Total Maximum Daily Load

Evaluation

for

Twenty-Five Stream Segments

in the

Chattahoochee 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* (GA EPD, 2000-2001).

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 twenty-five (25) stream segments located in the Chattahoochee 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. During 1998-2003, the Department of Natural Resources (DNR) Wildlife Resources Division (WRD) conducted studies of fish populations in the Chattahoochee 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. Twenty-five (25) stream segments in the Piedmont ecoregion with fish populations rated as Poor or Very Poor were listed as Biota Impacted, and were included in the partially supporting or not supporting list. Twenty-eight (28) stream segments in the Piedmont ecoregion were rated as Excellent, Good or Fair and assessed as supporting their designated water use.

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 total 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 the partially supporting 303(d) listed watersheds not previously assess, as well as the unimpaired watersheds in the same ecoregion, 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 of the Chattahoochee River Basin impaired watersheds located in the Piedmont ecoregion is 0.22 tons/acre/yr. The average sediment load of the

unimpaired watersheds located within the Piedmont ecoregion is 0.07 tons/acre/yr. This value represents sediment load contributions from all land uses within the unimpaired watersheds.

Table 1 shows that approximately 30.40 percent of the total sediment load in the Chattahoochee River Basin is from roads. Approximately 27.49 percent of the total sediment load results from pastureland with an average sediment load of 0.16 tons/acre/yr. Urban land contributes approximately 17.28 percent of the total sediment load, grasses and wetlands make up about 13.12 percent, and quarries, strip mine and gravel pits contribute approximately 5.55 percent of the total sediment load. 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 Chattahoochee River Basin

Land Use	Average Percent Land Use	Average Percent Sediment Load	Average Sediment Load (tons/acre/yr)
Open Water	0.89%	0.48%	0.16
Urban	13.61%	17.28%	0.32
Bare Rock, Sand and Clay	0.69%	0.00%	0.00
Quarries, Strip Mines, Gravel Pits	1.13%	5.55%	28.01
Forest	50.00%	4.26%	0.02
Pasture/Hay	19.26%	27.49%	0.16
Row Crops	0.13%	1.41%	5.13
Grasses, Wetland	14.28%	13.12%	0.50
Roads		30.40%	

These data indicate that agricultural lands may be a 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 Chattahoochee River Basin streams without causing sediment impairment to the streams. This is based on the hypothesis that if an impaired watershed has a total annual 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 total annual sediment load in the Chattahoochee River Basin unimpaired watersheds located in the Piedmont ecoregion is 0.07 tons/acre/yr. The total annual sediment loads for the impaired watersheds are summarized in Table 2, along with any required sediment load reductions.

Table 2. Total Annual Sediment Loads and the Required Sediment Load Reductions

Name	Current Load (tons/yr)	WLA (tons/yr)	WLAsw (tons/yr)	LA (tons/yr)	Allowable Total Load (tons/yr)	Allowable Maximum Daily Load (tons/day)	% Reduction
Bear Creek	714.2	3.0	495.7	212.4	711.1	91.7	0.43%
Browns Creek	296.6			296.6	296.6	38.3	0.00%
Bull Creek	2,890.1		835.5	722.1	1,557.6	200.9	46.10%
Dean Creek	842.3			266.6	266.6	34.4	68.34%
Deep Creek	1,041.5		729.0	312.4	1,041.5	134.4	0.00%
Flat Creek (PS)	468.2			338.5	338.5	43.7	27.71%
Flat Creek (NS)	539.8	140.3	8.3	4.1	152.8	19.7	71.70%
Hazel Creek	864.5			349.6	349.6	45.1	59.56%
Ivy Creek	632.9		245.3	106.3	351.6	45.4	44.45%
Long Island Creek	395.1		171.0	73.3	244.3	31.5	38.18%
Maple Branch	43.6			43.6	43.6	5.6	0.00%
Mountain Creek	714.1	34.3	58.4	253.6	346.3	44.7	51.51%
Mud Creek	998.4	91.3		353.4	444.7	57.4	55.46%
Nancy Creek	2,629.1	170.8	1,068.5	457.9	1,697.1	218.9	35.45%
Nickajack Creek	2,221.1	30.4	979.6	419.8	1,429.9	184.5	35.62%
North Fork Peachtree Creek	669.3	1.3	346.9	148.7	496.9	64.1	25.77%
Noses Creek	1,356.6	1.2	193.0	82.7	276.9	35.7	79.59%
Pea Creek	276.9		193.8	83.1	276.9	35.7	0.00%
Six Mile Creek	3,885.5	54.1	59.7	25.6	139.3	18.0	96.41%
South Fork Limestone Creek/ Limestone Creek	269.2		56.8	24.3	81.2	10.5	69.85%
Suwanee Creek	1,500.4	91.3	382.3	192.9	666.5	86.0	55.58%
Tributary to Limestone Creek	236.1		46.3	19.8	66.2	8.5	71.97%
Turner Creek	1,062.6			379.8	379.8	49.0	64.26%
Ward Creek	775.8		236.2	101.2	337.4	43.5	56.51%
White Creek	1,047.7			378.7	378.7	48.9	63.86%

Management practices that may be used to help maintain the annual average 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; and
- Evaluation of the effects of increased flow due to urban runoff on stream bank erosion.

Though 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.

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* (GA EPD, 2000-2001).

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During 1998 through 2003, the Department of Natural Resources (DNR) Wildlife Resources Division (WRD) conducted studies of fish populations in the Chattahoochee 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, and were included in the partially supporting or not supporting list. Twenty-five (25) stream segments were rated as Poor or Very Poor, placed on the 303(d) list as partially supporting their designated use, and scheduled for TMDL evaluation (Table 3). Twenty-eight (28) stream segments in the Piedmont ecoregion were rated as Excellent, Good or Fair and assessed as supporting their designated water use.

Table 3. 303(d) Listed Stream Segments Located in the Chattahoochee River Basin

Stream	Status	Location	Miles
Bear Creek	Partially Supporting	Little Bear Creek to Chattahoochee River	4
Browns Creek	Partially Supporting	Headwaters to Cedar Creek	5
Bull Creek	Partially Supporting	Flat Rock Creek to Cooper Creek, Columbus	3
Dean Creek	Partially Supporting	Headwaters to Mossy Creek	5
Deep Creek	Partially Supporting	Line Creek to Chattahoochee River	3
Flat Creek	Partially Supporting	Headwaters near Clermont to Lake Lanier	9
Flat Creek	Not Supporting	Headwaters, Gainesville to Lake Lanier	6
Hazel Creek	Partially Supporting	Reservoir No. 12 to Law Creek	4
Ivy Creek	Partially Supporting	Headwaters to Suwannee Creek	10
Long Island Creek	Not Supporting	Headwaters to Chattahoochee River	5
Maple Branch	Partially Supporting	Headwaters to Mountain Creek	4
Mountain Creek	Partially Supporting	Trib. to Mountain Creek (d/s SR 34) to Maple Branch	4

Stream	Status	Location	Miles
Mud Creek	Not Supporting	Headwaters to Little Mud Creek	13
Nancy Creek	Not Supporting	Headwaters to Peachtree Creek, Atlanta	16
Nickajack Creek	Not Supporting	Headwaters to Chattahoochee River	11
North Fork Peachtree Creek	Not Supporting	Headwaters to Peachtree Creek	14
Noses Creek	Partially Supporting	Headwaters to Ward Creek	7
Pea Creek	Partially Supporting	Cedar Grove Lake to Chattahoochee River	6
Six Mile Creek	Not Supporting	Headwaters to Lake Lanier	2
South Fork Limestone Creek/ Limestone Creek	Not Supporting	Headwaters to Limestone Creek Arm of Lake Lanier	2
Suwanee Creek	Partially Supporting	Suwanee Creek Lake (near Buford) to Ivy Creek	6
Tributary to Limestone Creek	Partially Supporting	Breneau Lake to Limestone Creek	1
Turner Creek	Partially Supporting	Headwaters to Tesnatee Creek	6
Ward Creek	Partially Supporting	Headwaters to Noses Creek	6
White Creek	Partially Supporting	Headwaters to Webster Lake, Cleveland	6

1.2 Watershed Description

The twenty-five (25) impaired stream segments are located in the Chattahoochee River Basin are located in Cobb, Coweta, DeKalb, Forsyth, Fulton, Gwinnett, Habersham, Hall, Muscogee, and White Counties. The twenty-eight (28) unimpaired watersheds are located in the following counties: Carroll, Coweta, Douglas, Heard, Meriwether, and Troup.

The land use characteristics of the Chattahoochee River Basin watersheds were determined using data from Georgia's National Land Cover Data (NLCD). This coverage is based on Landsat Thematic Mapper digital images developed in 2001. The classification is based on a modified Anderson level one and two system. Table 4 lists the land use distribution of the watersheds located in the Piedmont ecoregion. The watersheds are grouped by those that are unimpaired, followed by those that are impaired. Table 5 lists the land use percentages for all the Chattahoochee River Basin watersheds monitored in a similar fashion. The data show that the watersheds are predominately forested with approximately 50.0 percent (ranging from 10.37 to 92.45 percent) in forest use. Agriculture is the next predominate land use at approximately 19.4%, consisting of approximately 19.26 percent pastureland (ranging from 0.61 to 52.31 percent) and approximately 0.13 percent row crops (ranging from 0.0 to 2.78 percent).

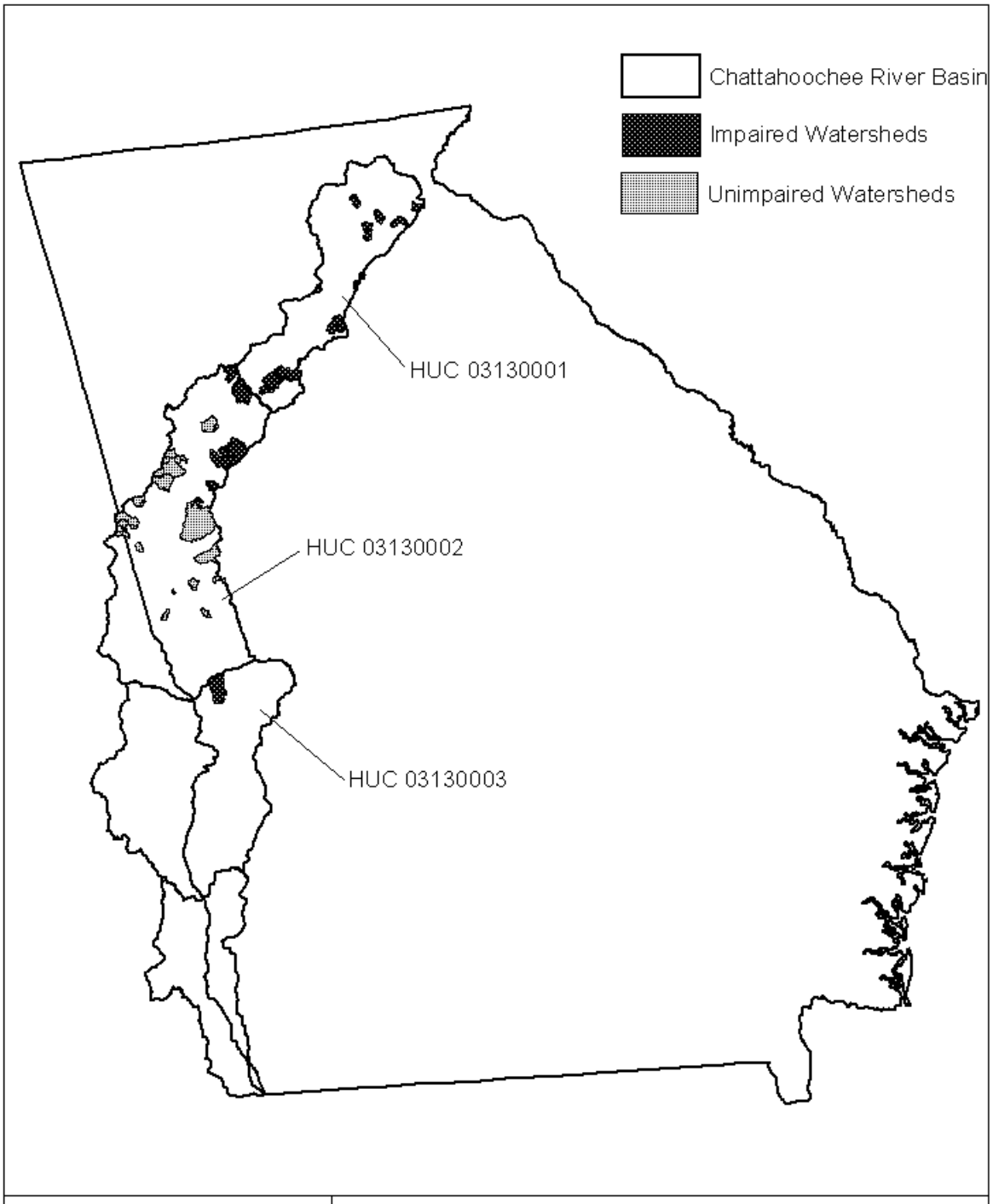
The soil characteristics of the Chattahoochee River Basin watersheds were determined using data from the State Soil Geographic (STATSGO) coverage. This coverage provides major soil type classifications. Table 6 lists the soil type distribution of the monitored watersheds.

1.3 Water Quality Standard

The water use classification for the impaired watersheds in the Chattahoochee River Basin is Fishing. The criterion violated is listed as Biota Impacted, which indicates that studies have shown a significant impact on fish. The potential cause(s) listed include urban runoff, nonpoint sources, and

a municipal facility. The narrative standard exists to prevent objectionable conditions that interfere with legitimate water uses, as stated in Georgia's *Rules and Regulations for Water Quality Control*, Chapter 391-3-6-.03(5)(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.



TMDL Evaluation - Biota Chattahoochee River Basin	Figure 1. Impaired and Unimpaired Watersheds Monitored in the Chattahoochee River Basin

Table 4. Land Use Distribution (Unimpaired – Piedmont Ecoregion)

	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	Deciduous Forest	Evergreen Forest	Mixed Forest	Deciduous Shrubland	Pasture/Hay	Row Crops	Other Grasses (Urban Recreational)	Woody Wetland	Total
Annewakee Creek u/s	72.1	2,681.1	724.1	586.4	68.3		1,668.8	1,250.7	26.2	58.0	688.1		1,970.1	54.0	9,848.0
Annewakee Creek d/s	79.2	2,875.7	733.9	588.0	82.7		1,874.3	1,418.6	35.1	80.3	894.0		2,198.5	74.9	10,935.2
Beech Creek	17.6	10.7			113.0		565.1	651.8	8.5	64.3	440.8	1.1	63.4	27.6	1,963.7
Big Branch	17.6	18.2	0.7		65.2		654.7	938.5	26.7	25.1	832.6		61.6	79.4	2,720.2
Blue John Creek	14.0	1,133.7	317.8	116.3	6.4		462.3	711.0	85.4	30.2	728.3		839.7	27.1	4,472.4
Brush Creek	19.3	26.0	0.4		46.5	51.1	1,076.1	924.7	6.4	114.5	873.5	1.8	51.8	77.2	3,269.5
Copeland Creek	6.2	6.7			4.0		394.7	327.6	0.9	91.6	299.1		15.8	2.9	1,149.5
Flat Creek	120.3	140.1	6.4		67.6		4,170.9	5,460.5	174.6	337.4	3,783.2	20.2	435.2	914.7	15,631.1
Flat Shoals Creek		1.1					240.4	330.2	4.2	3.1	17.6		15.1	10.0	621.8
Gum Branch	1.1	2.9	0.2				352.5	42.0	4.7	28.5	400.3		28.0	3.1	863.3
Gum Creek	10.7	27.8	7.1		8.9		1,925.6	1,098.8	23.1	71.8	1,503.8		131.2	80.3	4,889.2
Hillabahatchee Creek	17.1	51.8	3.8	1.3	249.5		6,240.4	4,117.9	61.4	485.5	2,631.5		251.5	38.7	14,150.5
Little Snake Creek	8.0	16.7	2.9		8.7		768.1	991.2	3.8	15.1	252.0		70.7	3.3	2,140.5
Long Cane Creek	19.6	18.5		2.4	11.1		1,221.8	1,065.2	50.0	35.4	896.4		104.7	92.3	3,517.5
Long Cane Creek	22.7	19.3		2.4	11.1		1,263.6	1,122.2	52.3	36.2	930.9		117.0	95.8	3,673.6
New River	1,168.0	918.9	123.4	38.7	134.5	79.2	14,297.5	19,028.8	455.4	664.3	14,036.0	38.0	2,377.8	3,270.2	56,630.6
Norman Creek		52.5					624.2	486.6	14.0	54.5	526.2		91.2	10.2	1,859.4
Panther Creek	6.9	4.7	0.4				274.2	411.9	0.9	5.8	268.4		54.7	13.6	1,041.4
Polecat Creek	48.7	42.3	3.1	6.9	9.1		435.7	419.0	42.0	45.1	1,206.2	0.9	136.8	82.5	2,478.3
Red Oak Creek	6.7	11.6			24.5		1,393.0	1,005.9	14.9	109.4	773.5		101.4	10.7	3,451.4
Snake Creek u/s	71.6	174.6	20.7	4.9	11.1		1,349.4	1,516.5	22.7	84.1	1,087.0		270.2	20.7	4,633.4
Snake Creek d/s	174.4	471.0	39.6	9.3	310.7		9,064.9	7,597.9	74.1	625.8	5,803.2	9.6	1,101.5	157.5	25,439.3
Town Creek	28.0	60.5	3.3	0.9	5.6		1,028.1	722.3	12.0	112.8	742.8		117.0	16.5	2,849.7
Trib to Whooping Creek	4.0	7.3	4.7	0.9			160.3	132.5	4.0	15.3	109.6		15.8	5.3	459.9
Whooping Creek u/s	78.9	175.2	13.3	4.9	4.7		969.8	850.0	20.5	39.1	841.1		241.7	42.5	3,281.8
Whooping Creek mid	111.0	366.9	44.0	14.7	20.5	4,689.5	4,495.8	1,039.7	484.4	3,514.6	950.7	462.1	348.3	52.5	16,594.5
Whooping Creek d/s	111.9	380.9	44.0	14.7	21.3	4,689.5	4,756.0	1,322.3	499.3	3,545.3	1,232.5	462.1	404.5	64.0	17,548.3
Wolf Creek	20.9	17.1	0.9		0.9		646.7	392.1	2.0	16.7	532.8		37.1	23.1	1,690.4

Table 4. Land Use Distribution (Impaired – Piedmont Ecoregion)

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	Deciduous Forest	Evergreen Forest	Mixed Forest	Deciduous Shrubland	Pasture/Hay	Row Crops	Other Grasses (Urban Recreational)	Woody Wetland	Emergent Herbaceous Wetlands	Total
Bear Creek	125.9	392.3	125.9	42.7	65.2		6,262.9	5,711.8	121.6	282.2	2,269.5	0.9	1,335.2	707.2	1.3	17,444.5
Browns Creek	351.6	253.1	1.8		2.7		1,861.6	1,375.0	19.8	39.6	891.3		312.2	44.3		5,152.9
Bull Creek	366.5	1,645.9	497.5	231.1	98.3	22.5	5,767.4	5,559.5	1,329.0	112.3	2,511.9	336.9	1,645.4	884.4	58.5	21,066.9
Dean Creek	7.3	50.7	21.6	6.7	33.1		1,350.6	240.8	44.7	32.9	1,432.6		385.4			3,606.4
Deep Creek	209.3	777.7	126.3	30.2	244.0		6,808.2	4,670.3	128.3	177.2	2,211.2	4.2	1,885.0	257.1		17,529.0
Flat Creek (PS)	25.1	106.7	34.9	3.1	15.6		1,342.6	225.3	44.5	65.2	2,276.4		387.4	51.4		4,578.1
Flat Creek (NS)	1.3	589.8	368.5	296.9	63.8		190.6	83.4	24.0	1.1	83.4		359.2	4.2		2,066.2
Hazel Creek	58.0	117.9	51.8	4.7	20.7		2,151.6	200.1	63.6	34.7	1,646.8		364.3	14.5		4,728.6
Ivy Creek	15.8	769.2	56.7	6.4	103.6		1,304.5	754.8	24.0	28.7	1,025.2		636.7	29.1		4,754.9
Long Island Creek	16.7	681.6	251.7	125.2	4.4		673.8	456.8	9.1	0.9	22.2		1,059.7	1.8		3,304.0
Maple Branch	22.5	57.8	2.4	0.9	0.9		98.7	174.4	4.4	4.4	295.1		69.8	10.2		741.7
Mountain Creek	20.7	703.0	83.2	75.8	4.9	0.0	1,009.0	1,272.1	116.1	41.4	542.8	0.0	737.7	76.9	0.0	4,683.5
Mud Creek	8.0	496.4	146.6	116.5	57.6		2,287.7	304.4	84.3	47.1	1,721.7		713.4	31.1		6,014.9
Nancy Creek	169.5	4,748.2	2,529.9	1,596.1	91.6	0.0	2,682.4	2,966.2	179.0	6.7	219.7	0.0	7,691.0	73.8	0.0	22,954.1
Nickajack Creek	112.1	5,461.8	1,224.7	477.7	189.3	0.0	3,337.8	1,949.9	93.2	14.7	475.5	0.0	5,859.0	144.6	0.0	19,340.1
North Fork Peachtree Creek	9.1	1,750.6	1,379.0	1,399.9	11.6		276.0	408.1	13.1	2.2	40.7		1,377.9	51.8		6,720.1
Noses Creek	27.1	432.1	102.7	46.5	7.6	9.8	1,269.8	908.7	18.7	4.9	279.3		610.0	28.2		3,745.4
Pea Creek	102.5	84.7	12.2		68.3		2,436.7	1,086.8	35.8	53.8	654.9		362.3	102.7		5,000.8
Six Mile Creek	25.1	27.4	24.9	2.0	16.0	115.6	572.4	97.6	25.4	19.3	839.3		119.6			1,884.7
South Fork Limestone Creek/Limestone Creek	5.3	264.9	93.8	35.4	1.1		237.5	159.0	30.5		62.3		207.9			1,097.7
Suwanee Creek	6.9	1,700.1	599.3	300.2	218.4		2,867.2	844.6	94.3	53.2	696.1		1,472.9	161.5		9,014.7
Trib to Limestone	2.2	170.3	89.4	28.5	3.1		290.2	24.2	7.8	1.1	28.9		249.1			894.9
Turner Creek	85.0	34.2	12.9	1.8	24.9		3,094.3	613.1	227.7	56.3	515.5	2.7	459.5	8.9		5,136.7
Ward Creek	26.7	862.4	134.1	68.3	27.8		740.1	1,097.3	30.7	2.9	141.0		1,384.8	47.4		4,563.4
White Creek	18.0	100.5	33.6	6.9	22.2		1,602.1	227.5	74.1	40.0	2,678.9		317.6			5,121.3

Table 5. Land Use Percentages (Unimpaired – Piedmont Ecoregion)

	Percent Total Land Use													
Name	**Open Water**	**Low Intensity Residential**	**High Intensity Residential**	**High Intensity Commercial Industrial Transportation**	**Bare Rock Sand and Clay**	**Quarries Strip Mines Gravel Pits**	**Deciduous Forest**	**Evergreen Forest**	**Mixed Forest**	**Deciduous Shrubland**	**Pasture/Hay**	**Row Crops**	**Other Grasses (Urban Recreational)**	**Woody Wetland**
Annewakee Creek u/s	0.73%	27.22%	7.35%	5.95%	0.69%	0.00%	16.95%	12.70%	0.27%	0.59%	6.99%	0.00%	20.01%	0.55%
Annewakee Creek d/s	0.72%	26.30%	6.71%	5.38%	0.76%	0.00%	17.14%	12.97%	0.32%	0.73%	8.18%	0.00%	20.10%	0.69%
Beech Creek	0.89%	0.54%	0.00%	0.00%	5.75%	0.00%	28.78%	33.19%	0.43%	3.27%	22.45%	0.06%	3.23%	1.40%
Big Branch	0.65%	0.67%	0.02%	0.00%	2.40%	0.00%	24.07%	34.50%	0.98%	0.92%	30.61%	0.00%	2.26%	2.92%
Blue John Creek	0.31%	25.35%	7.11%	2.60%	0.14%	0.00%	10.34%	15.90%	1.91%	0.68%	16.28%	0.00%	18.78%	0.61%
Brush Creek	0.59%	0.80%	0.01%	0.00%	1.42%	1.56%	32.91%	28.28%	0.20%	3.50%	26.72%	0.05%	1.58%	2.36%
Copeland Creek	0.54%	0.58%	0.00%	0.00%	0.35%	0.00%	34.34%	28.50%	0.08%	7.97%	26.02%	0.00%	1.37%	0.25%
Flat Creek	0.77%	0.90%	0.04%	0.00%	0.43%	0.00%	26.68%	34.93%	1.12%	2.16%	24.20%	0.13%	2.78%	5.85%
Flat Shoals Creek	0.00%	0.18%	0.00%	0.00%	0.00%	0.00%	38.66%	53.11%	0.68%	0.50%	2.83%	0.00%	2.43%	1.61%
Gum Branch	0.13%	0.33%	0.03%	0.00%	0.00%	0.00%	40.83%	4.87%	0.54%	3.30%	46.37%	0.00%	3.25%	0.36%
Gum Creek	0.22%	0.57%	0.15%	0.00%	0.18%	0.00%	39.39%	22.47%	0.47%	1.47%	30.76%	0.00%	2.68%	1.64%
Hillabahatchee Creek	0.12%	0.37%	0.03%	0.01%	1.76%	0.00%	44.10%	29.10%	0.43%	3.43%	18.60%	0.00%	1.78%	0.27%
Little Snake Creek	0.37%	0.78%	0.14%	0.00%	0.41%	0.00%	35.89%	46.31%	0.18%	0.71%	11.77%	0.00%	3.30%	0.16%
Long Cane Creek u/s	0.56%	0.52%	0.00%	0.07%	0.32%	0.00%	34.73%	30.28%	1.42%	1.01%	25.49%	0.00%	2.98%	2.62%
Long Cane Creek d/s	0.62%	0.53%	0.00%	0.07%	0.30%	0.00%	34.40%	30.55%	1.42%	0.99%	25.34%	0.00%	3.18%	2.61%
New River	2.06%	1.62%	0.22%	0.07%	0.24%	0.14%	25.25%	33.60%	0.80%	1.17%	24.79%	0.07%	4.20%	5.77%
Norman Creek	0.00%	2.82%	0.00%	0.00%	0.00%	0.00%	33.57%	26.17%	0.75%	2.93%	28.30%	0.00%	4.90%	0.55%
Panther Creek	0.66%	0.45%	0.04%	0.00%	0.00%	0.00%	26.33%	39.55%	0.09%	0.56%	25.77%	0.00%	5.25%	1.30%
Polecat Creek	1.97%	1.70%	0.13%	0.28%	0.37%	0.00%	17.58%	16.91%	1.70%	1.82%	48.67%	0.04%	5.52%	3.33%
Red Oak Creek	0.19%	0.34%	0.00%	0.00%	0.71%	0.00%	40.36%	29.14%	0.43%	3.17%	22.41%	0.00%	2.94%	0.31%
Snake Creek u/s	1.55%	3.77%	0.45%	0.11%	0.24%	0.00%	29.12%	32.73%	0.49%	1.81%	23.46%	0.00%	5.83%	0.45%
Snake Creek d/s	0.69%	1.85%	0.16%	0.04%	1.22%	0.00%	35.63%	29.87%	0.29%	2.46%	22.81%	0.04%	4.33%	0.62%
Town Creek	0.98%	2.12%	0.12%	0.03%	0.20%	0.00%	36.08%	25.35%	0.42%	3.96%	26.07%	0.00%	4.10%	0.58%
Trib to Whooping Creek	0.87%	1.60%	1.02%	0.19%	0.00%	0.00%	34.86%	28.82%	0.87%	3.34%	23.84%	0.00%	3.43%	1.16%
Whooping Creek u/s	2.41%	5.34%	0.41%	0.15%	0.14%	0.00%	29.55%	25.90%	0.62%	1.19%	25.63%	0.00%	7.37%	1.29%
Whooping Creek mid	0.67%	2.21%	0.27%	0.09%	0.12%	28.26%	27.09%	6.27%	2.92%	21.18%	5.73%	2.78%	2.10%	0.32%
Whooping Creek d/s	0.64%	2.17%	0.25%	0.08%	0.12%	26.72%	27.10%	7.54%	2.85%	20.20%	7.02%	2.63%	2.31%	0.36%
Wolf Creek	1.24%	1.01%	0.05%	0.00%	0.05%	0.00%	38.26%	23.19%	0.12%	0.99%	31.52%	0.00%	2.20%	1.37%

Table 5. Land Use Percentages (Impaired – Piedmont Ecoregion)

Percent Total Land Use															
Name	Open Water	Low Intensity Residential	High Intensity Residential	High Intensity Commercial Industrial Transportation	Bare Rock Sand and Clay	Quarries Strip Mines Gravel Pits	Deciduous Forest	Evergreen Forest	Mixed Forest	Deciduous Shrubland	Pasture/Hay	Row Crops	Other Grasses (Urban Recreational)	Woody Wetland	Emergent Herbaceous Wetlands
Bear Creek	0.72%	2.25%	0.72%	0.24%	0.37%	0.00%	35.90%	32.74%	0.70%	1.62%	13.01%	0.01%	7.65%	4.05%	0.01%
Browns Creek	6.82%	4.91%	0.03%	0.00%	0.05%	0.00%	36.13%	26.68%	0.38%	0.77%	17.30%	0.00%	6.06%	0.86%	0.00%
Bull Creek	1.74%	7.81%	2.36%	1.10%	0.47%	0.11%	27.38%	26.39%	6.31%	0.53%	11.92%	1.60%	7.81%	4.20%	0.28%
Dean Creek	0.20%	1.41%	0.60%	0.18%	0.92%	0.00%	37.45%	6.68%	1.24%	0.91%	39.72%	0.00%	10.69%	0.00%	0.00%
Deep Creek	1.19%	4.44%	0.72%	0.17%	1.39%	0.00%	38.84%	26.64%	0.73%	1.01%	12.61%	0.02%	10.75%	1.47%	0.00%
Flat Creek (PS)	0.55%	2.33%	0.76%	0.07%	0.34%	0.00%	29.33%	4.92%	0.97%	1.42%	49.72%	0.00%	8.46%	1.12%	0.00%
Flat Creek (NS)	0.06%	28.54%	17.83%	14.37%	3.09%	0.00%	9.22%	4.04%	1.16%	0.05%	4.04%	0.00%	17.38%	0.20%	0.00%
Hazel Creek	1.23%	2.49%	1.10%	0.10%	0.44%	0.00%	45.50%	4.23%	1.35%	0.73%	34.83%	0.00%	7.70%	0.31%	0.00%
Ivy Creek	0.33%	16.18%	1.19%	0.14%	2.18%	0.00%	27.44%	15.87%	0.51%	0.60%	21.56%	0.00%	13.39%	0.61%	0.00%
Long Island Creek	0.50%	20.63%	7.62%	3.79%	0.13%	0.00%	20.39%	13.83%	0.28%	0.03%	0.67%	0.00%	32.07%	0.05%	0.00%
Maple Branch	3.03%	7.80%	0.33%	0.12%	0.12%	0.00%	13.31%	23.51%	0.60%	0.60%	39.79%	0.00%	9.42%	1.38%	0.00%
Mountain Creek	0.44%	15.01%	1.78%	1.62%	0.10%	0.00%	21.54%	27.16%	2.48%	0.88%	11.59%	0.00%	15.75%	1.64%	0.00%
Mud Creek	0.13%	8.25%	2.44%	1.94%	0.96%	0.00%	38.03%	5.06%	1.40%	0.78%	28.62%	0.00%	11.86%	0.52%	0.00%
Nancy Creek	0.74%	20.69%	11.02%	6.95%	0.40%	0.00%	11.69%	12.92%	0.78%	0.03%	0.96%	0.00%	33.51%	0.32%	0.00%
Nickajack Creek	0.58%	28.24%	6.33%	2.47%	0.98%	0.00%	17.26%	10.08%	0.48%	0.08%	2.46%	0.00%	30.29%	0.75%	0.00%
North Fork Peachtree Creek	0.14%	26.05%	20.52%	20.83%	0.17%	0.00%	4.11%	6.07%	0.20%	0.03%	0.61%	0.00%	20.50%	0.77%	0.00%
Noses Creek	0.72%	11.54%	2.74%	1.24%	0.20%	0.26%	33.90%	24.26%	0.50%	0.13%	7.46%	0.00%	16.29%	0.75%	0.00%
Pea Creek	2.05%	1.69%	0.24%	0.00%	1.37%	0.00%	48.73%	21.73%	0.72%	1.08%	13.10%	0.00%	7.24%	2.05%	0.00%
Six Mile Creek	1.33%	1.45%	1.32%	0.11%	0.85%	6.14%	30.37%	5.18%	1.35%	1.03%	44.53%	0.00%	6.35%	0.00%	0.00%
South Fork Limestone Creek/Limestone Creek	0.49%	24.13%	8.55%	3.22%	0.10%	0.00%	21.64%	14.49%	2.78%	0.00%	5.67%	0.00%	18.94%	0.00%	0.00%
Suwanee Creek	0.08%	18.86%	6.65%	3.33%	2.42%	0.00%	31.81%	9.37%	1.05%	0.59%	7.72%	0.00%	16.34%	1.79%	0.00%
Trib to Limestone Creek	0.25%	19.04%	9.99%	3.18%	0.35%	0.00%	32.43%	2.71%	0.87%	0.12%	3.23%	0.00%	27.83%	0.00%	0.00%
Turner Creek	1.65%	0.67%	0.25%	0.03%	0.48%	0.00%	60.24%	11.94%	4.43%	1.10%	10.04%	0.05%	8.94%	0.17%	0.00%
Ward Creek	0.58%	18.90%	2.94%	1.50%	0.61%	0.00%	16.22%	24.04%	0.67%	0.06%	3.09%	0.00%	30.35%	1.04%	0.00%
White Creek	0.35%	1.96%	0.66%	0.13%	0.43%	0.00%	31.28%	4.44%	1.45%	0.78%	52.31%	0.00%	6.20%	0.00%	0.00%

Table 6. Soil Type Distribution (Unimpaired – Piedmont Ecoregion)

Name	Drainage Area (sq miles)	AL085	AL076	GA129	GA108	GA037	GA026	GA025
K-Factor		0.27	0.27	0.14	0.27	0.27	0.25	0.27
Annewakee Creek u/s	15.39			8,817.3				1,030.6
Annewakee Creek d/s	17.09			9,847.0			61.9	1,026.3
Beech Creek	3.07							1,963.7
Big Branch	4.25							2,720.2
Blue John Creek	6.99							4,472.4
Brush Creek	5.11				1,747.5		1,522.1	
Copeland Creek	1.80				780.1	369.4		
Flat Creek	24.42							15,631.1
Flat Shoals Creek	0.97							621.8
Gum Branch	1.35						507.7	355.6
Gum Creek	7.64						2,179.0	2,710.1
Hillabahatchee Creek	22.11	328.9	2,119.1		2,417.0	8,133.0		1,152.5
Little Snake Creek	3.34						1,132.8	1,007.7
Long Cane Creek u/s	5.50							3,517.5
Long Cane Creek d/s	5.50							3,673.6
New River	5.74						1,577.1	55,053.6
Norman Creek	2.91						211.0	1,648.3
Panther Creek	1.63						117.9	923.6
Polecat Creek	3.87							2,478.3
Red Oak Creek	5.39	320.9	522.0		1,339.6	1,269.0		
Snake Creek u/s	7.24						1,971.0	2,662.5
Snake Creek d/s	39.75						14,657.9	10,781.4
Town Creek	4.45	754.2	885.6	0.0	718.6	491.2		
Trib to Whooping Creek	0.72						77.6	382.3
Whooping Creek u/s	5.13						1,064.2	2,217.6
Whooping Creek mid	25.93						7,760.4	8,834.1
Whooping Creek d/s	27.42						8,224.9	9,323.4
Wolf Creek	2.64							1,690.4

Table 6. Soil Type Distribution (Impaired – Piedmont Ecoregion)

Name	Drainage Area (sq miles)	GA129	GA128	GA127	GA041	GA039	GA029	GA026	GA025	GA019
K-Factor		**0.14**	**0.13**	**0.03**	**0.17**	**0.13**	**0.24**	**0.25**	**0.27**	**0.25**
Bear Creek	27.26							5,441.4	12,003.1	
Browns Creek	8.05							286.0	4,866.9	
Bull Creek	32.92				2,682.1	8,611.3		5,716.0	4,057.6	
Dean Creek	5.64									
Deep Creek	27.39	1,514.5						792.4	15,222.1	
Flat Creek (PS)	7.15						1,159.4	193.1	3,225.6	
Flat Creek (NS)	3.23							790.0	1,276.2	
Hazel Creek	7.39							86.8	4,641.8	
Ivy Creek	7.43							2,118.3	2,636.6	
Long Island Creek	5.16	3,304.0								
Maple Branch	1.16								741.7	
Mountain Creek	7.32								4,683.5	
Mud Creek	9.40							6,014.9		
Nancy Creek	35.87	22,317.1	1.7	635.3						
Nickajack Creek	30.22	15,619.1	3,721.0							
North Fork Peachtree Creek	10.50	6,720.1								
Noses Creek	5.85	922.3						354.3	2,468.8	
Pea Creek	7.81							508.5	4,492.3	
Six Mile Creek	2.94							1,247.0	637.7	
South Fork Limestone Creek/Limestone Creek	1.72							83.7	1,014.0	
Suwanee Creek	14.09							592.9	8,421.8	
Tributary to Limestone Creek	1.40							473.7	421.2	
Turner Creek	8.03							3,662.8	278.8	1,195.1
Ward Creek	7.13	1,299.6						1,344.0	1,919.9	
White Creek	8.00							4,051.5	1,069.8	

2.0 WATER QUALITY ASSESSMENT

2.1 Fish Sampling

From 1998 to 2003, the Department of Natural Resources (DNR) Wildlife Resources Division (WRD) conducted studies of fish populations at a number of monitoring sites in the Chattahoochee River Basin. 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 listings of Biota Impacted stream segments on Georgia's 303(d) list.

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 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. Fifty-six (56) sites were sampled within the Chattahoochee River Basin in this ecoregion (see Tables 7, 8, and 9). 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 Apalachicola drainage basin, which includes the Chattahoochee and Flint 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 within the Watershed Protection Branch (WPB) of the Georgia Environmental Protection Division (GA EPD) 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 7 summarizes WRD's fish community study scores. The IBI, IWB, and Habitat Assessment scores are listed and the watersheds are grouped by the unimpaired watersheds, followed by the impaired watersheds. In addition, the table includes the drainage areas upstream of the monitoring points and the county in which the monitoring points are located. Table 8 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 9 provides a summary of these field measurements.

Visual observations of the stream and watershed were also made by WRD 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 7. 1998-2003 WRD's Fish Community Study Scores (Unimpaired – Piedmont Ecoregion)

Stream Name	Drainage Area upstream from the monitoring point (sq mile)	County	Date	IBI Score	IBI Category	IWB Score	IWB Category	Habitat Total
Annewakee Creek u/s	15.7	Douglas	08/20/1999	38	Fair	7.8	Fair	45.6
Annewakee Creek d/s	17.5	Douglas	08/20/1999	42	Fair	8	Fair	55.5
Beech Creek	3.2	Meriwether	05/17/1999	34	Fair	6	Fair	65.4
Big Branch	4.3	Troup	06/09/1999	36	Fair	6.5	Fair	82.4
Blue John Creek	7.2	Troup	04/06/1998	38	Fair	6.2	Fair	91.3
Brush Creek	5.2	Heard	09/27/2000	38	Fair	6.7	Fair	58.0
Copeland Creek	2.1	Heard	08/24/1998	34	Fair	7.2	Fair	163.3
Flat Creek	27.1	Troup	08/10/1999	36	Fair	8.3	Fair	63.1
Flat Shoals Creek	1.0	Meriwether	05/18/1999	34	Fair	6.9	Fair	78.0
Gum Branch	1.4	Heard	08/21/1998	46	Good	6.5	Fair	134.0
Gum Creek	7.7	Heard	08/25/1998	50	Good	8.6	Excellent	120.3
Gum Creek	7.7	Heard	07/16/1999	50	Good	8.1	Good	121.5
Gum Creek	7.7	Heard	09/18/2001	50	Good	8.5	Excellent	116.9
Hillabahatchee Creek	22.6	Heard	09/01/1999	52	Excellent	10	Excellent	149.9
Hillabahatchee Creek	22.6	Heard	09/28/2000	52	Excellent	9.9	Excellent	148.6
Hillabahatchee Creek	22.6	Heard	09/19/2001	46	Good	9.5	Good	141.3
Little Snake Creek	3.4	Carroll	08/19/1998	36	Fair	7.9	Good	154.7
Long Cane Creek u/s	5.6	Troup	06/09/1999	42	Fair	7.8	Good	68.9
Long Cane Creek d/s	5.9	Troup	07/28/1999	40	Fair	7.3	Good	68.5
New River	98.0	Heard	09/27/2000	40	Fair	7.7	Fair	78.0
Norman Creek	3.0	Carroll	08/25/1998	36	Fair	8	Good	144.3
Panther Creek	1.8	Troup	05/20/1999	36	Fair	5.7	Poor	89.7
Polecat Creek	4.4	Troup	08/11/1999	36	Fair	6.3	Fair	76.1
Red Oak Creek	5.7	Heard	08/26/1998	34	Fair	7.1	Fair	114.3
Snake Creek u/s	7.4	Carroll	08/19/1998	46	Good	8.3	Good	147.0
Snake Creek u/s	7.4	Carroll	03/01/1999	40	Fair	8.1	Good	106.4
Snake Creek d/s	40.6	Carroll	09/02/1999	48	Good	9.3	Good	70.2
Town Creek	9.9	Heard	08/31/1999	46	Good	7.9	Good	133.3
Trib to Whooping Creek	0.8	Carroll	08/21/1998	40	Fair	6.5	Fair	122.7
Whooping Creek u/s	5.1	Carroll	08/21/1998	48	Good	8.6	Excellent	112.3
Whooping Creek mid	26.4	Carroll	09/02/1999	56	Excellent	10.4	Excellent	123.1
Whooping Creek mid	26.4	Carroll	09/29/2000	50	Good	10.1	Excellent	142.9
Whooping Creek mid	26.4	Carroll	09/18/2001	54	Excellent	10	Good	134.8
Whooping Creek d/s	28.0	Carroll	04/19/2001	44	Good	8.5	Fair	117.2
Wolf Creek	2.7	Carroll	07/08/1998	38	Fair	6.9	Fair	136.3

Table 7. 1998-2003 WRD's Fish Community Study Scores (Impaired – Piedmont Ecoregion)

Stream Name	Drainage Area upstream from the monitoring point (sq mile)	County	Date	IBI Score	IBI Category	IWB Score	IWB Category	Habitat Total
Bear Creek	28.0	Fulton	10/14/2003	30	Poor	8.30	Fair	57.4
Browns Creek	8.2	Coweta	09/26/2000	24	Very Poor	5.6	Poor	73.1
Bull Creek	33.8	Muscogee	06/14/2000	28	Poor	7.8	Fair	55.9
Dean Creek	5.8	White	07/22/2003	32	Poor	7.00	Fair	74.2
Deep Creek	27.7	Fulton	10/14/2003	30	Poor	6.30	Poor	55.4
Flat Creek (PS)	7.4	Hall	06/10/2003	20	Very Poor	4.90	Very Poor	63.2
Flat Creek (NS)	3.7	Hall	06/10/2003	18	Very Poor	3.50	Very Poor	68.9
Hazel Creek	7.6	Habersham	06/25/2003	24	Very Poor	6.30	Fair	71.4
Ivy Creek	7.7	Gwinnett	08/07/2003	26	Poor	6.2	Fair	53.4
Long Island Creek	5.8	Fulton	06/12/2003	22	Very Poor	7.80	Good	77.2
Maple Branch	1.3	Coweta	09/26/2000	22	Very Poor	3.7	Very Poor	89.6
Mountain Creek	7.7	Coweta	09/27/2000	28	Poor	7.1	Fair	81.7
Mud Creek	10.1	Habersham	06/25/2003	22	Very Poor	6.30	Fair	71.4
Nancy Creek u/s	12.6	DeKalb	07/31/2003	28	Poor	7.70	Good	85.7
Nancy Creek mid	30.9	Fulton	10/07/2003	18	Very Poor	5.40	Very Poor	57.1
Nancy Creek d/s	37.2	Fulton	10/07/2003	24	Very Poor	6.80	Fair	87.4
Nickajack Creek u/s	11.7	Cobb	10/06/2003	28	Poor	7.60	Good	75.0
Nickajack Creek d/s	31.2	Cobb	10/07/2003	24	Very Poor	7.90	Fair	85.1
North Fork Peachtree Creek	10.9	DeKalb	07/31/2003	20	Very Poor	6.10	Fair	68.7
Noses Creek	6.1	Cobb	06/12/2003	26	Poor	6.30	Fair	78.6
Pea Creek	8.5	Fulton	10/14/2003	28	Poor	6.20	Fair	85.4
Six Mile Creek	3.1	Forsyth	05/14/2003	24	Very Poor	5.90	Fair	88.4
South Fork Limestone Creek/Limestone Creek	1.9	Hall	05/14/2003	20	Very Poor	5.50	Poor	78.9
Suwanee Creek	14.4	Gwinnett	08/27/2003	20	Very Poor	6.50	Fair	56.3
Tributary to Limestone Creek	1.6	Hall	05/14/2003	28	Poor	6.50	Fair	86.5
Turner Creek	8.3	White	07/22/2003	26	Poor	7.00	Fair	84.3
Ward Creek	7.3	Cobb	06/12/2003	14	Very Poor	4.30	Very Poor	58.0
White Creek	8.3	White	07/22/2003	20	Very Poor	5.30	Poor	60.8

Table 8. 1998-2003 WRD's Habitat Assessment Scores (Unimpaired – Piedmont Ecoregion)

Stream Name	Date	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)	Instream Cover / Epifaunal	Epifaunal	Velocity Depth	Habitat Total
Annewakee Creek u/s	08/20/1999	1.3	12.3	1.8	0.0	6.8	2.5	2.4	2.2	2.6	4.8	0.6	5.60	2.70		45.6
Annewakee Creek d/s	08/20/1999	1.4	12.0	2.7	0.0	7.7	3.5	3.2	2.9	2.5	9.0	3.0	5.60	2.10		55.5
Beech Creek	05/17/1999	5.5	13.7	6.2	0.0	7.6	3.3	3.1	4.1	3.7	9.0	0.7	2.70	6.00		65.4
Big Branch	06/09/1999	4.7	14.3	3.2	0.0	8.2	3.8	4.7	3.3	4.3	9.0	9.0	5.90	11.90		82.4
Blue John Creek	04/06/1998	6.0	5.3	4.0	10.3	11.0	6.3	6.3	4.0	4.3	6.3	9.0	11.00	7.30		91.3
Brush Creek	09/27/2000	1.7	16.0	3.2	0.0	8.7	4.3	4.3	3.7	3.7	2.3	2.7	6.00	1.77		58.0
Copeland Creek	08/24/1998	15.0	17.0	15.7	20.0	13.7	8.7	8.7	9.0	8.7	9.0	9.0	16.70	12.30		163.3
Flat Creek	08/10/1999	2.8	12.6	3.8	0.0	6.8	2.5	2.8	3.7	3.7	8.0	9.1	5.40	2.00		63.1
Flat Shoals Creek	05/18/1999	2.2	17.7	5.0	0.0	11.0	3.3	4.5	4.3	5.2	8.3	5.2	11.20	0.00		78.0
Gum Branch	08/21/1998	14.3	16.3	13.3	15.3	10.0	4.3	4.0	3.7	2.7	9.7	9.7	15.30	15.30		134.0
Gum Creek	08/25/1998	11.3	8.7	10.0	18.0	12.3	6.3	5.0	6.3	4.7	9.0	2.7	14.00	12.00		120.3
Gum Creek	07/16/1999	7.9	16.4	9.9	19.0	11.0	7.9	6.0	7.3	5.3	9.1	4.2	7.30	10.10		121.5
Gum Creek	09/18/2001	10.6	16.3	10.6	18.0	9.8	3.1	2.7	2.9	2.2	7.2	5.9	13.6		14.0	116.9
Hillabahatchee Creek	09/01/1999	15.0	16.0	15.2	19.0	8.2	9.0	8.3	8.7	8.0	9.7	9.7	14.00	9.57		149.9
Hillabahatchee Creek	09/28/2000	11.8	16.7	12.8	18.0	11.5	7.9	7.1	7.6	7.2	9.7	9.7	16.00	12.97		148.6
Hillabahatchee Creek	09/19/2001	13.2	16.5	12.9	20.0	12.2	5.3	5.2	5.4	5.0	8.2	8.4	14.7		14.3	141.3
Little Snake Creek	08/19/1998	15.7	11.7	14.0	16.3	11.3	8.0	8.3	8.3	8.0	9.3	9.0	17.70	17.00		154.7
Long Cane Creek u/s	06/09/1999	2.1	15.6	3.4	0.0	7.1	3.9	3.7	3.9	4.0	8.9	9.0	5.00	2.00		68.9
Long Cane Creek d/s	07/28/1999	1.5	9.3	6.1	0.0	7.8	5.6	5.3	5.1	4.8	8.7	8.5	6.00	0.30		68.5
New River	09/27/2000	7.2	16.4	7.3	0.0	8.9	3.6	4.2	3.4	3.7	2.3	3.0	12.00	5.90		78.0
Norman Creek	08/25/1998	15.3	11.7	14.7	16.7	15.7	6.3	6.3	6.7	6.7	6.0	7.3	14.00	17.00		144.3
Panther Creek	05/20/1999	3.9	13.3	5.6	13.5	8.8	3.3	4.5	3.7	4.8	8.5	7.2	4.70	8.10		89.7
Polecat Creek	08/11/1999	4.3	12.5	3.8	18.0	8.0	2.9	3.0	3.6	3.7	0.8	1.2	6.00	7.80		76.1

Stream Name	Date	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)	Instream Cover / Epifaunal	Epifaunal	Velocity Depth	Habitat Total
Red Oak Creek	08/26/1998	9.0	9.7	8.7	14.0	12.3	6.0	5.7	4.3	5.0	9.7	9.0	11.00	10.00		114.3
Snake Creek u/s	08/19/1998	11.7	13.7	14.0	18.3	12.0	7.7	7.3	7.0	7.0	9.0	8.3	13.00	18.00		147.0
Snake Creek u/s	03/01/1999	11.9	13.3	11.2	10.3	5.8	4.3	4.5	4.7	5.9	8.1	8.7	7.20	10.50		106.4
Snake Creek d/s	09/02/1999	1.8	15.9	3.8	0.0	6.9	7.0	5.4	6.5	4.6	8.4	3.8	3.50	2.60		70.2
Town Creek	08/31/1999	14.9	16.4	15.0	15.1	8.9	6.1	6.6	5.5	6.5	8.7	9.1	8.00	13.00		133.3
Trib to Whooping Creek	08/21/1998	14.7	7.7	14.3	18.0	10.0	3.3	3.3	2.3	2.0	9.3	9.3	14.00	14.30		122.7
Whooping Creek u/s	08/21/1998	12.0	7.0	11.0	15.3	15.3	4.0	3.7	4.3	4.0	9.0	1.7	13.70	11.30		112.3
Whooping Creek mid	09/02/1999	13.2	16.6	10.6	18.5	6.9	7.2	6.0	6.7	4.8	9.7	4.6	9.30	9.10		123.1
Whooping Creek mid	09/29/2000	13.7	16.0	13.8	17.0	9.1	7.4	6.5	6.6	5.5	9.7	9.7	13.00	15.03		142.9
Whooping Creek mid	09/18/2001	12.4	16.5	12.5	19.0	10.3	4.9	5.3	4.4	3.8	9.8	9.4	13.30		13.2	134.8
Whooping Creek d/s	04/19/2001	7.4	16.7	7.9	12.0	12.2	4.3	4.6	4.3	4.1	9.1	9.3	11.4		14.0	117.2
Wolf Creek	07/08/1998	11.7	14.7	11.3	15.0	10.3	6.3	6.3	7.3	7.3	9.3	9.3	13.70	13.70		136.3

Table 8. 1998-2003 WRD's Habitat Assessment Scores (Impaired – Piedmont Ecoregion)

Stream Name	Date	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)	Instream Cover / Epifaunal	Velocity Depth	Habitat Total
Bear Creek	10/14/2003	0.33	15.00	1.17	0.00	7.67	2.37	1.60	2.03	1.27	6.83	2.00	6.67	10.50	57.4
Browns Creek	09/26/2000	3.67	16.33	7.10	0.00	14.07	3.90	3.87	3.50	3.23	1.77	5.83	8.00	1.60	73.1
Bull Creek	06/14/2000	0.00	11.13	7.02	0.00	9.53	5.10	5.50	4.85	4.65	4.03	4.25	0.00	0.00	55.9
Dean Creek	07/22/2003	1.23	15.10	1.90	14.50	8.67	2.90	4.43	2.90	4.33	0.23	3.67	5.77	8.57	74.2
Deep Creek	10/14/2003	0.00	14.23	0.67	0.00	6.67	1.73	1.73	1.93	1.93	5.50	7.00	5.33	8.67	55.4
Flat Creek (PS)	06/10/2003	1.50	16.23	3.77	0.00	8.00	2.10	1.87	2.87	2.33	3.33	4.20	9.00	8.00	63.2
Flat Creek (NS)	06/10/2003	3.23	13.03	4.43	0.00	7.60	2.37	2.73	2.43	2.03	6.60	1.87	10.40	12.17	68.9
Hazel Creek	06/25/2003	2.57	11.00	5.10	0.00	11.00	4.33	4.50	3.60	4.07	4.10	2.67	8.33	10.10	71.4
Ivy Creek	08/07/2003	0.00	13.33	0.33	0.00	8.33	1.45	1.58	1.67	1.40	8.43	2.87	4.80	9.15	53.4
Long Island Creek	06/12/2003	7.33	14.77	6.90	0.00	8.50	2.00	2.23	2.83	2.40	4.17	3.07	11.00	12.00	77.2
Maple Branch	09/26/2000	1.00	16.33	1.83	19.00	7.83	4.17	6.17	6.50	7.00	2.83	5.67	4.00	6.97	89.6
Mountain Creek	09/27/2000	0.67	13.00	4.33	0.00	11.33	4.67	4.67	7.33	7.33	8.33	9.33	11.00	0.00	81.7
Mud Creek	06/25/2003	1.67	16.17	3.23	0.00	11.33	2.93	1.37	2.43	1.77	7.23	0.93	9.40	12.90	71.4
Nancy Creek u/s	07/31/2003	1.80	16.00	3.43	0.33	11.17	4.10	4.67	3.40	4.43	6.77	9.33	9.50	10.77	85.7
Nancy Creek mid	10/07/2003	0.33	3.67	2.67	0.00	9.50	1.73	1.93	6.93	6.53	3.43	5.07	4.93	10.33	57.1
Nancy Creek d/s	10/07/2003	5.20	15.57	5.07	13.00	10.77	1.55	1.77	2.22	1.97	6.23	3.75	8.70	11.65	87.4
Nickajack Creek u/s	10/06/2003	4.97	7.77	5.90	0.00	8.67	3.10	3.77	4.73	4.43	5.10	5.93	10.50	10.10	75.0
Nickajack Creek d/s	10/07/2003	0.00	15.43	2.67	13.00	8.44	2.87	3.00	2.97	4.11	3.09	6.32	10.43	12.73	85.1
North Fork Peachtree Creek	07/31/2003	2.43	14.67	1.90	0.00	11.67	2.07	2.83	4.50	1.77	2.33	2.67	8.77	13.10	68.7
Noses Creek	06/12/2003	5.43	13.83	5.07	8.00	12.83	0.77	1.33	1.10	1.10	2.50	3.23	11.43	12.00	78.6
Pea Creek	10/14/2003	0.80	17.10	2.23	13.50	7.83	1.40	1.67	1.57	1.50	9.33	9.33	8.10	11.00	85.4
Six Mile Creek	05/14/2003	6.67	17.33	6.27	13.00	7.33	1.67	1.00	3.10	0.87	6.77	7.33	7.77	9.33	88.4

Stream Name	Date	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)	Instream Cover / Epifaunal	Velocity Depth	Habitat Total
South Fork Limestone Creek/Limestone Creek	05/14/2003	6.40	14.17	6.00	16.00	7.67	2.10	1.50	2.77	1.50	4.43	2.00	6.33	8.00	78.9
Suwanee Creek	08/27/2003	0.33	13.53	3.33	0.00	11.10	1.43	1.03	1.77	1.23	1.00	2.00	9.53	10.00	56.3
Tributary to Limestone Creek	05/14/2003	10.87	11.83	9.17	8.00	9.17	2.33	2.50	2.33	3.00	6.00	1.50	8.33	11.50	86.5
Turner Creek	07/22/2003	5.00	9.33	7.17	0.00	14.00	7.50	7.67	6.17	6.17	0.67	0.67	7.50	12.50	84.3
Ward Creek	06/12/2003	0.50	15.00	3.67	0.00	10.00	1.33	1.17	2.00	2.33	5.50	4.00	5.50	7.00	58.0
White Creek	07/22/2003	0.00	15.90	2.00	0.00	11.00	1.33	2.23	1.43	2.43	3.10	3.23	8.10	10.00	60.8

Table 9. 1998-2003 WRD's Field Measurements (Unimpaired – Piedmont Ecoregion)

Stream Name	Date	Average Stream Width (m)	Average Stream Depth (m)	Reach Length (m)	Number of Riffles	Number of Pools	Deep Pool (m)	Water Temp (deg C)	Dissolved Oxygen (mg / L)	Conductivity (uS)	pH (SU)	Turbidity (NTU)	Total Hardness (mg / L)	Alkalinity (mg / L)
Annewakee Creek u/s	08/20/1999	6.3	0.2	220.5	0	6	0.94	26.6	6.97	73	7.04	4.24	21	25
Annewakee Creek d/s	08/20/1999	7.6	0.34	266	0	13	1.2	24.3	5.25	161.3	6.81	6.52	27	30
Beech Creek	05/17/1999	2.9	0.08	101.5	1	1	0.7	18.6	8.71	42.8	7.39	16.4	17	25
Big Branch	06/09/1999	5.5	0.25	192.5	2	6	0.74	20.5	5.88	41.5	6.88	28.6	13	20
Blue John Creek	04/06/1998	5.2	0.1	182	0	3	0	17	8.25	11.5				
Brush Creek	09/27/2000	3.00	0.12	105	0	1	0.75	18.3	7.47	38	6.5	12.3	11	10
Copeland Creek	08/24/1998													
Flat Creek	08/10/1999	7.5	0.27	262.5	0	7	0.85	24.8	6.7	74.5	7.42	10.5	31	40
Flat Shoals Creek	05/18/1999	2.4	0.26	84	0	1	0.77	18.1	3.51	42.9	6.52	307	15	30
Gum Branch	08/21/1998													
Gum Creek	08/25/1998	7.4	0.25	259	7	10	1.65	21.3	7.81	27.8	6.92	10.1		
Gum Creek	07/16/1999	6.9	0.21	241.5	7	6	1.06	20.5	8.02	31.1	6.39	6.56	11	20
Gum Creek	09/18/2001	7.10	0.30	248.5	7	7	0.95	18	8.79	29.5	6.5	5.8	9	20
Hillabahatchee Creek	09/01/1999	18.5	0.29	647.5	6	15	2	20.2	8.16	22.3	7.08	4.51	7	15
Hillabahatchee Creek	09/28/2000	16.50	0.24	577.5	6	16	2	15	9.23	21	7	25.3	6	10
Hillabahatchee Creek	09/19/2001	18.40	0.33	644	11	16	2	18.5	8.8	20.8	7	6.4	8	20
Little Snake Creek	08/19/1998													
Long Cane Creek u/s	06/09/1999	3.9	0.28	136.5	0	7	1.05	19.8	6.72	67.7	7.18	27.3	28	35
Long Cane Creek d/s	07/28/1999	5.6	0.49	196	0	7	1.27	24.3	6.35	74.9	637	15.8	29	40
New River	09/27/2000	10.00	0.27	350	1	13	1.1	17.4	8.56	424.6	7	4.17	171	60
Norman Creek	08/25/1998	5.6	0.1	196	8	7	0.8	18	8.28	24.8	6.78	8.17		
Panther Creek	05/20/1999	2.5	0.1	87.5	1	1	0.55	15.9	8.83	47.1	7.15	15.4	18	25
Polecat Creek	08/11/1999	4.1	0.26	143.5	2	4	0.85	24.2	7.2	44.3	6.59	16.12	12	20

Stream Name	Date	Average Stream Width (m)	Average Stream Depth (m)	Reach Length (m)	Number of Riffles	Number of Pools	Deep Pool (m)	Water Temp (deg C)	Dissolved Oxygen (mg / L)	Conductivity (uS)	pH (SU)	Turbidity (NTU)	Total Hardness (mg / L)	Alkalinity (mg / L)
Red Oak Creek	08/26/1998													
Snake Creek u/s	08/19/1998	7.5	0.16	262.5	10	6	0.71	25.3	7.61	31.8	7.12	11.3		
Snake Creek u/s	03/01/1999	5.3	0.14	185.5	2	1	0.59	22	8.2	31.9		3.76	8	15
Snake Creek d/s	09/02/1999	8.5	0.25	297.5	0	6	0.72	25.6	8.02	33.1		12.3	12	15
Town Creek	08/31/1999	8.8	0.27	308	5	6	1.5	21.3	7.9	24	7.03	4.62	8	15
Trib to Whooping Creek	08/21/1998	2.5	0.1	87.5	5	4	0.9	20.2	8.14	32.8	6.43	8.93		
Whooping Creek u/s	08/21/1998	5.5	0.1	192.5	5	10	0.83	22.7	6.88	36.2	6.64	9.75		
Whooping Creek mid	09/02/1999	11.1	0.2	388.5	8	7	0.95	20.2	7.98	27.9		4.19	9	20
Whooping Creek mid	09/29/2000	11.20	0.17	392	6	7	0.93	16.4	8.95	25.6	7	8.03	6	15
Whooping Creek mid	09/18/2001	13.90	0.29	486.5	7	11	1.25	17.1	8.7	28.7	7	5.8	8	15
Whooping Creek d/s	04/19/2001	11.60	0.45	406	3	9	1.4	9.3	7.52	20.6	6.5	96.15	6	10
Wolf Creek	07/08/1998	4.7	0.1	164.5	5	11	0.84	22.2	7.68	32.8	6.8	6.58		

Table 9. 1998-2003 WRD's Field Measurements (Impaired – Piedmont Ecoregion)

Stream Name	Date	Average Stream Width (m)	Average Stream Depth (m)	Reach Length (m)	Number of Riffles	Number of Pools	Deep Pool (m)	Water Temp (deg C)	Dissolved Oxygen (mg / L)	Conductivity (uS)	pH (SU)	Turbidity (NTU)	Total Hardness (mg / L)	Alkalinity (mg / L)
Bear Creek	10/14/2003	7.10	0.23	248.5	0	5	0.95	20.4	7.73	62.0	7.0	5.3	19	25
Browns Creek	09/26/2000	5.60	0.25	196		5	1.15	17.6	7.32	53.3	7	5.19	18	35
Bull Creek	06/14/2000	8.80	0.38	308	0	5	1.5	24.7	4.82	110.3	7	13.3	44	45
Dean Creek	07/22/2003	5.10	0.24	179	2	5	0.90	19.1	7.81	43.6	6.5	13.5	16	20
Deep Creek	10/14/2003	9.10	0.18	318.5	0	3	0.65	19.3	7.48	74.0	7.5	6.8	31	35
Flat Creek (PS)	06/10/2003	6.30	0.21	220	0	7	1.55	17.1	7.82	51.5	6.5	18.2	16	20
Flat Creek (NS)	06/10/2003	6.50	0.23	227	1	5	0.90	19.2	7.80	132.0	7.5	7.4	68	45
Hazel Creek	06/25/2003	5.10	0.36	179	0	8	1.10	19.9	8.14	34.2	6.5	7.6	11	20
Ivy Creek	08/07/2003	6.80	0.26	238	0	6	1	21.1	7.71	57	6.75	18.5	17	20
Long Island Creek	06/12/2003	4.90	0.22	172	2	8	0.90	22.2	7.08	92.5	7.0	3.3	51	35
Maple Branch	09/26/2000	2.70	0.04	94.5	0	0	0	19	8.25	61.8	7.5	30.7	17	30
Mountain Creek	09/27/2000	7.60	0.42	266	0	10	1.15	17	5.61	703	7	4.07	324.9	100
Mud Creek	06/25/2003	6.50	0.31	227	1	8	1.10	22.4	7.87	134.5	7.0	1.9	27	40
Nancy Creek u/s	07/31/2003	9.30	0.38	326	1	6	1.15	22.4	7.89	77.6	7.0	8.7	29	25
Nancy Creek mid	10/07/2003	10.10	0.46	352	1	6	1.10	18.9	8.52	87.4	7.5	5.6	31	30
Nancy Creek d/s	10/07/2003	12.30	0.39	430	4	3	0.85	18.4	8.25	90.8	7.3	3.4	35	35
Nickajack Creek u/s	10/06/2003	6.80	0.23	236	1	4	0.70	18.9	8.22	131.2	7.0	4.4	46	30
Nickajack Creek d/s	10/07/2003	9.90	0.39	348	4	9	99.00	18.0	7.78	97.1	7.0	6.0	35	30
North Fork Peachtree Creek	07/31/2003	7.70	0.26	271	1	7	1.00	23.2	6.59	81.8	7.0	8.7	32	35
Noses Creek	06/12/2003	4.90	0.26	172	2	4	99.00	21.0	6.94	75.1	7.0	10.6	51	40
Pea Creek	10/14/2003	6.30	0.21	220.5	2	3	0.75	20.1	7.15	62.6	7.0	6.8	18	40
Six Mile Creek	05/14/2003	5.70	0.19	196	2	1	0.62	15.8	8.94	136.0	6.0	3.9	42	25

Stream Name	Date	Average Stream Width (m)	Average Stream Depth (m)	Reach Length (m)	Number of Riffles	Number of Pools	Deep Pool (m)	Water Temp (deg C)	Dissolved Oxygen (mg / L)	Conductivity (uS)	pH (SU)	Turbidity (NTU)	Total Hardness (mg / L)	Alkalinity (mg / L)
South Fork Limestone Creek/ Limestone Creek	05/14/2003	3.00	0.32	105	2	3	0.93	15.3	8.47	114.6	6.5	3.5	95	86
Suwanee Creek	08/27/2003	7.90	0.72	276	0	4	99.00	23.8	6.58	165.7	7.0	13.5	68	35
Tributary to Limestone Creek	05/14/2003	2.90	0.18	98	2	1	0.93	15.7	8.57	73.4	7.0	8.2	35	35
Turner Creek	07/22/2003	5.80	0.48	203	1	5	1.00	21.4	7.60	29.5	6.5	7.7	9	15
Ward Creek	06/12/2003	2.30	0.46	81	0	4	0.90	24.1	7.04	81.9	7.0	8.9	36	40
White Creek	07/22/2003	4.80	0.33	164	0	8	0.92	19.6	7.16	71.1	6.5	15.5	21	20

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 (GA EPD, 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, NPDES permitted facilities will be considered point sources. Discharges from municipal, industrial, private and federal NPDES permitted facilities may contribute sediment to receiving waters as TSS and / or turbidity. There are eleven permitted NPDES discharges identified in the Chattahoochee River Basin watersheds upstream from the listed segments. Table 10 provides the permitted flow, TSS concentrations, and/or turbidity levels for the NPDES permittees located in the impaired Chattahoochee River Basin watersheds. The average levels (whether daily or monthly) and the highest maximum levels (whether daily or monthly) discharged over the last three years (2004-2006) are also given. These data were determined from analysis of the available Discharge Monitoring Reports (DMRs) or Operation Monitoring Reports (OMRs). Where the facility's permitted flow is less than 0.1 MGD, the 2004-2006 values are not given.

Some storm water runoff is covered under the NPDES Permit Program. It is considered a diffuse source of pollution. Unlike other NPDES permits that establish end-of-pipe limits, storm water NPDES permits establish controls. Currently, regulated storm water discharges include those associated with industrial activities, including construction sites one acre or greater, and large and medium municipal separate storm sewer systems (MS4s).

Table 10. NPDES Permit Limits for Facilities in the Impaired Watersheds of the Chattahoochee River Basin

Facility	NPDES Permit No.	Facility Type	Receiving Water	FLOW (MGD)		TSS (mg/L)	
				Monthly Average	Weekly Average	Monthly Average	Weekly Average
Buford - Southside WPCP	GA0023167	Municipal	Suwanee Creek Tributary	2.0	2.5	30	45
				1.58	2.34	12.1	31.0
Cornelia WPCP	GA0021504	Municipal	South Fork Little Mud Creek	3.0	3.75	20	30
				2.32	3.15	1.4	16.0
DeKalb County – Scott Candler WTP	GAG640000	Municipal	Nancy Creek	-	-	30	45
				3.74	9.15	12.9	227.0
Dixie Mobile Home Park	GA0023043	Private	Unnamed Tributary to Flat Creek	0.0043	0.0053	90	120
Fulton County - Little Bear Creek	GA0047104	Municipal	Little Bear Creek	0.1	0.125	20	30
				0.023	0.053	3.8	22.0
Gainesville – Flat Creek WPCP	GA0021156	Municipal	Flat Creek	10.2	12.75	20	30
				7.59	9.90	3.1	17.0
Newnan - Mineral Springs WPCP	GA0021423	Municipal	Mineral Springs Creek	0.75	0.94	30	45
				0.47	0.73	10.0	63.0
				FLOW (MGD)		TSS (mg/L)	
				Daily Average	Daily Max	Daily Average	Daily Max
Buckhorn Ventures LLC[1]	GA0037290	Industrial	Six Mile Creek Tributary	-	-	55	110
				0.43	0.77	8.8	30.0
Lafarge Building Materials, Inc.[2]	GA0025917	Industrial	Tributary to Noses Creek	-	-	-	40
				0.0096	0.0096	14	14
Lafarge Building Materials, Inc.[3]	GA0046906	Industrial	Tributary to North Fork Peachtree Ck	-	-	-	40
				0.0093	0.0096	11.6	19.0
USAF Lockheed (Plant No. 6)	GA0001198	Federal	Nickajack Creek	-	-	-	10
				1.04	2.60	0.7	3.8

permit limits
actual data from monthly Monitoring Reports

[1] Actual flow values are based upon reported values during 2006 (flows were not reported from this facility during 2004 and 2005).

[2] Actual data based upon reported values for the month of February 2005. This facility did not discharge during any other month for the 2004-2006 period.

[3] Actual data based upon months for which there was reported discharge from this facility for the 2004-2006 period.

Storm water discharges associated with industrial activities are currently covered under Georgia's General Storm Water NPDES Permit (GAR000000). This permit requires visual monitoring of storm water discharges, site inspections, implementation of Best Management Practices (BMPs), and record keeping. Table 11 provides a list of those facilities in the Chattahoochee River Basin that have submitted a Notice of Intent to be covered under Georgia's General Storm Water NPDES Permit Associated with Industrial Activities. It is unknown at this time whether these facilities are contributing sediment to the watershed.

Table 11. Facilities with a General Industrial Storm Water NPDES Permit in the Chattahoochee River Basin

Facility Name	NOI No.	County
2 C Optics, Inc.	3851	Forsyth
A. I. T. Atlanta, Inc.	3672	DeKalb
A.R. Brooks Enterprises, Inc.	5171	Cobb
A.T. Aviation, Inc.	4581	DeKalb
AAA Cooper Transportation	4231	Muscogee
ABC Compounding Company, Inc.	2842	Clayton
Advantis Technologies, Inc.		Forsyth
Aeroquip Inoac Corporation	3082	Fulton
Airway Aviation Services, Inc. DBA Air Bp Atlanta	4581	DeKalb
Ajay North America, LLC	2819	Cobb
Akzo Nobel Inks, Corporation	2893	Gwinnett
Alchemy South, Ltd.	2869	Cobb
Allied Foods, Inc.	2047	Fulton
Alpha Metals, Inc.	2899	Forsyth
American Proteins Inc./Cumming Division	2048	Forsyth
Ameron Composites, Inc.	2899	Coweta
Amoco Polymers, Inc.	2821	Forsyth
Amrep, Inc.	2841	Cobb
Anitox Corporation	2879	Gwinnett
Apac Georgia, Inc. - Forsyth Asphalt Plant	2951	Forsyth
Apac-Georgia	2951	Troup
Apl Limited	4231	Fulton
Arnold Transportation Services	4213	Cobb
Atco International	2842	Cobb
Atlanta Web Printers, Inc.	2751	DeKalb
Atlas Roofing Corporation	3086	Troup
Austell Box Board Corporation	2631	Cobb
Averitt Express, Inc.	4213	Gwinnett
Avery Dennison	2672	Hall
B - Line Systems, Inc.	3499	Gwinnett
Barin Quarry	1423	Muscogee
Barton Brands Of Georgia	2085	Fulton
Beaulieu Fibers - Gainesville Division	2281	Hall
Bellsouth Corporation Aviation	4581	Fulton
Bfi Waste Systems Of North America, Inc.	4212	Fulton
Big Creek WPCP	4952	Fulton
Bill Southern Auto Parts, Inc.	5015	Cobb
Billings Freight Systems, Inc.	4231	Douglas
Bj Transfer Station	4212	Gwinnett
Blount Construction Asphalt Plant	2951	Forsyth
Blue Circle Aggregates - Columbus Plant	1423	Harris
Blue Circle Aggregates - Douglasville	1423	Douglas
Boral Bricks - Atlanta Plant	3251	Cobb
Borden Chemical, Inc.	2842	Muscogee
Braddock Metallurgical/GA	3398	Fulton
Buckhorn Ventures, LLC	1429	Forsyth
Builders Transport, Inc.	4213	Coweta
Bulkmatic Transport Company	4231	Fulton
Burnham Service Company	4213	Muscogee
C & S Chemicals, Inc.	2819	Cobb
C. W. Matthews - Plant #14 Bolton	2951	Cobb

Facility Name	NOI No.	County
C. W. Matthews - Plant #5 Big Creek	2951	Forsyth
C. W. Matthews - Plant #9 Cumming	2951	Forsyth
Cadillac Products, Inc.	3083	Paulding
Camp Creek WPCP	4952	Fulton
Candler Concrete Products, Inc.	3273	Habersham
Candler Concrete Products, Inc.	3273	Lumpkin
Carmet Company	3544	Hall
Cascade Road Landfill	4953	Fulton
Caterpillar, Inc.	3531	Troup
Cedar Springs Works - General Chemical Corporation	2819	Early
Centennial Body Division	3713	Muscogee
Central Metals Company	5093	Cobb
Central Metals Company	5093	Fulton
Central Metals Company	5093	Fulton
Central Oil Asphalt Corporation	2951	Douglas
Cessna Columbus Georgia	3728	Muscogee
Chambers Atlanta Landfill	4953	Fulton
Chattahoochee Industrial Railroad	4011	Early
Chemstar Corporation	2899	Douglas
Ciba Vision Corporation	3851	Fulton
Ciba Vision Corporation	3851	Fulton
Circle P Ranch Sand Company, Inc.	1442	Douglas
Circuit Technologies, Inc.	3672	DeKalb
City Of Atlanta - R. M. Clayton WRC		Fulton
Clark - Schwebel, Inc.	2221	White
CMI Industries, Inc. - Clarkesville Plant	2221	Habersham
Cobb Community Transit Multi-Use Center	4111	Cobb
Coca-Cola USA - Beverage Base Plant	2087	Fulton
Coca-Cola USA - Syrup Manf. Plt & Private Truck Ops	2087	Fulton
Columbus Branch Truck Shop	2951	Muscogee
Columbus Metropolitan Airport	4581	Muscogee
Columbus Mills, Inc.	2273	Muscogee
Columbus Quarry	1423	Muscogee
Columbus Wilbert Vault Company	3272	Muscogee
Colwell Construction Company, Inc.	1423	Lumpkin
Consolidated Freightways - NCG	4213	Gwinnett
Consolidated Freightways - NNG	4213	Coweta
Couch Construction, Lp Plant #17	2951	Muscogee
Couch Ready Mix USA- Columbus	3273	Muscogee
County Farm Road Landfill No. 2		Cobb
CPI Plastics, Inc.	3089	Coweta
Crain Oil Company	5171	Coweta
Crooked Creek WRF	4952	Gwinnett
Crystal Farms Mills, Inc.	2048	Hall
CSX Transportation, Inc.	4011	Fulton
Cusseta Timber & Leasing Company	2411	Chattahoochee
Davidson Mineral Properties, Inc.	1423	Habersham
Degussa Construction Chemicals Operations, Inc.	2851	Cobb
DeKalb Peachtree Airport	4581	DeKalb
Dispersions, Inc.	2893	Fulton
Display Systems	3812	DeKalb
Display Systems	3812	Forsyth
Dolly Madison Bakery	2051	Muscogee
Drug Transport, Inc.	4231	DeKalb

Facility Name	NOI No.	County
Dryvit Systems, Inc.	2899	Muscogee
DSI Transports, Inc.	4231	Fulton
Duracell - North Atlanta Group	3692	Troup
Dynatron/Bondo Corporation	2851	Fulton
E. J. Knight Scrap Material Company, Inc.	5093	Muscogee
Eastman Chemical Company	2821	Muscogee
Elan Pharma, Inc.	2834	Hall
Enplas (USA), Inc.	3089	Cobb
Enplas (USA), Inc.	3089	Cobb
Enplas (USA), Inc.	3089	Cobb
Epps Air Service, Inc.	4581	DeKalb
Ethicon, Inc.	3841	Habersham
Exide Technologies	3691	Muscogee
Fairburn Ready Mix, Inc.	3273	Coweta
Fast Food Merchandisers, Inc.	4222	Troup
Federal Express JGLA	4513	Fulton
Federal Express LGCA	4513	Troup
Federal Express MGEA	4513	Gwinnett
Federal Express NCQA	4513	Cobb
Federal Express PDKA	4513	Fulton
Federal Express TOCA	4513	Hall
Federal Mogul Powertrain Systems	3592	Hall
Fieldale Farms Corporation - Baldwin Complex	2015	Banks
Fieldale Farms Corporation - Cornelia Complex	2015	Habersham
Fieldale Farms Corporation - Gainesville/Best Ice	2015	Hall
Fieldale Farms Corporation - Murrayville Complex	2015	Hall
Fieldale Farms Corporation -Gainesville Truck Shop	2015	Hall
Fieldcrest Cannon, Inc.	2261	Muscogee
Filtran - Newman	2295	Coweta
Fleet Transport Company, Inc.	4231	Fulton
Fleet Transport Company, Inc.	4231	Muscogee
Flexible Products Company	2821	Cobb
Flint Ink Corporation	2893	Fulton
Flint Ink Corporation	2893	Hall
Florida Rock & Tank Lines, Inc.	4213	DeKalb
Florida Rock & Tank Lines, Inc.	4213	Muscogee
Foley Products Company	3272	Coweta
Fort McPherson	4231	Fulton
Franklin Aluminum Company	3354	Heard
Freudenberg - Nok General Partnership	3053	Troup
Frito-Lay, Inc.	2096	DeKalb
Fulco Readymix	3273	Fulton
Fulton County Airport - Brown Field	4581	Fulton
Gaang Organizational Shop #5	9711	Muscogee
Gainesville Scrap & Metal Company	5093	Hall
Gaylord Container Corporation	2653	Gwinnett
Geiger International Corporation	2521	Fulton
General Motors Assembly Plant	3711	DeKalb
General Shale Products LLC - Plant #30	3251	Fulton
General Shale Products LLC - Plant #31	3251	Fulton
General Shale Products LLC, Blalock Mine	1459	Fulton
Georgia - Pacific Corporation	2653	DeKalb
Georgia - Pacific Corporation	2436	Meriwether
Georgia - Pacific Corporation - Alto Woodyard	2499	Habersham

Facility Name	NOI No.	County
Georgia - Pacific Corporation - Hilton Annex	2411	Early
Georgia Duck & Cordage Mill	3052	DeKalb
Georgia Marble Company - Jimco Stone Center	3281	Cobb
Georgia Mountain Timber, Inc.	2421	Habersham
Georgia Power Company - Plant McDonough/Atkinson	4911	Cobb
Georgia Power Company - Plant Wansley	4911	Heard
Georgia Power Company - Plant Yates	4911	Coweta
Georgia Sand Company	1442	Carroll
Georgia Sound Company	1442	Carroll
Georgia Tubing Corporation	3644	Early
Golden City Hosiery Mils, Inc.	2252	Carroll
Golden's Foundry & Machine Company	3321	Muscogee
Graphic Packaging Corporation	2657	Coweta
Great Southern Paper	2631	Early
Greif Bros. Corporation	2655	DeKalb
Guardian Chemical Company	2842	Fulton
Guilford Mills - Guilford Fibers Plant	2281	Hall
Gun Club Road Landfill	4953	Fulton
Habersham County Pea Ridge Road MSWLF		Habersham
Habersham Metal Products Company, Inc.	3442	Habersham
Habersham Mills, Inc.	2281	Habersham
Harris Calorific Division	3548	Hall
Heil South	3713	Cobb
Heliserv	4581	DeKalb
Hemphill Pumping Station	4941	Fulton
Henkel Surface Technologies	2899	Fulton
Hercules Aggregate Mine	1442	Meriwether
Hertiage Inks International	2893	Douglas
Holox, Inc.	2813	Carroll
Honey baked Ham Hangar	4581	DeKalb
Hoover Precision Products, Inc.	3562	Forsyth
Hormel Foods Corporation	2013	DeKalb
Hughes Georgia, Inc.	3761	Troup
Inflation Systems, Inc.	3714	Troup
Inland Paperboard & Packaging, Inc.	2411	Coweta
Interface Flooring Systems	2279	Troup
Interface Flooring Systems	2279	Troup
Intermet Columbus Foundry, L.P.	3321	Muscogee
Intermet Machining Columbus	3541	Muscogee
Irwin Lumber Company, Inc.	2421	Habersham
J. H. Williams, Division Of Snap - On Tool Company	3423	Muscogee
Jervis B. Webb Company Of Georgia	3535	Cobb
John's Creek WWTP	4952	Fulton
Johnson Industries - Columbus Mill	2211	Muscogee
Johnston Industries - Cusseta Plant	2269	Muscogee
K & H Enterprises, Inc.	4581	DeKalb
Kaydon Corporation	3999	Troup
Kenan Transport Company	4213	Gwinnett
Ken-Bar Manufacturing & Dist. Co.	3799	Habersham
Kimberly - Clark Corporation	2297	Troup
Kinnett Dairies, Inc.	2026	Muscogee
Kodak Polychrome Graphics LLC	2796	Muscogee
Kose Enterprises, Inc.	4581	DeKalb
Kysor/ Warren Case Plant	3585	Muscogee

Facility Name	NOI No.	County
Kysor/Warren	3585	Muscogee
L. B. Foster Company	3441	Gwinnett
Lafarge Building Materials, Incorporated	3241	Fulton
Lagrange Callaway Airport	4581	Troup
Lagrange Molded Products	3089	Troup
Lipton	2079	Fulton
LJS Grease & Tallow Inc.	2077	Carroll
Lockheed Martin Aeronautics Company	3721	Cobb
Lummus Corporation	3559	Muscogee
Lumpkin County - SLF		Lumpkin
Lumpkin County Wimpy's Airport	4581	Lumpkin
Macdermid Graphic Arts	2821	Fulton
Macs Customized Distribution Service, Inc.	4231	Gwinnett
Maltese Signs	3993	DeKalb
Manna Pro Corporation	2048	DeKalb
Marble Mill Transfer Station	4212	Cobb
Marta - Avondale Maintenance Facility & Yard	4110	DeKalb
Marta - Brady Avenue Paratransit Facility	4110	Fulton
Marta - Chamblee Rail Maintenance Facility	4110	DeKalb
Marta - Laredo Drive Bus Operating Facility	4110	DeKalb
Marta - Perry Blvd. Bus Operating Facility	4110	Fulton
Martin Marietta Aggregates - Junction City Quarry	1422	Talbot
Martin Sprocket & Gear, Inc.	3568	DeKalb
Marubeni Denim	2211	Muscogee
McConnell Drum Service, Inc.	3412	DeKalb
McEver Road Landfill		Gwinnett
McNeilus Truck & Manufacturing, Inc.	3713	Carroll
MD Building Products, Inc.	3354	Hall
Mead Containerboard	2653	Fulton
Mead Packaging - Atlanta	2657	Fulton
Mercury Air Center	4581	DeKalb
Metal Building Components, Inc.	3448	Douglas
Metalico - Evans, Inc.	3356	Fulton
Metalplate Galvanizing, L.P.	3479	Fulton
Metcam, Inc.	3499	Forsyth
Metromont Prestress Company (Hiram Plant)	3272	Paulding
Milliken & Company - Duncan M. Stewart Plant	2258	Troup
Milliken & Company - Elm City Plant	2262	Troup
Milliken & Company - Kex Plant	2281	Troup
Milliken & Company - New Holland Plant	2281	Hall
Milliken & Company - Pine Mountain Plant	2221	Troup
Milliken & Company Unity Plant	2281	Troup
Milliken Live Oak/Milstar Complex	2273	Troup
Mm Systems Corporation	3460	DeKalb
Mobil Chemical Company	3081	Troup
Momar, Inc.	2841	Fulton
Montgomery Tank Lines, Inc.	4213	DeKalb
Montgomery Tank Lines, Inc.	4213	DeKalb
Morgan Concrete Company	3273	Habersham
Mount Vernon Mills - Cleveland Plant	2211	White
Mutec	3691	Muscogee
National Envelope Corporation	2677	Cobb
National Starch & Chemical Company	2891	Fulton
Naval Air Station Atlanta	9711	Cobb

Facility Name	NOI No.	County
Neste Polyester. Inc.	2821	Fulton
No Business Creek WRF	4952	Gwinnett
Norfolk Southern - Columbus Yard	4011	Muscogee
Norfolk Southern - Inman Yard	4011	Fulton
Norfolk Southern-Doraville Thoroughbred Trf. Fac.	4011	Gwinnett
North American Van Lines	4213	Fulton
North Fulton Readymix	3273	Forsyth
Norton Construction Products	3425	Hall
Nottingham Company	2869	Fulton
OFS Brightwave Solutions	3357	Gwinnett
Oki Telecom Inc.	3694	Gwinnett
Oldcastle Precast East, Inc.	3272	DeKalb
Owens Corning	2952	Fulton
Owens Corning	3089	Fulton
Packaging Specialties Of Georgia	2759	Hall
Pamarco Southern, Inc.	2796	Fulton
Panduit Of Georgia	3644	Forsyth
Peachtree Hills Readymix	3273	Fulton
Peed Mine	1442	Muscogee
Piedmont Laboratories	2899	Hall
Pine Mountain Concrete Co.	3273	Meriwether
Pine Wood Products, Inc.	2491	Hall
Plastipak Packaging, Inc.	3085	Fulton
Pratt & Whitney	3724	Muscogee
Precision Components International	3724	Muscogee
Primex Plastics	3081	Hall
Quebecor Printing Atlanta, Inc.	2752	DeKalb
R. L. Sutton Water Reclamation Facility		Cobb
Recycling Industries Of Atlanta, Inc.	5093	Fulton
Regional Recycling, LLC	5093	Hall
Road Repair Products Co.	2951	Douglas
Roadway Express, Inc.	4213	Troup
Robert Bosch Corporation	3714	Douglas
Rohrer Corporation	2752	Gwinnett
Rollins, Inc.	4581	DeKalb
Royal Oak Enterprises, Inc.	4581	DeKalb
Ryder/Ate #7450	4111	Cobb
Safa, LLC	3714	Troup
Safety - Kleen Corporation	7389	Muscogee
SBF, Inc.	3560	Gwinnett
Schatulga Road Landfill	4953	Muscogee
Scientific Games, Inc.	2750	Forsyth
Scott Lithographing Company, Inc.	2752	DeKalb
Scovill Fasteners, Inc.	3965	Habersham
Selig Chemical Industries	2842	Fulton
Shaw Industries, Inc. Plant #22	2281	McDuffie
Sherman Concrete Pipe	3272	Muscogee
SKF USA, Inc.	3562	Hall
Smallwood Auto Parts	5015	Fulton
Smoker - Craft, Inc.	3732	Troup
Sonoco Products Company	2631	Fulton
South Cobb Water Reclamation Facility		Cobb
South Commons Water Resource Facility		Muscogee
Southeastern Freight Lines, Inc.	4231	Cobb

Facility Name	NOI No.	County
Southeastern Freight Lines, Inc.	4231	Gwinnett
Southeastern Freight Lines, Inc.	4231	Muscogee
Southeastern Services Maintenance Terminal	4213	Hall
Southeastern Transfer & Storage Company, Inc.	4231	Cobb
Southern Asphalt	2951	Muscogee
Southern Signatures	2752	Fulton
Southern States Cooperative Feed Mill	2048	Hall
Springs Industries - Gainesville Plant	2341	Hall
Star Paper Tube, Inc., Div Of Carrustar Industries	2655	Cobb
State Chemical Manufacturing	2842	Fulton
Stimsonite Corporation	2821	Fulton
Stimsonite Corporation	3531	Fulton
Stimsonite Corporation	2821	Fulton
Stone Container Corporation	2653	Fulton
Stone Container Corporation	2653	Fulton
Storopack, Inc.	3070	Fulton
Strategic Materials, Inc.	5093	Fulton
Superior Printing Ink Company, Inc.	2893	Fulton
Sweetwater Lumber & Land Co. Inc.	2421	Cobb
Swift Textiles, Inc. - Flat Rock Road Plant	2261	Muscogee
SWM - Georgia, LLC	3714	Whitfield
Synthetic Industries, Inc.	2299	Hall
T & S Hardwoods, Inc.	2421	Habersham
Talon, Inc.	3965	White
Target Container Co.	2653	Fulton
Techalloy Company Inc.	3315	Gwinnett
Tecpro Corporation	2899	Fulton
Tenneco Packaging - Hexacomb	2679	Fulton
The Atlanta Coca-Cola Bottling Company	2086	Cobb
The Bird Bath, Inc.	4581	DeKalb
The Concrete Company	3273	Coweta
The Concrete Company - Lagrange	3273	Troup
The Glidden Company, I.C.I. Americas	2851	Hall
The Inx International Ink Company	2893	Cobb
The Lovable Company	2345	Gwinnett
The Proctor & Gamble Manufacturing Company	2841	Richmond
The Torrington Company	3562	Lumpkin
Thomas Concrete Of Georgia, Inc. (Alpharetta)	3273	Fulton
Thomas Concrete Of Georgia, Inc. (Ben Hill Plant)	3273	Fulton
Thomas Concrete Of Georgia, Inc. (Doraville)	3273	Gwinnett
Thomas Concrete Of Georgia, Inc. (Gainesville)	3273	Hall
Thomas Concrete Of Georgia, Inc. (Hiram Plant)	3273	Paulding
Thomas Concrete Of Georgia, Inc. (Johnson Road)	3273	Fulton
Thomas Concrete Of Georgia, Inc. (Suwanee)	3273	Gwinnett
Tightitco, Inc.	3728	Fulton
Tip Top Poultry	2015	Cobb
Tom's Foods, Inc.	2064	Muscogee
Transflo Terminal Services, Inc.	4011	Fulton
Tucco - Cumming Ready-Mix Plant	3273	Forsyth
Tucker Ready-Mix Plant	3273	DeKalb
Tuggle Greer Road Landfill		Gwinnett
Turbine Engine Components Textron	3724	Thomas
Tyson Foods, Inc. Processing Plant	2015	Forsyth
U.S. Army Infantry Center	9711	Chattahoochee

Facility Name	NOI No.	County
U.S. Transport, Inc.	4581	DeKalb
U.S.P.S. Aux Vehicle Maintenance Facility	4311	Muscogee
Union Carbide Corporation	2821	DeKalb
United Parcel Service - Roswell	4215	Fulton
United Parcel Service, Inc.	4215	DeKalb
United Parcel Service, Inc.	4215	Muscogee
United Parcel Service, Inc. - Atlanta Hub	4215	Fulton
United Parcel Service, Inc. - Hall	4215	Hall
United Parcel Service, Inc. - Lagrange	4215	Troup
United States Gypsum Company	2851	DeKalb
Uptown Park Water Resource Facility		Muscogee
UWL/Richland Creek Rd Sanitary Landfill	4953	Gwinnett
Vadco Marble Of Georgia, Inc.	3089	DeKalb
Vinings Industries	2879	Cobb
Vinings Industries	2899	Cobb
Vinings Industries	2869	Fulton
Vulcan Performance Chemicals / B. H. Jackson Plant	2869	Muscogee
Vulcan Performance Chemicals / L. O. Strange Plant	2869	Muscogee
Vulcan Performance Chemicals / Smyrna Plant	2819	Cobb
W. C. Bradley Company - Char-Broil Division	3631	Muscogee
Watkins Motor Lines - Atl	4213	Cobb
Watkins Motor Lines - Col	4213	Muscogee
Wattyl Paint Corporation	2851	DeKalb
Wayne Davis Concrete Company	3273	Douglas
Wayne Davis Concrete Company	3273	Paulding
Weaver Transporation Company	4213	Cobb
Weaver Transporation Company	4213	Cobb
West Point Foundry & Machine Company	3552	Troup
West Point Foundry Assembly Shop	3552	Troup
Westpoint Stevens, Inc. - Dixie	2211	Troup
Westvaco Envelope Division - Atlanta Plant	2677	DeKalb
Weyerhaeuser Company	2653	Muscogee
Whitaker Oil Company	5171	Fulton
Wilbert Burial Vault Company	3911	Fulton
William C. Meredith Company, Inc.	2491	Fulton
Wm. Wrigley Jr. Company	2067	Hall
Wooley & Company, Inc.	3086	Gwinnett
World Color - Dittler Division - Atlanta	2752	Fulton
World Color - Dittler Division/Oakwood	2752	Hall
World Color Direct - Gainesville	2754	Hall
Worthington Cylinder Corporation	3443	Muscogee
Young Refining Corporation	2951	Douglas
Zep Manufacturing Company	2842	Fulton

The MS4 permits have been issued under two phases. Phase I MS4 permits require the prohibition of non-storm water discharges (i.e., illicit discharges) into the storm sewer systems and controls to reduce the discharge of pollutants to the maximum extent practicable, including the use of management practices, control techniques and systems, as well as design and engineering methods (Federal Register, 1990). A site-specific Storm Water Management Plan (SWMP) outlining appropriate controls is required by and referenced in the permit. There are twenty-nine (29) Phase I MS4s in the Chattahoochee River Basin (Table 12).

Table 12. Phase I Permitted MS4s in the Chattahoochee River Basin

Name	Permit No.	Watershed
Alpharetta	GAS000102	Chattahoochee
Atlanta	GAS000100	Chattahoochee, Flint, Ocmulgee
Austell	GAS000103	Chattahoochee
Berkley Lake	GAS000138	Chattahoochee
Buford	GAS000104	Chattahoochee
Chamblee	GAS000105	Chattahoochee
Clarkston	GAS000106	Chattahoochee, Ocmulgee
Cobb County	GAS000108	Chattahoochee, Coosa
College Park	GAS000109	Chattahoochee, Flint
Columbus Consolidated	GAS000202	Chattahoochee
Decatur	GAS000110	Chattahoochee, Ocmulgee
DeKalb County	GAS000111	Chattahoochee, Ocmulgee
Doraville	GAS000113	Chattahoochee
Duluth	GAS000112	Chattahoochee, Ocmulgee
East Point	GAS000114	Chattahoochee, Flint, Ocmulgee
Fairburn	GAS000115	Chattahoochee, Flint
Forsyth County	GAS000300	Chattahoochee, Coosa
Fulton County	GAS000117	Chattahoochee, Ocmulgee, Coosa, Flint
Gwinnett County	GAS000118	Chattahoochee, Ocmulgee, Oconee
Marietta	GAS000125	Chattahoochee, Coosa
Norcross	GAS000127	Chattahoochee, Ocmulgee
Palmetto	GAS000128	Chattahoochee, Flint
Powder Springs	GAS000129	Chattahoochee
Roswell	GAS000131	Chattahoochee, Coosa
Smyrna	GAS000132	Chattahoochee
Sugar Hill	GAS000135	Chattahoochee
Suwanee	GAS000144	Chattahoochee, Ocmulgee
Union City	GAS000136	Chattahoochee, Flint

Source: Nonpoint Source Permitting Program, GA DNR, 2007

As of March 10, 2003, small MS4s serving urbanized areas are required to obtain a storm water permit under the Phase II storm water regulations. An urbanized area is defined as an entity with a residential population of at least 50,000 people and an overall population density of at least 1,000 people per square mile. Thirty counties and 56 communities are permitted under the Phase II regulations in Georgia. There are twelve counties or communities located in the Chattahoochee River Basin that are covered by the Phase II General Storm Water Permit (Table 13).

Table 13. Phase II Permitted MS4s in the Chattahoochee River Basin

Name	Permit No.	Watershed
Cumming	GAG610000	Chattahoochee
Dallas	GAG610000	Chattahoochee, Coosa
Douglas County	GAG610000	Chattahoochee
Douglasville	GAG610000	Chattahoochee
Flowery Branch	GAG610000	Chattahoochee
Gainesville	GAG610000	Chattahoochee, Oconee
Hall County	GAG610000	Chattahoochee, Oconee
Hiram	GAG610000	Chattahoochee
Newnan	GAG610000	Chattahoochee, Flint
Oakwood	GAG610000	Chattahoochee, Oconee
Paulding County	GAG610000	Chattahoochee, Coosa, Tallapoosa
Sandy Springs	GAG610000	Chattahoochee

Source: Nonpoint Source Permitting Program, GA DNR, 2007

Those watersheds located within Phase I or Phase II MS4 city or county urbanized areas are listed in Table 14. The table provides the total area of each of these watersheds, and the percentage of the watershed that is in an MS4 area.

Table 14. Percentage of Watersheds Located in MS4 Areas

Name	Total Area (acres)	% in MS4 area
Bear Creek	27.26	100.0%
Browns Creek	8.05	0.0%
Bull Creek	32.92	76.6%
Dean Creek	5.64	0.0%
Deep Creek	27.39	100.0%
Flat Creek (PS)	7.15	0.0%
Flat Creek (NS)	3.23	95.6%
Hazel Creek	7.39	0.0%
Ivy Creek	7.43	99.7%
Long Island Creek	5.16	100.0%
Maple Branch	1.16	0.0%
Mountain Creek	7.32	26.8%
Mud Creek	9.40	0.0%
Nancy Creek	35.87	100.0%
Nickajack Creek	30.22	100.0%
North Fork Peachtree Creek	10.50	100.0%
Noses Creek	5.85	100.0%
Pea Creek	7.81	100.0%
Six Mile Creek	2.94	100.0%
South Fork Limestone Creek/ Limestone Creek	1.72	100.0%

Name	Total Area (acres)	% in MS4 area
Suwanee Creek	14.09	95.0%
Tributary to Limestone Creek	1.40	100.0%
Turner Creek	8.03	0.0%
Ward Creek	7.13	100.0%
White Creek	8.00	0.0%

Soil erosion from construction sites is also a major source of sediment in Georgia's streams. Georgia requires construction sites over one acre to have a General Storm Water NPDES permit. Since construction sites are regulated by NPDES permits, they will be considered as point sources. It is unknown if there are any construction sites in impaired watersheds of the Chattahoochee River Basin.

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 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 (GA EPD, 1999).

The majority of soil erosion from forested land occurs during timber harvesting and the period immediately following, and 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 15 lists the percent timberland and percent harvested per year by county.

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 per year in 1997 (USDA-NRCS, 1997). This suggests that the source of sediment in many of the impaired streams in the Chattahoochee 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 pastureland can leave areas of ground with little or no vegetative cover. During a rainfall runoff event, 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 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 most of 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 and sedimentation of surface waters.

3.2.5 Roads

Erosion from unpaved roadways can be a significant source of sediment to rivers and streams. Road erosion 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 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

Table 15. 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
Banks	149.6	103.0	68.85%	149.1	5.5	3.69%
Carroll	319.5	185.8	58.15%	291.4	11.0	3.77%
Chattahoochee	159.2	142.0	89.20%	168.6	5.0	2.97%
Cherokee	271.2	176.4	65.04%	347.6	9.8	2.82%
Clay	124.9	82.0	65.65%	105.2	3.1	2.95%
Cobb	217.7	46.0	21.13%	130.5	11.7	8.97%
Coweta	283.6	195.4	68.90%	330.3	5.3	1.60%
Dawson	135.1	101.1	74.83%	212.6	4.9	2.30%
DeKalb	382.0	201.1	52.64%	117.8	1.2	1.02%
Douglas	127.6	79.3	62.15%	182.9	3.6	1.97%
Early	327.2	151.5	46.30%	156.8	8.9	5.68%
Forsyth	144.5	68.1	47.13%	163.2	6.1	3.74%
Fulton	338.4	125.7	37.15%	372.3	14.9	4.00%
Gwinnett	277.0	104.4	37.69%	227.6	13.3	5.84%
Habersham	178.0	121.7	68.37%	263.7	5.3	2.01%
Hall	251.9	133.9	53.16%	240.7	1.3	0.54%
Harris	296.8	238.4	80.32%	260.3	10.0	3.84%
Heard	189.5	151.6	80.00%	169.0	10.2	6.04%
Lumpkin	182.1	139.5	76.61%	305.9	4.2	1.37%
Marion	234.9	188.2	80.12%	126.3	5.3	4.20%
Meriwether	322.1	230.7	71.62%	234.2	21.1	9.01%
Muscogee	138.4	86.2	62.28%	140.6	3.1	2.20%
Paulding	200.7	135.4	67.46%	203.0	8.9	4.38%
Quitman	97.0	80.5	82.99%	103.5	1.2	1.16%
Randolph	274.7	180.7	65.78%	166.6	8.7	5.22%
Seminole	126.7	66.9	52.80%	95.9	11.4	11.89%
Stewart	293.6	253.7	86.41%	203.1	20.7	10.19%
Talbot	251.7	219.5	87.21%	195.0	15.4	7.90%
Taylor	241.6	190.4	78.81%	121.6	7.2	5.92%
Towns	106.6	84	78.80%	131.8	27.9	21.17%
Troup	264.9	182.7	68.97%	334.1	8.3	2.48%
Union	206.5	135.6	65.67%	250.5	8.5	3.39%
White	154.6	98.1	63.45%	200.6	7.8	3.89%

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

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 roadbed into roadway drainage ditches. Some of these particles settle out satisfactorily, but usually they settle out poorly, causing diminished ditch carrying capacity that results 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 Chattahoochee River Basin decreased by approximately 1053 acres or 0.0045 percent (GA EPD, 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 stream flow 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 GA EPD from using a dynamic watershed runoff model, which requires a great deal of data for model development and calibration. Instead, GA 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 its 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 BMPs.

4.2 Universal Soil Loss Equation

For each of the watersheds monitored in the Chattahoochee 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 300 to 425 within the Chattahoochee River Basin. The R Factors by county are provided in Table 16.

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 6 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.

The cropland and pastureland C factors for each county were developed by NRCS under the National Resource Inventory Program. Table 17 lists the C factors by county for forest, cropland, and pastureland. These values were developed based on the 2001 NLCD and GFC 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 cropland and pastureland C factors for watersheds in multiple counties were determined by area-weighting the agricultural land use within each county.

C factors for the road networks were determined based on the road surface and are given in Table 18. 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 16. R Factors by County

County	R factor
Banks	300
Carroll	325
Chattahoochee	350
Cherokee	300
Clay	362.5
Cobb	300
Coweta	325
Dawson	275
DeKalb	412.5
Douglas	300
Early	400
Forsyth	275
Fulton	300
Gwinnett	300
Habersham	300
Hall	287.5
Harris	325
Heard	337.5
Lumpkin	275
Marion	337.5
Meriwether	325
Muscogee	337.5
Paulding	300
Quitman	362.5
Randolph	350
Seminole	425
Stewart	350
Talbot	325
Taylor	325
Towns	300
Troup	325
Union	300
White	300

Table 17. Forest, Cropland and Pastureland C Factors by County

County	C factor		
	Forested	Cropland	Pastureland
Banks	0.000163	0.070	0.013
Carroll	0.000164	0.272	0.003
Chattahoochee	0.00015	0.418	0.003
Cherokee	0.000148	0.460	0.003
Clay	0.00015	0.307	0.004
Cobb	0.000252	0.401	0.013
Coweta	0.000127	0.433	0.005
Dawson	0.000139	0.295	0.006
DeKalb	0.000176	0.355	0.029
Douglas	0.000133	0.385	0.003
Early	0.000196	0.408	0.004
Forsyth	0.000164	0.406	0.006
Fulton	0.000168	0.476	0.007
Gwinnett	0.000199	0.283	0.018
Habersham	0.000134	0.275	0.012
Hall	0.000109	0.224	0.004
Harris	0.000165	0.418	0.006
Heard	0.000203	0.460	0.007
Lumpkin	0.000123	0.090	0.018
Marion	0.000123	0.090	0.018
Meriwether	0.000253	0.360	0.004
Muscogee	0.000137	0.510	0.003
Paulding	0.000175	0.330	0.003
Quitman	0.00012	0.395	0.003
Randolph	0.000189	0.391	0.003
Seminole	0.000142	0.393	0.003
Stewart	0.000273	0.408	0.003
Talbot	0.000234	0.384	0.003
Taylor	0.000201	0.513	0.003
Towns	0.000144	0.358	0.011
Troup	0.000142	0.418	0.003
Union	0.000158	0.352	0.004
White	0.000166	0.296	0.018

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

Table 18. 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 19. These values were provided by the U.S. Environmental Protection Agency (EPA) and are used in all watersheds.

Table 19. 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
Deciduous Shrubland	0.005
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 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; and
- 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. 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 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

  $DR = \exp(-0.4233 * L * Sf)$

  Where: $Sf = \exp(-16.1 * r / L + 0.057) - 0.6$
  DR = sediment delivery ratio
  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 water body 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 range of sediment load that can enter the impaired Chattahoochee River Basin watersheds without causing additional impairment to the stream. 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 0.06 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 allocation is the portion of the receiving water's loading capacity that is allocated to existing or future point sources. There are eleven permitted facilities in the Chattahoochee River Basin watersheds that discharge into listed segments or upstream of a listed segment. These include industrial facilities, municipal treatment plants, a private and institutional development (PID) facility, and a federal facility. WLAs are provided to the point sources from municipal and industrial wastewater treatment systems with NPDES effluent limits.

There are eleven (11) active NPDES permitted facilities with TSS permit limits in the Chattahoochee River Basin watershed that discharge into listed segments or upstream of a listed segment. This facility includes process water a municipal treatment plants. The maximum allocated sediment load for these municipal wastewater treatment facility is dependent on the discharge flow. Table 20 provides the WLAs for these facility. The WLA loads are given as concentrations or as a range of daily average and daily maximum TSS limits for these facilities; however, a load can be calculated based on the permitted (where available) or design flows, and the permitted TSS concentrations.

The WLA, as a load, can be represented by the following equation:

$$WLA = Cpermitted * Q$$

Where: WLA = Wasteload Allocation sediment load
Cpermitted = permitted concentration, in TSS (mg / L)
Q = permitted (where available) or design discharge flow

Table 20. Waste Load Allocations for Permits with TSS Limits

Facility	NPDES Permit No.	Receiving Water	TSS	
			Monthly Avg (mg/L)	Weekly Avg (mg/L)
Buford – Southside WPCP	GA0023167	Suwanee Creek Tributary	30	45
Cornelia WPCP	GA0021504	South Fork Little Mud Creek	20	30
DeKalb County – Scott Candler WTP	GAG640000	Nancy Creek	30	45
Dixie Mobile Home Park	GA0023043	Unnamed Tributary to Flat Creek	90	120
Fulton County – Little Bear Creek	GA0047104	Little Bear Creek	20	30
Gainesville – Flat Creek WPCP	GA0021156	Flat Creek	5 - 9	5 - 9
Newnan – Mineral Springs WPCP	GA0021423	Mineral Springs Creek	30	45
			Daily Avg (mg/L)	Daily Max (mg/L)
Buckhorn Ventures LLC	GA0037290	Six Mile Creek Tributary	25 - 55	55 - 110
Lafarge Building Materials, Inc.	GA0025917	Tributary to Noses Creek	25 - 40	25 - 40
Lafarge Building Materials, Inc.	GA0046906	Tributary to North Fork Peachtree Creek	25 - 40	25 - 40
USAF Lockheed (Plant No. 6)	GA0001198	Nickajack Creek	5 - 10	5 - 10

If there is available assimilative capacity, a new facility may be allowed, or it may be acceptable for an existing facility to expand. Any discharge increases will be allowed dependent on engineering and biological integrity study results.

State and Federal Rules define storm water discharges covered by NPDES permits as point sources. However, storm water discharges are from diffuse sources and there are multiple storm water outfalls. Storm water sources (point and nonpoint) are different than traditional NPDES permitted sources in four respects: 1) they do not produce a continuous (pollutant loading) discharge; 2) their pollutant loading depends on the intensity, duration, and frequency of rainfall events, over which the permittee has no control; 3) the activities contributing to the pollutant loading may include the various allowable activities of others, and control of these activities is not solely within the discretion of the permittee; and 4) they do not have wastewater treatment plants that control specific pollutants to meet numerical limits.

The intent of storm water NPDES permits is not to treat the water after collection, but to reduce the exposure of storm water to pollutants by implementing various controls. It would be infeasible and prohibitively expensive to control pollutant discharges from each storm water outfall. Therefore, storm water NPDES permits require the establishment of controls or BMPs to reduce the pollutants entering the environment.

The stormwater discharges associated with industrial facilities that are not covered under individual NPDES permits are regulated by a Georgia General Storm Water NPDES Permit (GAR000000). Table 11 lists the industrial facilities that are covered under the Georgia General

Stormwater NPDES Permit in the Chattahoochee River Basin. Facilities covered by this permit that discharge storm water associated with industrial activity or within one linear mile upstream and within the same watershed of an impaired stream segment are required to monitor for the pollutant of concern.

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.

The WLA loads were calculated based on the design flow and average monthly permitted TSS concentration for the municipal 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 sediment load allocation for each stream by land use, including roads, is reported in Table 21. The watersheds are grouped by: those that are not on the 303(d) list and those that are on the 303(d) list. 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 0.05 tons/acre/yr. The average sediment load in the watersheds not on the 303(d) list is 0.06 tons/acre/yr. Table 22 gives each source's percent contribution to the total sediment load.

The Total Allowable Load for each impaired segment is calculated by multiplying the watershed area in acres by an annual load per acre. This annual load is based on the average annual load per acre from all the unimpaired streams within a given ecoregion (Piedmont, 0.06 tons/acre/yr). The unimpaired streams are those with an IBI score greater than or equal to 50. The LA is then calculated by subtracting the WLA from the Total Allowable 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 loadings due to episodic events is usually evened out by the response of the annual sediment load was determined.

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, the use of the average sediment loading rates for the numeric targets, and the assumption that no BMPs were used.

5.5 Total Sediment Load

The total annual sediment load was determined by adding the WLA (WLA + WLAsw) and the LA. The MOS, as described above, was implicitly included in the TMDL analysis and does not factor directly into the TMDL equation as shown above.

The USLE method used calculates a total annual sediment load, as opposed to a daily load. The R factor from the USLE (the rainfall erosivity index) 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. Table 23 provides the rainfall statistics from six meteorological stations located throughout Georgia, and shows the variability of rainfall frequency and amount.

The allowable annual average sediment load expressed in terms of tons per acre per year is intended to prevent the cumulative impacts of excessive run-off related sediment in the watershed. The maximum daily allowable sediment load is a subcomponent of the allowable annual load. It is based upon the critical flow event that represents the maximum sediment load capacity for the stream. Research conducted by the Agricultural Research Service-National Sediment Laboratory and USEPA Region 4 has determined that the bankfull flow is the critical flow that has the maximum daily sediment carrying capacity, and therefore has the maximum daily sediment loading capacity. Bankfull flow can be estimated using the one-day flow event that occurs once every one and a half years, 1Q1.5, determined by the Log Pearson recurrence interval statistical analysis.

The National Sediment Laboratory has correlated, by ecoregion, a relationship between the annual average sediment load and the bankfull flow sediment load for stable or unimpaired streams. For the Piedmont ecoregion, the median bankfull flow sediment load expressed as tons per day per square kilometer is 2.54. This is 12.9 percent of the median annual average sediment load of 19.6 tons per year per square kilometer discharged into a stable unimpaired

stream. This relationship was used to transform total annual sediment loads to a daily maximum sediment loads.

The total annual sediment loads and daily maximum sediment loads for the impaired watershed are summarized in Table 24, along with any required sediment load reductions.
The WLAs (WLA + WLAsw) provided in Table 24 are for accounting purposes. For kaolin facilities, the WLA (as a TSS load) was calculated using a conversion factor between TSS and turbidity developed from instream data. 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, especially 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 overestimate some sediment loads.

Table 21. Sediment Load Allocations (Unimpaired – Piedmont Ecoregion)

	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	Deciduous Forest	Evergreen Forest	Mixed Forest	Deciduous Shrubland	Pasture/Hay	Row Crops	Other Grasses (Urban Recreational)	Woody Wetland	Road	Total	Load (ton/acre/yr)
Annewakee Creek u/s	0.0	360.8	20.0	13.0	0.0		2.5	1.4	0.0	2.0	19.2		55.6	11.9	229.2	715.6	0.07
Annewakee Creek d/s	0.0	372.6	20.2	13.0	0.0		2.7	1.5	0.0	3.3	55.8		58.6	14.5		542.3	0.05
Beech Creek	0.0	1.8			0.0		4.2	3.6	0.0	8.7	36.4	0.2	2.2	6.6	38.8	102.7	0.05
Big Branch	0.0	2.2	0.0		0.0		1.9	1.9	0.1	1.7	44.0		1.4	26.9	18.3	98.4	0.04
Blue John Creek	0.0	245.6	18.5	4.0	0.0		0.9	1.4	0.2	2.4	72.6		32.4	6.0	185.3	569.4	0.13
Brush Creek	0.0	0.8	0.0		0.0	600.1	7.3	4.9	0.0	17.0	97.2	0.0	1.0	23.4		751.8	0.23
Copeland Creek	0.0	0.8			0.0		4.1	1.6	0.0	15.8	43.9		0.3	0.6	2.6	69.6	0.06
Flat Creek	0.0	36.5	0.3		0.0		21.0	15.1	0.6	29.1	224.9	10.8	13.2	134.2	114.8	600.6	0.04
Flat Shoals Creek		0.2					1.3	1.0	0.0	0.3	1.6		0.1	3.2	0.8	8.5	0.01
Gum Branch	0.0	1.0	0.0				3.9	0.4	0.0	6.7	109.8		0.8	1.2	50.5	174.3	0.20
Gum Creek	0.0	3.8	0.3		0.0		14.1	5.4	0.1	11.3	102.6		2.0	19.0	37.4	196.1	0.04
Hillabahatchee Creek	0.0	8.6	0.0	0.0	0.0		63.3	26.3	0.4	49.4	435.6		8.3	13.5	188.1	793.6	0.06
Little Snake Creek	0.0	0.1	0.0		0.0		3.0	4.0	0.0	1.1	6.4		1.4	0.8	16.7	33.6	0.02
Long Cane Creek u/s	0.0	2.1		0.1	0.0		2.3	1.5	0.1	3.6	42.1		3.0	17.3	19.0	91.1	0.03
Long Cane Creek d/s	0.0	2.6		0.1	0.0		2.4	1.6	0.1	3.7	87.6		3.3	18.1	22.2	141.5	0.04
New River	0.0	282.5	8.0	1.3	0.0	3,197.8	43.8	44.7	1.2	79.7	1199.8	41.9	108.6	707.3	624.5	6,341.0	0.11
Norman Creek		4.9					3.1	0.8	0.0	4.7	11.6		1.5	2.5	8.2	37.4	0.02
Panther Creek	0.0	2.8	0.0				0.8	0.7	0.0	0.8	8.1		1.6	3.1	8.0	25.8	0.02
Polecat Creek	0.0	4.1	0.4	0.7	0.0		0.8	0.6	0.1	3.5	49.3	1.0	4.0	26.1	24.5	115.1	0.05
Red Oak Creek	0.0	0.3			0.0		15.0	5.3	0.1	14.8	144.1		4.6	3.6	95.9	283.7	0.08
Snake Creek u/s	0.0	17.8	0.0	0.0	0.0		4.4	3.0	0.1	7.8	31.8		5.8	4.9	46.0	121.6	0.03
Snake Creek d/s	0.0	55.8	1.6	0.0	0.0	0.0	52.5	25.8	0.2	63.5	307.1	28.3	33.8	35.6	358.5	962.8	0.04
Town Creek	0.0	12.1	0.0	0.0	0.0	0.0	7.7	2.6	0.1	17.1	94.3	0.0	4.9	5.4	96.3	240.4	0.08
Tributary to Whooping Creek	0.0	0.9	0.4	0.1			1.9	0.9	0.0	3.5	9.3		1.6	1.5	51.5	71.5	0.16

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	Deciduous Forest	Evergreen Forest	Mixed Forest	Deciduous Shrubland	Pasture/Hay	Row Crops	Other Grasses (Urban Recreational)	Woody Wetland	Road	Total	Load (ton/acre/yr)
Whooping Creek u/s	0.0	41.3	0.1	0.0	0.0		5.7	4.4	0.1	4.5	45.0		7.9	7.3	138.9	255.3	0.08
Whooping Creek mid	0.0	68.3	3.6	0.9	0.0	48.1	28.1	5.6	75.9	196.6	54.3	16.9	44.3	11.1	560.0	1,113.5	0.07
Whooping Creek d/s	0.0	73.0	3.6	0.9	0.0	48.1	30.1	6.9	75.9	197.4	63.0	16.9	46.2	15.9	593.5	1,171.3	0.07
Wolf Creek	0.0	0.8	0.0		0.0		2.1	0.7	0.0	2.0	28.4		0.7	12.7	0.0	47.3	0.03

Table 21. Sediment Load Allocations (Impaired – Piedmont Ecoregion)

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	Deciduous Forest	Evergreen Forest	Mixed Forest	Deciduous Shrubland	Pasture/Hay	Row Crops	Other Grasses (Urban Recreational)	Woody Wetland	Road	Total	Load (ton/acre/yr)
Bear Creek	0.0	73.0	3.2	0.5	0.0		28.2	17.2	0.4	14.9	131.1	1.4	40.5	112.2	288.5	711.1	0.04
Browns Creek	0.0	93.0	0.2		0.0		5.9	3.4	0.0	4.0	76.0		15.8	7.3	91.0	296.6	0.06
Bull Creek	0.0	292.6	17.1	4.4	0.0	392.5	18.0	11.3	1.5	10.3	140.7	1,525.6	57.1	164.5	249.4	2,890.1	0.14
Dean Creek	0.0	18.5	1.7	0.3	0.0		8.3	1.8	0.3	4.6	652.1		21.5		133.5	842.3	0.23
Deep Creek	0.0	172.0	3.2	0.1	0.0		34.0	14.0	0.5	17.4	252.6	29.2	66.4	60.7	391.5	1,041.5	0.06
Flat Creek (PS)	0.0	21.2	1.5	0.2	0.0		6.2	0.5	0.1	4.9	290.7		15.9	10.3	116.7	468.2	0.10
Flat Creek (NS)	0.0	128.3	23.4	7.9	0.0		0.4	0.2	0.1	0.0	4.5		13.1	0.7	220.9	399.5	0.19
Hazel Creek	0.0	45.8	5.7	0.1	0.0		10.4	0.8	0.3	4.0	619.7		24.3	6.7	146.6	864.5	0.18
Ivy Creek	0.0	205.0	2.4	0.0	0.0		5.9	2.8	0.1	3.2	241.0		28.3	11.3	132.9	632.9	0.13
Long Island Creek	0.0	179.7	15.8	1.9	0.0		2.6	1.9	0.0	0.0	4.7		47.8	0.4	140.3	395.1	0.12
Maple Branch	0.0	12.0	0.0	0.0	0.0		0.5	0.2	0.0	0.4	13.8		3.6	4.2	8.9	43.6	0.06
Mountain Creek	182.5	111.0	3.3	0.5	0.0	0.8	4.3	2.6	2.2	23.0	48.2	22.4	28.4	20.9	229.7	679.8	0.15

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**	**Deciduous Forest**	**Evergreen Forest**	**Mixed Forest**	**Deciduous Shrubland**	**Pasture/Hay**	**Row Crops**	**Other Grasses (Urban Recreational)**	**Woody Wetland**	**Road**	**Total**	**Load (ton/acre/yr)**
Mud Creek	0.0	189.0	18.3	8.2	0.0		9.7	0.7	0.2	6.5	490.5		49.1	26.2	108.6	907.1	0.15
Nancy Creek	0.0	1,160.7	116.4	31.9	0.0	0.0	7.8	7.9	0.5	0.5	46.2	0.0	311.9	14.0	760.5	2,458.4	0.13
Nickajack Creek	0.0	838.3	37.4	6.3	0.0	0.0	19.5	6.6	0.5	1.3	80.1	0.0	158.6	34.2	1,007.9	2,190.7	0.11
North Fork Peachtree Creek	0.0	228.2	60.7	19.3	0.0		0.3	0.5	0.0	0.2	7.8		38.1	8.8	304.2	668.1	0.10
Noses Creek	0.0	91.8	1.9	0.4	0.0	928.4	15.4	7.4	0.2	0.8	74.4		26.7	7.4	200.6	1,355.5	0.36
Pea Creek	0.0	18.6	0.1		0.0		13.9	4.0	0.1	3.3	71.7		22.1	16.3	126.8	276.9	0.06
Six Mile Creek	0.0	6.5	4.5	0.2	0.0	3,649.6	5.2	0.8	0.2	4.5	120.0		7.0		32.8	3,831.4	2.03
South Fork Limestone Creek/Limestone Creek	0.0	94.0	9.7	1.5	0.0		0.9	0.6	0.1		9.3		17.5		135.5	269.2	0.25
Suwanee Creek	0.0	538.2	42.7	12.4	0.0		16.7	3.6	0.8	5.6	326.3		71.4	38.1	353.4	1,409.0	0.16
Tributary to Limestone Creek	0.0	41.1	3.6	0.3	0.0		1.2	0.1	0.0	0.4	4.5		11.1		173.8	236.1	0.26
Turner Creek	0.0	14.6	2.6	0.0	0.0		96.8	11.1	4.5	18.3	563.9	113.5	61.0	3.7	172.6	1,062.6	0.21
Ward Creek	0.0	229.4	4.6	0.4	0.0		4.5	5.7	0.3	0.2	23.5		73.1	13.3	420.8	775.8	0.17
White Creek	0.0	19.2	3.0	0.1	0.0		7.8	1.0	0.4	4.4	872.1		11.6		128.3	1,047.7	0.20

Table 22. Sediment Load Percentages (Unimpaired – Piedmont Ecoregion)

Percent Total Sediment Load															
Name	Open Water	Low Intensity Residential	High Intensity Residential	High Intensity Commercial / Industrial Transportation	Bare Rock Sand and Clay	Quarries Strip Mines Gravel Pits	Deciduous Forest	Evergreen Forest	Mixed Forest	Deciduous Shrub	Pasture / Hay	Row Crops	Other Grasses (Urban Recreational)	Woody Wetland	Road
Annewakee Creek u/s	0.00%	50.42%	2.79%	1.82%	0.00%	0.00%	0.36%	0.19%	0.00%	0.28%	2.68%	0.00%	7.77%	1.67%	32.03%
Annewakee Creek d/s	0.00%	68.70%	3.73%	2.40%	0.00%	0.00%	0.51%	0.28%	0.00%	0.61%	10.29%	0.00%	10.80%	2.68%	0.00%
Beech Creek	0.00%	1.75%	0.00%	0.00%	0.00%	0.00%	4.06%	3.54%	0.04%	8.49%	35.49%	0.18%	2.17%	6.46%	37.82%
Big Branch	0.00%	2.24%	0.00%	0.00%	0.00%	0.00%	1.95%	1.90%	0.06%	1.76%	44.76%	0.00%	1.42%	27.30%	18.60%
Blue John Creek	0.00%	43.13%	3.25%	0.71%	0.00%	0.00%	0.15%	0.24%	0.03%	0.43%	12.75%	0.00%	5.70%	1.06%	32.54%
Brush Creek	0.00%	0.11%	0.00%	0.00%	0.00%	79.82%	0.97%	0.65%	0.00%	2.26%	12.93%	0.01%	0.14%	3.12%	0.00%
Copeland Creek	0.00%	1.15%	0.00%	0.00%	0.00%	0.00%	5.91%	2.30%	0.01%	22.65%	63.00%	0.00%	0.41%	0.83%	3.73%
Flat Creek	0.00%	6.08%	0.04%	0.00%	0.00%	0.00%	3.50%	2.51%	0.10%	4.85%	37.45%	1.80%	2.21%	22.35%	19.11%
Flat Shoals Creek	0.00%	2.34%	0.00%	0.00%	0.00%	0.00%	14.92%	11.94%	0.16%	3.55%	18.79%	0.00%	1.32%	37.61%	9.36%
Gum Branch	0.00%	0.57%	0.00%	0.00%	0.00%	0.00%	2.24%	0.21%	0.03%	3.84%	62.99%	0.00%	0.45%	0.71%	28.97%
Gum Creek	0.00%	1.94%	0.15%	0.00%	0.00%	0.00%	7.20%	2.78%	0.04%	5.78%	52.34%	0.00%	1.03%	9.67%	19.07%
Hillabahatchee Creek	0.00%	1.08%	0.00%	0.00%	0.00%	0.00%	7.98%	3.31%	0.05%	6.23%	54.89%	0.00%	1.05%	1.70%	23.70%
Little Snake Creek	0.00%	0.30%	0.04%	0.00%	0.00%	0.00%	8.99%	11.94%	0.01%	3.34%	19.15%	0.00%	4.29%	2.30%	49.65%
Long Cane Creek u/s	0.00%	2.30%	0.00%	0.08%	0.00%	0.00%	2.50%	1.69%	0.08%	3.93%	46.20%	0.00%	3.33%	19.03%	20.85%
Long Cane Creek d/s	0.00%	1.84%	0.00%	0.05%	0.00%	0.00%	1.69%	1.11%	0.06%	2.60%	61.87%	0.00%	2.33%	12.77%	15.68%
New River	0.00%	4.46%	0.13%	0.02%	0.00%	50.43%	0.69%	0.71%	0.02%	1.26%	18.92%	0.66%	1.71%	11.15%	9.85%
Norman Creek	0.00%	13.11%	0.00%	0.00%	0.00%	0.00%	8.29%	2.23%	0.01%	12.54%	31.09%	0.00%	4.00%	6.80%	21.94%
Panther Creek	0.00%	10.84%	0.02%	0.00%	0.00%	0.00%	2.96%	2.52%	0.00%	3.11%	31.52%	0.00%	6.05%	12.01%	30.97%
Polecat Creek	0.00%	3.56%	0.32%	0.65%	0.00%	0.00%	0.66%	0.52%	0.07%	3.02%	42.88%	0.86%	3.48%	22.69%	21.29%
Red Oak Creek	0.00%	0.11%	0.00%	0.00%	0.00%	0.00%	5.30%	1.86%	0.03%	5.20%	50.79%	0.00%	1.63%	1.26%	33.81%
Snake Creek u/s	0.00%	14.64%	0.01%	0.00%	0.00%	0.00%	3.62%	2.48%	0.05%	6.40%	26.18%	0.00%	4.73%	4.05%	37.84%
Snake Creek d/s	0.00%	5.80%	0.17%	0.00%	0.00%	0.00%	5.45%	2.68%	0.03%	6.60%	31.90%	2.94%	3.51%	3.70%	37.23%
Town Creek	0.00%	5.03%	0.00%	0.00%	0.00%	0.00%	3.19%	1.09%	0.02%	7.11%	39.20%	0.00%	2.05%	2.25%	40.06%
Trib to Whooping Creek	0.00%	1.26%	0.52%	0.09%	0.00%	0.00%	2.65%	1.31%	0.04%	4.89%	12.99%	0.00%	2.26%	2.03%	71.97%
Whooping Creek u/s	0.00%	16.16%	0.04%	0.01%	0.00%	0.00%	2.24%	1.72%	0.03%	1.77%	17.62%	0.00%	3.11%	2.87%	54.43%

Percent Total Sediment Load															
Name	Open Water	Low Intensity Residential	High Intensity Residential	High Intensity Commercial / Industrial Transportation	Bare Rock Sand and Clay	Quarries Strip Mines Gravel Pits	Deciduous Forest	Evergreen Forest	Mixed Forest	Deciduous Shrub	Pasture / Hay	Row Crops	Other Grasses (Urban Recreational)	Woody Wetland	Road
Whooping Creek mid	0.00%	6.13%	0.32%	0.08%	0.00%	4.32%	2.52%	0.50%	6.81%	17.66%	4.87%	1.52%	3.98%	1.00%	50.29%
Whooping Creek d/s	0.00%	6.23%	0.30%	0.08%	0.00%	4.10%	2.57%	0.59%	6.48%	16.85%	5.38%	1.44%	3.95%	1.36%	50.67%
Wolf Creek	0.00%	1.63%	0.00%	0.00%	0.00%	0.00%	4.35%	1.54%	0.01%	4.13%	60.05%	0.00%	1.48%	26.82%	0.00%

Table 22. Sediment Load Percentages (Impaired – Piedmont Ecoregion)

Percent Total Sediment Load															
Name	Open Water	Low Intensity Residential	High Intensity Residential	High Intensity Commercial / Industrial Transportation	Bare Rock Sand and Clay	Quarries Strip Mines Gravel Pits	Deciduous Forest	Evergreen Forest	Mixed Forest	Deciduous Shrub	Pasture / Hay	Row Crops	Other Grasses (Urban Recreational)	Woody Wetland	Road
Bear Creek	0.00%	10.26%	0.45%	0.08%	0.00%	0.00%	3.97%	2.42%	0.06%	2.10%	18.43%	0.19%	5.69%	15.77%	40.57%
Browns Creek	0.00%	31.35%	0.07%	0.00%	0.00%	0.00%	1.98%	1.14%	0.01%	1.35%	25.62%	0.00%	5.33%	2.47%	30.68%
Bull Creek	0.00%	10.12%	0.59%	0.15%	0.00%	13.58%	0.62%	0.39%	0.05%	0.36%	4.87%	52.79%	1.97%	5.69%	8.63%
Dean Creek	0.00%	2.19%	0.20%	0.03%	0.00%	0.00%	0.99%	0.21%	0.03%	0.54%	77.41%	0.00%	2.55%	0.00%	15.85%
Deep Creek	0.00%	16.51%	0.30%	0.01%	0.00%	0.00%	3.26%	1.35%	0.05%	1.67%	24.26%	2.81%	6.37%	5.83%	37.59%
Flat Creek (PS)	0.00%	4.53%	0.31%	0.03%	0.00%	0.00%	1.33%	0.10%	0.03%	1.05%	62.10%	0.00%	3.40%	2.21%	24.91%
Flat Creek (NS)	0.00%	32.11%	5.85%	1.98%	0.00%	0.00%	0.09%	0.04%	0.02%	0.00%	1.14%	0.00%	3.29%	0.19%	55.29%
Hazel Creek	0.00%	5.30%	0.66%	0.01%	0.00%	0.00%	1.20%	0.10%	0.03%	0.47%	71.68%	0.00%	2.81%	0.77%	16.96%
Ivy Creek	0.00%	32.39%	0.38%	0.01%	0.00%	0.00%	0.93%	0.44%	0.02%	0.51%	38.08%	0.00%	4.47%	1.79%	21.00%
Long Island Creek	0.00%	45.47%	4.00%	0.47%	0.00%	0.00%	0.66%	0.49%	0.01%	0.01%	1.19%	0.00%	12.10%	0.09%	35.50%
Maple Branch	0.00%	27.47%	0.00%	0.00%	0.00%	0.00%	1.04%	0.47%	0.01%	0.83%	31.72%	0.00%	8.36%	9.70%	20.40%
Mountain Creek	26.84%	16.33%	0.48%	0.07%	0.00%	0.12%	0.63%	0.38%	0.32%	3.38%	7.09%	3.30%	4.18%	3.07%	33.80%
Mud Creek	0.00%	20.84%	2.02%	0.90%	0.00%	0.00%	1.07%	0.08%	0.02%	0.72%	54.08%	0.00%	5.42%	2.89%	11.97%

Percent Total Sediment Load																
Name	Open Water	Low Intensity Residential	High Intensity Residential	High Intensity Commercial / Industrial Transportation	Bare Rock Sand and Clay	Quarries Strip Mines Gravel Pits	Deciduous Forest	Evergreen Forest	Mixed Forest	Deciduous Shrub	Pasture / Hay	Row Crops Other Grasses (Urban Recreational)		Woody Wetland	Road
Nancy Creek	0.00%	47.22%	4.74%	1.30%	0.00%	0.00%	0.32%	0.32%	0.02%	0.02%	1.88%	0.00%	12.69%	0.57%	30.94%
Nickajack Creek	0.00%	38.27%	1.71%	0.29%	0.00%	0.00%	0.89%	0.30%	0.02%	0.06%	3.65%	0.00%	7.24%	1.56%	46.01%
North Fork Peachtree Creek	0.00%	34.16%	9.09%	2.89%	0.00%	0.00%	0.05%	0.07%	0.00%	0.03%	1.16%	0.00%	5.70%	1.32%	45.54%
Noses Creek	0.00%	6.77%	0.14%	0.03%	0.00%	68.49%	1.14%	0.55%	0.02%	0.06%	5.49%	0.00%	1.97%	0.54%	14.80%
Pea Creek	0.00%	6.71%	0.05%	0.00%	0.00%	0.00%	5.02%	1.46%	0.03%	1.19%	25.89%	0.00%	7.98%	5.88%	45.80%
Six Mile Creek	0.00%	0.17%	0.12%	0.01%	0.00%	95.25%	0.14%	0.02%	0.00%	0.12%	3.13%	0.00%	0.18%	0.00%	0.86%
South Fork Limestone Creek/Limestone Creek	0.00%	34.92%	3.61%	0.56%	0.00%	0.00%	0.34%	0.22%	0.05%	0.00%	3.46%	0.00%	6.51%	0.00%	50.33%
Suwanee Creek	0.00%	38.19%	3.03%	0.88%	0.00%	0.00%	1.18%	0.25%	0.06%	0.40%	23.15%	0.00%	5.06%	2.70%	25.08%
Tributary to Limestone Creek	0.00%	17.41%	1.51%	0.13%	0.00%	0.00%	0.50%	0.03%	0.01%	0.19%	1.92%	0.00%	4.69%	0.00%	73.62%
Turner Creek	0.00%	1.37%	0.25%	0.00%	0.00%	0.00%	9.11%	1.05%	0.42%	1.72%	53.07%	10.68%	5.74%	0.35%	16.24%
Ward Creek	0.00%	29.57%	0.59%	0.05%	0.00%	0.00%	0.58%	0.74%	0.04%	0.02%	3.03%	0.00%	9.43%	1.71%	54.24%
White Creek	0.00%	1.83%	0.28%	0.01%	0.00%	0.00%	0.74%	0.09%	0.04%	0.42%	83.23%	0.00%	1.11%	0.00%	12.24%

Table 23. Georgia Meteorological Rainfall Statistics

Station	Normal Monthly Precipitation (in.) / Avg. Days of Precipitation (0.1 in. or more)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Athens, GA	4.6/11	4.4/9	5.5/11	4.0/8	4.4/9	3.9/9	4.9/11	3.7/9	3.4/8	3.3/7	3.7/8	4.1/10
Atlanta, GA	4.8/11	4.8/10	5.8/11	4.3/9	4.3/9	3.6/10	5.0/12	3.7/10	3.4/8	3.1/6	3.9/8	4.3/10
Augusta, GA	4.1/10	4.3/9	4.7/10	3.3/8	3.8/9	4.1/9	4.2/11	4.5/10	3.0/7	2.8/6	2.5/7	3.4/9
Columbus, GA	4.6/10	4.9/10	5.8/10	4.3/8	4.2/8	4.1/9	5.5/13	3.7/10	3.2/8	2.2/5	3.6/8	5.0/10
Macon, GA	4.6/11	4.7/10	4.8/10	3.5/7	3.6/9	3.6/10	4.3/13	3.6/11	2.8/8	2.2/6	2.7/7	4.3/9
Savannah, GA	3.6/9	3.2/9	3.8/9	3.0/7	4.1/9	5.7/10	6.4/14	7.5/13	4.5/10	2.4/6	2.2/6	3.0/8

Table 24. Total Annual Sediment Loads and the Required Sediment Load Reductions

Name	Current Load (tons/yr)	WLA (tons/yr)	WLAsw (tons/yr)	LA (tons/yr)	Allowable Total Load (tons/yr)	Allowable Maximum Daily Load (tons/day)	% Reduction
Bear Creek	714.2	3.0	495.7	212.4	711.1	91.7	0.43%
Browns Creek	296.6			296.6	296.6	38.3	0.00%
Bull Creek	2,890.1		835.5	722.1	1,557.6	200.9	46.10%
Dean Creek	842.3			266.6	266.6	34.4	68.34%
Deep Creek	1,041.5		729.0	312.4	1,041.5	134.4	0.00%
Flat Creek (PS)	468.2			338.5	338.5	43.7	27.71%
Flat Creek (NS)	539.8	140.3	8.3	4.1	152.8	19.7	71.70%
Hazel Creek	864.5			349.6	349.6	45.1	59.56%
Ivy Creek	632.9		245.3	106.3	351.6	45.4	44.45%
Long Island Creek	395.1		171.0	73.3	244.3	31.5	38.18%
Maple Branch	43.6			43.6	43.6	5.6	0.00%
Mountain Creek	714.1	34.3	58.4	253.6	346.3	44.7	51.51%
Mud Creek	998.4	91.3		353.4	444.7	57.4	55.46%
Nancy Creek	2,629.1	170.8	1,068.5	457.9	1,697.1	218.9	35.45%
Nickajack Creek	2,221.1	30.4	979.6	419.8	1,429.9	184.5	35.62%
North Fork Peachtree Creek	669.3	1.3	346.9	148.7	496.9	64.1	25.77%
Noses Creek	1,356.6	1.2	193.0	82.7	276.9	35.7	79.59%
Pea Creek	276.9		193.8	83.1	276.9	35.7	0.00%
Six Mile Creek	3,885.5	54.1	59.7	25.6	139.3	18.0	96.41%
South Fork Limestone Creek/ Limestone Creek	269.2		56.8	24.3	81.2	10.5	69.85%
Suwanee Creek	1,500.4	91.3	382.3	192.9	666.5	86.0	55.58%
Tributary to Limestone Creek	236.1		46.3	19.8	66.2	8.5	71.97%
Turner Creek	1,062.6			379.8	379.8	49.0	64.26%
Ward Creek	775.8		236.2	101.2	337.4	43.5	56.51%
White Creek	1,047.7			378.7	378.7	48.9	63.86%

6.0 RECOMMENDATIONS

6.1 Monitoring

Monitoring is conducted at a number of locations across the State each year. GA EPD 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 and offers a five-year planning and assessment cycle. The Chattahoochee River Basin, along with the Flint River Basin, were the basins of focused monitoring in 2000 and will again receive focused monitoring in 2010. 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 compliance with NPDES permits and implementation of Best Management Practices (BMPs) be monitored. The anticipated effects of compliance with NPDES permits and implementation of BMPs will be the improvement of stream habitats and water quality, and thus be an indirect measurement of the TMDL.

Management practices recommended to maintain the total 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; and
- Mitigation and prevention of stream bank erosion due to increased stream flow 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 developing municipal,

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

In accordance with GA EPD 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 that identified in the TMDL. However, if there is available assimilative capacity, new discharges may be allowed based on engineering evaluations and current stream biological integrity studies.

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 sedimentation ponds or detention basins prior to being discharged to the stream and are regulated by NPDES permits. It is recommended that the peak flow from mining sites be maintained at pre-development levels in order to control bank erosion and instabilities in the receiving stream. In addition, monitoring frequencies should be such that the total annual sediment loads coming from mining facilities can be characterized.

The GA EPD has developed a General Storm Water NPDES Permit for Construction Activities. The current permit is required for all construction sites disturbing one or more acres. As of 2003, this permit covers 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. All construction sites will monitor their storm water runoff as required by the General Storm Water NPDES Permit for Construction Activities. It is also recommended that the peak flow from construction sites be maintained at pre-development levels.

6.2.2 Nonpoint Source Land Use Approaches

The GA EPD is responsible for administering and enforcing laws to protect the waters of the State. GA 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 BMPs that address nonpoint source pollution. In addition, public education efforts are being targeted to individual stakeholders to provide information regarding the use of BMPs 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, GA 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 to develop recommendations for reducing or eliminating 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 incorporate 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 (GA EPD, 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 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 GA 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 cannot get satisfactory compliance, the case is turned over to GA 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, GA 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 Protecting 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, found in the electronic Field Office Technical Guide (FOTG), on their website (http://www.nrcs.usda.gov/technical/efotg/). Some of these BMPs may be used for farming operations to reduce soil erosion. It is recommended that the agricultural communities with cropland close to impaired streams, and pastureland 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 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 includes 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 GA EPD 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, the NRCS 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 NRI found that 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 per year in 1997 (USDA-NRCS, 1997).

NRCS also provides a web-based database application (Performance Results System, PRS) 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://ias.sc.egov.usda.gov/prshome/default.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 GA EPD supports the PRS 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 are therefore 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 GA EPD. These permits are administered by the Land Protection Branch of GA EPD. 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 GA 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 GMA 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 BMPs 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, result 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 stream flows 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 stream flows 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 affect 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 GA 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 BMPs. 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 GA EPD, and the Soil and Water Conservation Districts, are primarily responsible for implementing the Georgia Erosion and Sedimentation Act, O.C.G.A. §12-7-1 (amended in 2003). Reports of suspected violations are made to the agency that issued the permit. In cases with local issuing authority, if the violation continues, the complaint is referred to the appropriate Soil and Water Conservation District. If the situation remains unresolved, the complaint is then referred to GA 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 Georgia 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 stream flow rates may increase significantly from pre-construction rates. These changes in the stream flow 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* (GA EPD, 1997). Additional information on site design and best management practices to address stormwater run-off may be found in the *Georgia Stormwater Management Manual* (the "Blue Book") (ARC, 2001) and Georgia's *Green Growth Guidelines* (GADNR, 2005), both of which are available electronically via the internet.

6.3 Reasonable Assurance

Permitted discharges will be regulated through the NPDES permitting process described in this report. Through its NPDES permitting process, GA EPD will determine whether a new discharger has a reasonable potential of discharging sediment levels equal to or greater than the total allocated load. The results of this reasonable potential analysis will determine the specific requirements in an individual facility's NPDES permit. As part of its analysis, the GA EPD will use its EPA approved 2003 NPDES Reasonable Potential Procedures to determine whether monitoring requirements or effluent limitations are necessary.

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 is being provided for this TMDL. During that time, the availability of the TMDL will be public noticed, a copy of the TMDL will be provided as requested, and the public is invited to provide comments on the TMDL.

7.0 INITIAL TMDL IMPLEMENTATION PLAN

GA EPD has coordinated with EPA to prepare this Initial TMDL Implementation Plan for this TMDL. GA EPD has also established a plan and schedule for development of a more comprehensive implementation plan after this TMDL is established. GA 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 GA EPD and / or Regional Development Centers (RDCs) or other GA EPD contractors (hereinafter, "GA EPD Contractors") will develop expanded plans (hereinafter, "Revised TMDL Implementation Plans").

This Initial TMDL Implementation Plan, written by GA EPD and for which GA EPD and / or the GA 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. GA EPD and the GA 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. GA 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 GA EPD Contractor and approved by GA 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 GA EPD approves. If for any reason the GA EPD Contractor does not complete the BMP demonstration project, GA EPD will take responsibility for doing so.

3. As part of the Initial TMDL Implementation Plan, the GA EPD brochure entitled "Watershed Wisdom -- Georgia's TMDL Program" will be distributed by GA EPD to the GA 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 GA EPD Contractor for its use in making presentations to appropriate stakeholders on TMDL implementation plan development.

4. If for any reason an GA EPD Contractor does not complete one or more elements of a Revised TMDL Implementation Plan, GA 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 September 2010.

6. The GA EPD Contractor helping to develop the Revised TMDL Implementation Plan, in coordination with GA 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 a monitoring plan, taking into account available resources, to measure effectiveness; and
   H. Complete and submit to GA 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 once GA EPD accepts the Revised TMDL Implementation Plan.

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
Bear Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Fulton

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130002

Waterbody Name: Bear Creek
Location: Little Bear Creek to Chattahoochee River
Stream Length: 4 miles
Watershed Area: 27.3 square miles
Tributary to: Chattahoochee River
Ecoregion: Piedmont

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): 3.0 tons/yr
Fulton Co. – Little Bear Creek 20 mg/L (3.0 tons/yr)
Future Construction Sites Meet requirements of General Storm Water Permit

Wasteload Allocations (WLA_{SW}): 495.7 tons/yr

Load Allocation (LA) : 212.4 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 711.1 tons/yr

Maximum Daily Sediment Load: 91.7 tons/day

SUMMARY MEMORANDUM
Annual Average Sediment Load
Browns Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Coweta

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130002

Waterbody Name: Browns Creek
Location: Headwaters to Cedar Creek
Stream Length: 5 miles
Watershed Area: 8.1 square miles
Tributary to: Cedar Creek
Ecoregion: Piedmont

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) : 296.6 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 296.6 tons/yr

Maximum Daily Sediment Load: 38.3 tons/day

SUMMARY MEMORANDUM
Annual Average Sediment Load
Bull Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Muscogee

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130003

Waterbody Name: Bull Creek
Location: Flat Rock Creek to Cooper Creek, Columbus
Stream Length: 3 miles
Watershed Area: 32.9 square miles
Tributary to: Chattahoochee River
Ecoregion: Piedmont

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

Wasteload Allocations (WLA_{SW}): 835.5 tons/yr

Load Allocation (LA) : 722.1 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 1,557.6 tons/yr

Maximum Daily Sediment Load: 200.9 tons/day

SUMMARY MEMORANDUM
Annual Average Sediment Load
Dean Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: White

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130001

Waterbody Name: Dean Creek
Location: Headwaters to Mossy Creek
Stream Length: 5 miles
Watershed Area: 5.6 square miles
Tributary to: Mossy Creek
Ecoregion: Piedmont

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) : 266.6 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 266.6 tons/yr

Maximum Daily Sediment Load: 34.4 tons/day

SUMMARY MEMORANDUM
Annual Average Sediment Load
Deep Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Fulton

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130002

Waterbody Name: Deep Creek
Location: Line Creek to Chattahoochee River
Stream Length: 3 miles
Watershed Area: 27.4 square miles
Tributary to: Chattahoochee River
Ecoregion: Piedmont

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

Wasteload Allocations (WLA_{SW}): 729.0 tons/yr

Load Allocation (LA) : 312.4 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 1,041.5 tons/yr

Maximum Daily Sediment Load: 134.4 tons/day

SUMMARY MEMORANDUM
Annual Average Sediment Load
Flat Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: White/Hall

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130001

Waterbody Name: Flat Creek
Location: Headwaters near Clermont to Lake Lanier
Stream Length: 9 miles
Watershed Area: 7.2 square miles
Tributary to: Lake Lanier
Ecoregion: Piedmont

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) : 338.5 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 338.5 tons/yr

Maximum Daily Sediment Load: 43.7 tons/day

SUMMARY MEMORANDUM
Annual Average Sediment Load
Flat Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Hall

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130001

Waterbody Name: Flat Creek
Location: Headwaters, Gainesville to Lake Lanier
Stream Length: 6 miles
Watershed Area: 3.2 square miles
Tributary to: Lake Lanier
Ecoregion: Piedmont

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): 140.3 tons/yr
Dixie Mobile Home Park: 90 mg/L (0.6 tons/yr)
Gainesville – Flat Creek WPCP: 5 – 9 mg/L (77.6 – 139.7 tons/yr)
Future Construction Sites: Meet requirements of General Storm Water Permit

Wasteload Allocations (WLA_{SW}): 8.3 tons/yr

Load Allocation (LA) : 4.1 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 152.8 tons/yr

Maximum Daily Sediment Load: 19.7 tons/day

SUMMARY MEMORANDUM
Annual Average Sediment Load
Hazel Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Habersham

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130001

Waterbody Name: Hazel Creek
Location: Reservoir No. 12 to Law Creek
Stream Length: 4 miles
Watershed Area: 7.4 square miles
Tributary to: Soquee River
Ecoregion: Piedmont

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) : 349.6 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 349.6 tons/yr

Maximum Daily Sediment Load: 45.1 tons/day

SUMMARY MEMORANDUM
Annual Average Sediment Load
Ivy Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Gwinnett

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130001

Waterbody Name: Ivy Creek
Location: Headwaters to Suwannee Creek
Stream Length: 10 miles
Watershed Area: 7.4 square miles
Tributary to: Suwannee Creek
Ecoregion: Piedmont

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

Wasteload Allocations (WLA_{SW}): 245.3 tons/yr

Load Allocation (LA) : 106.3 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 351.6 tons/yr

Maximum Daily Sediment Load: 45.4 tons/day

SUMMARY MEMORANDUM
Annual Average Sediment Load
Long Island Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Fulton

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130001

Waterbody Name: Long Island Creek
Location: Headwaters to Chattahoochee River
Stream Length: 5 miles
Watershed Area: 5.2 square miles
Tributary to: Chattahoochee River
Ecoregion: Piedmont

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

Wasteload Allocations (WLA_{SW}): 171.0 tons/yr

Load Allocation (LA) : 73.3 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 244.3 tons/yr

Maximum Daily Sediment Load: 31.5 tons/day

SUMMARY MEMORANDUM
Annual Average Sediment Load
Maple Branch

1. 303(d) Listed Waterbody Information

State: Georgia
County: Coweta

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130002

Waterbody Name: Maple Branch
Location: Headwaters to Mountain Creek
Stream Length: 4 miles
Watershed Area: 1.2 square miles
Tributary to: Mountain Creek
Ecoregion: Piedmont

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) : 43.6 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 43.6 tons/yr

Maximum Daily Sediment Load: 5.6 tons/day

SUMMARY MEMORANDUM
Annual Average Sediment Load
Mountain Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Coweta

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130002

Waterbody Name: Bear Creek
Location: Tributary to Mountain Creek (d/s SR 34) to Maple Branch
Stream Length: 4 miles
Watershed Area: 7.3 square miles
Tributary to: New River
Ecoregion: Piedmont

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): 34.3 tons/yr
Newnan – Mineral Springs WPCP: 30 mg/L (34.3 tons/yr)
Future Construction Sites: Meet requirements of General Storm Water Permit

Wasteload Allocations (WLA_{SW}): 58.4 tons/yr

Load Allocation (LA) : 253.6 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 346.3 tons/yr

Maximum Daily Sediment Load: 44.7 tons/day

SUMMARY MEMORANDUM
Annual Average Sediment Load
Mud Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Habersham/Hall

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130001

Waterbody Name: Mud Creek
Location: Headwaters to Little Mud Creek
Stream Length: 13 miles
Watershed Area: 9.4 square miles
Tributary to: Chattahoochee River
Ecoregion: Piedmont

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): 91.3 tons/yr
Cornelia WPCP: 20 mg/L (91.3 tons/yr)
Future Construction Sites: Meet requirements of General Storm Water Permit

Load Allocation (LA) : 353.4 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 444.7 tons/yr

Maximum Daily Sediment Load: 57.4 tons/day

SUMMARY MEMORANDUM
Annual Average Sediment Load
Nancy Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: DeKalb/Fulton

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130001

Waterbody Name: Nancy Creek
Location: Headwaters to Peachtree Creek, Atlanta
Stream Length: 16 miles
Watershed Area: 35.9 square miles
Tributary to: Peachtree Creek
Ecoregion: Piedmont

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): 170.8 tons/yr
DeKalb Co. – Scott Candler WTP 30 mg/L (170.8 tons/yr)
Future Construction Sites Meet requirements of General Storm Water Permit

Wasteload Allocations (WLA_{SW}): 1,068.5 tons/yr

Load Allocation (LA) : 457.9 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 1,697.1 tons/yr

Maximum Daily Sediment Load: 218.9 tons/day

SUMMARY MEMORANDUM
Annual Average Sediment Load
Nickajack Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Cobb

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130002

Waterbody Name: Nickajack Creek
Location: Headwaters to Chattahoochee River
Stream Length: 11 miles
Watershed Area: 30.2 square miles
Tributary to: Chattahoochee River
Ecoregion: Piedmont

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): 30.4 tons/yr
USAF Lockheed (Plant No. 6) 5 – 10 mg/L (15.2 – 30.4 tons/yr)
Future Construction Sites Meet requirements of General Storm Water Permit

Wasteload Allocations (WLA_{SW}): 979.6 tons/yr

Load Allocation (LA) : 419.8 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 1,429.9 tons/yr

Maximum Daily Sediment Load: 184.5 tons/day

SUMMARY MEMORANDUM
Annual Average Sediment Load
North Fork Peachtree Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Gwinnett/DeKalb/Fulton

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130001

Waterbody Name: North Fork Peachtree Creek
Location: Headwaters to Peachtree Creek
Stream Length: 14 miles
Watershed Area: 10.5 square miles
Tributary to: Peachtree Creek
Ecoregion: Piedmont

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): 1.3 tons/yr
Lafarge Building Materials (GA0046906) 25 – 40 mg/L (0.8 – 1.3 tons/yr)
Future Construction Sites Meet requirements of General Storm Water Permit

Wasteload Allocations (WLA_{SW}): 346.9 tons/yr

Load Allocation (LA) : 148.7 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 496.9 tons/yr

Maximum Daily Sediment Load: 64.1 tons/day

SUMMARY MEMORANDUM
Annual Average Sediment Load
Noses Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Cobb

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130002

Waterbody Name: Noses Creek
Location: Headwaters to Ward Creek
Stream Length: 7 miles
Watershed Area: 5.9 square miles
Tributary to: Sweetwater Creek
Ecoregion: Piedmont

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): 1.2 tons/yr
Lafarge Building Materials (GA0025917) 25 – 40 mg/L (0.7 – 1.2 tons/yr)
Future Construction Sites Meet requirements of General Storm Water Permit

Wasteload Allocations (WLA_{SW}): 193.0 tons/yr

Load Allocation (LA) : 82.7 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 276.9 tons/yr

Maximum Daily Sediment Load: 35.7 tons/day

SUMMARY MEMORANDUM
Annual Average Sediment Load
Pea Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Fulton

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130002

Waterbody Name: Pea Creek
Location: Cedar Grove Lake to Chattahoochee River
Stream Length: 6 miles
Watershed Area: 7.8 square miles
Tributary to: Chattahoochee River
Ecoregion: Piedmont

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

Wasteload Allocations (WLA_{SW}): 193.8 tons/yr

Load Allocation (LA) : 83.1 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 276.9 tons/yr

Maximum Daily Sediment Load: 35.7 tons/day

SUMMARY MEMORANDUM
Annual Average Sediment Load
Six Mile Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Forsyth

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130001

Waterbody Name: Six Mile Creek
Location: Headwaters to Lake Lanier
Stream Length: 2 miles
Watershed Area: 2.9 square miles
Tributary to: Lake Lanier
Ecoregion: Piedmont

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): 54.1 tons/yr
Buckhorn Ventures, LLC: 25 – 55 mg/L (24.6 – 54.1 tons/yr)
Future Construction Sites: Meet requirements of General Storm Water Permit

Wasteload Allocations (WLA_{SW}): 59.7 tons/yr

Load Allocation (LA) : 25.6 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 139.3 tons/yr

Maximum Daily Sediment Load: 18.0 tons/day

SUMMARY MEMORANDUM
Annual Average Sediment Load
South Fork Limestone Creek/Limestone Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Hall

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130001

Waterbody Name: South Fork Limestone Creek/Limestone Creek
Location: Headwaters to Limestone Creek Arm of Lake Lanier
Stream Length: 2 miles
Watershed Area: 1.7 square miles
Tributary to: Lake Lanier
Ecoregion: Piedmont

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

Wasteload Allocations (WLA_{SW}): 56.8 tons/yr

Load Allocation (LA) : 24.3 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 81.2 tons/yr

Maximum Daily Sediment Load: 10.5 tons/day

SUMMARY MEMORANDUM
Annual Average Sediment Load
Suwanee Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Gwinnett

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130001

Waterbody Name: Suwanee Creek
Location: Suwanee Creek Lake (near Buford) to Ivy Creek
Stream Length: 6 miles
Watershed Area: 14.1 square miles
Tributary to: Chattahoochee River
Ecoregion: Piedmont

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): 91.3 tons/yr
Buford – Southside WPCP: 30 mg/L (91.3 tons/yr)
Future Construction Sites: Meet requirements of General Storm Water Permit

Wasteload Allocations (WLA_{SW}): 382.3 tons/yr

Load Allocation (LA) : 192.9 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 666.5 tons/yr

Maximum Daily Sediment Load: 86.0 tons/day

SUMMARY MEMORANDUM
Annual Average Sediment Load
Tributary to Limestone Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Hall

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130001

Waterbody Name: Tributary to Limestone Creek
Location: Breneau Lake to Limestone Creek
Stream Length: 1 mile
Watershed Area: 1.4 square miles
Tributary to: South Fork Limestone Creek/Limestone Creek
Ecoregion: Piedmont

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

Wasteload Allocations (WLA_{SW}): 46.3 tons/yr

Load Allocation (LA) : 19.8 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 66.2 tons/yr

Maximum Daily Sediment Load: 8.5 tons/day

SUMMARY MEMORANDUM
Annual Average Sediment Load
Turner Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: White

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130001

Waterbody Name: Turner Creek
Location: Headwaters to Tesnatee Creek
Stream Length: 6 miles
Watershed Area: 8.0 square miles
Tributary to: Tesnatee Creek
Ecoregion: Piedmont

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) : 379.8 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 379.8 tons/yr

Maximum Daily Sediment Load: 49.0 tons/day

SUMMARY MEMORANDUM
Annual Average Sediment Load
Ward Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: Cobb

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130002

Waterbody Name: Ward Creek
Location: Headwaters to Noses Creek
Stream Length: 6 miles
Watershed Area: 7.1 square miles
Tributary to: Noses Creek
Ecoregion: Piedmont

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

Wasteload Allocations (WLA_{SW}): 236.2 tons/yr

Load Allocation (LA) : 101.2 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 337.4 tons/yr

Maximum Daily Sediment Load: 43.5 tons/day

SUMMARY MEMORANDUM
Annual Average Sediment Load
White Creek

1. 303(d) Listed Waterbody Information

State: Georgia
County: White

Major River Basin: Chattahoochee
8-Digit Hydrologic Unit Code(s): 03130001

Waterbody Name: White Creek
Location: Headwaters to Webster Lake, Cleveland
Stream Length: 6 miles
Watershed Area: 8.0 square miles
Tributary to: Chattahoochee River
Ecoregion: Piedmont

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) : 378.7 tons/yr

Margin of Safety (MOS): implicit

Annual Average Sediment Load: 378.7 tons/yr

Maximum Daily Sediment Load: 48.9 tons/day