	91.63
Scoggins Creek	6.50	2.25	4.75	17.00	4.50	1.75	6.25	5.25	6.00	2.75	2.50	9.25	9.25	78.00
Tobesofkee Creek U/S confluence	12.00	11.00	8.00	12.00	10.00	14.00	10.00	2.00	3.00	4.00	2.00	6.00	7.00	101.00
Tobesofkee Creek D/S confluence	9.00	12.50	2.00	17.00	5.00	17.00	11.50	2.00	2.00	0.50	0.50	9.00	10.00	98.00
Tobler Creek	3.25	1.00	1.50	18.25	1.25	0.00	4.00	4.50	4.50	1.75	2.25	8.00	8.25	58.50
Trib Tobesofkee Creek	6.00	19.50	10.50	16.00	9.00	9.00	14.50	7.00	5.00	6.00	6.00	7.00	3.00	118.50
Town Branch D/S Jackson WPCP	6.25	2.25	7.00	16.25	8.25	1.75	8.25	5.25	5.00	4.25	4.50	5.00	9.50	83.50
Town Branch - Rum Ck U/S	13.00	8.75	8.50	15.75	11.00	11.50	12.00	6.50	7.25	7.50	7.75	4.50	8.75	122.75
Town Branch - Rum Ck D/S	12.00	11.50	12.00	16.50	10.25	11.33	12.25	6.75	6.75	3.00	2.75	8.00	9.00	122.08
Walnut Creek – upper	6.75	2.50	5.00	17.25	5.25	1.00	6.75	4.00	4.25	1.75	1.50	9.50	9.50	75.00
Walnut Creek - Jones	7.25	2.25	2.00	16.00	3.50	0.75	9.00	7.00	7.50	6.50	6.75	2.00	1.75	72.25
White Creek	11.33	7.00	7.33	16.66	5.33	10.00	7.33	5.00	5.00	4.00	3.00	7.00	3.33	92.31
Wood Creek	16.50	9.50	11.25	18.50	10.25	9.75	6.75	8.25	8.50	7.75	6.75	9.50	8.75	132.00
Bay Creek	7.70	2.30	3.00	15.00	5.00	3.70	13.30	4.00	5.00	3.60	3.00	6.00	8.00	79.60

Table 12. Pebble Counts (Unimpaired)

Name	Silt/Clay/Sand <4 mm	Fine Gravel l 4-6 mm	Fine Gravel 6-8 mm	Medium Gravel 8-10 mm	Coarse to Very Coarse >10 mm	Small Cobble 64 - 127 mm	Large Cobble 128-255 mm	Small Boulder 256-511 mm	Medium Boulder 512-1023 mm	Large Boulder 1024-2047 mm	Very Large Boulder	Bedrock	Total
Deer Creek D/S Bunn Rd													
Douglas Creek	43	6	5	3	29	10	3	0	0	0	1	0	100
Panther Creek	33	4	0	4	2	6	15	16	6	6	8	0	100
Rocky Creek - Bibb													
Swan Creek U/S	17	0	0	8	0	25	0	50	0	0	0	0	100
Towaliga River													
Troublesome Creek													
Yellow Water Creek Trib D/S	59	1	0	1	27	4	0	1	0	7	0	0	100
Yellow Water Creek U/S	rapid field survey conducted before pebble count was adopted in revised SOP												
Yellow Water Creek	rapid field survey conducted before pebble count was adopted in revised SOP												

Table 12. Pebble Counts (Impaired)

Name	Silt/Clay/Sand <4 mm	Fine Gravel l 4-6 mm	Fine Gravel 6-8 mm	Medium Gravel 8-10 mm	Coarse to Very Coarse >10 mm	Small Cobble 64 - 127 mm	Large Cobble 128-255 mm	Small Boulder 256-511 mm	Medium Boulder 512-1023 mm	Large Boulder 1024-2047 mm	Very Large Boulder	Bedrock	Total
Big Sandy Creek	68	7	4	5	16	0	0	0	0	0	0	0	100
Butlers Creek	60	7	5	7	11	0	0	2	0	1	7	0	100
Calaparchee Creek	92	2	3	0	3	0	0	0	0	0	0	0	100
Cole Creek	rapid field survey conducted before pebble count was adopted in revised SOP												
Eightmile Creek	49	0	0	0	3	4	4	2	3	5	30	0	100
Galdesville Creek	Diverged creek for new bridge construction												
Hansford Branch	73	7	1	1	16	2	0	0	0	0	0	0	100
Little Chehaw Creek	74	8	3	4	8	0	0	0	0	0	0	3	100
Little Deer Creek Tributary	Too small to sample												
Little Deer Creek U/S DOT	70	2	4	3	20	1	0	0	0	0	0	0	100
Little Deer Creek	rapid field survey conducted before pebble count was adopted in revised SOP												
Long Branch	41	3	4	5	25	8	3	0	3	0	8	0	100
Malholms Creek	100	0	0	0	0	0	0	0	0	0	0	0	100
Mill Dam Creek	84	4	1	2	9	0	0	0	0	0	0	0	100
Phinazee Creek	41	2	0	3	54	0	0	0	0	0	0	0	100
Rocky Creek - Butts	50	11	2	7	30	0	0	0	0	0	0	0	100
Rocky Creek - Bibb	87	4	0	3	6	0	0	0	0	0	0	0	100
Rocky Creek - Monroe	60	3	10	4	22	1	0	0	0	0	0	0	100
Rum Creek	rapid field survey conducted before pebble count was adopted in revised SOP												
Sand Branch	63	3	2	2	12	12	1	1	4	0	0	0	100
Scoggins Creek	77	2	0	5	16	0	0	0	0	0	0	0	100
Tobesofkee Creek U/S confluence	rapid field survey conducted before pebble count was adopted in revised SOP												
Tobesofkee Creek D/S confluence	rapid field survey conducted before pebble count was adopted in revised SOP												
Tobler Creek	72	5	5	4	12	0	0	1	0	0	1	0	100
Trib Tobesofkee Creek	rapid field survey conducted before pebble count was adopted in revised SOP												
Town Branch D/S Jackson WPCP	67	2	3	7	19	2	0	0	0	0	0	0	100
Town Branch - Rum Ck U/S	31	0	0	2	10	5	8	4	0	0	40	0	100
Town Branch - Rum Ck D/S	15	0	0	2	28	12	23	3	0	0	17	0	100
Walnut Creek - upper	98	0	0	0	2	0	0	0	0	0	0	0	100
Walnut Creek - Jones	62	15	10	8	5	0	0	0	0	0	0	0	100
White Creek	54	4	2	9	19	0	0	0	0	0	12	0	100
Wood Creek	70	3	0	2	3	3	12	0	0	2	5	0	100
Bay Creek	Did not sample												

3.0 SOURCE ASSESSMENT

A healthy aquatic ecosystem requires a healthy habitat. The major disturbance to stream habitats is erosion and sedimentation. As sediment is carried into the stream, it changes the stream bottom and smothers sensitive organisms. Turbidity associated with sediment loads may also impair recreational and drinking water uses (GAEPD, 1998).

A source assessment characterizes the known and suspected sources of sediment in the watershed for use in a water quality model and the development of the TMDL. The general sources of sediment are point and nonpoint sources. National Pollutant Discharge Elimination System (NPDES) permittees discharging treated wastewater are the primary point sources of sediment as total suspended solids (TSS) and/or turbidity.

Nonpoint sources of sediment are diffuse sources that cannot be identified as entering the water body at a single location. These sources generally involve land use activities that contribute sediment to streams during a rainfall runoff event. Nonpoint sources of sediment included in the source assessment analysis are:

- Silviculture,
- Agriculture,
- Grazing areas,
- Mining sites,
- Roads, and
- Urban Development

For Nonpoint sources involving silviculture, the Georgia Forestry Commission (GFC) was consulted for information and parameters regarding silviculture activities. The Natural Resources Conservation Service (NRCS) was consulted for information and parameters regarding agricultural activities.

3.1 Point Source Assessment

For purposes of this TMDL, facilities permitted under the National Pollutant Discharge Elimination System (NPDES) will be considered point sources. Discharges from municipal and industrial facilities may contribute sediment to receiving waters as TSS and/or turbidity. There are ten permitted NPDES discharges identified in the Ocmulgee River Basin watersheds upstream from the listed segments (see Table 13).

Table 13 provides the permitted flow and TSS concentrations levels for the NPDES permits located in the impaired Ocmulgee River Basin watersheds, as well as the calculated TSS loads. The average levels discharged over the last nine years are also given. These data were determined from analysis of the available Discharge Monitoring Reports (DMR).

The following facilities report metals in their DMRs as a requirement of their NPDES permits: Barnesville, Fort Valley, Spring Industries, and William Carter Company. The City of Barnesville WPCP discharges to Tobesofkee Creek. This facility is permitted to discharge 0.066 mg/L zinc and exceeded its permit limit during two months in 1995, one month in 1996, and five months in 1997. On June 11, 1999, the zinc limits and monitoring requirements were removed from the Barnesville WPCP NPDES permit. The City of Fort Valley WPCP discharges to Bay Creek. This facility's DMRs indicate it exceeded its permitted zinc limit of 0.068 mg/L approximately one-third of the time since 1994. Spring Industries, Inc., discharges to Cabin Creek. Since 1993, this

facility exceeded its permitted copper limit of 0.0065 mg/L in all but nine months, and exceeded its permitted zinc limit of 0.06 mg/L more than one-third of the time. The William Carter Company discharges to a tributary of Tobesofkee Creek. This facility exceeded its permitted copper limit of 0.06 mg/L twice in 1993 and four times in 1994. In addition, this facility exceeded its permitted zinc limit of 0.0898 mg/L from 1992 to 1993 and five times since then, most recently in May 1997. The William Carter Company eliminated 90 percent of its discharge in early 2000, and is scheduled for closure in the summer of 2001. These metal exceedances may have affected the fish community in the listed stream segments.

The ammonia concentrations discharged from four municipal facilities, Barnesville, Forsyth, Griffin, and Jackson Southside, and one industrial facility, Spring Industries, were also reviewed. Effluent ammonia concentrations were developed for these facilities according to the 1999 Ambient Water Quality Criteria for Ammonia (USEPA, 1999a). The Barnesville WPCP, which discharges to Tobesofkee Creek, has monthly ammonia permit limits ranging from 2.0 to 17.4 mg/L. The ammonia limits based on the 1999 Ambient Water Quality Criteria for Ammonia range from 2.7 to 10.8 mg/L. This facility has never exceeded its permitted limits or the 1999 ammonia criteria limits. The Forsyth Northeast WPCP discharges to Town Creek, a tributary to Rum Creek. This facility has monthly ammonia permit limits ranging from 2.0 to 8.7 mg/L, which based on the 1999 ammonia criteria (ranging from 3.4 to 9.7 mg/L), are protective of the creek. However, this facility exceeded the 1999 ammonia criteria during June 1999. The Griffin WPCP, which discharges to Cabin Creek, a tributary of the Towaliga River, has monthly ammonia limits ranging from 3.3 to 10.6 mg/L. Monthly ammonia limits calculated using the 1999 Ambient Water Quality Criteria for Ammonia range from 2.4 to 7.75 mg/L. Based on available DMR data, this facility exceeded these 1999 ammonia criteria once in 1994, 1995 and 1996, and twice in 1997, 1998 and 1999. However, the Griffin WPCP was in compliance with the ammonia limits in its permit during these years. Jackson Southside WPCP has a permitted ammonia limit of 1.0 mg/L, which was found to be protective of the stream. However, the Jackson Southside WPCP, which discharges into Town Branch, a tributary to Aboothlacoosta Creek, was found to have one discharge in April 1996 that exceeded the 1999 ammonia criteria of 1.52 mg/L. Spring Industries, Inc., discharges to Cabin Creek. Although, ammonia limits are not specified in this facility's NPDES permit, monitoring is required. This facility exceeded the 1999 ammonia criteria of 3.04 mg/L during three months between 1997 and 1999. These high ammonia discharges may have affected the fish communities in the listed stream segments.

There was a fish kill in Walnut Creek, as a result of a manure lagoon discharge, during 1998. The spill resulted in approximately 19,059 fish killed and the suspected cause was DO depletion within the stream. This may also have been contributed to the low fish scores measured in this stream segment (GAEPD 1998-1999).

Soil erosion from construction sites is also a major source of sediment in Georgia's streams. Georgia requires construction sites over five acres to have a General Storm Water NPDES permit. Since construction sites are regulated by NPDES permits, they will be considered as point sources.

3.2 Nonpoint Source Assessment

Eroded soils from forests, cropland, mining sites, and other land can be transported to Georgia streams through runoff. Excessive sediment that reaches the water bodies can cause several changes to the stream. It can make the streams shallower and wider, affecting the stream's temperature, dissolved oxygen, flow rate and velocity. It can affect the ability of the stream to assimilate pollutants. It can change the diversity of fish populations and other biological

Table 13. NPDES Permit Limits For Facilities in the Impaired Watersheds of the Ocmulgee River Basin

FACILITY	NPDES PERMIT NO	FACILITY TYPE	RECEIVING WATER	FLOW (MGD)		TSS (mg/L)		TSS (lbs/day)	
				Daily Average	Monthly Max	Daily Average	Monthly Max	Daily Average	Daily Max
Davidson Mineral Prop - outfall no. 001	GA0046558	Industrial	Little Deer Creek trib	NA	NA	55	110		
				0.42	1.75	10.49	80		
outfall no. 002			Little Deer Creek trib	NA	NA	NA	NA		
				0.21	0.5	7.83	70		
Spring Industries, Inc (Griffin)	GA0003409	Industrial	Cabin Creek	NA	NA			1037	2074
				0.92	1.24			120.6	
Southern Aggregates	GA0036781	Industrial	Rock Creek	NA	NA	55	110		
				0.45	1.30	16.25	32		
William Carter Company	GA0003115	Industrial	Tobesofkee Creek trib	NA	NA			654	1308
				0.98	1.56			305.6	
Barnesville Gordon Road WPCP	GA0021041	Municipal	Tobesofkee Creek	NA	NA	30	45		
				0.93	2.50	16.94	46		
DOT-Rest Area #22/I-75	GA0023591	Municipal	Little Deer Creek	0.045	0.056	30	45		
				0.04	2.60	11.75	60		
Fort Valley WPCP	GA0031046	Municipal	Bay Creek	2.20	2.75	30	45		
			to Indian Creek Tributary	1.32	2.02	5.87	22.67		
Forsyth Northeast WPCP	GA0031801	Municipal	Town Creek	1.40	1.80	30	45		
			Rum Creek Tributary	0.50	1.20	7.63	33		
Griffin Cabin Creek WPCP	GA0020214	Municipal	Cabin Creek	1.50	1.88	30	45		
				1.18	2.15	12.98	42.5		
Jackson-Southside WPCP	GA0023931	Municipal	Town Branch	NA	NA	20	30		
				0.36	0.69	4.42	110		

[1]Average annual load assumes discharge every day at average daily flow

permit limits

actual data from monthly DMR

communities. It can also cause increased flooding. In addition, harmful pollutants attached to the sediment can be transported to rivers and streams.

3.2.1 Silviculture

Georgia has 23.6 million acres of commercial forests. This represents approximately 64 percent of all of Georgia's land use. Approximately 68 percent of the commercial forests are privately owned, 25 percent are owned by industry, and 7 percent are publicly held (GAEPD, 1999).

The majority of soil erosion from forested land occurs during timber harvesting and the period immediately following, during reforestation. Once the forest is re-established, very little soil erosion occurs. Timber harvesting includes the layout of access roads, log decks, and skid trails; the construction and stabilization of these areas; and the cutting of trees. Both hardwoods and pines are harvested throughout Georgia. A minimum harvest is usually ten acres and the percent of forest that is harvested each year varies from county to county. Table 14 lists the percent timberland and percent harvested per year by county.

Table 14. Percent Timberland and Percent Harvested per Year by County

County	Total Area (1000 acres)	Timberland (1000 acres)	Percent Timberland	Growing Stock Volume (million ft^3) [a]	Annual Volume Removal (million ft^3)	Annual percent Removal
Bibb	160	87.1	54.44%	97.2	8.2	8.44%
Bleckley	139.1	78.6	56.51%	139.3	2.4	1.72%
Butts	119.4	83.3	69.77%	110.8	6.1	5.51%
Crawford	208.1	163.2	78.42%	119.3	9.5	7.96%
Gwinnett	277	104.4	37.69%	227.6	13.3	5.84%
Henry	206.5	109.7	53.12%	198.8	8	4.02%
Jasper	237.1	190.7	80.43%	304.3	9.4	3.09%
Jones	252	210.7	83.61%	309.8	17	5.49%
Lamar	118.3	72.1	60.95%	81.2	3.3	4.06%
Monroe	253.2	194.3	76.74%	261.8	9	3.44%
Newton	176.9	98.7	55.79%	240.5	7.7	3.20%
Peach	96.7	40.9	42.30%	28.2	0	0.00%
Spalding	126.7	66.9	52.80%	95.9	11.4	11.89%
Twiggs	230.6	188.5	81.74%	214.8	20.3	9.45%
Walton	210.7	114.7	54.44%	250.4	2.7	1.08%

[a] Estimate - does not include trees less than 5" DBH.
Source: Thomas, Michael T., 1997. Forest Statistics for Georgia

3.2.2 Agriculture

Agriculture can be a significant contributor of nonpoint pollutants to rivers and streams. Sediment and nutrients are the major pollutants of concern and cropland is one of the major sources of soil loss due to sheet and rill erosion. Over the last century there has been a dramatic decrease in the amount of land farmed in Georgia. In 1950, there were 208,000 farms encompassing 26 million acres in Georgia (U.S. Department of Agriculture, National Agricultural Statistics Service website). In 2000, there were approximately 11.1 million acres of farmland in Georgia, with the number of farms estimated to be 50,000 and the average farm size being approximately 222 acres. This represents a 57 percent reduction in farmland.

With the reduction in farmland, there has also been a decrease in the amount of soil erosion. The National Resources Inventory found the total wind and water erosion on cropland and Conservation Reserve Program land in Georgia declined 38 percent, from 3.1 billion tons per year in 1982 to 1.9 billion tons in 1997 (Source: 1997 NRI, USDA NRCS). This suggest that the source of sediment in many of the impaired streams in the Ocmulgee River Basin may be the result of past land use practices. Thus, it is believed that if sediment loads are maintained at acceptable levels, streams will repair themselves over time.

3.2.3 Grazing Areas

Farm animals grazing on pasture land can leave areas of ground with little or no vegetative cover. During a rainfall runoff event, the soil in the pastures is eroded and transported to nearby streams, typically by gully erosion. The amount of soil loss from gully erosion is generally less than that caused by sheet and rill erosion. Work in small grazed catchments in New Mexico found that gully erosion contributed only 1.4 percent of the total sediment load as compared to sheet and rill erosion. Other research had found that gully erosion typically contributes less than 30 percent of the total sediment load; however, contributions have ranged from 0 to 89 percent (USEPA, 2001b).

Beef cattle spend all their time grazing in pastures; while dairy cattle and hogs are confined periodically. Hog farms confine the animals or allow them to graze in small pastures or pens. On dairy farms, the cows are confined for a limited period each day, during which time they are fed and milked.

In addition, cattle and other unconfined animals often have direct access to streams that pass through pastures. As these animals walk down to the stream, they often damage stream banks. Stream bank vegetation is destroyed and the banks often collapse, resulting in increased sedimentation to the waterway.

3.2.4 Mining Sites

Minerals, rocks, and ores are found in natural deposits on or in the earth. Kaolin, clays, granite, marble, sand, gravel, and other mineral products are the materials primarily mined in Georgia. Surface mining involves the activities and processes used to remove minerals, ores, or other solid material. Tunnels, shafts and dimension stone quarries are not considered to be surface mines. Surface mining encompasses a variety of activities from sand dredging to open pit clay mining to hard rock aggregate quarrying.

Removal of vegetation, displacement of soils and other significant land disturbing activities are typically associated with surface mining. These operations can result in accelerated erosion

Table 15. Mines Located in the Ocmulgee River Basin Watersheds

Name	Company	Type	County	Current Status	Material Mined
F B Willingham Prospect		Surface/Underground	Monroe	Developed Deposit	Mica
Westbrook's Prospect		Underground Mine	Monroe	Developed Deposit	Mica
Means Prospect		Underground Mine	Lamar	Developed Deposit	Mica
Old Childs Prospect		Surface/Underground	Lamar	Developed Deposit	Mica
Bell Cochran Prospect		Unknown	Jasper	Exp Prospect	Mica
H B Manrey Prospect		Surfaced/Underground	Lamar	Exp Prospect	Mica
H S Worsham Prospect		Unknown	Lamar	Exp Prospect	Mica
Ingraham Prospects		Surface/Underground	Lamar	Exp Prospect	Mica
Melton Prospects		Unknown	Spalding	Exp Prospect	Mica
Old Callaway Prospect		Surface Mine	Monroe	Exp Prospect	Mica
Turner Prospect		Underground Mine	Jasper	Exp Prospect	Mica
Worsham & Goodwin Prospect		Unknown	Monroe	Exp Prospect	Mica
U.S. Fuller Prospect		Unknown	Monroe	Raw Prospect	Mica
C A Ensign Mine		Underground Mine	Monroe	Past Producer	Mica
C H Greer Mine		Surface Mine	Jasper	Past Producer	Vermiculite
Calloway Mine		Surface Mine	Monroe	Past Producer	Mica
Early Vaughn Mine		Surface/Underground	Lamar	Past Producer	Mica
Feldspar Corp. Jasper Quarry B	Feldspar Corp.	Surface/Underground	Jasper	Past Producer	Feldspar
Fletcher Mine		Underground Mine	Monroe	Past Producer	Mica
L P Goodwin Mine		Surface Mine	Monroe	Past Producer	Mica
Phinazee Mines		Surface/Underground	Monroe	Past Producer	Mica
Smith Mine		Surface/Underground	Monroe	Past Producer	Mica
The Turner Quarry		Surface Mine	Spalding	Past Producer	Stone Feldspar
Thurman Mine		Underground Mine	Monroe	Past Producer	Mica
Feldspar Corp/ Ga Mine & Plant	Feldspar Corp.	Surface Mine	Jasper	Producer	Feldspar
Grayson Granite Quarry	Vulcan Materials	Surface Mine	Gwinnett	Producer	Stone Granite CB
Grayson Quarry	United Materials Company	Surface Mine	Gwinnett	Producer	Stone Limestone
Hitchcock Quarry	Southern Aggregates	Surface Mine	Jones	Producer	Stone Granite CB
Monroe Quarry	Davidson Mineral Properties	Surface Mine	Monroe	Producer	Stone Granite CB

Source: USEPA, 2001a. Watershed Characterization System (WCS) Data, Georgia, US. Tetra Tech, Environmental Protection Agency, Region IV, Atlanta, Georgia , Jan 31, 2001.

and sedimentation of surface waters. Table 15 lists the active, inactive, and exploratory mines located in the watersheds monitored in the Ocmulgee River Basin.

3.2.5 Roads

Erosion from unpaved roadways can be a significant source of sediment to our rivers and streams. It occurs when soil particles are loosened and carried away from the roadway, ditch, or road bank by water, wind, or traffic. The actual road construction (including erosive road-fill soil types, shape and size of coarse surface aggregate, poor subsurface and/or surface drainage, poor road bed construction, roadway shape, and inadequate runoff discharge outlets or “turn-outs” from the roadway) may aggravate roadway erosion. In addition, external factors such as roadway shading and light exposure, traffic patterns, and road maintenance may also affect roadway erosion.

Exposed soils, high runoff velocities and volumes, and poor road compaction all increase the potential for erosion. Loose soil particles are often carried from the road bed into the roadway drainage ditches. Some of these particles settle out satisfactorily, but usually they settle out poorly, causing diminished ditch carrying capacity resulting in roadway flooding and, subsequently, more roadway erosion (Choctawhatchee, et. al, 2000).

3.2.6 Urban Development

Soil erosion from land disturbing activities is a major source of sediment in Georgia’s streams. Land-disturbing activities are defined as any activity that may result in soil erosion and the movement of sediments into state waters or on lands of the state. Examples of land disturbing activities include, clearing, grading, excavating, or filling of land. The following activities are unconditionally exempt from the provisions of the Erosion and Sedimentation Act; surface mining, granite quarrying, minor land-disturbing activities such as home gardens and landscaping, agricultural and silvicultural operations, and any project carried out under the technical supervision of the NRCS.

Conversion of forest to urban land use is often associated with water quality degradation. From 1982 through 1989, the area classified as commercial forest within the Ocmulgee River Basin decreased by approximately 1053 acres or 0.0045 percent (GAEPD, 1998). It should be noted that forest undergoing conversion to another land use is not considered silviculture, but rather a land disturbing activity.

Storm water runoff from developed urban areas can also have an impact on the transport of sediment to and within streams. Urbanization increases imperviousness, resulting in an increase in the volume of runoff entering the streams. In addition, the streamflow rates may increase significantly from pre-construction rates causing stream bank erosion and stream bottom down cutting.

4.0 MODELING APPROACH

Establishing the relationship between the in-stream water quality and the source loadings is an important component of TMDL development. It provides for both the identification of sources, and their relative contribution, as well as the examination of potential water quality changes resulting from varying management options to meet the water quality standard. This relationship can be developed using a variety of techniques ranging from simple methods based on scientific principles to more complex numerical computer modeling techniques.

In this section, the numerical modeling techniques developed to simulate sediment fate and transport in the watershed are discussed. The limited amount of sediment loading data and in-stream sediment information prevents EPD from using a dynamic watershed runoff model, which requires a great deal of data for model development and calibration. Instead, EPD determined the annual sediment loads delivered to the stream from the surrounding watershed. This TMDL does not address in-stream sedimentation processes, such as bank erosion and stream bottom down cutting, since computer models that simulate these processes are not available at this time.

4.1 Model Selection

The Agricultural Research Station (ARS) developed the Universal Soil Loss Equation (USLE) over 30 years ago. It is the most widely accepted and most used soil loss equation. It was designed as a method to predict average annual soil loss caused by sheet and rill erosion. The USLE can estimate long-term soil loss, and can assist in choosing proper cropping, management and conservation practices. However, it cannot be used to determine erosion for a specific year or specific storm. Because of the wide acceptance by the forestry, agricultural, and academic communities, the USLE was selected as the tool for estimating long-term annual soil erosion, assessing the impacts of various land uses, and evaluating the benefits of various Best Management Practices (BMPs).

4.2 Universal Soil Loss Equation

For each of the watersheds monitored in the Ocmulgee River Basin, the existing annual sediment load was estimated using the USLE. The USLE predicts the average annual soil loss caused by sheet and rill erosion. Soil loss from sheet and rill erosion is mainly due to detachment of soil particles during rainfall events. It is the major source of soil loss from crop production and animal grazing areas, logging areas, mine sites, unpaved roads, and construction sites. The equation used for estimating average annual soil erosion is:

$$A = RKLSCP$$

Where:

A = average annual soil loss in tons/acre
R = rainfall erosivity index
K = soil erodibility factor
LS = topographic factor
    L = slope length
    S = slope
C = cropping factor
P = conservation practice factor

4.2.1 Rainfall Erosivity Index

The R factor or rainfall erosivity index describes the kinetic energy generated by the frequency and intensity of the rainfall. It is statistically calculated from the annual summation of rainfall energy in every storm, which correlates to the raindrop size, times its maximum 30-minute intensity. It varies geographically and ranges from 275 to 300 within the Ocmulgee River Basin.

4.2.2 Soil Erodibility Factor

The K factor or soil erodibility factor represents the susceptibility of soil to be eroded. This factor quantifies the cohesive or bonding character of the soil and ability of the soil to resist detachment and transport during a rainfall event. It is a function of the soil type, which is provided by the STATSGO data. Table 5 provides a breakdown of the soil type within each modeled watershed and the corresponding K factor. STATSGO soil data has a resolution of 1:250,000 and is available for all of Georgia. A higher-resolution (1:25,000) soil data, SSURGO, is available for fourteen Georgia counties. For consistency, it was decided that STATSGO data would be used for the first round or phase of sediment TMDLs because of its availability for all of Georgia. During the second phase of sediment TMDLS, if SSURGO data is available for all of Georgia, it may be used.

4.2.3 Topographic Factor

The LS factor or topographic factor represents the effect of slope length and slope steepness on erosion. Steeper slopes produce higher overland flow velocities. Longer slopes accumulate more runoff from larger areas and also result in higher overflow velocities. The slope length and slope is based on the grid size and ground slope provided by the USGS 30 by 30 meter Digital Elevation Model (DEM) grids downloaded from the State GIS clearinghouse.

4.2.4 Cropping factor

The C factor or cropping factor represents the effect plants, soil cover, soil biomass, and soil disturbing activities have on erosion. It is the most complicated of the USLE factors. It incorporates effects of tillage, crop type, cropping history, and crop yield. Cropping factors for forested, agricultural, and urban lands were provided by the Georgia Forestry Commission (GFC), Natural Resources Conservation Service (NRCS), and U.S. Environmental Protection Agency (EPA), respectively.

Forested land includes both mature trees and those being harvested. The forest C factor for each watershed was calculated based on the percent of forest harvested in each county (see Table 13). If a watershed is in multiple counties, the percent forest harvested is determined by area-weighting the forested area within each county.

C factors for cropland and pasture land for each county were developed by NRCS under the National Resource Inventory Program and are listed in Table 16. These values were developed based on the 1995 MRLC data. Low-level aerial photography was performed and the photographs are interpreted to identify land features. If data were not available for a given county, the C factor was calculated by averaging the C factors from all the surrounding counties. The crop and pasture land C factors for watersheds in multiple counties were determined by area-weighting the agricultural land use within each county.

Table 16. Cropland and Pasture C factors by County

County	C factor	
	Cropland	Pasture
Bibb	0.221	0.003
Bleckley	0.461	0.005
Butts	0.289	0.003
Crawford	0.479	0.011
Gwinnett	0.283	0.018
Henry	0.305	0.004
Jasper	0.143	0.003
Jones	0.349	0.012
Lamar	0.306	0.026
Monroe	0.298	0.003
Newton	0.286	0.005
Peach	0.324	0.028
Spalding	0.410	0.005
Twiggs	0.421	0.003
Walton	0.192	0.003

Source:, USDA-NCRS, 1997. National Resources Inventory; USDA-NCRS Athens, Georgia

C factors for the road network were determined based on the road surface and are given in Table 17. Road information, including road surface, was provided by the Georgia Department of Transportation (DOT). Data gaps were filled based on adjacent road surfaces and road types (i.e., state, county, private).

Table 17. Road C factors

Road Surface	Type	C factor
Rigid and High Flexible Road	1	0.13
Bituminous Surfaced Road	2	0.25
Gravel or Stone Road	3	0.65
Soil-Surfaced Road	4	0.75
Primitive or Unimproved Road	5	0.75

C factors for other land uses including urban, mining, transitional, grass, and wetlands are listed in Table 18. These values were provided by the U.S. Environmental Protection Agency (EPA) and are used in all watersheds.

Table 18. Various Land Use C factors

Land Use	C factor
Water	0
Low Intensity Residential	0.02
High Intensity Residential	0.005
High Intensity Commercial, Industrial, Transportation	0.003
Bare rock, sand, clay	0
Quarries, strip mines, gravel pits	0.75
Transitional	0.002
Other Grasses	0.003
Woody Wetlands	0.011
Emergent Herbaceous Wetlands	0.003

4.2.5 Conservation Practice Factor

The P factor or conservation practice factor represents the effects of conservation practices on erosion. The conservation practices include Best Management Practices (BMPs) such as contour farming, strip cropping and terraces. In all cases, it was assumed that no BMPs were used and the P factor for all land uses was 1.0.

4.3 WCS Sediment Tool

EPA and Tetra Tech developed the Arcview-based Watershed Characterization System (WCS) to provide tools for characterizing various watersheds. WCS was used to display and analyze geographic information system (GIS) data including land use, soil type, ground slope, road networks, point source discharges, and watershed characteristics.

An extension of WCS is the Sediment Tool, which incorporates the USLE. The Sediment Tool can be used to perform the following tasks:

- Estimate the extent and distribution of potential soil erosion within a watershed.
- Estimate the potential sediment delivery to the receiving water body.
- Evaluate the effects of land use, BMPs, and road networks on erosion and sediment delivery.

The watersheds of interest were delineated based on the RF3 stream coverage and elevation data. If there was no RF3 segment within the delineated watershed, the WCS Sediment Tool could not be used (i.e. Whitten Creek trib and Lake Sinclair trib).

A stream grid for each delineated watershed was created based on elevation data. The stream grid corresponded to a stream network with twenty-five 30 by 30 meter headwater cells (5.5 acres). The stream grid network has flow and can accumulate flow.

For each 30 by 30 meter grid cell within the watershed, the WCS Sediment Tool calculates the potential erosion using the USLE based on the specific cell characteristics. The model then calculates the potential sediment delivery to the stream grid network. Sediment delivery can be calculated using one of the four available sediment delivery equations:

- Distance-based equation

  $Md = M * (1-0.97 * D/L)$

  where Md = mass moved (tons/acre/yr)
  M = sediment mass eroded (ton)
  D = least cost distance from a cell to the nearest stream grid (ft)
  L = maximum distance the sediment may travel (ft)

- Distance Slope-based equation

  $DR = \exp(-0.4233 * L * Sf)$ $Sf = \exp(-16.1 * r/L + 0.057)) - 0.6$

  where DR = sediment delivery ration
  L = distance to the stream (m)
  r = relief to the stream (m)

- Area-based equation

  $DR = 0.417762 * A^{(-0.134958)} - 1.27097,$ $DR <= 1.0$

  where DR = sediment delivery ratio
  A = area (sq miles)

- WEPP-based regression equation

  $Z = 0.9004 - 0.1341 * X^2 + X^3 - 0.0399 * Y + 0.0144 * Y^2 + 0.00308 * Y^3$

  where Z = percent of source sediment passing to the next grid cell
  X = cumulative distance downslope
  Y = percent slope in the grid cell

Based on work previously performed by EPA on the Chattooga River Watershed, it was determined that the distance slope-based equation provided the best prediction of the sediment delivery (USEPA, 2001b).

The WCS Sediment Tool estimates the total soil erosion and sediment delivered to the stream from each grid cell due to land use cover and from the grids representing roads.

5.0 TOTAL MAXIMUM DAILY LOAD

A Total Maximum Daily Load (TMDL) is the amount of a pollutant that can be assimilated by the receiving waterbody without exceeding the applicable water quality standard; in this case the narrative water quality standard for aquatic life. TMDLs establish allowable pollutant loadings that are less than or equal to the TMDL, and thereby provide the basis to establish water quality based controls. For some pollutants, TMDLs are expressed on a mass loading basis.

This TMDL determines the sediment loads that can enter the impaired Ocmulgee River Basin streams without causing sediment impairment to the streams. This is based on the hypothesis that if an impaired watershed has an annual average sediment loading rate similar to a biologically unimpaired watershed, then the receiving stream will remain stable and not be biologically impaired due to sediment. The average sediment load in the watersheds not on the 303(d) list is 0.54 tons/acre/yr, ranging from 0.01 to 2.31 tons/acre/yr.

A TMDL is the sum of the individual waste load allocations (WLA) for point sources and load allocations (LA) for nonpoint sources and natural background (40 CFR 130.2). The sum of these components may not result in an exceedance of water quality standards for a water body. To protect against exceedances, the TMDL must also include a margin of safety (MOS), either implicitly or explicitly, that accounts for the uncertainty in the relationship between pollutant loads and the water quality response of the receiving water body. Conceptually, a TMDL can be expressed as follows:

$$TMDL = \Sigma WLAs + \Sigma LAs + MOS$$

The following sections describe the various TMDL components.

5.1 Waste Load Allocations

The waste load allocations are provided to the point sources. There are ten permitted facilities in the Ocmulgee River Basin watersheds. Their daily maximum and annual allocated TSS loads are given in Table 19.

Table 19. Waste Load Allocations

FACILITY	NPDES PERMIT NO	RECEIVING WATER	COUNTY	TSS LOAD	
				Daily Max (lbs/day)	Annual (ton/yr)
Davidson Mineral Prop - outfall no. 001	GA0046558	Little Deer Creek Trib	Monroe	193	35
Davidson Mineral Prop - outfall no. 002	GA0046558	Little Deer Creek Trib	Monroe	14	3
Spring Industries, Inc (Griffin)	GA0003409	Cabin Creek	Spaulding	1037	189
Southern Aggregates	GA0036781	Rock Creek	Jones	495	90
William Carter Company*	GA0003115	Tobesofkee Creek Trib	Lamar	0	0
Barnesville Gordon Road WPCP	GA0021041	Tobesofkee Creek	Lamar	300	55
DOT-Rest Area #22/I-75	GA0023591	Little Deer Creek	Monroe	11	2
Forsyth Northeast WPCP	GA0031801	Town Creek to Rum Creek Trib	Monroe	350	64
Fort Valley WPCP	GA0031046	Bay Creek to Indian Creek Trib	Peach	550	100
Griffin Cabin Creek WPCP	GA0020214	Cabin Creek	Spaulding	375	68
Jackson-Southside WPCP	GA0023931	Town Branch	Butts	117	21

Average annual load assumes discharge every day at average daily flow

*Note: William Carter Company is scheduled for closure in the summer of 2001, thus this facility was given no wasteload allocation.

The WLA loads are based on either the daily average loads given in the permits, or were calculated based on the design flow and average monthly permitted TSS concentration for the

municipal facilities, or the average measured flow and average daily permitted TSS concentration for the industrial facilities.

The sediment load allocation from future construction sites within the watershed will have to meet the requirements outlined in the Georgia General Storm Water NPDES Permit for Construction Activities. This permit authorizes the discharge of storm water associated with construction activity to the waters of the State in accordance with the limitations, monitoring requirements, and other conditions set forth in Parts I through VII of the Georgia Storm Water Permit. The conditions of the permit were established to assure that the storm water runoff from these sites does not cause or contribute sediment to the stream. Georgia's General Storm Water Permit can be considered a water quality-based permit in that the numeric limits in the permit, if met, will not cause a water quality problem.

5.2 Load Allocations

The USLE was used to determine the relative sediment contributions from each significant land use. The USLE was applied to those watersheds that are biologically impaired and those that are not, to determine the current sediment loading rates to the streams. The load allocation for each stream by land use, including roads, is reported in Table 20 . The watersheds are grouped by: those that are not on the 303(d) list (unimpaired) and those that are on the 303(d) list (impaired). For comparison purposes, the total sediment load in tons per acre per year is also given. The average sediment load in the watersheds that are biota impacted is 0.70 tons/acre/yr, ranging from 0.04 to 9.53 tons/acre/yr. The average sediment load in the watersheds not on the 303(d) list is 0.54 tons/acre/yr, ranging from 0.01 to 2.31 tons/acre/yr. Table 21 gives each source's percent contribution to the total sediment load.

Understanding the potential sediment sources and the changes in land use that have occurred over the last century, provides insight into the streams current water quality issues. The average annual sediment load per unit area for the unimpaired and impaired watersheds are generally within the same range. Over the last century there has been a dramatic decrease in the amount of land farmed in Georgia. Since 1950, there has been a 57 percent reduction in farmland. With the reduction in farmland, there has also been a decrease in the amount of soil erosion. This suggests that the sedimentation observed in the impaired stream segments may be legacy sediment resulting from past land use practices. It is believed that if sediment loads are maintained at acceptable levels, streams will repair themselves over time.

5.3 Seasonal Variation

Sediment is expected to fluctuate according to the amount and distribution of rainfall. Since rainfall is greatest in the spring and winter seasons, it is expected that sediment loadings would be highest during these seasons. However, these seasonal fluctuations and other short-term variability in loading due to episodic events are usually evened out by the response of the biological community to habitat alteration, which is a long-term process. Therefore, the average annual sediment was determined.

Table 20. Load Allocations (Unimpaired)

Sediment Load (tons/yr)																		
Name	**Open Water**	**Low Intensity Residential**	**High Intensity Residential**	**High Intensity Commercial/ industrial Transportation**	**Bare Rock Sand and Clay**	**Quarries Strip Mines Gravel Pits**	**Transitional**	**Deciduous Forest**	**Evergreen Forest**	**Mixed Forest**	**Pasture/Hay**	**Row Crops**	**Other Grasses (Urban Recreational)**	**Woody Wetland**	**Emergent Herbaceous Wetlands**	**Road**	**Total**	**load (tons/acre/yr)**
Alcovv River	0.0	982.2	49.0	102.6	0.0	6549.5	47.0	403.9	146.8	195.9	4411.7	32212.2	69.3	2157.5	15.7	6736.3	54079.6	**0.47**
Beaverdam Creek	0.0	198.9		11.1	0.0		10.6	32.5	9.4	8.6	2.6	3114.4	9.8	7.2	0.7	290.1	3696.0	**0.64**
Big Sandy Creek	0.0	250.7	7.1	38.0	0.0	825.1	98.3	253.0	132.6	152.0	1028.5	31725.7	19.4	1111.8	13.8	4872.4	40528.5	**0.44**
Buck Creek	0.0	18.2	0.4	5.1			0.3	63.9	27.8	45.7	1130.0	12086.9	2.7	454.8	0.8	1065.0	14901.6	**0.73**
Chambliss Creek	0.0	36.2	5.1	6.9				15.4	9.0	4.4	65.2	1971.0	8.6			165.2	2286.9	**0.65**
Deer Creek U/S	0.0	0.6	5.1	5.5				16.0	8.1	5.4	128.2	2642.7	0.0			99.9	39.5	**0.01**
Douglas Creek	0.0	0.6		5.9				16.8	8.9	5.7	132.1	2660.2	0.0			115.5	2945.8	**0.64**
Falling Creek	0.0	1.9		0.7				5.6	2.0	2.5	7.7	593.8		0.7		47.0	661.8	**0.51**
Herds Creek at CR 198	0.0	13.0		0.4	0.0	694.4	29.3	170.7	189.1	57.5	66.4	3690.6	0.6	102.6	0.7	2104.2	7119.4	**0.15**
Herds Creek at GA 212	0.0			0.1				2.3	0.5	0.5	4.8	63.4				8.7	80.2	**0.15**
Kinnard Creek	0.0			0.1			0.2	9.6	7.5	4.7	50.2	378.8		0.5		205.7	657.4	**0.21**
Lee Creek	0.0			0.1	0.0		0.2	25.4	13.1	9.5	69.1	1548.3		4.0	0.1	238.5	1908.5	**0.38**
Little Buck Creek							49.1	4.9	4.1	2.2	0.7	79.3				21.6	161.8	**0.08**
Little Deer Creek D/S DOT	0.0	0.7		0.7				5.3	3.2	3.5	250.4	1917.0		89.7	0.4	133.6	2404.5	**0.82**
Little Falling Creek	0.0			1.0	0.0	5707.7	1.6	19.5	14.5	6.6	12.8	2834.3	0.1	81.4	0.1	49.1	8728.5	**2.31**
Long Branch	0.0				0.0	43.0	2.8	37.5	29.5	17.0	19.4	529.4		63.5	0.3	569.7	1312.1	**0.11**
Panther Creek	0.0	0.4		0.2			0.1	2.8	1.7	1.0	5.7	103.4		0.8		24.4	140.5	**0.17**
Peeksville Creek	0.0	3.2	0.0	0.1				1.9	0.6	0.8	7.8	161.9	0.1	1.3		30.1	207.9	**0.21**
Prairie Creek	0.0	0.1		0.3				5.1	2.5	2.4	25.2	618.2		14.0		50.2	718.0	**0.37**
Rock Creek	0.0	0.4		0.2				1.7	1.8	1.8	140.6	362.1	0.2	4.2		60.8	573.9	**0.33**
Rocky Creek - Bibb	0.0	2.3		0.1	0.0	2365.7	10.5	6.1	6.2	1.7	9.0	782.1		3.6	0.1	126.7	3314.3	**1.13**
Rocky Creek - Monroe	0.0	340.8	15.9	14.6	0.0		24.4	30.7	12.7	14.6	27.4	6712.8	7.8	44.7	1.1	590.2	7837.7	**0.55**
Sabbath Creek	0.0	8.1	0.0	8.5		33.0	7.8	69.3	31.9	36.0	206.7	2125.4	1.6	129.8		587.9	3245.9	**0.20**
Swan Creek - U/S	0.0	736.0	31.3	6.3	0.0		8.1	3.5	3.5	3.2	3.1	806.1	1.1	5.5	0.1	325.4	1933.3	**0.70**
Swan Creek -D/S	0.0	0.1		0.1				1.9	0.4	1.6	273.1	467.3		11.1		60.8	816.4	**0.73**
Tobesofkee Creek lower	0.0	0.1		0.2				7.8	5.2	6.6	346.9	569.9		144.6		144.0	1225.2	**0.41**
Towaliga River	0.0	294.8	9.1	12.8		6970.5	18.5	100.7	63.2	55.2	1903.8	12097.7	12.5	206.5	0.0	1127.2	22872.6	**0.67**
Town Branch U/S Jackson	0.0	211.2	3.7	35.9	0.0	825.1	18.9	152.0	97.1	128.2	995.8	30236.2	16.3	600.6		3266.4	36587.6	**0.55**
Troublesome Creek	0.0	55.8	2.3	3.0				1.8	1.0	1.4	0.4	92.4	3.1	0.4		97.0	258.6	**0.19**
Tussahaw Creek Trib	0.0	93.4	1.2	6.5				29.8	29.4	33.8	120.5	3508.0	5.4	18.3	0.0	277.7	4123.9	**0.47**
Tussahaw Creek upper	0.0	0.7		0.2				2.2	1.2	2.1	38.3	1345.6	0.0	1.1		66.9	1458.3	**0.90**
Tussahaw Creek lower	0.0	12.9	0.4	4.1		742.8		20.4	11.0	15.5	218.1	6988.4	1.6	58.3	0.3	610.1	8683.8	**0.73**
Yellow Creek	0.0	52.7	3.7	8.2	0.0	742.8	29.1	86.0	60.4	58.5	548.7	19174.2	7.5	574.2	0.6	1770.6	23117.2	**0.61**
Yellow Water Creek Trib	0.0			1.4			21.9	19.8	9.7	5.1	101.6	2144.3		93.6	0.2	161.7	2559.3	**0.44**
Yellow Water Creek U/S	0.0	9.3	0.2	0.3				0.8	0.3	0.4	2.0	182.5	0.8			19.7	216.3	**0.53**
Yellow Water Creek D/S	0.0	96.4	2.8	1.4			0.0	8.1	3.9	6.1	80.7	2258.5	3.8	21.8	0.2	2483.7	4967.4	**0.89**
Yellow Water Creek lower	0.0	96.9	2.8	1.5			0.0	8.1	3.9	6.1	81.9	2258.5	3.8	21.8	0.2	2484.1	4969.8	**0.88**

Table 20. Load Allocations (Impaired)

	Sediment Load (tons/yr)																	
Name	**Open Water**	**Low Intensity Residential**	**High Intensity Residential**	**High Intensity Commercial/ Industrial Transportation**	**Bare Rock Sand and Clay**	**Quarries Strip Mines Gravel Pits**	**Transitional**	**Deciduous Forest**	**Evergreen Forest**	**Mixed Forest**	**Pasture/Hay**	**Row Crops**	**Other Grasses (Urban Recreational)**	**Woody Wetland**	**Emergent Herbaceous Wetlands**	**Road**	**Total**	**load (tons/acre/yr)**
Bav Creek		47.1	3.3	4.7	0.0		0.7	0.1	0.1	0.0	27.9	751.8	0.7	1.2	0.1	50.6	888.2	**0.69**
Big Sandy Creek	0.0			0.1				6.4	5.0	5.5	48.4	1296.5		0.9		144.3	1507.2	**0.47**
Browns Branch	0.0	4.4	0.0	0.3				4.4	2.4	4.1	69.2	2896.4	0.8	0.5		241.5	3224.1	**1.05**
Buttlers Creek	0.0				0.0		2.8	9.1	16.7	2.6	0.8			0.6	0.1	237.1	269.8	**0.09**
Cabin Creek - upper		213.9	5.8	6.8				2.0	1.2	2.4	0.4	175.5	5.6			103.6	517.2	**0.53**
Cabin Creek - middle	0.0	443.1	14.5	9.5				4.4	4.1	6.6	9.4	531.9	13.9			239.6	1277.0	**0.51**
Cabin Creek	0.0	598.5	19.7	15.3	0.0			19.0	11.6	18.8	127.2	3270.3	23.4	3.0		525.7	4632.5	**0.60**
Calaparchee Creek	0.0	17.3		5.5	0.0		4.1	5.3	1.3	1.3	10.2	2197.8	1.7	3.6	0.1	133.8	2382.0	**0.97**
Cole Creek	0.0	0.1						2.2	0.5	1.1	125.7	495.3		0.1		12.0	637.0	**0.71**
Eightmile Creek	0.0	0.3		0.0				1.7	0.7	0.5	4.6	67.7				16.9	92.5	**0.16**
Gladesville Creek	0.0				0.0		1.2	14.0	9.2	7.4	18.8	424.5		6.6	0.2	173.8	655.7	**0.18**
Hansford Branch								3.0	0.9	0.9	0.2	11.6				11.7	28.4	**0.05**
Harmon Pye Branch		0.7			0.0		0.6	15.3	6.8	5.8	0.8	191.3		0.8		115.3	337.5	**0.19**
Hartely Branch	0.0				0.0	5.4	3.3	6.4	2.3	2.0	13.7	1976.8		1.7		45.3	2056.8	**0.78**
Herds Creek at CR 159	0.0	0.8		0.5			3.5	33.4	23.3	13.8	81.1	735.3		53.1	0.4	424.8	1369.9	**0.16**
Little Chehaw Creek	0.0	8.0		0.5	0.0		3.9	6.1	4.2	1.8	49.1	1837.8	0.0	4.7	0.0	75.3	1991.4	**1.03**
Little Deer Creek trib				0.2	0.0	5707.7	1.5	3.8	3.1	0.8	1.3	1042.8		0.1		6.1	6767.4	**9.53**
Little Deer Creek U/S DOT	0.0			0.9	0.0	5707.7	1.6	19.3	14.4	6.6	12.7	2735.0	0.0	78.8	0.0	46.0	8622.9	**2.32**
Little Deer Creek	0.0			1.0	0.0	5707.7	2.0	30.8	22.6	9.7	13.8	3212.9	0.1	96.6	0.1	69.6	9166.9	**1.61**
Little Shellstone Creek							0.5	0.6	0.2	0.1		137.6		3.3		8.5	150.9	**0.21**
Long Branch							4.2	11.5	6.7	5.3	0.1	387.7		0.0		75.6	491.2	**0.30**
Malholms Creek	0.0	1.2		1.0				2.8	1.7	2.6	29.7	1011.2	0.4	2.5		25.6	1078.6	**0.77**
Mill Dam Creek	0.0			0.0				3.4	3.9	1.7	8.1	177.6				30.0	224.6	**0.17**
Phinazee Creek	0.0	0.2		0.2			7.6	6.7	1.6	2.7	36.3	281.6		17.6		27.3	381.9	**0.21**
Red Creek	0.0	0.2		5.0		33.0	7.7	28.8	20.2	21.5	133.8	653.1	0.2	61.7		260.5	1225.8	**0.16**
Rock Creek	0.0				0.0	1007.4	1.5	1.5	0.9	0.4	1.3	782.1		0.9	0.0	22.9	1818.9	**2.15**
Rocky Creek - Jasper	0.0	0.1		0.1				2.7	1.2	0.9	13.2	228.2				5.3	251.8	**0.26**
Rocky Creek - Butts	0.0	0.1		0.3			0.2	9.2	3.4	3.3	16.3	200.5		1.3		111.8	346.4	**0.16**
Rocky Creek - Bibb	0.0	0.7		0.1	0.0		3.1	7.8	4.1	4.7	6.7	1447.6	5.1	22.1	0.3	110.8	1613.1	**0.43**
Rocky Creek - Monroe	0.0			1.8			0.0	11.1	4.0	7.5	42.7	1008.2	0.1			208.0	1283.3	**0.32**
Rum Creek	0.0	107.5	4.3	14.9			7.9	26.6	11.6	7.9	48.1	2405.8	5.0			258.4	2897.9	**0.41**
Sand Branch								2.2	2.3	1.6	0.3	36.4				8.2	50.9	**0.07**
Scoggins Creek	0.0					98.2	19.1	12.3	6.8	3.6	2.3			1.4	0.1	391.5	535.2	**0.25**
Shellstone Creek	0.0	0.8		0.1	0.0		41.0	45.1	15.6	7.4	19.5	15537.1	0.7	264.0	0.2	291.6	16223.0	**0.58**
Third Branch	0.0			0.3			2.0	8.7	5.5	5.8	0.1	1.5		42.5		5.5	72.0	**0.04**
Tobesofkee Creek Trib		11.4	0.8	1.0				1.4	0.4	0.9	92.8	404.3	1.0	0.1		56.9	570.9	**0.86**
Tobesofkee Creek U/S	0.0	80.6	5.9	2.7				1.0	1.3	1.6	37.4	355.4	4.8	8.2		88.4	587.2	**0.40**
Tobesofkee Creek D/S	0.0	92.5	6.7	3.7			0.0	3.1	1.9	2.9	135.4	861.6	5.9	8.2		147.9	1269.8	**0.52**
Tobesofkee Creek	0.0	93.9	6.7	5.2			11.2	44.6	19.9	27.4	1573.6	6709.2	5.9	36.0		683.8	9217.3	**0.53**
Tobler Creek	0.0	34.4		1.6	0.0	1.4	16.3	31.1	29.7	8.5	1.5	1896.2	0.0	3.1	0.2	247.0	2270.9	**0.38**
Town Branch D/S Jackson	0.0	55.8	2.3	3.0				1.9	1.1	1.4	0.6	100.6	3.1	0.4		98.3	268.5	**0.19**
Town Branch - Rum Creek U/S	0.0	75.4	3.8	12.9				1.9	0.7	1.1	6.1	242.9	3.9			118.3	467.1	**0.49**
Town Branch - Rum Creek D/S	0.0	75.4	3.8	12.9				2.1	0.7	1.2	6.5	243.3	3.9			118.5	468.3	**0.48**
Walnut Creek Crawford	0.0	0.4	0.1	1.7			20.5	26.7	14.6	6.4	155.1	2136.1		11.4		384.7	2757.7	**0.34**
Walnut Creek - upper	0.0	9.1		0.1	0.0		4.9	15.2	13.9	4.6	44.9	1847.8	0.1	2.2	0.0	287.6	2230.4	**0.41**
Walnut Creek - Jones	0.0	113.6	2.5	3.2	0.0		27.6	49.9	41.1	15.2	413.4	11249.6	0.7	14.9	0.3	1019.3	12951.2	**0.66**
White Creek	0.0			0.1			0.1	4.7	4.4	3.9	95.0	232.2		2.8		95.3	438.5	**0.26**
Wise Creek	0.0	0.7		0.5	0.0		2.2	22.9	16.8	13.1	60.5	1400.7		3.5	0.0	248.3	1769.2	**0.25**
Wood Creek	0.0			0.1			6.6	2.2	0.5	0.6	225.0	364.1				49.5	648.6	**0.55**

Impaired upstream watersheds that contribute to a impaired downstream watersheds

Impaired downstream watersheds

Table 21. Load Percentages (Unimpaired)

Name	Percent Total Sediment Load															
	Open Water	Low Intensity Residential	High Intensity Residential	High Intensity Commercial/ industrial Transportation	Bare Rock Sand and Clay	Quarries Strip Mines Gravel Pits	Transitional	Deciduous Forest	Evergreen Forest	Mixed Forest	Pasture/Hay	Row Crops	Other Grasses (Urban Recreational)	Woody Wetland	Emergent Herbaceous Wetlands	Road
Alcovy River	0.00%	1.82%	0.09%	0.19%	0.00%	12.11%	0.09%	0.75%	0.27%	0.36%	8.16%	59.56%	0.13%	3.99%	0.03%	12.46%
Beaverdam Creek	0.00%	5.38%		0.30%	0.00%		0.29%	0.88%	0.25%	0.23%	0.07%	84.26%	0.27%	0.20%	0.02%	7.85%
Big Sandy Creek	0.00%	0.62%	0.02%	0.09%	0.00%	2.04%	0.24%	0.62%	0.33%	0.38%	2.54%	78.28%	0.05%	2.74%	0.03%	12.02%
Buck Creek	0.00%	0.12%	0.00%	0.03%			0.00%	0.43%	0.19%	0.31%	7.58%	81.11%	0.02%	3.05%	0.01%	7.15%
Chambliss Creek	0.00%	1.58%	0.22%	0.30%				0.67%	0.39%	0.19%	2.85%	86.19%	0.37%			7.22%
Deer Creek U/S	0.00%	0.02%	0.18%	0.19%				0.55%	0.28%	0.18%	4.40%	90.77%	0.00%			3.43%
Deer Creek D/S	0.00%	0.02%		0.20%				0.57%	0.30%	0.20%	4.49%	90.30%	0.00%			3.92%
Douglas Creek	0.00%	0.29%		0.10%				0.85%	0.30%	0.38%	1.16%	89.73%		0.10%		7.10%
Falling Creek	0.00%	0.18%		0.00%	0.00%	9.75%	0.41%	2.40%	2.66%	0.81%	0.93%	51.84%	0.01%	1.44%	0.01%	29.56%
Herds Creek at CR 198	0.00%			0.06%				2.83%	0.61%	0.66%	5.99%	79.04%				10.81%
Herds Creek at GA 212	0.00%			0.01%			0.04%	1.47%	1.14%	0.72%	7.63%	57.63%		0.07%		31.29%
Kinnard Creek	0.00%			0.01%	0.00%		0.01%	1.33%	0.69%	0.50%	3.62%	81.13%		0.21%	0.01%	12.50%
Lee Creek							30.32%	3.02%	2.51%	1.34%	0.44%	49.03%				13.34%
Little Buck Creek	0.00%	0.03%		0.03%				0.22%	0.14%	0.15%	10.41%	79.72%		3.73%	0.02%	5.55%
Little Deer Creek D/S DOT	0.00%			0.01%	0.00%	65.39%	0.02%	0.22%	0.17%	0.08%	0.15%	32.47%	0.00%	0.93%	0.00%	0.56%
Little Falling Creek	0.00%				0.00%	3.27%	0.21%	2.86%	2.25%	1.30%	1.48%	40.35%		4.84%	0.02%	43.42%
Long Branch	0.00%	0.26%		0.18%			0.05%	1.97%	1.22%	0.74%	4.03%	73.58%		0.59%		17.37%
Panther Creek	0.00%	1.53%	0.01%	0.04%				0.93%	0.27%	0.41%	3.75%	77.88%	0.06%	0.65%		14.49%
Peeksville Creek	0.00%	0.01%		0.05%				0.71%	0.35%	0.33%	3.50%	86.11%		1.95%		6.99%
Prairie Creek	0.00%	0.07%		0.04%				0.30%	0.31%	0.32%	24.51%	63.10%	0.03%	0.73%		10.60%
Rock Creek	0.00%	0.07%		0.00%	0.00%	71.38%	0.32%	0.19%	0.19%	0.05%	0.27%	23.60%		0.11%	0.00%	3.82%
Rocky Creek - Bibb	0.00%	4.35%	0.20%	0.19%	0.00%		0.31%	0.39%	0.16%	0.19%	0.35%	85.65%	0.10%	0.57%	0.01%	7.53%
Rocky Creek - Monroe	0.00%	0.25%	0.00%	0.26%		1.02%	0.24%	2.14%	0.98%	1.11%	6.37%	65.48%	0.05%	4.00%		18.11%
Sabbath Creek	0.00%	38.07%	1.62%	0.32%	0.00%		0.42%	0.18%	0.18%	0.17%	0.16%	41.70%	0.06%	0.29%	0.01%	16.83%
Swan Creek - U/S	0.00%	0.01%		0.01%				0.24%	0.05%	0.20%	33.46%	57.23%		1.35%		7.45%
Swan Creek -D/S	0.00%	0.00%		0.01%				0.64%	0.43%	0.54%	28.31%	46.52%		11.80%		11.75%
Tobesofkee Creek lower	0.00%	1.29%	0.04%	0.06%		30.48%	0.08%	0.44%	0.28%	0.24%	8.32%	52.89%	0.05%	0.90%	0.00%	4.93%
Towaliga River	0.00%	0.58%	0.01%	0.10%	0.00%	2.26%	0.05%	0.42%	0.27%	0.35%	2.72%	82.64%	0.04%	1.64%		8.93%
Town Branch U/S Jackson	0.00%	21.57%	0.88%	1.16%				0.70%	0.40%	0.53%	0.16%	35.71%	1.20%	0.17%		37.51%
Troublesome Creek	0.00%	2.26%	0.03%	0.16%				0.72%	0.71%	0.82%	2.92%	85.06%	0.13%	0.44%	0.00%	6.73%
Tussahaw Creek Trib	0.00%	0.05%		0.01%				0.15%	0.08%	0.14%	2.63%	92.28%	0.00%	0.08%		4.59%
Tussahaw Creek upper	0.0%	0.1%	0.0%	0.0%		8.6%		0.2%	0.1%	0.2%	2.5%	80.5%	0.0%	0.7%	0.0%	7.0%
Tussahaw Creek lower	0.00%	0.23%	0.02%	0.04%	0.00%	3.21%	0.13%	0.37%	0.26%	0.25%	2.37%	82.94%	0.03%	2.48%	0.00%	7.66%
Yellow Creek	0.00%			0.05%			0.86%	0.78%	0.38%	0.20%	3.97%	83.79%		3.66%	0.01%	6.32%
Yellow Water Creek Trib	0.00%	4.32%	0.09%	0.14%				0.39%	0.13%	0.20%	0.94%	84.35%	0.35%			9.10%
Yellow Water Creek U/S	0.00%	1.94%	0.06%	0.03%			0.00%	0.16%	0.08%	0.12%	1.62%	45.47%	0.08%	0.44%	0.00%	50.00%
Yellow Water Creek D/S	0.00%	1.95%	0.06%	0.03%			0.00%	0.16%	0.08%	0.12%	1.65%	45.45%	0.08%	0.44%	0.00%	49.98%
Yellow Water Creek lower	0.00%	1.18%	0.05%	0.09%	0.00%		0.00%	0.24%	0.10%	0.12%	2.22%	73.53%	0.04%	0.80%	0.00%	21.63%

Table 21. Load Percentages (Impaired)

Name	Percent Total Sediment Load															
	Open Water	Low Intensity Residential	High Intensity Residential	Commercial/ industrial Transportation	Bare Rock Sand and Clay	Quarries Strip Mines Gravel Pits	Transitional	Deciduous Forest	Evergreen Forest	Mixed Forest	Pasture/Hay	Row Crops	Other Grasses (Urban Recreational)	Woody Wetland	Emergent Herbaceous Wetlands	Road
Bay Creek		5.30%	0.37%	0.53%	0.00%		0.07%	0.01%	0.01%	0.00%	3.14%	84.64%	0.08%	0.14%	0.01%	5.70%
Big Sandy Creek	0.00%			0.01%				0.42%	0.33%	0.36%	3.21%	86.02%		0.06%		9.57%
Browns Branch	0.00%	0.14%	0.00%	0.01%				0.14%	0.08%	0.13%	2.15%	89.84%	0.03%	0.02%		7.49%
Buttlers Creek	0.00%				0.00%		1.02%	3.37%	6.20%	0.96%	0.31%			0.22%	0.04%	87.88%
Cabin Creek - upper		41.36%	1.12%	1.32%				0.38%	0.23%	0.47%	0.08%	33.93%	1.08%			20.03%
Cabin Creek - middle	0.00%	34.70%	1.14%	0.75%				0.34%	0.32%	0.52%	0.73%	41.66%	1.09%			18.76%
Cabin Creek	0.00%	12.92%	0.42%	0.33%	0.00%			0.41%	0.25%	0.41%	2.75%	70.59%	0.51%	0.06%		11.35%
Calaparchee Creek	0.00%	0.73%		0.23%	0.00%		0.17%	0.22%	0.05%	0.05%	0.43%	92.27%	0.07%	0.15%	0.00%	5.62%
Cole Creek	0.00%	0.01%						0.35%	0.07%	0.18%	19.73%	77.75%		0.02%		1.88%
Eightmile Creek	0.00%	0.33%		0.02%				1.87%	0.73%	0.56%	4.96%	73.23%				18.31%
Gladesville Creek	0.00%				0.00%		0.19%	2.14%	1.40%	1.13%	2.87%	64.73%		1.01%	0.04%	26.50%
Hansford Branch								10.69%	3.21%	3.16%	0.85%	41.00%				41.09%
Harmon Pye Branch		0.21%			0.00%		0.16%	4.53%	2.03%	1.73%	0.24%	56.68%		0.23%		34.17%
Hartely Branch	0.00%				0.00%	0.26%	0.16%	0.31%	0.11%	0.10%	0.66%	96.11%		0.08%		2.20%
Herds Creek at CR 159	0.00%	0.06%		0.03%			0.26%	2.44%	1.70%	1.01%	5.92%	53.67%		3.88%	0.03%	31.01%
Little Chehaw Creek	0.00%	0.40%		0.02%	0.00%		0.20%	0.31%	0.21%	0.09%	2.46%	92.29%	0.00%	0.23%	0.00%	3.78%
Little Deer Creek trib				0.00%	0.00%	84.34%	0.02%	0.06%	0.05%	0.01%	0.02%	15.41%		0.00%		0.09%
Little Deer Creek U/S DOT	0.00%			0.01%	0.00%	66.19%	0.02%	0.22%	0.17%	0.08%	0.15%	31.72%	0.00%	0.91%	0.00%	0.53%
Little Deer Creek	0.00%			0.01%	0.00%	62.26%	0.02%	0.34%	0.25%	0.11%	0.15%	35.05%	0.00%	1.05%	0.00%	0.76%
Little Shellstone Creek							0.35%	0.40%	0.12%	0.09%		91.19%		2.20%		5.65%
Long Branch							0.86%	2.34%	1.37%	1.08%	0.02%	78.94%		0.01%		15.39%
Malholms Creek	0.00%	0.11%		0.09%				0.26%	0.16%	0.24%	2.75%	93.75%	0.04%	0.23%		2.37%
Mill Dam Creek	0.00%			0.02%				1.52%	1.74%	0.74%	3.59%	79.06%				13.33%
Phinazee Creek	0.00%	0.06%		0.06%			2.00%	1.75%	0.43%	0.71%	9.51%	73.75%		4.60%		7.14%
Red Creek	0.00%	0.02%		0.41%		2.69%	0.63%	2.35%	1.65%	1.76%	10.91%	53.28%	0.02%	5.03%		21.25%
Rock Creek	0.00%				0.00%	55.39%	0.09%	0.08%	0.05%	0.02%	0.07%	43.00%		0.05%	0.00%	1.26%
Rocky Creek - Jasper	0.00%	0.05%		0.05%				1.07%	0.48%	0.37%	5.24%	90.62%				2.12%
Rocky Creek - Butts	0.00%	0.03%		0.09%			0.07%	2.66%	0.97%	0.95%	4.70%	57.89%		0.38%		32.26%
Rocky Creek - Bibb	0.00%	0.05%		0.00%	0.00%		0.19%	0.48%	0.25%	0.29%	0.42%	89.74%	0.32%	1.37%	0.02%	6.87%
Rocky Creek - Monroe	0.00%			0.14%			0.00%	0.86%	0.31%	0.58%	3.33%	78.56%	0.01%			16.21%
Rum Creek	0.00%	3.71%	0.15%	0.51%			0.27%	0.92%	0.40%	0.27%	1.66%	83.02%	0.17%			8.92%
Sand Branch								4.24%	4.52%	3.10%	0.62%	71.42%				16.10%
Scoggins Creek	0.00%					18.34%	3.56%	2.30%	1.27%	0.68%	0.42%			0.26%	0.02%	73.15%
Shellstone Creek	0.00%	0.01%		0.00%	0.00%		0.25%	0.28%	0.10%	0.05%	0.12%	95.77%	0.00%	1.63%	0.00%	1.80%
Third Branch	0.00%			0.37%			2.84%	12.07%	7.66%	8.08%	0.16%	2.15%		59.09%		7.58%
Tobesofkee Creek Trib		1.99%	0.14%	0.17%				0.25%	0.06%	0.16%	16.25%	70.83%	0.18%	0.01%		9.96%
Tobesofkee Creek U/S confluence	0.00%	13.73%	1.01%	0.47%				0.17%	0.23%	0.26%	6.36%	60.51%	0.82%	1.39%		15.05%
Tobesofkee Creek D/S confluence	0.00%	7.28%	0.53%	0.29%			0.00%	0.25%	0.15%	0.23%	10.66%	67.85%	0.47%	0.65%		11.64%
Tobesofkee Creek middle	0.00%	1.02%	0.07%	0.06%			0.12%	0.48%	0.22%	0.30%	17.07%	72.79%	0.06%	0.39%		7.42%
Tobler Creek	0.00%	1.51%		0.07%	0.00%	0.06%	0.72%	1.37%	1.31%	0.38%	0.07%	83.50%	0.00%	0.13%	0.01%	10.87%
Town Branch D/S Jackson WPCP	0.00%	20.78%	0.84%	1.12%				0.73%	0.39%	0.54%	0.21%	37.47%	1.16%	0.16%		36.60%
Town Branch - Rum Creek U/S	0.00%	16.14%	0.81%	2.76%				0.41%	0.14%	0.24%	1.31%	52.01%	0.84%			25.33%
Town Branch - Rum Creek D/S Forsyth	0.00%	16.10%	0.80%	2.75%				0.44%	0.14%	0.26%	1.39%	51.96%	0.84%			25.30%
Walnut Creek Crawford	0.00%	0.02%	0.00%	0.06%			0.74%	0.97%	0.53%	0.23%	5.62%	77.46%		0.41%		13.95%
Walnut Creek - upper	0.00%	0.41%		0.00%	0.00%		0.22%	0.68%	0.62%	0.20%	2.01%	82.85%	0.00%	0.10%	0.00%	12.90%
Walnut Creek - Jones	0.00%	0.88%	0.02%	0.02%	0.00%		0.21%	0.39%	0.32%	0.12%	3.19%	86.86%	0.01%	0.12%	0.00%	7.87%
White Creek	0.00%			0.03%			0.02%	1.07%	1.01%	0.89%	21.66%	52.95%		0.64%		21.74%
Wise Creek	0.00%	0.04%		0.03%	0.00%		0.12%	1.29%	0.95%	0.74%	3.42%	79.17%		0.20%	0.00%	14.04%
Wood Creek	0.00%			0.02%			1.01%	0.35%	0.08%	0.09%	34.69%	56.13%				7.64%

Impaired upstream watersheds that contribute to a impaired downstream watersheds

Impaired downstream watersheds

5.4 Margin of Safety

The MOS is a required component of TMDL development. There are two basic methods for incorporating the MOS: 1) Implicitly incorporate the MOS using conservative model assumptions to develop allocations; or 2) Explicitly specify a portion of the TMDL as the MOS and use the remainder for allocations. For this TMDL, the MOS was implicitly incorporated in the use of conservative modeling assumptions including the selection of average USLE factors and the use of the average sediment loading rates for the numeric targets.

5.5 Total Sediment Load

The total maximum daily load of sediment was determined by adding the WLA and the LA. The MOS, as described above, was implicitly included in the TMDL analysis and does not factor directly in the TMDL equation as shown above. The annual average sediment loads for each of the impaired watersheds are summarized in the Table 22 with any required sediment load reduction. A Summary Memorandum for each watershed is provided in Appendix A.

The USLE method used indicates that the largest sediment loads come from areas with close proximity to the stream grid, especial dirt roads and croplands. The model does not account for any BMPs that are currently being used to control erosion from these areas., and thus may over estimate some sediment loads.

The sediment loads calculated for Little Deer Creek tributary (9.53 tons/acre/yr), Little Deer Creek (1.61 tons/acre/yr), and Rock Creek (2.15 tons/acre/yr) are high. This is due to the high C factor used for quarries, strip mines and gravel pits, and thus the large contribution of sediment (84.34 percent, 62.26 percent, and 55.39 percent, respectively) from this land use. Davidson Mineral Properties mines granite from the Monroe Quarry in the Little Deer watershed, and Southern Aggregates inc., mines granite from the Hitchcock Quarry in the Rock Creek watershed. The sediment load from stone and gravel mines is typically low. It is believed the C factor used in the USLE for stone quarries was too high and thus, the sediment load was over estimated.

Table 22. Annual Average Sediment Loads and the Required Sediment Load Reductions

Name	Current Load (tons/yr)	WLA (tons/yr)	LA (tons/yr)	Total Load (tons/yr)	% Reduction
Bay Creek	988	100	597	697	29.5%
Big Sandy Creek	1,507	0	1,507	1,507	0.0%
Browns Branch	3,224	0	1,664	1,664	48.4%
Bulters Creek	270	0	270	270	0.0%
Cabin Creek	4,889	257	3,893	4,150	15.1%
Calaparchee Creek	2,382	0	1,331	1,331	44.1%
Cole Creek	637	0	484	484	24.1%
Eightmile Creek	92	0	92	92	0.0%
Gladesville Creek	656	0	656	656	0.0%
Hansford Branch	28	0	28	28	0.0%
Harmon Pye Branch	337	0	337	337	0.0%
Hartley Branch	2,057	0	1,420	1,420	30.9%
Herds Creek	1,370	0	1,370	1,370	0.0%
Little Chehaw Creek	1,991	0	1,048	1,048	47.4%
Little Deer Creek Trib	6,805	38	345	383	94.4%
Little Deer Creek	9,207	40	3,035	3,075	66.6%
Little Shellstone Creek	151	0	151	151	0.0%
Long Branch	491	0	491	491	0.0%
Malholms Creek	1,079	0	755	755	30.0%
Mill Dam Creek	225	0	225	225	0.0%
Phinazee Creek	382	0	382	382	0.0%
Red Creek	1,226	0	1,226	1,226	0.0%
Rock Creek	1,909	90	368	458	76.0%
Rocky Creek – Jasper	252	0	252	252	0.0%
Rocky Creek – Butts	346	0	346	346	0.0%
Rocky Creek – Bibb	1,613	0	1,613	1,613	0.0%
Rocky Creek – Monroe	1,283	0	1,283	1,283	0.0%
Rum Creek	2,962	64	2,898	2,962	0.0%
Sand Branch	51	0	51	51	0.0%
Scoggins Creek	535	0	535	535	0.0%
Shellstone Creek	16,223	0	14,991	14,991	7.6%
Third Branch	72	0	72	72	0.0%
Trib Tobesofkee Creek	571	0*	358	358	37.3%
Tobesofkee Creek	9,260	43*	9,217	9,260	0.0%
Tobler Creek	2,271	0	2,271	2,271	0.0%
Town Branch	290	21	269	290	0.0%
Walnut Creek - Crawford	2,758	0	2,758	2,758	0.0%
Walnut Creek – Jones/Bibb	12,951	0	10,551	10,551	18.5%
White Creek	438	0	438	438	0.0%
Wise Creek	1,769	0	1,769	1,769	0.0%
Wood Creek	649	0	634	634	2.3%

*Note: William Carter Company is scheduled for closure in the summer of 2001, thus this facility was given no wasteload allocation.

6.0 RECOMMENDATIONS

6.1 Monitoring

Monitoring is conducted at a number of locations across the State each year. GAEPD has adopted a basin approach to water quality management; an approach that divides Georgia's major river basins into five groups. This approach provides for additional sampling work to be focused on one of the five basin groups each year. The Ocmulgee River Basin along with the Oconee and Altamaha River Basins were the basins of focused monitoring in 1999 and will again receive focused monitoring in 2004. One goal of the focused basin monitoring is to continue to monitor 303(d) listed waters. Therefore, additional monitoring of these streams will be initiated as appropriate during the next monitoring cycle to determine if there has been improvement in the biological communities.

6.2 Sediment Management Practices

Based on the findings of the source assessment, it was determined that most of the sediment found in the Oconee River Basin streams is due to past land use practices and is referred to as "legacy" sediment. Therefore, it is recommended that there be no net increase in sediment delivered to the impaired stream segments, so that these streams will recover over time.

The measurement of sediment delivered to a stream is difficult, if not impossible, to determine. Therefore, setting a numeric TMDL may be ineffective given the difficulty in measuring it. In addition, changes in habitat and aquatic communities are usually slow to respond, which is why monitoring will continue according to the five-year monitoring cycle. Thus, this TMDL recommends that the compliance with NPDES permits and implementation of Best Management Practices (BMPs) be monitored. The anticipated effects of compliance with NPDES and implementation of BMPs will contribute to the improvement of stream habitats and water quality, and thus be an indirect measurement of the TMDL.

Management practices recommended to maintain the average annual sediment loads at current levels include:

- Compliance with NPDES permit limits and requirements
- Implementation of GFC Best Management Practices for forestry
- Adoption of NRCS Conservation Practices
- Adherence to the Mined Land Use Plan prepared as part of the Surface Mining Permit Application
- Adoption of proper unpaved road maintenance practices
- Implementation of Erosion and Sedimentation Control Plans for land disturbing activities
- Mitigation and prevention of stream bank erosion due to increased streamflow and velocities caused by urban runoff

6.2.1 Point Source Approaches

Point sources are defined as discharges of treated wastewater or storm water into rivers and streams at discrete locations. Treated wastewater tends to be discharged at relatively stable rates; whereas, storm water is discharged at irregular, intermittent rates, depending on precipitation and runoff. The NPDES permit program provides a basis for municipal, industrial

and storm water permits, monitoring and compliance with limitations, and appropriate enforcement actions for violations.

In accordance with GAEPD rules and regulations, all NPDES dischargers in the watershed are required to meet their current NPDES permit limits. It is recommended that there be no authorized increase in the mass loading of sediment (TSS) above those in the current NPDES permits, in order to maintain the current sediment loads in the impaired streams. The removal of mined material involves water pumped from the mine pit, and mineral processing involves the disposal of process waters. These waters are treated through either sedimentation ponds or detention basins prior to being discharged to the stream and are regulated by NPDES permits. For mining facilities located within the impaired watersheds, it is recommended that monitoring frequencies be increased in order to better characterize the total annual sediment loads coming from these facilities.

Georgia EPD has developed a General Storm Water NPDES Permit for Construction Activities. The current permit is required for all construction sites disturbing five or more acres. In 2003, this permit will cover all construction sites disturbing one or more acres. All sites required to have this permit are authorized to discharge storm water associated with construction activity to the waters of the State in accordance with the limitations, monitoring requirements, and other conditions set forth in Parts I through VII of the Georgia Storm Water Permit. The permit requires all sites to have an Erosion and Sedimentation Control Plan; to implement, inspect and maintain BMPs; and to monitor storm water for turbidity. Georgia's General Storm Water Permit can be considered a water quality-based permit, in that the numeric limits in the permit, if met and enforced, will not cause a water quality problem.

It is recommended that construction sites within impaired watersheds located within 100 feet of the impaired stream, or its tributaries, use DIRT II techniques to model and manage storm water runoff from these sites. In addition, all construction sites will monitor their storm water runoff as required by the General Storm Water NPDES Permit for Construction Activities.

6.2.2 Nonpoint Source Land Use Approaches

The Georgia EPD is responsible for administering and enforcing laws to protect the waters of the State. EPD is the lead agency for implementing the State's Nonpoint Source Management Program. Regulatory responsibilities include establishing water quality standards and use classifications, assessing and reporting water quality conditions, issuing point source permits, issuing water withdrawal and ground water permits, and regulating land-disturbing activities. Georgia is working with local governments, agricultural, and forestry agencies such as the Natural Resources Conservation Service, the Georgia Soil and Water Conservation Commission, and the Georgia Forestry Commission to foster the implementation of best management practices that address nonpoint source pollution. In addition, public education efforts are being targeted to individual stakeholders to provide information regarding the use of best management practices to protect water quality. The following sections describe in more detail the specific measures to reduce nonpoint sources of sediment by land use type.

6.2.2.1 Forested Land

In 1978, EPD designated the Georgia Forestry Commission (GFC) to be the lead agency in managing and implementing the silvicultural portion of Georgia's Nonpoint Source Management Program. The GFC is responsible for coordinating water quality issues with regard to forested land in Georgia. The GFC is basically responsible for:

- Developing Best Management Practices (BMPs) for the forestry industry,
- Educating the forestry community on BMPs, and
- Conducting site inspections for compliance with the established BMPs.

The GFC formed a Forestry Nonpoint Source Pollution Technical Task Force to assess the extent of water pollution caused by forestry practices, and develop recommendations to reduce or eliminate erosion and sedimentation. After a three-year field study, the task force developed a set of BMPs that address all aspects of silviculture including forest road construction, timber harvesting, site preparation, and forest regeneration. The task force recommended the BMPs be implemented through a voluntary program, exempt from permitting under the Georgia Erosion and Sedimentation Control Act, emphasizing educational and training programs instead. In 1997, the original BMP document was revised to incorporated the 1989 Wetland BMP manual developed by the Georgia Forestry Association. The current BMP manual, *Georgia's Best Management Practices for Forestry,* was developed and became effective January 1, 1999 (GAEPD, 1999).

It is the responsibility of the GFC to educate and inform the forest community (landowners, procurement and land management foresters, consulting foresters, loggers, site prep and tree planting contractors) on the importance of BMPs. The GFC statewide coordinator and the twelve district coordinators conduct the educational programs across the state. The district coordinators receive specialized training in erosion and sediment control, forest road layout and construction, stream habitat assessment, rapid bioassessment (macroinvertebrate) monitoring, wetland delineation, and fluvial geomorphology. The GFC has developed training videos, slide programs, tabletop exhibits, and BMP billboards that are displayed at wood yards across the State. For the benefit of private landowners selling timber, the GFC has developed a Sample Forest Products Sale Agreement, which includes fill in the blank spaces for specific BMP incorporation. Since December 1995, the GFC has been cooperating with the University of Georgia School of Forest Resources, the Georgia Forestry Association, and American Forest and Paper Association (AFPA) member companies in the ongoing education of loggers and timber buyers through the Sustainable Forestry Initiative (SFI) Master Timber Harvester program. This includes an intensive training session on the BMPs conducted by the GFC.

To determine if educational efforts have been successful and if the BMPs are effective at minimizing erosion and sedimentation, the GFC conducted BMP compliance surveys in 1991 and 1992. In 1998, another BMP survey was conducted using a newly developed and more rigorous protocol recommended by a Southern Group of State Foresters (SGSF) Task Force. The GFC sampled about 10 percent of the forestry operations that occur annually. The number of samples taken in each county was based on the volume of wood harvested as reported in the state's latest Product Drain Report. Sites were randomly selected to reflect various forest types (non-industrial private forest, forest industry, and publicly owned lands). The survey results show that of the number of acres evaluated, the number in BMP compliance for the most part was very good. In 1991, approximately 86 percent of the acres evaluated were in compliance. In 1992, the figure increased to 92 percent compliance and in 1998, compliance rose to 98 percent.

The GFC also investigates and mediates complaints or concerns involving forestry operations on behalf of the EPD and the Army Corps of Engineers (COE) when stream water quality and wetlands are involved, respectively. Complaints from citizens are common, particularly in counties growing in population where landowners are living close to commercial forestry operations. After notifying the forest owner, the GFC District Coordinator conducts a field inspection to determine if BMPs were followed, if the potential for water quality problems exists,

and who is the responsible party. If the complaint is valid, GFC will work with the responsible party until the problem is corrected. However, the GFC has no regulatory authority. In situations where the GFC can not get satisfactory compliance, the case is turned over to Georgia EPD or COE for enforcement actions under the Georgia Water Quality Control Act or Section 404 of the Federal Clean Water Act.

It is recommended that the GFC continue to encourage BMP implementation, educational training programs, and site compliance surveys. The numbers of individuals trained and site compliance inspections should be recorded each year. In addition, the number of complaints received, the actions taken, and enforcement actions written should be recorded.

6.2.2.2 Agricultural Land

There are a number of agricultural organizations that work to support Georgia's more than 40,000 farmers. The following three organizations have primary responsibility for working with farmers to promote soil and water conservation:

- The University of Georgia - Cooperative Extension Service
- Georgia Soil and Water Conservation Commission
- Natural Resources Conservation Service

The University of Georgia (UGA) has faculty, County Cooperative Extension Agents, and technical specialists who provide services in several key areas relating to agricultural impacts on water quality. These include classroom instruction, basic and applied research, consulting assistance, and information on nonpoint source water quality impacts.

The Georgia Soil and Water Conservation Commission (GSWCC) was created in 1937 by a Georgia Legislative Act. In 1977, Georgia EPD designated the GSWCC as the lead agency for agricultural Nonpoint Source Management in the State. The GSWCC develops nonpoint source management programs and conducts educational activities to promote conservation and protection of land and water devoted to agricultural uses. In September 1994, the GSWCC developed a BMP manual, *Agricultural Best Management Practices for Protection Water Quality in Georgia,* for the agricultural community (GSWCC, 1994).

The Natural Resources Conservation Service (NRCS) cooperates with Federal, State, and local governments to provide financial and technical assistance to farmers. NRCS develops standards and specifications for BMPs that are to be used to improve, protect, or maintain our State's natural resources. Practice standards establish the minimum level of acceptable quality for planning, designing, installing, operating, and maintaining BMPs. Practice specifications describe the technical details and workmanship required to install a BMP and the quality and extent of materials to be used in a BMP.

The NRCS provides Conservation Practice Standards and Job Sheets on their website (www.ga.nrcs.usda.gov/ga/gapas/FOTG/Section _4/). Some of these BMPs may be used for farming operations to reduce soil erosion. It is recommended that the agricultural communities with crop land close to impaired streams, and pasture land where grazing animals have access to the stream, investigate the various BMPs available to them in order to reduce soil erosion and bank collapse.

The 1996 Farm Bill and PL83-566 Small Watershed Program provided new financial assistance programs to address high priority environmental protection goals. Some programs that specifically address erosion and sedimentation are:

- The Environmental Quality Incentives Program
- Conservation Reserve Program
- Small Watershed Program

The Environmental Quality Incentives Program (EQIP) is a USDA cost-share program available to farmers to address natural resource problems. EQIP offers financial, educational, and technical assistance funding for installing BMPs that reduce soil erosion, improve water quality, or enhance wildlife habitats.

The Conservation Reserve Program (CRP) was originally designed to provide incentive and offer assistance to farmers to convert highly erodible and other environmentally sensitive land normally devoted to the crop production, to land with other long-term resource-conserving cover. CRP has been expanded to place eligible acreage into filter strips, riparian buffers, grassed waterways, or contour grass strips. Each of these practices helps to reduce erosion and sedimentation and improve water quality.

The Small Watershed Program provides financial and technical assistance funding for the installation of BMPs in watersheds less than 250,000 acres. This program is used to augment ongoing conservation programs where serious natural resource degradation has or is occurring. Agricultural water management, which included projects that reduce soil erosion and sedimentation and improve water quality, is one of the eligible purposes of this program. NRCS is authorized by Public Law 83-566 to conduct river basin surveys and investigations. The NRCS River Basin Planning Program is designed to collect data on natural resource conditions within river basins of focus. NRCS is providing technical assistance to the GSWCC and the Georgia Environmental Protection Division with the Georgia River Basin Planning Program. Planning activities associated with this program will describe conditions of the agricultural natural resource base once every five years.

Every five years by the USDA Natural Resources Conservation Service conducts the National Resources Inventory (NRI). The NRI is a statistically based sample of land use and natural resource conditions and trends and it covers non-federal land in the United States. The National Resources Inventory found the total wind and water erosion on cropland and Conservation Reserve Program land in Georgia declined 38 percent from 3.1 billion tons per year in 1982 to 1.9 billion tons in 1997 (USDA NRCS, 1998).

NRCS also provides a web-based database application (Performance and Results Measurement System, PRMS) so conservation partners and the public can gain fast and easy access to the accomplishments and the progress made toward strategies and performance goals. The web site is http://sugarberry.itc.nrcs.usda.gov/Netdynamics/deeds/index.html.

It is recommended that the GSWCC and the NRCS continue to encourage BMP implementation, education efforts, and river basin surveys with regard to River Basin Planning. The five year National Resources Inventory should be continued and GAEPD supports the PRMS website.

6.2.2.3 Mine Sites

Surface mining and mineral processing present two threats to surface waters. The first threat is the wastewater from mining and mineral processing operations. These discharges are considered point sources, and therefore, are regulated by NPDES permits and were discussed in Section 6.2.1 above. The second threat involves mine reclamation activities. Reclamation occurs throughout the mining operation. From the first cut to the last, overburden is moved twice. With each movement of the soil and rock debris, the overburden must be managed to prevent soil and mineral erosion. Until the mine is re-vegetated, and hence reclaimed, BMPs must be implemented to prevent nonpoint source pollution.

The Georgia Surface Mining Act of 1968 provides for the issuance of mining permits at the discretion of the Director of Georgia EPD. These permits are administered by the Land Protection Branch. The surface mining permit application must include a Mined Land Use Plan, reclamation strategies, and surety bond requirements to guarantee proper management and reclamation of surface mined areas. The Mined Land Use Plan specifies activities prior to, during, and following mining to dispose of refuse and control erosion and sedimentation. The reclamation strategy includes the use of operational BMPs and procedures. The BMPs used are drawn from *the Manual for Erosion and Sedimentation Control in Georgia*, *Georgia's Best Management Practices for Forestry*, and from other states. Thus, the issuance of a surface mining permit in effect addresses BMPs to control nonpoint source pollutants. The regional EPD offices monitor and inspect surface mining sites to assess permit compliance.

It is recommended that special attention be given to those facilities located in impaired watersheds. The implementation and maintenance of BMPs used to control erosion should be reviewed during the site inspections.

The Georgia Mining Association (GMA) is an informal trade association of the mining industry. It serves more than 200 members, 47 mining companies and over 150 associate companies. The association monitors legislative developments and coordinates industry response. It educates miners about laws and regulations that affect them and provides a forum for the exchange of ideas. Through its newsletters, seminars, workshops, and annual conventions, the Georgia Mining Association serves as a source for mining industry information. It has several committees, including the Environmental Committee that meet three to four times a year. The mining industry is conducting informal discussions on the potential of developing industry-wide standards for Best Management Practices to prevent and reduce nonpoint source pollution. If these standards are adopted, the mining industry would likely conduct demonstration projects to gauge the effectiveness of the BMPs.

6.2.2.4 Roads

Unpaved roads can be a major contributor of sediment to our waterways if not properly managed. The following guidance for the maintenance and service of unpaved roadways, drainage ditches, and culverts can be used to minimize roadway erosion. One publication that may include some additional guidance is *Recommended Practices Manual, A Guideline for Maintenance and Service of Unpaved Roads* (Choctawhatchee, et. al, 2000).

Disturbances to unpaved roadway surfaces and ditches, and poor road surface drainage, results in deterioration of the road surface. This leads to increased roadway erosion and thus stream sedimentation. Unpaved roads are typically maintained by blading and/or scraping of the roads to remove loose material. Proper, timely, and selective surface maintenance can

prevent and minimize erosion of unpaved roadways. This in turn lengthens the life of the road and reduces maintenance costs. Roadway blading that occurs during periods when there is enough moisture content allows for immediate re-compaction. In addition, roadwork performed near streams or stream-crossings during "dry" months of the year can reduce the amount of sediment that enters a stream.

Roadside ditches convey storm water runoff to an outlet. A good drainage ditch is shaped and lined with appropriate vegetative or structural material. A well-vegetated ditch slows, controls and filters the storm water runoff, providing an opportunity for sediments to be removed from the runoff before it enters surface waters. Energy dissipating structures to reduce velocity, dissipate turbulence or flatten flow grades in ditches are often necessary. Efficient disposal of runoff from the road helps preserve the roadbed and banks. Properly installed "turn-outs" or intermittent discharge points help to maintain a stable velocity and proper flow capacity within the ditch by timely outleting water from them. This in turns alleviates roadway flooding, erosion, and maintenance problems. Properly placed "turn-outs" distribute roadway runoff and sediments over a larger vegetative filtering area, helping to reduce road side ditch maintenance to remove accumulated sediment.

Culverts are conduits used to convey water from one side of a road to another. Installation, modification, and/or improvements of culverts when streamflows and expected rainfall is low can reduce the amount of sediment that enters a stream. If the entire installation process, from beginning to end, can be completed before the next rainfall event stream sedimentation can be minimized. Diverting all existing or potential streamflows while the culvert is being installed can also help reduce or avoid sedimentation below the installation. The culvert design can have a significant impact on the biological community if the size and species of fish passing through it are not considered. Changes in water velocities and the creation of vertical barriers effect the biological communities.

6.2.2.5 Urban Development

The Erosion and Sedimentation Act, established in 1975, provides the mechanism for controlling erosion and sedimentation from land-disturbing activities. This Act establishes a permitting process for land-disturbing activities. Many local governments and counties have adapted erosion and sedimentation ordinances and have been given authority to issue and enforce permits for land-disturbing activities. Approximately 32 counties and 240 municipalities in Georgia have been certified as the local issuing authority. In areas where local governments have not been certified as an issuing authority, the Georgia EPD is responsible for permitting, inspecting, and enforcing the Erosion and Sedimentation Act.

To receive a land-disturbing permit, an applicant must submit an erosion and sedimentation control plan that incorporates specific conservation and engineering Best Management Practices. The *Field Manual for Erosion and Sediment Control in Georgia* developed by the State Soil and Water Conservation Commission may be used as a guide to develop erosion and sedimentation control plans (GSWCC, 1997).

Local governments, with oversight by the Georgia EPD, and the Soil and Water Conservation Districts, are primarily responsible for implementing the Erosion and Sedimentation Act. Reports of suspected violations are made to the agency that issued the permit. In cases with local issuing authority, if the violation continues, the compliant is referred to the appropriate Soil and Water Conservation District. If the situation remains unresolved, the compliant is then referred to Georgia EPD for enforcement action. Enforcement may include administrative orders, injunctions, and civil penalties. It is recommended that the local and state governments

continue to work to implement the provisions of the revised January 2001 Erosion and Sedimentation Act across Georgia.

Storm water runoff from developed urban areas (post-construction) can also have an impact on the transport of sediment to and within streams. Urbanization increases imperviousness, resulting in an increase in the volume of runoff that enters the streams. In addition, the streamflow rates may increase significantly from pre-construction rates. These changes in the streamflow can result in stream bank erosion and stream bottom down cutting. It is recommended that local governments review and consider implementation of practices presented in the *Land Development Provisions to Protect Georgia Water Quality* (GAEPD, 1997).

6.3 Reasonable Assurance

Permitted discharges will be regulated through the NPDES permitting process described in this report. Georgia is working with local governments, agricultural, and forestry agencies, such as the Natural Resources Conservation Service, the Georgia Soil and Water Conservation Commission, and the Georgia Forestry Commission, to foster the implementation of best management practices to address nonpoint sources. In addition, public education efforts will be targeted to individual stakeholders to provide information regarding the use of best management practices to protect water quality.

6.4 Public Participation

A thirty-day public notice was provided for this TMDL. During this time the availability of the TMDL was public noticed, a copy of the TMDL was provided as requested, and the public was invited to provide comments on the TMDL.

7.0 INITIAL TMDL IMPLEMENTATION PLAN

EPD has coordinated with EPA to prepare this Initial TMDL Implementation Plan for this TMDL. EPD has also established a plan and schedule for development of a more comprehensive implementation plan after this TMDL is established. EPD and EPA have executed a Memorandum of Understanding that documents the schedule for developing the more comprehensive plans. This Initial TMDL Implementation Plan includes a list of best management practices and provides for an initial implementation demonstration project to address one of the major sources of pollutants identified in this TMDL while State and/or local agencies work with local stakeholders to develop a revised TMDL implementation plan. It also includes a process whereby EPD and/or Regional Development Centers (RDCs) or other EPD contractors (hereinafter, "EPD Contractors") will develop expanded plans (hereinafter, "Revised TMDL Implementation Plans").

This Initial TMDL Implementation Plan, written by EPD and for which EPD and/or the EPD Contractor are responsible, contains the following elements.

1. EPA has identified a number of management strategies for the control of nonpoint sources of pollutants, representing some best management practices. The "Management Measure Selector Table shown below identifies these management strategies by source category and pollutant. Nonpoint sources are the primary cause of excessive pollutant loading in most cases. Any wasteload allocations in this TMDL will be implemented in the form of water-quality based effluent limitations in NPDES permits issued under CWA Section 402. See 40 C.F.R. § 122.44(d)(1)(vii)(B). NPDES permit discharges are a secondary source of excessive pollutant loading, where they are a factor, in most cases.

2. EPD and the EPD Contractor will select and implement one or more best management practice (BMP) demonstration projects for each River Basin. The purpose of the demonstration projects will be to evaluate by River Basin and pollutant parameter the site-specific effectiveness of one or more of the BMPs chosen. EPD intends that the BMP demonstration project be completed before the Revised TMDL Implementation Plan is issued. The BMP demonstration project will address the major category of contribution of the pollutant(s) of concern for the respective River Basin as identified in the TMDLs of the watersheds in the River Basin. The demonstration project need not be of a large scale, and may consist of one or more measures from the Table or equivalent BMP measures proposed by the EPD Contractor and approved by EPD. Other such measures may include those found in EPA's "Best Management Practices Handbook", the "NRCS National Handbook of Conservation Practices, or any similar reference, or measures that the volunteers, etc., devise that EPD approves. If for any reason the EPD Contractor does not complete the BMP demonstration project, EPD will take responsibility for doing so.

3. As part of the Initial TMDL Implementation Plan the EPD brochure entitled "Watershed Wisdom -- Georgia's TMDL Program" will be distributed by EPD to the EPD Contractor for use with appropriate stakeholders for this TMDL, and a copy of the video of that same title will be provided to the EPD Contractor for its use in making presentations to appropriate stakeholders, on TMDL Implementation plan development.

4. If for any reason an EPD Contractor does not complete one or more elements of a Revised TMDL Implementation Plan, EPD will be responsible for getting that (those) element(s) completed, either directly or through another contractor.

5. The deadline for development of a Revised TMDL Implementation Plan, is the end of August, 2003.

6. The EPD Contractor helping to develop the Revised TMDL Implementation Plan, in coordination with EPD, will work on the following tasks involved in converting the Initial TMDL Implementation Plan to a Revised TMDL Implementation Plan:
   A. Generally characterize the watershed;
   B. Identify stakeholders;
   C. Verify the present problem to the extent feasible and appropriate, (e.g., local monitoring);
   D. Identify probable sources of pollutant(s);
   E. For the purpose of assisting in the implementation of the load allocations of this TMDL, identify potential regulatory or voluntary actions to control pollutant(s) from the relevant nonpoint sources;
   F. Determine measurable milestones of progress;
   G. Develop monitoring plan, taking into account available resources, to measure effectiveness; and
   H. Complete and submit to EPD the Revised TMDL Implementation Plan.

7. The public will be provided an opportunity to participate in the development of the Revised TMDL Implementation Plan and to comment on it before it is finalized.

8. The Revised TMDL Implementation Plan will supersede this Initial TMDL Implementation Plan when the Revised TMDL Implementation Plan is approved by EPD.

Management Measure Selector Table

Land Use	Management Measures	Fecal Coliform	Dissolved Oxygen	pH	Sediment	Temperature	*Toxicity*	*Mercury*	Metals (copper, lead, zinc, cadmium)	PCBs, toxaphene
Agriculture	1. Sediment & Erosion Control	_	_		_	_				
	2. Confined Animal Facilities	_	_							
	3. Nutrient Management	_	_							
	4. Pesticide Management		_							
	5. Livestock Grazing	_	_		_	_				
	6. Irrigation		_		_	_				
Forestry	1. Preharvest Planning				_	_				
	2. Streamside Management Areas	_	_		_	_				
	3. Road Construction &Reconstruction		_		_	_				
	4. Road Management		_		_	_				
	5. Timber Harvesting		_		_	_				
	6. Site Preparation & Forest Regeneration		_		_	_				
	7. Fire Management	_	_	_	_	_				
	8. Revegetation of Disturbed Areas	_	_	_	_	_				
	9. Forest Chemical Management		_			_				
	10. Wetlands Forest Management	_	_	_		_		_		

Land Use	Management Measures	Fecal Coliform	Dissolved Oxygen	pH	Sediment	Temperature	*Toxicity*	*Mercury*	Metals (copper, lead, zinc, cadmium)	PCBs, toxaphene
Urban	1. New Development	–	–		–	–			–	
	2. Watershed Protection & Site Development	–	–		–	–		–	–	
	3. Construction Site Erosion and Sediment Control		–		–	–				
	4. Construction Site Chemical Control		–							
	5. Existing Developments	–	–		–	–			–	
	6. Residential and Commercial Pollution Prevention	–	–							
Onsite Wastewater	1. New Onsite Wastewater Disposal Systems	–	–							
	2. Operating Existing Onsite Wastewater Disposal Systems	–	–							
Roads, Highways and Bridges	1. Siting New Roads, Highways & Bridges	–	–		–	–			–	
	2. Construction Projects for Roads, Highways and Bridges		–		–	–				
	3. Construction Site Chemical Control for Roads, Highways and Bridges		–							
	4. Operation and Maintenance-Roads, Highways and Bridges	–	–			–			–	

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APPENDIX A

Annual Average Sediment Load Summary Memorandum

SUMMARY MEMORANDUM
Annual Average Sediment Load
Bay Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Peach/Houston

Major River Basin: Ocmulgee
8-Digit Hydrologic Unit Code(s): 03070104

Waterbody Name: Bay Creek
Location: Headwaters to Beaver Creek
Stream Length: 9 miles
Watershed Area: 2.30 square miles
Tributary to: Big Indian Creek

Constituent(s) of Concern: Sediment

Designated Use: Fishing (not supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA): 100 tons/yr
Fort Valley WPCP 100 tons/yr
Future Construction Sites Meet requirements of General Storm Water Permit

Load Allocation (LA): 597 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 697 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Big Sandy Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Butts

Major River Basin: Ocmulgee
8-Digit Hydrologic Unit Code(s): 03070103

Waterbody Name: Big Sandy Creek
Location: Upstream Indian Springs
Stream Length: 8 miles
Watershed Area: 5.11 square miles
Tributary to: Ocmulgee River

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites **Meet requirements of General Storm Water Permit**

Load Allocation (LA): 1,507 tons/yr
Land Use 1,363 tons/yr
Road 144 tons yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 1,507 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Brown Branch

1. 303(d) Listed Waterbody Information

State: Georgia
County: Henry

Major River Basin: Ocmulgee
8-Digit Hydrologic Unit Code(s): 03070103

Waterbody Name: Brown Branch
Location: Headwaters (Locust Grove) to Wolf Creek
Stream Length: 5 miles
Watershed Area: 5.00 square miles
Tributary to: Wolf Creek

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites — Meet requirements of General Storm Water Permit

Load Allocation (LA): 1,664 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load): 1,664 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Butlers Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Jones

Major River Basin: Ocmulgee
8-Digit Hydrologic Unit Code(s): 03070103

Waterbody Name: Butlers Creek
Location: Tributary to Ocmulgee River
Stream Length: 5 miles
Watershed Area: 4.62 square miles
Tributary to: Ocmulgee River

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites **Meet requirements of General Storm Water Permit**

Load Allocation (LA): 270 tons/yr
Land Use 33 tons/yr
Road 237 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 270 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Cabin Creek

1. 303(d) Listed Waterbody Information

State:	**Georgia**
County:	**Spalding/Butts**
Major River Basin:	**Ocmulgee**
8-Digit Hydrologic Unit Code(s):	**03070103**
Waterbody Name:	**Cabin Creek**
Location:	**Headwaters (Griffin) to Towaliga River**
Stream Length:	**16 miles**
Watershed Area:	**12.53 square miles**
Tributary to:	**Towaliga River**
Constituent(s) of Concern:	**Sediment**
Designated Use:	**Fishing (not supporting designated use)**

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):	**257 tons/yr**
Griffin – Cabin Creek WPCP	**68 tons/yr**
Spring Industries, Inc .	**189 tons/yr**
Future Construction Sites	**Meet requirements of General Storm Water Permit**
Load Allocation (LA):	**3,893 tons/yr**
Margin of Safety (MOS):	**implicit**
Annual Average Sediment Load:	**4,150 tons/yr**

SUMMARY MEMORANDUM
Annual Average Sediment Load
Calaparchee Creek

1. 303(d) Listed Waterbody Information

State:	**Georgia**
County:	**Monroe/Bibb**
Major River Basin:	**Ocmulgee**
8-Digit Hydrologic Unit Code(s):	**03070103**
Waterbody Name:	**Calaparchee Creek**
Location:	**Upstream Lake Wildwood**
Stream Length:	**13 miles**
Watershed Area:	**4.14 square miles**
Tributary to:	**Rocky Creek**
Constituent(s) of Concern:	**Sediment**
Designated Use:	**Fishing (partially supporting designated use)**

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):

Future Construction Sites	**Meet requirements of General Storm Water Permit**
Load Allocation (LA):	**1,331 tons/yr**
Margin of Safety (MOS):	**implicit**
Annual Average Sediment Load:	**1,331 tons/yr**

SUMMARY MEMORANDUM
Annual Average Sediment Load
Cole Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Lamar/Monroe

Major River Basin: Ocmulgee
8-Digit Hydrologic Unit Code(s): 03070103

Waterbody Name: Cole Creek
Location: Tributary to Tobesofkee Creek
Stream Length: 6 miles
Watershed Area: 1.51 square miles
Tributary to: Tobesofkee Creek

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites — Meet requirements of General Storm Water Permit

Load Allocation (LA): 484 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 484 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Eightmile Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Monroe

Major River Basin: Ocmulgee
8-Digit Hydrologic Unit Code(s): 03070103

Waterbody Name: Eightmile Creek
Location: Tributary to Towaliga River
Stream Length: 5 miles
Watershed Area: 1.01 square miles
Tributary to: Towaliga River

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites **Meet requirements of General Storm Water Permit**

Load Allocation (LA): 92 tons/yr
Land Use 75 tons/yr
Road 17 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 92 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Gladesville Creek

1. 303(d) Listed Waterbody Information

State:	**Georgia**
County:	**Jasper**
Major River Basin:	**Ocmulgee**
8-Digit Hydrologic Unit Code(s):	**03070103**
Waterbody Name:	**Gladesville Creek**
Location:	**Headwaters to Little Falling Creek**
Stream Length:	**9 miles**
Watershed Area:	**5.53 square miles**
Tributary to:	**Little Falling Creek**
Constituent(s) of Concern:	**Sediment**
Designated Use:	**Fishing (partially supporting designated use)**

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):		
	Future Construction Sites	**Meet requirements of General Storm Water Permit**
Load Allocation (LA):		**656 tons/yr**
	Land Use	**482 tons/yr**
	Road	**174 tons/yr**
Margin of Safety (MOS):		**implicit**
Annual Average Sediment Load:		**656 tons/yr**

SUMMARY MEMORANDUM
Annual Average Sediment Load
Hansford Branch

1. 303(d) Listed Waterbody Information

State:	**Georgia**
County:	**Monroe**
Major River Basin:	**Ocmulgee**
8-Digit Hydrologic Unit Code(s):	**03070103**
Waterbody Name:	**Hansford Branch**
Location:	**Monroe County**
Stream Length:	**2 miles**
Watershed Area:	**0.97 square miles**
Tributary to:	**Standard Creek**
Constituent(s) of Concern:	**Sediment**
Designated Use:	**Fishing (partially supporting designated use)**

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):	
Future Construction Sites	**Meet requirements of General Storm Water Permit**
Load Allocation (LA):	**28.4 tons/yr**
Land Use	**16.7 tons/yr**
Road	**11.7 tons/yr**
Margin of Safety (MOS):	**implicit**
Annual Average Sediment Load:	**28.4 tons/yr**

SUMMARY MEMORANDUM
Annual Average Sediment Load
Harmon Pye Branch

1. 303(d) Listed Waterbody Information

State: Georgia
County: Jasper

Major River Basin: Ocmulgee
8-Digit Hydrologic Unit Code(s): 03070103

Waterbody Name: Harmon Pye Branch
Location: Tributary to Wise Creek
Stream Length: 1 miles
Watershed Area: 2.78 square miles
Tributary to: Wise Creek

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites **Meet requirements of General Storm Water Permit**

Load Allocation (LA): 337 tons/yr
Land Use 222 tons/yr
Road 115 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 337 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Hartley Branch

1. 303(d) Listed Waterbody Information

State: Georgia
County: Crawford

Major River Basin: Ocmulgee
8-Digit Hydrologic Unit Code(s): 03070103

Waterbody Name: Hartley Branch
Location: Tributary to Deep Creek
Stream Length: 1 miles
Watershed Area: 4.29 square miles
Tributary to: Deep Creek

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites **Meet requirements of General Storm Water Permit**

Load Allocation (LA): 1,420 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 1,420 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Herds Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Jasper

Major River Basin: Ocmulgee
8-Digit Hydrologic Unit Code(s): 03070103

Waterbody Name: Herds Creek
Location: Downstream Ga. Hwy 212 to Ocmulgee River
Stream Length: 6 miles
Watershed Area: 14.00 square miles
Tributary to: Ocmulgee River

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites — Meet requirements of General Storm Water Permit

Load Allocation (LA): 1,370 tons/yr
Land Use — 945 tons/yr
Road — 425 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 1,370 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Little Chehaw Creek

1. 303(d) Listed Waterbody Information

State:	**Georgia**
County:	**Jones**
Major River Basin:	**Ocmulgee**
8-Digit Hydrologic Unit Code(s):	**03070103**
Waterbody Name:	**Little Chehaw Creek**
Location:	**Headwaters to Chehaw Creek**
Stream Length:	**3 miles**
Watershed Area:	**3.07 square miles**
Tributary to:	**Chehaw Creek**
Constituent(s) of Concern:	**Sediment**
Designated Use:	**Fishing (partially supporting designated use)**

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):	
Future Construction Sites	**Meet requirements of General Storm Water Permit**
Load Allocation (LA):	**1,048 tons/yr**
Margin of Safety (MOS):	**implicit**
Annual Average Sediment Load:	**1,048 tons/yr**

SUMMARY MEMORANDUM
Annual Average Sediment Load
Little Deer Creek Tributary

1. 303(d) Listed Waterbody Information

State:	**Georgia**
County:	**Monroe**
Major River Basin:	**Ocmulgee**
8-Digit Hydrologic Unit Code(s):	**03070103**
Waterbody Name:	**Little Deer Creek Tributary**
Location:	**Headwaters to Little Deer Creek**
Stream Length:	**1 mile**
Watershed Area:	**1.20 square miles**
Tributary to:	**Little Deer Creek**
Constituent(s) of Concern:	**Sediment**
Designated Use:	**Fishing (partially supporting designated use)**

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):	**38 tons/yr**
Davidson Mineral Outfall 001	**35 tons/yr**
Davidson Mineral Outfall 002	**3 tons/yr**
Future Construction Sites	**Meet requirements of General Storm Water Permit**
Load Allocation (LA):	**345 tons/yr**
Margin of Safety (MOS):	**implicit**
Annual Average Sediment Load:	**383 tons/yr**

SUMMARY MEMORANDUM
Annual Average Sediment Load
Little Deer Creek

1. 303(d) Listed Waterbody Information

State:	**Georgia**
County:	**Monroe**
Major River Basin:	**Ocmulgee**
8-Digit Hydrologic Unit Code(s):	**03070103**
Waterbody Name:	**Little Deer Creek**
Location:	**Headwaters to Deer Creek**
Stream Length:	**6 miles**
Watershed Area:	**9.22 square miles**
Tributary to:	**Deer Creek**
Constituent(s) of Concern:	**Sediment**
Designated Use:	**Fishing (partially supporting designated use)**

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):	**40 tons/yr**
Davidson Mineral Outfall 001	**35 tons/yr**
Davidson Mineral Outfall 002	**3 tons/yr**
DOT Rest Area #22/I-75	**2 tons/yr**
Future Construction Sites	**Meet requirements of General Storm Water Permit**
Load Allocation (LA):	**3,035 tons/yr**
Margin of Safety (MOS):	**implicit**
Annual Average Sediment Load:	**3,075 tons/yr**

SUMMARY MEMORANDUM
Annual Average Sediment Load
Little Shellstone Creek

1. 303(d) Listed Waterbody Information

State:	**Georgia**
County:	**Bleckley**
Major River Basin:	**Ocmulgee**
8-Digit Hydrologic Unit Code(s):	**03070104**
Waterbody Name:	**Little Shellstone Creek**
Location:	**Bleckley County**
Stream Length:	**4 miles**
Watershed Area:	**1.22 square miles**
Tributary to:	**Shellstone Creek**
Constituent(s) of Concern:	**Sediment**
Designated Use:	**Fishing (partially supporting designated use)**

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):	
Future Construction Sites	**Meet requirements of General Storm Water Permit**
Load Allocation (LA):	**151 tons/yr**
Land Use	**142 tons/yr**
Road	**9 tons/yr**
Margin of Safety (MOS):	**implicit**
Annual Average Sediment Load:	**151 tons/yr**

SUMMARY MEMORANDUM
Annual Average Sediment Load
Long Branch

1. 303(d) Listed Waterbody Information

State:	**Georgia**
County:	**Jasper**
Major River Basin:	**Ocmulgee**
8-Digit Hydrologic Unit Code(s):	**03070103**
Waterbody Name:	**Long Branch**
Location:	**Tributary to Ocmulgee River**
Stream Length:	**3 miles**
Watershed Area:	**2.62 square miles**
Tributary to:	**Ocmulgee River**
Constituent(s) of Concern:	**Sediment**
Designated Use:	**Fishing (partially supporting designated use)**

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):	
Future Construction Sites	**Meet requirements of General Storm Water Permit**
Load Allocation (LA):	**491 tons/yr**
Land Use	**415 tons/yr**
Road	**76 tons/yr**
Margin of Safety (MOS):	**implicit**
Annual Average Sediment Load:	**491 tons/yr**

SUMMARY MEMORANDUM
Annual Average Sediment Load
Malholms Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Butts

Major River Basin: Ocmulgee
8-Digit Hydrologic Unit Code(s): 03070103

Waterbody Name: Malholms Creek
Location: Headwaters (Jenkinsburg) to Tussahaw Creek
Stream Length: 6 mile
Watershed Area: 2.33 square miles
Tributary to: Tussahaw Creek

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites — Meet requirements of General Storm Water Permit

Load Allocation (LA): 755 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 755 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Mill Dam Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Monroe

Major River Basin: Ocmulgee
8-Digit Hydrologic Unit Code(s): 03070103

Waterbody Name: Mill Dam Creek
Location: Monroe County
Stream Length: 4 mile
Watershed Area: 2.12 square miles
Tributary to: Standard Creek

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites **Meet requirements of General Storm Water Permit**

Load Allocation (LA): 225 tons/yr
Land Use 195 tons/yr
Road 30 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 225 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Phinazee Creek

1. 303(d) Listed Waterbody Information

State:	**Georgia**
County:	**Lamar/Monroe**
Major River Basin:	**Ocmulgee**
8-Digit Hydrologic Unit Code(s):	**03070103**
Waterbody Name:	**Phinazee Creek**
Location:	**Lamar/Monroe Counties**
Stream Length:	**6 mile**
Watershed Area:	**2.87 square miles**
Tributary to:	**White Creek**
Constituent(s) of Concern:	**Sediment**
Designated Use:	**Fishing (partially supporting designated use)**

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):	
Future Construction Sites	**Meet requirements of General Storm Water Permit**
Load Allocation (LA):	**382 tons/yr**
Land Use	**355 tons/yr**
Road	**27 tons/yr**
Margin of Safety (MOS):	**implicit**
Annual Average Sediment Load:	**382 tons/yr**

SUMMARY MEMORANDUM
Annual Average Sediment Load
Red Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Monroe

Major River Basin: Ocmulgee
8-Digit Hydrologic Unit Code(s): 03070103

Waterbody Name: Red Creek
Location: Headwaters to Rocky Creek
Stream Length: 3 mile
Watershed Area: 12.39 square miles
Tributary to: Rocky Creek

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites **Meet requirements of General Storm Water Permit**

Load Allocation (LA): 1,226 tons/yr
Land Use 965 tons/yr
Road 261 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 1,226 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Rock Creek

1. 303(d) Listed Waterbody Information

State:	**Georgia**
County:	**Jones**
Major River Basin:	**Ocmulgee**
8-Digit Hydrologic Unit Code(s):	**03070103**
Waterbody Name:	**Rock Creek**
Location:	**Upstream Lite-N-Tie Rd**
Stream Length:	**1 mile**
Watershed Area:	**1.36 square miles**
Tributary to:	**Walnut Creek**
Constituent(s) of Concern:	**Sediment**
Designated Use:	**Fishing (partially supporting designated use)**

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):	**90 tons/yr**
Southern Aggregates	**90 tons/yr**
Future Construction Sites	**Meet requirements of General Storm Water Permit**
Load Allocation (LA):	**368 tons/yr**
Margin of Safety (MOS):	**implicit**
Annual Average Sediment Load:	**458 tons/yr**

SUMMARY MEMORANDUM
Annual Average Sediment Load
Rocky Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Jasper

Major River Basin: Ocmulgee
8-Digit Hydrologic Unit Code(s): 03070103

Waterbody Name: Rocky Creek
Location: Jasper County
Stream Length: 5 mile
Watershed Area: 1.60 square miles
Tributary to: South River

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites **Meet requirements of General Storm Water Permit**

Load Allocation (LA): 252 tons/yr
Land Use 247 tons/yr
Road 5 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 252 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Rocky Creek

1. 303(d) Listed Waterbody Information

State:	**Georgia**
County:	**Monroe/Butts**
Major River Basin:	**Ocmulgee**
8-Digit Hydrologic Unit Code(s):	**03070103**
Waterbody Name:	**Rocky Creek**
Location:	**Upstream Big Sandy Creek**
Stream Length:	**6 mile**
Watershed Area:	**3.44 square miles**
Tributary to:	**Big Sandy Creek**
Constituent(s) of Concern:	**Sediment**
Designated Use:	**Fishing (partially supporting designated use)**

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):	
Future Construction Sites	**Meet requirements of General Storm Water Permit**
Load Allocation (LA):	**346 tons/yr**
Land Use	**234 tons/yr**
Road	**112 tons/yr**
Margin of Safety (MOS):	**implicit**
Annual Average Sediment Load:	**346 tons/yr**

SUMMARY MEMORANDUM
Annual Average Sediment Load
Rocky Creek

1. 303(d) Listed Waterbody Information

State:	**Georgia**
County:	**Monroe/Bibb**
Major River Basin:	**Ocmulgee**
8-Digit Hydrologic Unit Code(s):	**03070103**
Waterbody Name:	**Rocky Creek**
Location:	**Upstream Lake Wildwood**
Stream Length:	**7 mile**
Watershed Area:	**6.23 square miles**
Tributary to:	**Lake Wildwood**
Constituent(s) of Concern:	**Sediment**
Designated Use:	**Fishing (partially supporting designated use)**

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):	
Future Construction Sites	**Meet requirements of General Storm Water Permit**
Load Allocation (LA):	**1,613 tons/yr**
Land Use	**1,502 tons/yr**
Road	**111 tons/yr**
Margin of Safety (MOS):	**implicit**
Annual Average Sediment Load:	**1,613 tons/yr**

SUMMARY MEMORANDUM
Annual Average Sediment Load
Rocky Creek

1. 303(d) Listed Waterbody Information

State:	**Georgia**
County:	**Monroe**
Major River Basin:	**Ocmulgee**
8-Digit Hydrologic Unit Code(s):	**03070103**
Waterbody Name:	**Rocky Creek**
Location:	**Downstream English Rd (CR152) to Towaliga River**
Stream Length:	**4 mile**
Watershed Area:	**6.60 square miles**
Tributary to:	**Towaliga River**
Constituent(s) of Concern:	**Sediment**
Designated Use:	**Fishing (partially supporting designated use)**

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):	
Future Construction Sites	**Meet requirements of General Storm Water Permit**
Load Allocation (LA):	**1,283 tons/yr**
Land Use	**1,075 tons/yr**
Road	**208 tons/yr**
Margin of Safety (MOS):	**implicit**
Annual Average Sediment Load:	**1,283 tons/yr**

SUMMARY MEMORANDUM
Annual Average Sediment Load
Rum Creek

1. 303(d) Listed Waterbody Information

State:	**Georgia**
County:	**Monroe**
Major River Basin:	**Ocmulgee**
8-Digit Hydrologic Unit Code(s):	**03070103**
Waterbody Name:	**Rum Creek**
Location:	**Rum and Town Creeks, upstream Lake Juliette**
Stream Length:	**6 mile**
Watershed Area:	**11.36 square miles**
Tributary to:	**Lake Juliette**
Constituent(s) of Concern:	**Sediment**
Designated Use:	**Fishing (partially supporting designated use)**

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):	**64 tons/yr**
Forsyth Northeast WPCP	**64 tons/yr**
Future Construction Sites	**Meet requirements of General Storm Water Permit**
Load Allocation (LA):	**2,898 tons/yr**
Land Use	**2,640 tons/yr**
Road	**258 tons/yr**
Margin of Safety (MOS):	**implicit**
Annual Average Sediment Load:	**2,962 tons/yr**

SUMMARY MEMORANDUM
Annual Average Sediment Load
Sand Branch

1. 303(d) Listed Waterbody Information

State:	**Georgia**
County:	**Monroe**
Major River Basin:	**Ocmulgee**
8-Digit Hydrologic Unit Code(s):	**03070103**
Waterbody Name:	**Sand Branch**
Location:	**Tributary to Towaliga River**
Stream Length:	**2 mile**
Watershed Area:	**1.14 square miles**
Tributary to:	**Towaliga River**
Constituent(s) of Concern:	**Sediment**
Designated Use:	**Fishing (partially supporting designated use)**

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):	
Future Construction Sites	**Meet requirements of General Storm Water Permit**
Load Allocation (LA):	**51 tons/yr**
Land Use	**43 tons/yr**
Road	**8 tons/yr**
Margin of Safety (MOS):	**implicit**
Annual Average Sediment Load:	**51 tons/yr**

SUMMARY MEMORANDUM
Annual Average Sediment Load
Scoggins Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Monroe

Major River Basin: Ocmulgee
8-Digit Hydrologic Unit Code(s): 03070103

Waterbody Name: Scoggins Creek
Location: Tributary to Ocmulgee River
Stream Length: 2 mile
Watershed Area: 3.51 square miles
Tributary to: Ocmulgee River

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites **Meet requirements of General Storm Water Permit**

Load Allocation (LA): 535 tons/yr
Land Use 144 tons/yr
Road 391 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 535 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Shellstone Creek

1. 303(d) Listed Waterbody Information

State:	**Georgia**
County:	**Bleckley/Twiggs**
Major River Basin:	**Ocmulgee**
8-Digit Hydrologic Unit Code(s):	**03070104**
Waterbody Name:	**Shellstone Creek**
Location:	**U.S. Hwy 23 to Ocmulgee River**
Stream Length:	**8 mile**
Watershed Area:	**42.82 square miles**
Tributary to:	**Ocmulgee River**
Constituent(s) of Concern:	**Sediment**
Designated Use:	**Fishing (partially supporting designated use)**

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):	
Future Construction Sites	**Meet requirements of General Storm Water Permit**
Load Allocation (LA):	**14,991 tons/yr**
Margin of Safety (MOS):	**implicit**
Annual Average Sediment Load:	**14,991 tons/yr**

SUMMARY MEMORANDUM
Annual Average Sediment Load
Third Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Jones

Major River Basin: Ocmulgee
8-Digit Hydrologic Unit Code(s): 03070103

Waterbody Name: Third Creek
Location: Tributary to Ocmulgee River
Stream Length: 3 mile
Watershed Area: 3.17 square miles
Tributary to: Ocmulgee River

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites **Meet requirements of General Storm Water Permit**

Load Allocation (LA): 72 tons/yr
Land Use 67 tons/yr
Road 5 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 72 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Tobesofkee Creek

1. 303(d) Listed Waterbody Information

State:	**Georgia**
County:	**Lamar/Monroe**
Major River Basin:	**Ocmulgee**
8-Digit Hydrologic Unit Code(s):	**03070103**
Waterbody Name:	**Tobesofkee Creek**
Location:	**Barnesville to Cole Creek**
Stream Length:	**8 mile**
Watershed Area:	**27.72 square miles**
Tributary to:	**Tobesofkee Creek to Ocmulgee River**
Constituent(s) of Concern:	**Sediment**
Designated Use:	**Fishing (partially supporting designated use)**

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):	**43 tons/yr**
William Carter	**0 tons/yr**
Barnesville WPCP	**43 tons/yr**
Future Construction Sites	**Meet requirements of General Storm Water Permit**
Load Allocation (LA):	**9,217 tons/yr**
Land Use	**8,533 tons/yr**
Road	**684 tons/yr**
Margin of Safety (MOS):	**implicit**
Annual Average Sediment Load:	**9,260 tons/yr**

SUMMARY MEMORANDUM
Annual Average Sediment Load
Tobler Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Monroe

Major River Basin: Ocmulgee
8-Digit Hydrologic Unit Code(s): 03070103

Waterbody Name: Tobler Creek
Location: Tributary to Ocmulgee River
Stream Length: 6 mile
Watershed Area: 9.34 square miles
Tributary to: Ocmulgee River

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites — Meet requirements of General Storm Water Permit

Load Allocation (LA): 2,271 tons/yr
Land Use — 2,024 tons/yr
Road — 247 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 2,271 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Tributary to Tobesofkee Creek

1. 303(d) Listed Waterbody Information

State:	**Georgia**
County:	**Lamar**
Major River Basin:	**Ocmulgee**
8-Digit Hydrologic Unit Code(s):	**03070103**
Waterbody Name:	**Tributary to Tobesofkee Creek**
Location:	**Barnesville**
Stream Length:	**2 mile**
Watershed Area:	**1.13 square miles**
Tributary to:	**Tobesofkee Creek**
Constituent(s) of Concern:	**Sediment**
Designated Use:	**Fishing (partially supporting designated use)**

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):	
William Carter	**0 tons/yr**
Future Construction Sites	**Meet requirements of General Storm Water Permit**
Load Allocation (LA):	**358 tons/yr**
Margin of Safety (MOS):	**implicit**
Annual Average Sediment Load:	**358 tons/yr**

SUMMARY MEMORANDUM
Annual Average Sediment Load
Town Branch

1. 303(d) Listed Waterbody Information

State: Georgia
County: Butts

Major River Basin: Ocmulgee
8-Digit Hydrologic Unit Code(s): 03070103

Waterbody Name: Town Branch
Location: Downstream Jackson Southside WPCP to Aboothlacoosta Creek
Stream Length: 3 mile
Watershed Area: 2.32 square miles
Tributary to: Aboothlacoosta Creek

Constituent(s) of Concern: Sediment

Designated Use: Fishing (not supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA): 21 tons/yr
Jackson- Southside WPCP 21 tons/yr
Future Construction Sites Meet requirements of General Storm Water Permit

Load Allocation (LA): 269 tons/yr
Land Use 171 tons/yr
Road 98 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 290 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Walnut Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Crawford

Major River Basin: Ocmulgee
8-Digit Hydrologic Unit Code(s): 03070103

Waterbody Name: Walnut Creek
Location: Downstream Hwy 42
Stream Length: 4 mile
Watershed Area: 12.99 square miles
Tributary to: Echeconnee Creek

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites **Meet requirements of General Storm Water Permit**

Load Allocation (LA): 2,758 tons/yr
Land Use 2,373 tons/yr
Road 385 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 2,758 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Walnut Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Jones/Bibb

Major River Basin: Ocmulgee
8-Digit Hydrologic Unit Code(s): 03070103

Waterbody Name: Walnut Creek
Location: Headwaters to Ocmulgee River
Stream Length: 20 mile
Watershed Area: 31.01 square miles
Tributary to: Ocmulgee River

Constituent(s) of Concern: Sediment

Designated Use: Fishing (not supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites — Meet requirements of General Storm Water Permit

Load Allocation (LA): 10,551 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 10,551 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
White Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Lamar/Monroe

Major River Basin: Ocmulgee
8-Digit Hydrologic Unit Code(s): 03070103

Waterbody Name: White Creek
Location: Lamar/Monroe Counties
Stream Length: 4 mile
Watershed Area: 2.81 square miles
Tributary to: Red Creek

Constituent(s) of Concern: Sediment

Designated Use: Fishing (partially supporting designated use)

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):
Future Construction Sites — Meet requirements of General Storm Water Permit

Load Allocation (LA): 438 tons/yr
Land Use — 343 tons/yr
Road — 95 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 438 tons/yr

SUMMARY MEMORANDUM
Annual Average Sediment Load
Wise Creek

1. 303(d) Listed Waterbody Information

State:	**Georgia**
County:	**Lamar**
Major River Basin:	**Ocmulgee**
8-Digit Hydrologic Unit Code(s):	**03070103**
Waterbody Name:	**Wise Creek**
Location:	**Headwaters to Ocmulgee River**
Stream Length:	**6 mile**
Watershed Area:	**11.31 square miles**
Tributary to:	**Ocmulgee River**
Constituent(s) of Concern:	**Sediment**
Designated Use:	**Fishing (not supporting designated use)**

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):	
Future Construction Sites	**Meet requirements of General Storm Water Permit**
Load Allocation (LA):	**1,769 tons/yr**
Land Use	**1,521 tons/yr**
Road	**248 tons/yr**
Margin of Safety (MOS):	**implicit**
Annual Average Sediment Load:	**1,769 tons/yr**

SUMMARY MEMORANDUM
Annual Average Sediment Load
Wood Creek

1. 303(d) Listed Waterbody Information

State:	**Georgia**
County:	**Lamar/Monroe**
Major River Basin:	**Ocmulgee**
8-Digit Hydrologic Unit Code(s):	**03070103**
Waterbody Name:	**Wood Creek**
Location:	**Headwaters to downstream Ga Hwy 83**
Stream Length:	**3 mile**
Watershed Area:	**1.96 square miles**
Tributary to:	**Echeconnee Creek**
Constituent(s) of Concern:	**Sediment**
Designated Use:	**Fishing (partially supporting designated use)**

Applicable Water Quality Standard:
All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

2. TMDL Development

Analysis/Modeling:
Universal Soil Loss Equation was used to determine the average annual sediment load

3. Allocation Watershed/Stream Reach:

Wasteload Allocations (WLA):	
Future Construction Sites	**Meet requirements of General Storm Water Permit**
Load Allocation (LA):	**634 tons/yr**
Margin of Safety (MOS):	**implicit**
Annual Average Sediment Load:	**634 tons/yr**