TOTAL MAXIMUM DAILY LOAD (TMDL)

For

Sediment

In Tallapoosa and Coosa River Basins

Carroll, Forsyth, Floyd, Bartow, Polk, Gordon, and Pickens Counties, Georgia

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TMDL SUMMARY / SIGNATURE SHEET

SEDIMENT / Tallapoosa and Coosa River Basins
Carroll, Forsyth, Floyd, Bartow, Polk, Gordon, and Pickens Counties, Georgia
HUC 03150102, 03150103, 03150104, 03150108

In 2003, EPA Region 4 targeted twelve streams in the Tallapoosa and Coosa River Basins for assessment and 303(d) listing decision. These streams were originally placed on the State of Georgia's 1998 Section 303(d) list in response to requirements of the settlement agreement of the Georgia "TMDL" lawsuit (Sierra Club v. EPA & Hankinson; No. 194-CV-2501-MHS, N.D.GA). The settlement agreement required a stream to be listed unless data expressly demonstrated the stream supported water quality standards.

EPA Science and Support Division (SESD) conducted field investigations in 2003 to assess biological conditions and sediment/nutrient loading characteristics of the targeted waters and to identify reference streams with "healthy" biology. Based on the field studies, three of the 12 waterbodies were identified as supporting water quality standards and will be delisted on the State's 2004 303(d) list. The remaining nine waterbodies were determined not supporting the fishing designated use and remained on the State's 2002 303(d) list. The nine waterbodies requiring TMDLs and the listed impairment(s) include: Little Tallapoosa River (2 segments for biota and habitat), Settingdown and Bannister Creeks (one listing for biota and habitat); Dykes Creek and Conesena Creek (one listing for habitat and sediment), Euharlee Creek (impaired for biota), Oothkalooga Creek (biota, habitat, and sediment), Pine Log Creek (sediment), and Salacoa Creek (biota and habitat).

The TMDLs presented herein are based on the hypothesis that if the impaired waterbodies have a long-term annual sediment load similar to the biology of the reference streams, then the impacted waterbodies will remain stable and not be biologically impaired due to sediment. Watershed-scale loading of sediment in water was simulated using the Watershed Characterization System (EPA, 2001) for both the impaired and reference streams. <u>The TMDLs are expressed in terms of average annual loading rates as summarized in the TMDL Summary Table.</u> Average annual watershed loading rates represent the long-term processes of accumulation of sediments in the stream habitat areas that are associated with the potential for habitat alteration and aquatic life effects.

NPDES facilities discharge to both Euharlee Creek and Oothkalooga Creek. Wasteload allocations are provided to these facilities based on permit limits for monthly average loads. As shown in the TMDL summary table, the average annual sediment loads from NPDES facilities are significantly lower relative to the overall TMDL load. Assuming these facilities comply with their permits, reductions are not required to meet the TMDL. NPDES construction activities are considered a significant source of sediment. Compliance with the State of Georgia's Storm Water General Permit should lead to sediment loadings from construction sites at or below applicable targets.

Nonpoint sources of sediment are considered the major sediment producing areas in the watershed. These sources include road crossings, agriculture, and bare ground (non-permitted construction type sites, etc.). In the Little Tallapoosa River, Settingdown Creek, and Bannister Creek, instream erosion processes (i.e., stream bank and streambed erosion) are significant sources of sediment.

TMDL SUMMARY

Waterbody Segment	Drainage Area (mi^2)	Wasteload Allocation (tons/yr)	Load Allocation[1] (tons/mi^2/yr)	TMDL (tons/mi^2/yr)	Total Load (tons/yr)	Percent Reduction
Little Tallapoosa River	85	0	120.58	120.58	10,220	46
Lower Little Tallapoosa River	247	0	120.58	120.58	29,744	72
Settingdown Creek	45	0	144.09	144.09	6,540	78
Bannister Creek	5	0	144.09	144.09	707	83
Dykes Creek	15	0	13.22	13.22	197	90
Conesena Creek	16	0	13.22	13.22	208	85
Euharlee Creek	177	4.76	13.22	13.22	2,342	92
Oothkalooga Creek	47	1.5	13.22	13.22	622	97
Pine Log Creek	111	0	13.22	13.22	1,468	88
Salacoa Creek	90	0	13.22	13.22	1,188	92

Note: To estimate the nonpoint source load from a particular land cover in units of tons per year multiply the sediment rate by the drainage area of the land cover.

Under the authority of Section 303(d) of the Clean Water Act, 33 U.S.C. 1251 et seq., as amended by the Water Quality Act of 1987, P.L. 100-4, the U.S. Environmental Protection Agency is herby establishing TMDLs for sediment the following waterbodies. The Total Maximum Daily Loads (TMDLs) established for these waters require effluent from point sources, where applicable, and waters originating from nonpoint sources shall not exhibit sediment loadings above the limits set herein.

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Date

Table of Contents

List of Tables

List of Figures

1. Introduction

TMDLs are required for impaired waters on a State's Section 303(d) list as required by the Federal Clean Water Act Section 303(d) and implementing regulation 40 CFR 130. A TMDL establishes the maximum amount of a pollutant a waterbody can assimilate without exceeding the applicable water quality standard. The TMDL then allocates the total allowable load to individual sources or categories of sources through wasteload allocations (WLAs) for point sources, and through load allocations (LAs) for non-point sources. In the TMDL, the WLAs and LAs provide a basis for states to reduce pollution from both point and non-point source activities that will lead to the attainment of water quality standards and protection of the designated use.

The TMDLs for the listed streams in the Tallapoosa and Coosa River Basins satisfies the consent decree obligation established in Sierra Club v. EPA, Civil Action No: 94-CV-2501-MHS (N.D.GA). The Consent Decree requires TMDLs to be developed for all waters on Georgia's most current Section 303(d) list consistent with the schedule established by Georgia for its rotating basin management approach.

As part of the settlement agreement, the State of Georgia, and subsequently EPA Region 4, was required to gather data to determine the status of waters in groups of watersheds for possible inclusion on the Georgia 303(d) list. The identification of watersheds was based on the USDA, Soil Conservation Service's report *"Georgia's Watershed Agricultural Nonpoint Source Pollution Assessment"* (USDA, 1993). Screening level bioassessments and habitat evaluation of 89 watersheds were conducted by staff from EPA Region 4 and Georgia Environmental Protection Division (EPD) in 1996 and 1997 and appropriate additions to the State's 1998 303(d) list were made.

During the winter and spring of 2003, EPA Region 4 Science and Support Division (SESD) conducted further investigations of twelve of the streams in the Tallapoosa and Coosa River Basins. The objective of the field study was to assess the biological conditions and sediment/nutrient loading characteristics of these waters. SESD scientist collected macroinvertibrate samples, waters samples, and sediment samples. Sediment samples were collected before, during and after a storm event.

Based on the results of the field investigation, three of the twelve waterbodies were identified as supporting water quality standards and will be delisted on the State's 2004 303(d) list. The remaining nine waterbodies were determined to not support the fishing designated use and required a TMDL. The 303(d) listings of these nine streams are shown in Table 1.

Table 1. Summary of 303(d) Listings

Waterbody	Listing ID	County	Parameter
Little Tallapoosa River	GA-TP-LITTLE_TALLAPOOSA_RIVER	Carroll	Biota, Habitat
Lower Little Tallapoosa River	GA-TP-LOWER_LITTLE_TALLAPO	Carroll	Habitat, Sediment
Settingdown Creek and Bannister Creek	GA-CA-SETTINGDOWN_BANISTER_CREEKS	Forsyth	Biota, Habitat
Dykes Creek and Conesena Creek	GA-CA-DYKES_AND_CONASEENA_CREEKS	Floyd, Bartow	Habitat, Sediment
Euharlee Creek	GA-CA-EUHARLEE_CREEK	Polk, Bartow	Biota
Oothkalooga Creek	GA-CA-OOTHKLOOGA_CREEK	Bartow, Gordon	Biota, Habitat, Sediment
Pine Log Creek	GA-CA-PINELOG_CREEK	Bartow, Gordon	Sediment
Salacoa Creek	GA-CA-SALACOA_CREEK	Pickens, Gordon	Biota, Habitat

2. Watershed Characterization

The locations of the listed streams and the reference streams in the Tallapoosa and Coosa River Basins are shown in Figures 1 and 2, respectively. The drainage areas discharging to the listed streams are identified in Figure 1 and are based on the State of Georgia's Environmental Protection Division (EPD) Hydrologic Unit Code (HUC) level 12 watershed boundaries.

Landuse characteristics for the watershed of the impaired and reference streams are shown in Table 2. Land use is based on the National Land Cover Database (NLDC) of 1995. As shown in this table, forest and agriculture (e.g., cropland and pasture) are the primary land covers in the watersheds.

The following sections summarize the field studies conducted in 2003 by EPA Region 4 Science and Ecosystem Support Division (SESD). The purpose of the field studies was to characterize the habitat of the impaired waterbodies and to determine appropriate reference sites within the ecoregion of the impaired streams. An ecoregion is a region of relative homogeneity in ecological systems. The State of Georgia is divided into seven major ecoregions based upon soil types, potential natural vegetation, land surface forms, and predominate land uses.

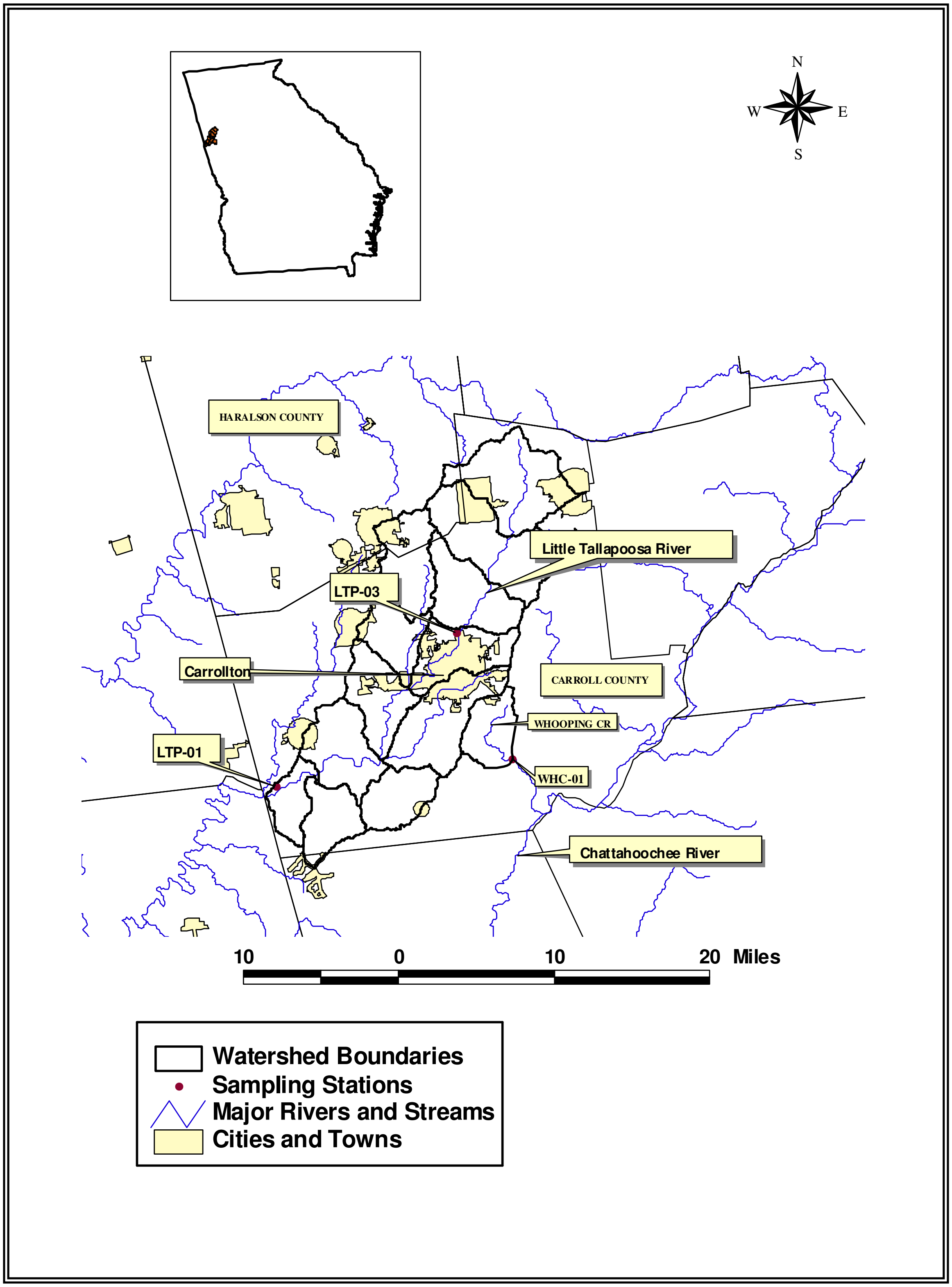

Figure 1. Location of waterbodies in Tallapoosa River Basin

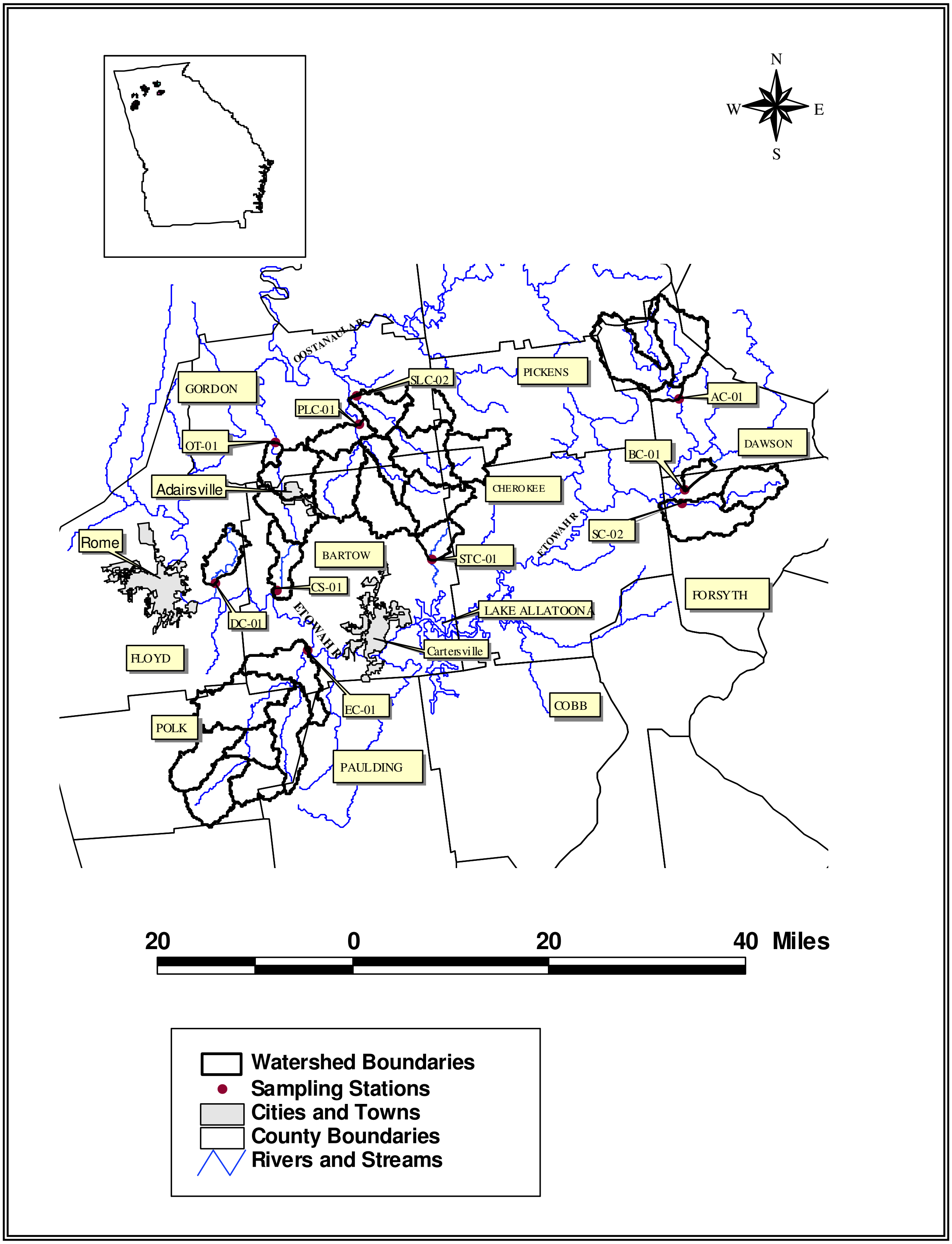

Figure 2. Location of waterbodies in Coosa River Basin

Table 2. Landuse Characteristics (acres)

Waterbody	Urban	Barren	Commercial, Industry	Agriculture	Water	Wetlands	Forest	Total
Little Tallapoosa River	754	222	1134	14669	943	2145	34349	54218
Lower Little Tallapoosa River	3736	573	4659	47620	1979	5086	94153	157806
Settingdown Creek	85	271	194	8416	203	24	19838	29031
Bannister Creek	507	186	635	4623	479	457	13118	20006
Dykes Creek	17	49	10	974	17	0	8449	9516
Conesena Creek	44	482	48	594	3	0	8889	10060
Euharlee Creek	711	2016	933	29063	443	794	79365	113326
Oothkalooga Creek	288	1934	545	7297	90	244	19705	30103
Pine Log Creek	34	2152	215	14924	104	4	53591	71024
Salacoa Creek	117	2292	169	5756	143	0	49020	57496
Whooping Creek	21	0	29	1983	65	18	6526	8642
Amicalola Creek	10	1009	18	2344	59	0	48259	51699
Stamp Creek	0	127	0	12	1	0	7092	7232

2.1 Little Tallapoosa River

The Little Tallapoosa River drains areas west of Atlanta, Georgia and mostly south of Interstate 20. The area of the river investigated lies in the western edge of the Southern Upper Piedmont Ecoregion (45a) in the state of Georgia. The western part of this ecoregion is characterized by rolling to hilly uplands. The region is mostly forested with the major forest types including oak-pine, oak-hickory and loblolly-shortleaf pine. Open areas, such as pastures and croplands, are common. In general, the area has experienced a large increase in land development during the last 20 years.

Little Tallapoosa River was investigated at two points: at State Line Road (i.e., Lower Little Tallapoosa River listing at station LTP-01) and at Northside Drive (Station LTP-03). A physical habitat survey indicated unstable banks, streambank cover, inadequate riparian zone cover, and heavy sedimentation as concerns in the river. Obvious potential for non-point source pollution and erosion was identified. Habitats available at both sites included leaf packs, undercut banks, woody debris and one riffle. Results of the biological community investigation indicated moderate impairment and degradation of habitat conditions was identified as the likely cause.

2.2 Settingdown Creek

Settingdown Creek lies north of Atlanta, Georgia in Forsyth County. It drains an area west of Lake Lanier and discharges into the Etowah River northwest of the city of Cumming. The creek lies in the eastern end of Southern Upper Piedmont Ecoregion (45a). The region is mostly forested with oak-pine, oak-hickory and loblolly-shortleaf pine forest types dominating. Open areas, such as pastures and croplands, are quite common. In general, the area has experienced a large increase in land development during the last few decades.

Settingdown Creek was sampled at Wallace Tatum Road (Station SC-02). A physical habitat survey indicated heavy sedimentation, unstable banks, and marginal streambank vegetation cover as concerns in the creek. Habitats available included leaf packs, undercut banks, woody debris, pools and riffles. Results of the biological community investigation indicated slight to moderate impairment and degradation of habitat conditions was identified as the likely cause.

2.3 Bannister Creek

Bannister Creek lies north of Atlanta, Georgia in northern Forsyth County. It drains a small area west of Lake Lanier, around the town of Hightower and discharges into the Etowah River. The creek lies in the eastern end of Southern Upper Piedmont Ecoregion (45a). The region is mostly forested with oak-pine, oak-hickory and loblolly-shortleaf pine forest types dominating. Open areas, such as pastures and croplands, are quite common. In general, the area has experienced a large increase in land development during the last few decades.

Bannister Creek was sampled at Nicholson Road (Station BC-01). The stream flows through a pasture and discharges into the Etowah 50 yards downstream. Physical habitat survey indicated very heavy sedimentation, extremely unstable banks, and extreme lack of streambank vegetation, and poor riparian zones cover as concerns for the stream. Habitats available included leaf packs, undercut banks, woody debris, pools and riffles. Results of the biological community investigation indicated a poor condition. Excessive sedimentation was identified as the likely cause of impairment.

2.4 Dykes Creek

Dykes Creek lies northwest of Atlanta, Georgia in Floyd County and drains an area east of the city of Rome. The creek discharges into the Etowah River and lies in the Southern Limestone/Dolomite Valley and Rolling Hills Ecoregion (67f). Undulating valleys, rounded ridges and hills characterize this ecoregion. Land use is variable with the presence of forests, pasture, urban, industrial, and agriculture.

Dykes Creek was sampled at State Road 293 (Station DC-01). A physical habitat survey indicated overall good conditions with the exception some riparian cover disruptions. Some sediment deposition was observed, however, it was not indicated to be excessive. The substrate was embedded to about 25%. Habitats available included leaf packs, undercut banks, woody debris, pools and riffles. Results of the biological community investigation indicated slight to moderate impairment. Elevated conductivity levels in comparison with reference conditions were documented at the site. However, no violations of state water quality standards were noted.

2.5 Conesena Creek

Conesena Creek lies northwest of Atlanta, Georgia in Bartow County and drains and area between the cities of Rome and Cartersville. The creek discharges in the Etowah River and lies in the Southern Limestone/Dolomite Valley and Rolling Hills Ecoregion (67f). Undulating valleys, rounded ridges and hills characterize the ecoregion. Land use is variable with the presence of forests, pasture, urban, industrial, and agriculture.

Conesena Creek was sampled at Old Rome Road (Station CS-01). A physical habitat survey indicated moderate sedimentation, embeddedness of substrate and the presence of side and point bars within the stream. Habitats available included leaf packs, undercut banks, woody debris, pools and riffles. Results of the biological community investigation indicated slight to moderate impairment and degradation of habitat conditions was identified as the likely cause. Elevated conductivity levels in comparison with reference conditions were documented at the site. However, no violations of state water quality standards were noted.

2.6 Euharlee Creek

Euharlee Creek lies northwest of Atlanta, Georgia in Bartow and Polk Counties. It drains an area southwest of Cartersville and discharges in the Etowah River. The creek lies in the Southern Limestone/Dolomite Valley and Rolling Hills Ecoregion (67f). Undulating valleys, rounded ridges and hills characterize the ecoregion. Land use is variable with the presence of forests, pasture, urban/sub-urban, industrial, and agriculture.

Euharlee Creek was sampled at Covered Bridge Road (Station EC-01). A physical habitat survey indicated moderate sedimentation, embeddedness of substrate, scarcity of riffles, unstable banks, and marginal riparian zone cover as issues in the creek. Abundant algal growth was noted, along with some sulfide odors. Habitats available included leaf packs, undercut banks, woody debris, and gravel runs. Results of the biological community investigation indicated moderate impairment of the community. Degradation of habitat conditions and water quality were identified as likely causes of impairment. Elevated conductivity levels in comparison with reference conditions were documented at the site. However, no violations of state water quality standards were noted.

2.7 Oothkalooga Creek

Oothkalooga Creek lies northwest of Atlanta, Georgia in Bartow and Gordon Counties. It drains an area around Adairsville and discharges into the Oostanaula River near Calhoun, Georgia. The creek lies in the Southern Shale Valley Ecoregion (67g). The ecoregion is characterized by undulating to rolling valleys and low, rounded hills. Land use is mixed and includes forested, agriculture, pasture, and urban.

Oothkalooga Creek was sampled at Salem Road (Station OT-01). Land use surrounding the sample site was primarily field/pasture and obvious potential for non-point source pollution and erosion was identified. A physical habitat survey indicated unstable banks, poor streambank vegetation, lack of riffles, and inadequate riparian zone cover as concerns in the stream. Habitats available included leaf packs, undercut banks, woody debris and bottom substrate. Results of the biological community investigation indicated moderate impairment and degradation of habitat conditions was identified as the likely cause. Elevated conductivity levels in comparison with reference conditions were documented at the site. However, no violations of state water quality standards were noted.

2.8 Pine Log Creek

Pine Log Creek lies northwest of Atlanta, Georgia in Bartow and Gordon Counties. It drains an area north of Cartersville and joins with Salacoa Creek before it discharges into the Oostanaula River upstream of Calhoun, Georgia. The creek lies in the Southern Shale Valley Ecoregion (67g). The ecoregion is characterized by undulating to rolling valleys and low, rounded hills. Land use is mixed and includes forested, agriculture, pasture, and urban.

Pine Log Creek was sampled at Boone Ford Road (Station PLC-01). A physical habitat survey indicated obvious habitat concerns. Poor bank stability, excessive sedimentation, embeddedness of habitats at 75%, lack of adequate velocity/depth regimes, lack of streambank vegetation, and poor riparian zone vegetation cover were identified as concerns for the creek. Habitats available for sampling included only woody debris and gravel runs. Results of the biological community investigation indicated moderate impairment. Degraded habitat conditions were identified as the likely cause of impairment. Elevated conductivity levels in comparison with reference conditions were documented at the site. However, no violations of state water quality standards were noted.

2.9 Salacoa Creek

Salacoa Creek lies northwest of Atlanta, Georgia in Cherokee, Pickens and Gordon Counties. It drains an area west of Calhoun, Georgia and discharges into the Oostanaula River. The creek lies in the Southern Shale Valley Ecoregion (67g). The ecoregion is characterized by undulating to rolling valleys and low, rounded hills. Land use is mixed and includes forested, agriculture, pasture, and urban.

Salacoa Creek was sampled at Knight Bottom Road (Station SLC-02). Land use surrounding the sample point was primarily field/pasture and obvious potential for non-point source pollution and erosion was identified. A physical habitat survey indicated unstable banks, poor streambank vegetation, inadequate riffles, and poor riparian zone cover as concerns in the stream. Habitats available included leaf packs, riffles, undercut banks, woody debris and bottom substrate. Results of the biological community investigation indicated moderate impairment and degradation of habitat conditions was identified as the likely cause. Elevated conductivity levels in comparison with reference conditions were documented at the site. However, no violations of state water quality standards were noted.

2.10 Amicalola Creek

Amicalola Creek lies north of Atlanta, Georgia and drains an area northwest of Lake Lanier in Dawson County. The Creek lies along the northern edge of the Southern Upper Piedmont Ecoregion (45a). The ecoregion is characterized by rolling to hilly uplands. The region is mostly forested with the major forest types including oak-pine, oak-hickory and loblolly-shortleaf pine. Open areas, such as pastures and croplands, are common. In general, the area has experienced a large increase in land development during the last 20 years. However, Amicalola Creek primarily drains undeveloped land within the Dawson Forest Wildlife Management Area.

Amicalola Creek was sampled at County Road 192 (Station AC-01). A physical habitat survey indicated optimal habitat conditions are present. The survey documented minimal sediment deposition, a diversity of velocity and depth regimes, the presence of optimal epifaunal substrate, stable stream banks and adequate vegetation cover. The habitat evaluation score places Amicalola Creek in the optimal range of conditions. Results of the biological community investigation indicated the stream is in good condition and further validates its selection as a reference site.

2.11 Whooping Creek

Whooping Creek lies west of Atlanta, Georgia and drains an area south of Carrolton, Georgia in Carroll County. Whooping Creek discharges into the Chattahoochee River. The creek lies in the western edge of the Southern Upper Piedmont Ecoregion (45a). The western part of this ecoregion is characterized by rolling to hilly uplands. The region is mostly forested with the major forest types including oak-pine, oak-hickory and loblolly-shortleaf pine. Open areas, such as pastures and croplands, are common. In general, the area has experienced a large increase in land development during the last 20 years.

Whooping Creek was sampled at State Route 5 (Station WHC-01). A physical habitat survey indicated good habitat quality, with the exception of some bank stability problems. However, the survey documented the presence of optimal epifaunal substrate, low sediment deposition and very little embeddedness. These characteristics make Whooping Creek an excellent candidate for reference conditions in the lower Southern Upper Piedmont ecoregion. Results of the biological community investigation indicated the stream is in good condition and further validates its selection as a reference site.

2.12 Stamp Creek

Stamp Creek lies northwest of Atlanta, Georgia in eastern Bartow County. It drains part of the Pine Log Wildlife Management Area and discharges into Lake Allatoona near Cartersville, Georgia. The creek lies near the southern edge of the Blue Ridge in the Southern Metasedimentary Mountains Ecoregion(66g). This region is known as one of the richest centers of biodiversity in the eastern United States. The area is characterized by open, low hills with some isolated masses of rugged mountains and supports diverse and complex communities of plants and animals.

Stamp Creek was sampled at Stamp Creek Road (Station STC-01). A physical habitat survey indicated optimal habitat conditions are present at the sample site. The survey documented very little sediment deposition, prominent riffles, and optimal epifaunal substrate. The Stamp Creek habitat evaluation score is the highest of all streams sampled during the 2003 field investigations. Results of the biological community investigation indicate that the Stamp Creek biological community is in good condition and validates its selection as a reference site.

3. Target Identification

3.1 Numerical Target

The water use classification for the impaired waterbodies is fishing. The fishing classification, as stated in Georgia's Rules and Regulations for Water Quality Control Chapter 391-3-6-.03(6)(c), is established to protect the "[p]ropogation of Fish, Shellfish, Game and Other Aquatic Life; secondary contact recreation in and on the water; or for any other use requiring water of a lower quality".

GAEPD has established narrative criteria for sediment that applies to all waters of the State. Georgia Regulation 391-3-6-.03(5)(e) of Georgia's Rules and Regulations for Water Quality Control states that "[a]ll 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".

3.2 Target Selection

The TMDLs presented herein are based on the hypothesis that if the impaired waterbodies have a long-term annual sediment load similar to a biologically unimpacted, healthy stream in the same ecoregion, then the impacted waterbodies will remain stable and not be biologically impaired due to sediment. During the 2003 field investigations, SESD identified three streams in the Upper Piedmont and Ridge and Valley ecoregions that were determined to have habitat of acceptable quality and a macroinvertebrate community not adversely impacted by sediment. Table 3 lists the reference streams and the target yield from the watershed.

The criteria SESD used in selecting the reference sites included: 1) level of human disturbance; 2) accessibility; 3) representativeness; and 4) health of the stream. Other considerations included lack of permitted discharges, landuse classification, and good riparian conditions. Once the reference site was selected, SESD used established metrics to assess the biotic integrity of both the impaired stream and the reference site. SESD collected macroinvertebrate samples to provide additional information on water quality conditions.

Habitat assessments were completed for the reference sites as well as the listed streams. The habitat assessment evaluates the stream's physical parameters and is broken in three levels: 1) instream characteristics affecting biological communities (e.g., instream cover, epifaunal substrate, embeddedness, and riffle frequency); 2) channel morphology, and 3) riparian zone surrounding the stream.

Table 3. Target Loads for Reference Streams

Reference Stream	County	Drainage Area (mi^2)	Target Yields ($tons/mi^2/yr$)	Impacted Waterbodies
Whooping Creek	Carroll	14	120.58	Little Tallapoosa River (both segments)
Amicalola Creek	Carroll	81	144.09	Settingdown Creek, Bannister Creek
Stamp Creek	Bartow	11	13.22	Dykes Creek, Conesena Creek, Euharlee Creek, Oothkalooga Creek, Pine Log Creek, Salacoa Creek

4. Source Assessment

A TMDL evaluation examines the known potential sources of the pollutant in the watershed, including point sources, nonpoint sources, and background levels. For the purpose of these TMDLs, facilities under the National Pollutant Discharge Elimination System (NPDES) Program permitted to discharge TSS are considered point sources.

4.1 Point Sources

Three point sources have been identified on Euharlee Creek. Two of the point sources are municipal wastewater treatment plants: the City of Rockmart Water Pollution Control Plant and the City of Aragon/Polk County Water Pollution Control Plant (WPCP). The other facility is Rockmart Slate Corporation a private quarry operation manufacturing landscaping stones and assorted slate products. No current permit violations for any of the point sources were discovered during a database search. The NPDES facilities are located over 15 miles upstream of the sampling location.

Two point source dischargers have been identified on Oothkalooga Creek, however they are located over 5 miles upstream of the sampling location. The point sources are the City of Adairsville WPCP and the Vulcan Materials Company, a quarry operation that produces crushed stone, sand and gravel for use in construction products. No current permit violations for either discharge were discovered during a database search.

Permit information for the NPDES facilities are shown in Table 4. The WPCPs discharge TSS in concentrations much less than permit limits. Operators of WPCPs reduce TSS below permit requirements to achieve permit limits for Biochemical Oxygen Demand (BOD) concentration in the effluent. Many WPCPs are required to monitor the settleable solids concentration in the effluent, which would have a greater impact on habitat degradation than TSS. Typical settleable solids limits for WPCPs are 1.0 ml/l and would be considered very small compared to sediment from nonpoint sources.

Table 4. Permit Information for NPDES Facilities Discharging TSS

Facility	Permit No.	Receiving Water	County	Flow (mgd)	TSS Permit Limits Max Conc. (mg/L)	WLA (lb/day)
City of Rockmart WPCP	GA0026042	Euharlee Cr.	Polk	3.0	45	952.56
City of Aragon/Polk County WPCP	GA0026182	Euharlee Cr.	Polk	0.17	45	52.92
Rockmart Slate Corporation	GA0001929	Lake Doreen Cr.	Polk	Minor	TSS_{max} = 110 mg/l; $TSS_{ave.}$= 55 mg/l (see Note 1)	
City of Adairsville WPCP (south)	GA0032832	Oothkalooga Cr.	Bartow	0.5	45	156.56
Adairsville WPCP (north)	GA0046035			0.5	45	156.56
Vulcan Materials Company	GA0033413	Oothkalooga Cr.	Bartow	Minor	TSS_{max} = 110 mg/l; $TSS_{ave.}$= 55 mg/l (see Note 1)	

Notes:

1. Flow data are not available for these facilities and it was not possible to assign a WLA to the individual facilities.
2. TSS permit limits reflect maximum seven-day average concentration. All WPCP have average 30-day permit limits of 30 mg/l.

Other potential point source discharges in the listed streams are storm water discharges of sediment associated with construction activities. GAEPD has developed a general storm water permit covering all existing and new storm water point source dischargers required to have a permit. Discharge from storm water associated with construction activity to the waters of the State are authorized in accordance with the limitations, monitoring requirements, and other conditions set forth in Parts I through IV of the Georgia General Storm Water Permit for Construction Activities (Storm Water Permit). A Comprehensive Monitoring Plan with turbidity monitoring requirements is required to assure any storm water discharge from the site does not cause or contribute to the existing sediment problem.

The Storm Water Permit can be considered a water quality-based permit, in that the numerical limits in the permit, if met and enforced, will not cause a water quality problem in an unimpaired stream or contribute to an existing problem in an impaired stream. It is recommended that for the impaired streams in the Tallapoosa and Coosa River Basins, the cold water (trout stream) turbidity table located in Appendix B of the Georgia's General Construction Permit be used to establish necessary turbidity limits.

4.2 Nonpoint Sources

Roads, agriculture, bare ground (i.e., non-permitted construction type sites, etc.), and silviculture are the major nonpoint source of sediment in the watersheds. During the field reconnaissance study, it was documented that several of the impaired waterbodies have unstable banks and lack vegetation on the stream banks. Undercutting of the streambed and banks can be a major nonpoint source of sediment during high flow events. Although several watersheds have point source discharges of sediment, nonpoint sources are considered the primary source of sediment in the impaired waterbodies.

The watershed loadings of sediment in water from nonpoint sources in the watershed were simulated using the Watershed Characterization System Sediment Tool (WCS, EPA, 2001). The WCS provides a mechanistic, simplistic simulation of precipitation-driven runoff and sediment delivery based on the Universal Soil Loss Equation (USLE). The USLE equation is designed as a method to predict average annual soil loss caused by sheet and rill erosion. While it can estimate long-term annual soil loss and guide on proper cropping, management, and conservation practices, it cannot be applied to a specific year or storm event. A summary of USLE input parameters used to estimate the watershed loadings is provided in Appendix A. Details of the WCS Sediment Tool are documented in the TMDL developed for sediment in the Upper Chattahoochee River Basin (EPA, 2003). Sediment loading rates based on results of the WCS analysis are shown in Table 5. Loading rates expressed in units of tons/yr/mi^2 provide an estimate of chronic, or long-term, impact of sediment discharging from the watershed and represent average conditions during all seasons.

The WCS Sediment Tool assumes all the sediment in the stream originates from the watershed. For streams characterized by extremely unstable banks (e.g., Bannister Creek and Settingdown Creek) the Sediment Tool may underestimate the load, as sediment originating from instream processes may be a major source of sediment as compared to the loadings from the watershed. The WCS results should not be interpreted to imply that changes to landuse do not impact water quality, as increased flow from the upland areas could be a cause of instream erosion processes. For Bannister and Settingdown creeks, data collected during the sampling events were used to estimate the reductions necessary to achieve the loadings observed in the reference streams.

Suspended sediment concentration data collected during the field study are provided in Appendix A. Sediment loading rates were calculated based on the field data and provide an estimate of acute conditions. These rates are summarized in
Table 6 and include sediment from both runoff and instream processes. Comparing the loads calculated from field measurements to those calculated using WCS is not exact as the field measurements represent loading rates on one day during wet weather conditions.

Table 5. Estimated Sediment Loadings Rates for Existing (chronic) Conditions

Waterbody	Drainage Area (mi^2)	Sediment Rate ($tons/mi^2/yr$)	Total Load (tons/yr)
Dykes Creek (3150104170)	15	128.26	1,908
Conesena Creek (3150104170)	16	86.21	1,356
Euharlee Creek (3150104150)	177	172.89	30,627
Oothkalooga Creek (3150103020)	47	422.32	19,874
Pine Log Creek (3150102060)	111	109.30	12,134
Salacoa Creek (3150102050)	90	156.27	14,046
Little Tallapoosa River (3150108190)	85	402.09	34,081
Lower Little Tallapoosa River (3150108180)	247	432.38	106,660
Settingdown Creek (3150104030)	45	109.05	4,949
Bannister Creek (3050104030)	5	87.58	429

Table 6. Estimated Sediment Loadings Rates for Existing (acute) Conditions using Storm Data (see Appendix A)

Waterbody	Sediment Rate ($lb/mi^2/day$)
Dykes Creek	68.04
Conesena Creek	206.98
Euharlee Creek	295.49
Oothkalooga Creek	992.82
Pine Log Creek	679.05
Salacoa Creek	1688.89
Lower Little Tallapoosa River	191.63
Little Tallapoosa River	109.33
Settingdown Creek	3377.05

Waterbody	Sediment Rate (lb/mi^2/day)
Bannister Creek	5776.31

Note: Rates represents the total sediment load measured during the storm event

5. Total Maximum Daily Load (TMDL)

A TMDL establishes the total pollutant load a waterbody can assimilate and still achieve water quality standards. The components of a TMDL include a wasteload allocation (WLA) for point sources, a load allocation (LA) for nonpoint sources (including natural background), and a margin of safety (MOS), either implicitly or explicitly, to account for uncertainty in the analysis. Conceptually, a TMDL is defined by the equation:

$$TMDL = \Sigma\ WLA + \Sigma\ LA + MOS$$

The TMDLs for the Tallapoosa and Coosa River Basin streams are expressed in terms of sediment rate (or yield), in units of tons/mi^2/yr, as shown in Table 7. It is acceptable for TMDLs to be expressed through other appropriate measures (e.g., sediment rates) other than mass loads per time (40 CFR 130.2). The TMDLs are also expressed as total annual loads as several of the streams have NPDES facilities discharging sediment and permit limits are expressed in units of mass loads per time**.** Sediment loads discharging from upland areas for each of the general landuse categories is provided in Appendix A. The loads shown in Table A-17 are relative estimates and do not consider variations in washoff rates between landuse classifications.

Table 7. TMDL Components

Waterbody	Drainage Area (mi^2)	WLA (tons/day)	LA (tons/mi^2/yr)	TMDL (tons/mi^2/yr)	TMDL (tons/yr)	Percent Reduction
Little Tallapoosa River	85	0	120.58	120.58	10,220	72
Lower Little Tallapoosa River	247	0	120.58	120.58	29,744	70
Settingdown Creek	45	0	144.09	144.09	6,520	78 (see note 1)
Bannister Creek	5	0	144.09	144.09	707	87 (see note 1)
Dykes Creek	15	0	13.22	13.22	197	90
Conesena Creek	16	0	13.22	13.22	208	85
Euharlee Creek	177	0.50	13.22	13.22	2,342	92
Oothkalooga Creek	47	0.16	13.22	13.22	622	97
Pine Log	111	0	13.22	13.22	1,468	88

Creek						
Salacoa Creek	90	0	13.22	13.22	1,188	92

Notes:

1. Percent reductions based on storm sampling data as sediment rates from the watershed model are small relative to the loading rates from instream processes.

5.1 Wasteload Allocation (WLA)

As shown in Table 7, the contribution of sediment from NPDES facilities, when present, is significantly less than the load transported to the stream from nonpoint sources. Sediment discharging from water pollution control plants (WPCPs) is predominately organic sediment and would likely decay or be consumed by filter-feeding invertebrates before accumulating on the streambed. A review of Discharge Monitoring Reports (DMRs) indicates effluent TSS concentrations at or below permit limits; therefore, reductions are not required.

Compliance with the Georgia Storm Water Permit will ensure construction sites meet the TMDL area weighted loadings. EPA assumes that construction activities in the watershed will be conducted in compliance with Georgia's Storm Water Permit including monitoring and discharge limitations. Compliance with these permits should lead to sediment loadings from construction sites at or below applicable targets.

5.2 Load Allocation (LA)

Nonpoint sources are considered to be the primary cause of sediment impairment in the listed streams. To reduce sediment from agricultural activities, road crossing, and construction activities, restoration of riparian buffer zones is recommended. Where stream banks and streambed erosion appear to be the sources of sediment, instream restoration activities should be the focus to ensure compliance with the TMDL. Further ongoing monitoring should occur to monitor progress and to assure further degradation does not occur.

For land disturbing activities related to silviculture it is recommended that practices as outlined for landowners, foresters, timber buyers, loggers, site preparation and reforestation contractors, and others involved with silviculture operations follow the practices to minimize nonpoint source pollution as outlined in "Georgia's Best Management Practices for Forestry (GaEPD 1999).

The percent reductions necessary to meet the loading conditions in the reference streams for Settingdown Creek and Banister Creek are based on storm data. Field notes indicate that the streambanks on these streams are unstable. Bank sloughing is assumed to be the predominate source of sediment rather than runoff from the watershed. Hydrologic modification in the watershed (i.e., increased flow resulting from increase impervious area) could be a possible cause of stream bank erosion. The WCS analysis does not directly consider flow nor does it account for sediment from instream processes.

5.3 Margin of Safety

A Margin of Safety (MOS) is a required component of a TMDL that accounts for the uncertainty in the relationship between the pollutant leads and the quality of the receiving waterbody. The MOS is typically incorporated into the conservative assumptions used to develop the TMDL. A MOS is incorporated into these TMDLs by selecting the average sediment loading numerical target rather than the greatest allowable sediment loading value for streams that have been identified as having good habitat and biology.

5.4 Critical Conditions

The average annual watershed load represents the long-term processes of sediment accumulation of sediments in the stream habitat areas that are associated with the potential for habitat alteration and aquatic life effects.

5.5 Seasonal Variation

Seasonal variation is incorporated in these TMDLs through the use of average annual loads which include high and low flow periods.

6. Recommendations

EPA and EPD have developed Implementation Plans for sediment TMDLs in other impaired waterbodies in the state. The demonstration project outlined in "*Total Maximum Daily Load for Sediment in the Chattahoochee River Basin, GA*" (EPA, 2003) is an example of how Best Management Practices (BMPs) can be used to restore the designated uses of the impaired streams. Voluntary BMPs should be encouraged to reduce nonpoint source loadings. Additional monitoring should be required to ensure compliance with the TMDL.

Future sediment sources from construction activities should be controlled through the GA General NPDES program. The impact increased flow has on instream erosion processes should be considered in the design of BMPs. Reducing peak flow to pre-construction rates should not result in increased instream erosion problems.

6.1 Monitoring

Water quality 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 monitoring to be focused on one of the five basin groups each year. The Coosa, Tallapoosa, and Tennessee River Basins were the basins of focused monitoring in 2001 and will again receive focused monitoring in 2006. 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 Tennessee 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, in order that these streams may 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, 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 compliance with NPDES permits and the implementation of BMPs. The effects of compliance with NPDES permits and the implementation of BMPs will contribute to the improvement of stream habitats and water quality, and will represent a beneficial measure of TMDL implementation.

Management practices recommended include:

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

6.2.1 Point Source Approaches

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

In accordance with 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 concentration of sediment (TSS) above those in the current NPDES permits. In addition, it is necessary to maintain the current sediment loads in the impaired streams. The removal of mined material involves water pumped from the mine pit, and mineral processing involves the disposal of process waters. These waters are treated through either sedimentation ponds or detention basins prior to being discharged to the stream and are regulated by NPDES permits. For mining facilities located within the impaired watersheds, it is recommended that monitoring frequencies be increased in order to better characterize the total average annual sediment loads coming from these facilities.

GA EPD has developed a General Storm Water NPDES Permit for Construction Activities. The current permit is required for all construction sites disturbing five or more acres. In 2003, this permit will cover all construction sites disturbing one or more acres. All sites required to have this permit are authorized to discharge storm water associated with construction activity to the waters of the State in accordance with the limitations, monitoring requirements, and other conditions set forth in Parts I through VII of the Georgia Storm Water NPDES Permit for Construction Activities. 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 NPDES Permit for Construction Activities 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 that are located within 100 feet of the impaired stream or its tributaries use DIRT II techniques to model and manage storm water runoff from these sites. In addition, all construction sites will monitor their storm water runoff as required by the General Storm Water NPDES Permit for Construction Activities.

6.2.2 Nonpoint Source Land Use Approaches

The 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 that may affect water quality. Georgia is working with local governments, and agricultural and forestry agencies such as the Natural Resources Conservation Service, the Georgia Soil and Water Conservation Commission, and the Georgia Forestry Commission to foster the implementation of best management practices that address nonpoint source pollution. In addition, public education efforts are being targeted at individual stakeholders to provide information regarding the use of best management practices to protect water quality. The following sections describe in more detail the specific measures to reduce nonpoint sources of sediment by land use type.

6.2.2.1 Forested Land

In 1978, 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 measuring 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 to reduce or eliminate erosion and sedimentation. After a three-year field study, the task force developed a set of BMPs that address all aspects of silviculture including forest road construction, timber harvesting, site preparation, and forest regeneration. The task force recommended the BMPs be implemented through a voluntary program, exempt from permitting under the Georgia Erosion and Sedimentation Control Act, emphasizing educational and training programs instead. In 1997, the original BMP document was revised to 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 June 1, 1999 (GA EPD, 1999).

It is the responsibility of the GFC to educate and inform the forestry 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, along with twelve district coordinators, conducts these educational programs across the state. The district coordinators receive specialized training in erosion and sedimentation 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 the 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 was generally high. 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 also received, 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 the identity of 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 the number of site compliance inspections conducted should be recorded each year. In addition, the number of complaints received, the actions taken, and the 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 (UGA) - Cooperative Extension Service
- Georgia Soil and Water Conservation Commission (GSWCC)
- Natural Resources Conservation Service (NRCS)

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 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 Protection of Water Quality in Georgia,* for the agricultural community (GSWCC, 1994).

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

The NRCS provides Conservation Practice Standards and Job Sheets on their website (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 crop land close to impaired streams, and pasture land where grazing animals have access to the stream, investigate the various BMPs available to them in order to reduce soil erosion and bank collapse.

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

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

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

The Conservation Reserve Program (CRP) was originally designed by NRCS to provide incentive and offer assistance to farmers to convert highly erodible and other environmentally sensitive land normally devoted to crop production into land with other long-term resource-conserving cover. The 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 USDA Natural Resources Conservation Service conducts the National Resources Inventory (NRI). The NRI is a statistically based sample of land use and natural resource conditions and trends, covering non-federal land in the United States. The National Resources Inventory found the total wind and water erosion on cropland and Conservation Reserve Program land in Georgia declined 38 percent from 3.1 billion tons per year in 1982 to 1.9 billion tons in 1997 (USDA NRCS, 1998).

NRCS also provides a web-based database application, Performance and Results Measurement System (PRMS), so that conservation partners and the public can gain fast and easy access to the accomplishments and the progress made toward strategies and performance goals.

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 NRI activities should be continued, and GA EPD supports the PRMS.

6.2.2.3 Mine Sites

Surface mining and mineral processing present two threats to surface waters. The first threat is the wastewater from mining and mineral processing operations. These discharges are considered point sources and therefore are regulated by NPDES permits, as 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 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 that all activities prior to, during, and following mining include disposal of refuse and erosion and sedimentation control. 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 their 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 the laws and regulations that affect them and provides a forum for the exchange of ideas. Through its newsletters, seminars, workshops, and annual conventions, the Georgia Mining Association serves as a source for mining industry information. It has several committees, including the Environmental Committee, that meet three to four times a year. The mining industry is conducting informal discussions on the potential of developing industry-wide standards for 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, results in deterioration of the road surface. This leads to increased roadway erosion and thus stream sedimentation. Unpaved roads are typically maintained by the 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 and dissipate turbulence 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 sediment over a larger vegetative filtering area, helping to reduce road side ditch maintenance to remove accumulated sediment.

Culverts are conduits used to convey water from one side of a road to another. Installation, modification, and/or improvements of culverts when streamflows and expected rainfall is low can reduce the amount of sediment that enters a stream. If the entire installation process, from beginning to end, can be completed before the next rainfall event, stream sedimentation can be minimized. Diverting all existing or potential streamflows while the culvert is being installed can also help reduce or avoid sedimentation below the installation. The culvert design can have a significant impact on the biological community if the size and species of fish passing through it are not considered. Changes in water velocities and the creation of vertical barriers also 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 adopted 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 for land-disturbing permits. 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 GSWCC, 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 Erosion and Sedimentation Act. Reports of suspected violations are made to the agency that issued the permit. In cases with local issuing authority, if the violation continues, the compliant is referred to the appropriate Soil and Water Conservation District. If the situation remains unresolved, the compliant is then referred to 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 revised June 2001 Erosion and Sedimentation Act across Georgia.

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

6.3 Reasonable Assurance

Permitted discharges will be regulated through the NPDES permitting process described in this report. Georgia is working with local governments, and 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 at 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 will be provided for this TMDL. During this time, the availability of the TMDL will be public noticed, a copy of the TMDL will be provided as requested, and the public will be 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 BMPs 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 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 pollutant categories of concern for the respective River Basin as identified in the TMDLs. 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. Also, 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 the 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 December 2005.

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 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 when GA EPD approves 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	_	_	_		_		_		
Urban	1. New Development	_	_		_	_			_	
	2. Watershed Protection & Site Development	_	_		_	_		_	_	
	3. Construction Site Erosion and		_		_	_				

Land Use	**Management Measures**	*Fecal Coliform*	*Dissolved Oxygen*	*pH*	*Sediment*	*Temperature*	*Toxicity*	*Mercury*	*Metals (copper, lead, zinc, cadmium)*	*PCBs, toxaphene*
	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	–	–			–			–	

REFERENCES

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APPENDIX A

SEDIMENT LOADS

During the field investigation, EPA collected suspended sediment concentration (SSC) samples in both the impaired and reference streams. Samples were collected using both automated and integrated samplers. In the sample identification column in the following data tables, automated samplers are designated with the letter “A”; integrated samplers are designated with the letter “I”. **In most of the streams, the automated samplers collected SSC data during the entire storm event. The exceptions were Oothkalooga Creek, and Pine Log Creek. For these streams, loading rates obtained from the “I” samples were compared to the reference streams. Total daily loading rates were calculated using the storm data and compared to rates measured in the reference streams. The proposed reductions were compared to WCS Sediment Tool modeling results. Neither the “A” nor “I” samples recorded the storm event on Dykes Creek and the data were not used to estimate loadings rates.**

Table A- 1. Data Summary Table for Tallapoosa River Basin

Lower Little Tallapoosa River

Sample	Date	Time	SSC (kg/hr/mi²)	Flow (cfs)
LTP01-01I	4/3/03	1445	1.08	244.30
LTP01-02I	4/7/03	1430	17.80	690.83
LTP01-03I	4/7/03	1755	22.82	696.70
LTP01-04I	4/7/03	2300	25.43	690.83
LTP01-05I	4/8/03	810	27.85	687.90
LTP01-06I	4/8/03	1320	16.33	633.82
LTP01-07I	4/8/03	1810	10.27	569.48
LTP01-08I	4/9/03	740	6.75	524.05
LTP01-08C	4/9/03	745	9.07	524.05
LTP01-07A	4/6/03 10:00	1000	1.19	248.87
LTP01-10A	4/7/03 4:00	400	2.88	601.10
LTP01-12A	4/7/03 13:20	1320	16.46	687.90
LTP01-13A	4/7/03 16:20	1620	20.52	696.70
LTP01-14A	4/7/03 19:20	1920	21.71	693.76
LTP01-15A	4/7/03 22:20	2220	24.16	690.83
LTP01-18A	4/8/03 7:20	720	17.22	687.90
LTP01-20A	4/8/03 13:20	1320	13.77	633.82
LTP01-21A	4/8/03 16:30	1630	11.08	590.44
LTP01-22A	4/8/03 19:30	1930	9.18	554.07
LTP01-24A	4/9/03 1:30	130	7.31	509.43
LTP01-26A	4/9/03 7:30	730	6.78	526.51
Max. Daily Sediment Rate (4/6/03 10:00 to 4/7/03 22:20):			**86.91**	**kg/day/mi²**
			191.63	**lb/day/mi²**

LTP03 Drainage Area = 96.97 mi²

Little Tallapoosa River

Sample	Date	Time	SSC (kg/hr/mi²)	Flow (cfs)
LTP03-01I	4/3/03	1130	1.27	121.21
LTP03-02I	4/7/03	1205	10.44	206.68
LTP03-03I	4/7/03	1640	12.56	238.83
LTP03-04I	4/7/03	2220	20.22	240.29
LTP03-05I	4/8/03	710	10.66	220.32
LTP03-06I	4/8/03	1135	8.31	208.02
LTP03-07I	4/9/03	905	3.84	192.26
LTP03-07C	4/9/03	910	5.26	192.26
LTP03-08A	4/6/03 16:00	1600	1.52	131.21
LTP03-10A	4/7/03 4:00	0400	1.73	137.44
LTP03-12A	4/7/03 11:30	1130	7.84	201.37
LTP03-13A	4/7/03 14:30	1430	9.87	228.75
LTP03-14A	4/7/03 17:30	1730	10.36	240.29
LTP03-15A	4/7/03 20:30	2030	10.49	243.22
LTP03-16A	4/7/03 23:30	2330	9.29	238.83
LTP03-18A	4/8/03 5:30	0530	6.89	225.92
LTP03-19A	4/8/03 8:30	0830	5.91	216.17
LTP03-20A	4/8/03 11:30	1130	4.81	208.02
LTP03-21A	4/8/03 14:30	1430	4.21	200.05
Max. Daily Sediment Rate (4/7/03 04:00 to 4/7/03 23:30):			**49.58**	**kg/day/mi²**
			109.33	**lb/day/mi²**

Table A- 2. Data Summary for Little Tallapoosa River Reference Stream

Whooping Creek (reference stream for Little Tallapoosa River)

Sample	Date	Time	SSC (kg/hr/mi^2)	Flow (cfs)
WHC01-01I	4/3/03	1300	0.53	23.92
WHC01-02I	4/7/03	1310	12.57	32.76
WHC01-03I	4/7/03	1535	9.91	30.99
WHC01-04I	4/7/03	1710	9.03	30.99
WHC01-05I	4/7/03	2335	3.64	28.48
WHC01-1G	4/7/03	855	2.83	28.48
WHC01-06I	4/8/03	900	1.55	27.68
WHC01-01A	4/4/03 22:00	2200	0.51	23.92
WHC01-03A	4/5/03 10:00	1000	0.51	23.92
WHC01-06A	4/6/03 4:00	0400	0.68	23.92
WHC01-08A	4/6/03 16:00	1600	0.53	23.92
WHC01-09A	4/6/03 22:00	2200	0.51	23.92
WHC01-11A	4/7/03 10:00	1000	2.49	31.87
WHC01-12A	4/7/03 12:20	1220	11.40	32.76
WHC01-13A	4/7/03 14:20	1420	13.50	32.76
WHC01-14A	4/7/03 16:20	1620	9.25	30.99
WHC01-17A	4/7/03 22:20	2220	3.64	28.48
WHC01-18A	4/8/03 0:20	0020	3.15	27.68
WHC01-19A	4/8/03 2:20	220	2.75	27.68
WHC01-22A	4/8/03 8:20	820	1.67	27.68
WHC01-23A	4/8/03 10:20	1020	1.53	27.68
WHC01-24A	4/8/03 13:20	1320	1.26	27.68
Max. Daily Sediment Rate (4/6/03 22:00 to 4/8/03 00:20):			**43.93**	**kg/day/mi^2**
			96.87	**lb/day/mi^2**

Table A- 3. Data Summary for Settingdown Creek

Settingdown Creek

Sample I.D.	Date	Time	SSC Loading (kg/hr/mi^2)	Flow (cfs)
SC02-02I	02/27/03	900	405.46	169.34
SC02-03I	02/27/03	1500	316.95	260.40
SC02-04I	02/28/03	930	67.35	281.28
SC02-05I	03/01/03	825	22.89	179.26
OT01 26I	03/04/03	1400	NC	
SC02-01A	2/26/03 22:00	2200	15.40	142.92388
SC02-06A	2/27/03 8:00	800	19.23	160.65667
SC02-07A	2/27/03 10:00	1000	44.88	160.65667
SC02-08A	2/27/03 12:00	1200	284.52	264.06852
SC02-09A	2/27/03 14:00	1400	603.54	252.06657
SC02-10A	2/27/03 16:00	1600	452.56	263.73439
SC02-12A	2/27/03 20:00	2000	58.39	243.8661
SC02-16A	2/28/03 4:00	400	53.02	166.06772
SC02-19A	2/28/03 10:00	1000	72.04	277.7243
SC02-26A	3/1/03 8:00	800	19.78	180.26936
Max. Daily Sediment Rate (2/26 22:00 to 2/28 04:00):			**1531.54**	**kg/day/mi^2**
			3377.05	**lb/day/mi^2**

Table A- 4. Data summary for Bannister Creek

Bannister Creek

Sample I.D.	Date	Time	SSC Loading (kg/hr/mi^2)	Flow (cfs)
BC01-01I	02/26/03	1720	8.31	33.06292
BC01-02I	02/27/03	945	593.26	181.53365
BC01-03I	02/27/03	1620	90.75	111.07709
BC01-04I	02/28/03	1000	21.35	58.579406
BC01-05I	02/28/03	1455	17.91	50.882343
BC01-01A	2/26/03 22:30	2230	9.58	39.104088
BC01-03A	2/27/03 2:30	230	17.07	84.863299
BC01-05A	2/27/03 6:30	630	48.16	178.20103
BC01-06A	2/27/03 8:30	830	66.92	186.80627
BC01-07A	2/27/03 10:30	1030	1217.34	176.09057
BC01-08A	2/27/03 12:30	1230	881.08	157.52206
BC01-09A	2/27/03 14:30	1430	296.09	138.56709
BC01-11A	2/27/03 18:00	1800	47.41	112.59448
BC01-15A	2/28/03 2:00	200	36.00	76.384165
BC01-19A	2/28/03 10:00	1000	22.46	58.579406
BC01-21A	2/28/03 14:00	1400	20.02	52.222564
BC01-22A	2/28/03 16:00	1600	20.26	49.584864
BC01-26A	3/1/03 8:00	800	8.32	44.11387
Max. Daily Sediment Rate (2/26 22:30 to 2/28 02:00):			**2619.64**	**kg/day/mi^2**
			5776.31	**lb/day/mi^2**

Table A- 5. Data Summary Table for Dykes Creek

Dykes Creek

Sample I.D.	Date	Time	SSC Loading (kg/hr/mi^2)	Flow (cfs)
DC01A-BFI	2/26/03 18:35	1835	0.91	41.80
DC01A-01I	2/27/03 10:10	1010	19.91	118.57
DC01A-03I	2/28/03 16:10	1610	3.50	93.78
DC01A-04I	3/1/03 13:50	1350	13.03	61.63
DC01A-BFA	02/26/03	1810	0.78	41.80
DC01A-01A	02/26/03	1900	1.20	41.80
DC01A-06A	02/27/03	500	--	--
DC01A-08A	02/27/03	900	--	--
DC01A-09A	02/27/03	1100	25.81	118.57
DC01A-11A	02/27/03	1500	--	--
DC01A-12A	02/27/03	1700	--	--
DC01A-13A	02/27/03	1900	--	--
DC01A-14A	02/27/03	2100	--	--
DC01A-16A	02/28/03	100	--	--
DC01A-20A	02/28/03	900	--	--
DC01A-23A	02/28/03	1500	3.85	93.78
DC01A-24A	02/28/03	1800	--	--
DC01A-29A	03/01/03	1400	1.53	61.63
Max. Daily Sediment Rate (2/27 05:00 to 2/28 01:00):			**30.86**	**kg/day/mi^2**
			68.04	**lb/day/mi^2**

Table A- 6. Data Summary for Conesena Creek

Connesena Creek

Sample I.D.	Date	Time	SSC Loading (kg/hr/mi^2)	Flow (cfs)
CS01-BFI	2/26/03 16:20	1620	1.02	28.70
CS01-01I	2/27/03 9:40	940	12.22	57.47
CS01-02I	2/27/03 17:35	1735	69.53	189.30
CS01-03I	2/28/03 15:20	1520	4.56	64.33
CS01-04I	3/1/03 12:30	1230	1.75	46.84
CS01-BFA	2/26/03 16:15	1615	0.92	28.70
CS01-09A	2/27/03 9:00	900	10.00	57.47
CS01-13A	2/27/03 18:00	1800	82.94	189.30
CS01-24A	2/28/03 16:00	1600	4.56	64.33
Max. Daily Sediment Rate (2/26 16:15 to 2/27 18:00):			**93.87**	**kg/day/mi^2**
			206.98	**lb/day/mi^2**

Table A- 7. Data Summary Table for Euharlee Creek

Euharlee Creek

Sample I.D.	Date	Time	SSC Loading (kg/hr/mi^2)	Flow (cfs)
EC01-BFI	02/26/03	1945	7.98	325.91
EC01-01I	02/27/03	1055	12.66	496.29
EC01-02I	02/27/03	1915	14.07	467.53
EC01-03I	02/28/03	1810	10.78	660.03
EC01-04I	03/01/03	1520	4.49	325.91
EC01-BFA	2/25/03 18:45	1845	6.17	366.41
EC01-02A	2/26/03 23:00	2300	4.35	327.89
EC01-03A	2/27/03 1:00	100	6.89	482.52
EC01-04A	2/27/03 3:00	300	6.90	436.16
EC01-08A	2/27/03 11:00	1100	11.14	496.29
EC01-09A	2/27/03 13:00	1300	16.29	665.21
EC01-10A	2/27/03 15:00	1500	36.43	751.60
EC01-11A	2/27/03 17:00	1700	24.60	709.07
EC01-12A	2/27/03 19:00	1900	14.85	485.12
EC01-14A	2/27/03 23:00	2300	12.55	464.04
EC01-15A	2/28/03 1:00	100	13.72	584.47
EC01-16A	2/28/03 3:00	300	11.11	444.31
EC01-17A	2/28/03 5:00	500	8.40	391.75
EC01-18A	2/28/03 7:00	700	7.83	383.86
EC01-21A	2/28/03 13:00	1300	9.99	559.22
EC01-23A	2/28/03 17:00	1700	10.75	658.39
EC01-26A	2/28/03 23:00	2300	7.84	451.83
EC01-29A	3/1/03 5:00	500	4.93	333.44
EC01-34A	3/1/03 15:00	1500	4.50	326.31
Max. Daily Sediment Rate (2/26 23:00 to 2/27 23:00):			**134.01**	**kg/day/mi^2**
			295.49	**lb/day/mi^2**

Table A- 8. Data Summary for Oothkalooga Creek

Oothkalooga Creek

Sample I.D.	Date	Time	SSC Loading (kg/hr/mi^2)	Flow (cfs)
OT01-01I	2/26/03 11:00	1100	2.27	74.10
OT01-02I	2/26/03 22:30	2230	66.03	958.56
OT01-03I	2/27/03 11:20	1120	275.52	1439.97
OT01-04I	2/27/03 22:20	2220	108.72	1092.69
OT01-05I	2/28/03 11:00	1100	7.61	1325.83
OT01-06I	3/4/03 14:00	1400	2.27	69.89
OT01-26I	3/4/03 14:00	1400	NC	
Max. Daily Sediment Rate (2/26 22:30 to 2/27 22:20):			**450.26**	**kg/day/mi^2**
			992.82	**lb/day/mi^2**
OT01-01A	2/26/03 0:00	1010	26.39	985.26
OT01-02A	2/26/03 0:00	1011	NC	
OT01-03A	2/26/03 0:00	1120	29.54	964.98
OT01-04A	2/26/03 0:00	1120	NC	
OT01-13A	2/26/03 0:00	2120	66.03	958.56
OT01-14A	2/26/03 0:00	2120	NC	
OT01-15A	2/26/03 0:00	2320	75.20	958.56
OT01-16A	2/26/03 0:00	2320	NC	
OT01-25A	2/27/03 0:00	920	223.17	1439.97
OT01-26A	2/27/03 0:00	920	NC	

Note: Data from automated samples not used to calculate maximum daily rate as duration of storm event was not measured

Table A- 9. Data Summary for Pine Log Creek

Pine Log Creek

Sample I.D.	Date	Time	SSC Loading (kg/hr/mi^2)	Flow (cfs)
PLC01A-01I	2/26/03 15:00	1500	3.29	223.56
PLC01A-02I	2/26/03 23:30	2330	7.00	295.37
PLC01A-03I	2/27/03 14:50	1450	122.55	1153.62
PLC01A-04I	2/27/03 23:15	2315	178.41	1984.80
PLC01A-05I	2/28/03 12:00	1200	46.33	1156.97
PLC01A-06I	3/4/03 12:40	1240	2.42	211.63
PLC01A-26I	03/04/03	1240	NC	
Max. Daily Sediment Rate (2/26 23:30 to 2/27 23:15):			**307.96**	**kg/day/mi^2**
			679.06	**lb/day/mi^2**
PLC01A-01A	02/26/03	1415	2.56	223.56
PLC01A-02A	02/26/03	1415	NC	--
PLC01A-03A	02/26/03	1628	--	
PLC01A-04A	02/26/03	1628	NC	
PLC01A-09A	02/26/03	2228	6.76	295.37
PLC01A-10A	02/26/03	2228	NC	
PLC01A-11A	02/27/03	28	48.66	1984.80
PLC01A-12A	02/27/03	28	NC	--
PLC01A-19A	02/27/03	828	--	
PLC01A-20A	02/27/03	828	NC	
PLC01A-21A	02/27/03	1028	--	
PLC01A-22A	02/27/03	1028	NC	
PLC01A-25A	02/27/03	1428	141.41	1153.62
PLC01A-26A	02/27/03	1428	NC	

Note: Data from automated samples not used to calculate maximum daily rate as duration of storm event was not measured

Table A- 10. Data Summary for Salacoa Creek

Salacoa Creek

Sample I.D.	Date	Time	SSC Loading (kg/hr/mi^2)	Flow (cfs)
SLC02-01I	2/26/03 16:50	1650	5.61	215.70
SLC02-02I	2/27/03 0:00	2400	10.69	277.51
SLC02-03I	2/27/03 16:15	1615	206.22	892.37
SLC02-04I	2/27/03 23:55	2355	156.88	1018.25
SLC02-05I	2/28/03 13:15	1315	81.98	860.03
SLC02-06I	3/4/03 13:15	1315	3.94	185.80
SLC02-46I	03/04/03	1315	NC	
SLC02-01A	2/26/03 16:15	1615	13.11	567.18
SLC02-02A	2/26/03 16:15	1615		
SLC02-07A	2/26/03 22:30	2230	22.90	660.73
SLC02-08A	2/26/03 22:30	2230		
SLC02-09A	2/27/03 0:30	30	28.21	681.44
SLC02-10A	2/27/03 0:30	30		
SLC02-17A	2/27/03 8:30	830	67.42	886.27
SLC02-18A	2/27/03 8:30	830		
SLC02-25A	2/27/03 16:30	1630	390.67	1408.74
SLC02-26A	2/27/03 16:30	1630		
SLC02-33A	2/28/03 0:30	30	279.64	1659.51
SLC02-34A	2/28/03 0:30	30		
SLC02-35A	2/28/03 2:30	230	236.27	1680.63
SLC02-36A	2/28/03 2:30	230		
SLC02-41A	2/28/03 8:30	830	149.48	1584.04
SLC02-42A	2/28/03 8:30	830		
SLC02-45A	2/28/03 12:30	1230	133.90	1376.87
SLC02-46A	2/28/03 12:30	1230		
Max. Daily Sediment Rate (2/27 00:30 to 2/28 00:30):			**765.94**	**kg/day/mi^2**
			1688.89	**lb/day/mi^2**

Table A- 11. Data Summary for Reference Streams in Coosa River Basin

Amicalola Creek

Sample I.D.	Date	Time	SSC Loading (kg/hr/mi^2)	Flow (cfs)
AC01-01I	02/26/03	1230	1.50	210.37
AC01-02I	02/27/03	1130	39.89	520.02
AC01-03I	02/27/03	1810	87.25	713.59
AC01-04I	02/28/03	1130	8.82	396.94
AC01-05I	02/28/03	1730	5.21	360.74
AC01-03A	2/27/03 0:00	2400	4.40	282.77
AC01-07A	2/27/03 8:00	800	6.78	321.12
AC01-09A	2/27/03 12:00	1200	41.44	532.62
AC01-11A	2/27/03 16:00	1600	111.05	713.59
AC01-12A	2/27/03 18:00	1800	95.19	713.59
AC01-13A	2/27/03 20:00	2000	65.91	673.74
AC01-17A	2/28/03 4:00	400	14.88	495.77
AC01-21A	2/28/03 12:00	1200	5.66	391.85
AC01-24A	2/28/03 18:00	1800	5.18	358.55
AC01-28A	3/1/03 10:00	1000	2.98	304.54
Max. Daily Sediment Rate (2/27 24:00 to 2/28 04:00):			**339.65**	**kg/day/mi^2**
			748.93	**lb/day/mi^2**

Stamp Creek

Sample I.D.	Date	Time	SSC Loading (kg/hr/mi^2)	Flow (cfs)
STC01-BFI	02/26/03	1155	0.15	21.02
STC01-01I	02/27/03	820	0.27	28.04
STC01-02I	02/27/03	1525	6.70	76.18
STC01-03I	02/28/03	1150	0.20	33.73
STC01-04I	03/01/03	1100	0.16	26.41
STC01-BFA	02/26/03	1210	0.02	21.02
STC01-01A	02/26/03	1300	0.02	21.02
STC01-05A	02/26/03	2100	0.22	21.02
STC01-09A	02/27/03	500	0.17	21.02
STC01-10A	02/27/03	700	0.27	21.02
STC01-11A	02/27/03	900	1.75	29.62
STC01-12A	02/27/03	1100	13.28	50.34
STC01-13A	02/27/03	1500	8.83	78.87
STC01-14A	02/27/03	1700	4.04	67.34
STC01-17A	02/27/03	2300	1.94	46.71
STC01-18A	02/28/03	100	0.76	43.43
STC01-23A	02/28/03	1100	0.52	34.10
Max. Daily Sediment Rate (2/26 21:00 to 2/27 23:00):			**30.49**	**kg/day/mi^2**
			67.23	**lb/day/mi^2**

Table A- 12. Storm Loads and Reductions for Impaired Streams Based on Data

Waterbody	Drainage Area (sq miles)		Existing load (lb/day/mi^2)	Reference Load (lb/day/mi^2)	Total Allowable Load (lb/day)	% Reduction (%)
Lower Little Tallapoosa R (LTP-01)	246.68		191.63	89.94	22186.69	53.1
Little Tallapoosa R (LTP-03)[1]	84.76		109.33	89.94	7623.04	17.7
Settingdown Creek (SC-02)[2]	45.38		3377.05	748.93	33989.61	77.8
Bannister Creek (BC-01)[2]	4.90		5776.31	748.93	3671.92	87.0
Dykes Creek (DC-01)	14.88		68.04	67.23	1000.16	1.2
Connesena Creek (CS-01)	15.72		206.98	67.23	1057.16	67.5
Euharlee Creek (EC-01)	177.15		295.49	67.23	11909.84	77.2
Oothkalooga Creek (OT-01)	47.06		992.82	67.23	3163.81	93.2
Pine Log Creek (PLC-01)	111.01		679.06	67.23	7463.54	90.1
Salacoa Creek (SLC-02)	89.89		1688.89	67.23	6043.17	96.0
Note: Total Allowable load = reference load (lb/day/mi^2) * drainage area (mi^2)						
Reference Streams						
Whooping Creek (WHC-01)	14		89.94		1259.16	
Amicalola Creek (AC-01)	81		748.93		60663.33	
Stamp Creek (STC-01)	11		67.23		739.53	

Table A- 13. Comparison of Reductions between Chronic and Acute Conditions

Waterbody	WCS reduction (Chronic Conditions)	Storm Sampling Reduction (Acute Conditions)
Lower Little Tallapoosa River	70 %	53 %
Little Tallapoosa River	72 %	18 %
Settingdown Creek	Reduction from watershed not needed	78 %
Bannister Creek	Reduction from watershed not needed	87 %
Dykes Creek	90 %	2 %
Connesena Creek	85 %	68 %
Euharlee Creek	92 %	77 %
Oothkalooga Creek	97 %	93 %
Pine Log Creek	88 %	90 %
Sallacoa Creek	92 %	96 %

Note: "Reductions from watershed not needed" does not imply that increased flow resulting from increased impervious area does not have an impact on water quality

Table A- 14. USLE Parameters used in Tallapoosa River Basin Sediment Models

	Tallapoosa River		Settingdown Creek		Bannister Creek	
Factor	min	max	min	max	min	max
LS Factor	0.076	158.826	0.076	191.451	0.076	133.585
K Factor	0.25	0.3	0.25	0.27	0.25	0.25
P Factor	1	1	1	1	1	1
C Factor	0	0.12	0	0.12	0	0.12
R Factor	312.5	337.5	275	275	275	275
Weighted R Factor	324.455	325.627	275	275	275	275
Composite Erosion	0	434.599	0	305.601	0	257.086
Composite Sediment	0	242.501	0	302.786	0	249.356

Table A- 15. USLE Parameters used in Coosa River Basin Sediment Models

	Dykes Creek		Connesena Creek		Euharlee Creek		Oothkalooga Creek		Pine Log Creek		Sallacoa Creek	
Factor	min	max	min	max	min	max	min	max	min	max	min	max
LS Factor	0.076	155.999	0.076	153.811	0.076	199.69	0.076	156.789	0.076	171.518	0.076	223.276
K Factor	0.32	0.35	0.32	0.35	0.24	0.35	0.32	0.35	0.32	0.35	0.25	0.35
P Factor	1	1	1	1	1	1	1	1	1	1	1	1
C Factor	0	0.12	0	0.12	0	0.75	0	0.12	0	0.12	0	0.12
R Factor	300	300	300	300	300	312.5	300	300	300	300	275	300
Weighted R Factor	300	300	300	300	300.047	300.047	300	300	300	300	294.303	297.416
Composite Erosion	0	409.085	0	341.811	0	2661.63	0	503.072	0	470.671	0	701.317
Composite Sediment	0	375.569	0	336.618	0	1789.259	0	321.857	0	469.477	0	699.538

Table A- 16. USLE Parameters Used in Sediment Models of Reference Streams

	Whooping Creek		Amicalola Creek		Stamp Creek	
Factor	min	max	min	max	min	max
LS Factor	0.076	110.373	0.076	260.824	0.123	217.925
K Factor	0.250	0.270	0.25	0.25	0.25	0.35
P Factor	1.000	1.000	1	1	1	1
C Factor	0.000	0.120	0	0.12	0	0.12
R Factor	325.000	325.000	275	275	300	300
Weighted R Factor	325.000	325.000	275	275	300	300
Composite Erosion	0.000	243.396	0	559.579	0	363.302
Composite Sediment	0.000	186.021	0	456.719	0	200.332

Table A- 17. Relative Contribution of Sediment from Select Individual Land Cover Categories

Waterbody	**Urban (tons/yr)**	**Barren (tons/yr)**	**Agriculture (tons/yr)**	**Forest (tons/yr)**
Little Tallapoosa River	142	42	2,764	6,472
Lower Little Tallapoosa River	704	108	8,972	17,739
Settingdown Creek	19	61	1,895	4,466
Bannister Creek	114	42	1,041	2,953
Dykes Creek	1	1	21	175
Conesena Creek	1	10	12	184
Euharlee Creek	15	42	600	1,639
Oothkalooga Creek	6	40	151	407
Pine Log Creek	1	45	308	1,107
Salacoa Creek	3	47	119	1,013

Notes:

1. Sediment loads are estimates based on landuse characteristics provided in Table 2 and may be different from current conditions due to changes in landuse and BMPs that impact washoff rates.
2. Sediment loads calculated using the following equation:
   Load (tons/yr) = landcover area (acres) * Load Allocation Rate (tons/yr/mi^2) / 640 acres/mi^2
   For example, Little Tallapoosa River has 754 acres of urban land cover and the load allocation for this stream is 120.58 tons/yr/mi^2 ; therefore, load = 754 acres * 120.58 tons/yr/mi^2 /640 acres/mi^2 = 142 tons/yr
3. Steams in the Tallapoosa River Basin have higher loads than streams in the Coosa River Basin due to differences in transport capacities of the ecoregions. The Tallapoosa Basin is in the Piedmont Ecoregion (#45) whereas the Coosa Basin is in the Southern Shale Valley Ecoregion (#67). Piedmont streams have steeper gradients than Southern Shale Valley streams and will transport a relatively higher rate of sediment.