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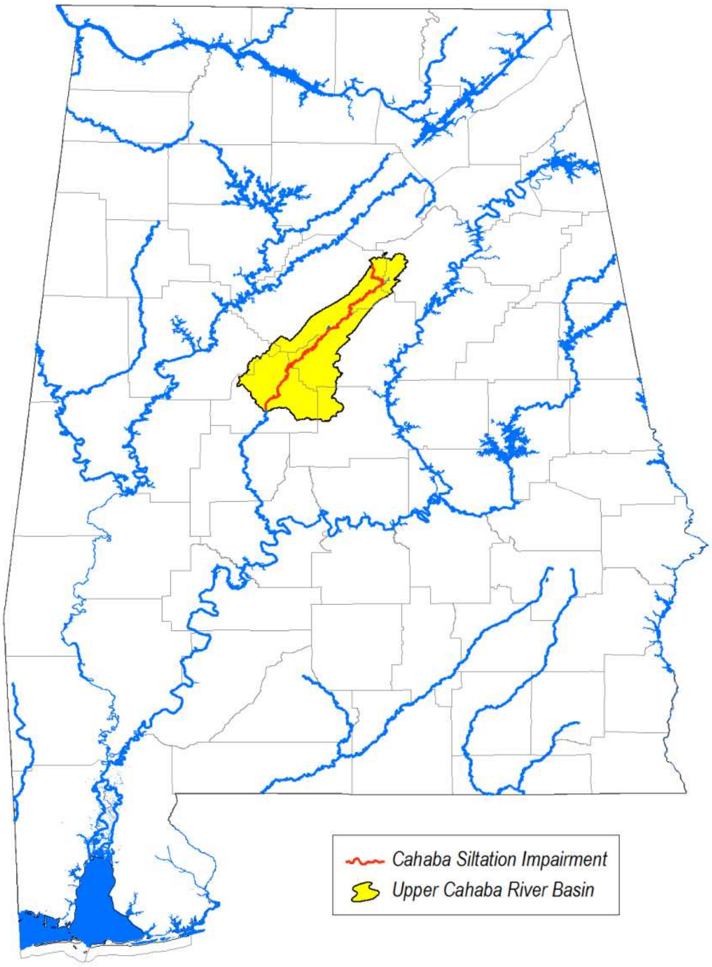
TOTAL MAXIMUM DAILY LOAD (TMDL) For Siltation and Habitat Alteration In The Upper Cahaba River Watershed

(HUC 03150202)



Alabama Department of Environmental Management
Water Quality Branch
Water Division
July 2012

ADEM
Alabama Department of Environmental Management

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Useful Acronyms & Abbreviations

A

A&I	- Agriculture and Industry Use Classification
AAF	- Average Annual Flow
ACES	- Alabama Cooperative Extension Service
ADEM	- Alabama Department of Environmental Management
ADPH	- Alabama Department of Public Health
AEMC	- Alabama Environmental Management Commission
AFO	- Animal Feeding Operation
AL	- Alabama; Aluminum (Metals)
AS	- Arsenic
ASWCC	- Alabama Soil & Water Conservation Committee
AWIC	- Alabama Water Improvement Commission

B

BAT	- Best Available Technology
BCT	- Best Conventional Pollutant Control Technology
BMP	- Best Management Practices
BOD	- Biochemical Oxygen Demand
BPJ	- Best Professional Judgment

C

CAFO	- Confined Animal Feeding Operation
$CBOD_5$	- Five-Day Carbonaceous Biochemical Oxygen Demand
$CBOD_u$	- Ultimate Carbonaceous Biochemical Oxygen Demand
CFR	- Code of Federal Regulations
CFS	- Cubic Feet per Second
CMP	- Coastal Monitoring Program
COD	- Chemical Oxygen Demand
COE	- Corps of Engineers (US Army)
CPP	- Continuing Planning Process
CWA	- Clean Water Act
CY	- Calendar Year

D

DA	- Drainage Area
DEM	- Digital Elevation Model
DMR	- Discharge Monitoring Report
DNCR	- Department of Conservation & Natural Resources
DO	- Dissolved Oxygen

E

E. coli	- Escherichia Coliform Bacteria
EOP	- End of Pipe
EPA	- Environmental Protection Agency (US)

F

F&W	- Fish and Wildlife Use Classification
FDA	- Food and Drug Administration
Fe	- Iron
FO	- Field Operations
FS	- Forestry Service (US)
FY	- Fiscal Year

G

GIS	- Geographic Information Systems
GOMA	- Gulf of Mexico Alliance
GPS	- Global Positioning System
GSA	- Geological Survey of Alabama

H

HCR	- Hydrographic Controlled Release
Hg	- Mercury
HUC	- Hydrologic Unit Code

I

IBI	- Index of Biotic Integrity
IF	- Incremental Flow
IWC	- Instream Waste Concentration

L

LA	- Load Allocation
Lat/Long	- Latitude / Longitude
LDC	- Load Duration Curve
LIDAR	- Light Detection & Ranging
LWF	- Limited Warmwater Fishery Use Classification

M

m^3/s	- Cubic Meters per Second
MAF	- Mean Annual Flow (MAF = AAF)
mg/l	- Milligrams per Liter
MGD	- Million Gallons per Day
mi	- Miles
MOS	- Margin of Safety
MS4s	- Municipal Separate Storm Sewer Systems
MZ	- Mixing Zone

N

N	- Nitrogen
NA	- Not Applicable
NASS	- National Agricultural Statistics Service
$NBOD_x$	- Nitrogenous Biochemical Oxygen Demand
NED	- National Elevation Database
$NH_3\text{-}N$	- Ammonia Nitrogen
NHD	- National Hydrography Database
NLCD	- National Land Cover Dataset
$NO_3{+}NO_2\text{-}N$	-Nitrate + Nitrite Nitrogen

N (Cont.)

NOAA - National Oceanic and Atmospheric Administration
NOV - Notice of Violation
NPDES - National Pollutant Discharge Elimination System
NPS - Non-Point Source
NRCS - National Resource Conservation Service
NTUs - Nephelometric Turbidity Units
NWS - National Weather Service

O

OAW - Outstanding Alabama Water Use Classification
OE - Organic Enrichment
ONRW - Outstanding National Resource Water Designation

P

P - Phosphorus
Pb - Lead
PCBs - Polychlorinated Biphenyl
pH - Concentration of Hydrogen Ions Scale
POTW - Publicly Owned Treatment Works
ppb - Parts per Billion
ppm - Parts per Million
ppt - Parts per Trillion
PS - Point Source
PWS - Public Water Supply Use Classification
PWSS - Public Water Supply System

Q

Q - Flow (MGD / m^3/s)
QA/QC - Quality Assurance / Quality Control
QAPP - Quality Assurance Project Plan

R

RGA - Rapid Geomorphic Assessment
RRMP - River and Reservoirs Monitoring Program
RSMP - River and Streams Monitoring Program

S

S - Swimming and Other Whole Body Waters Contact Sports Use Classification
SH - Shellfish Harvesting Use Classification
SID - State Indirect Discharge
SMZ - Streamside Management Zone
SOD - Sediment Oxygen Demand
SOP - Standard Operating Procedure
SPPP - Stormwater Pollution Prevention Plan
SPCC - Spill Prevention Control & Countermeasures (plan)
SRF - State Revolving Fund
SSO - Sanitary Sewer Overflow
STP - Sewage Treatment Facility
SW - Surface Water
SWMP - Stormwater Management Plan
SWQM - Spreadsheet Water Quality Model (AL)
SWQMP - Surface Water Quality Monitoring Program

T

T&E - Threatened and Endangered (species)
TBC - Technology-Based Controls
TBD - To be Determined
TDS - Total Dissolved Solids
TKN - Total Kjeldahl Nitrogen
TMDL - Total Maximum Daily Load
TON - Total Organic Nitrogen
TOT - Time of Travel
Total P - Total Phosphorus
TSS - Total Suspended Solids
TVA - Tennessee Valley Authority

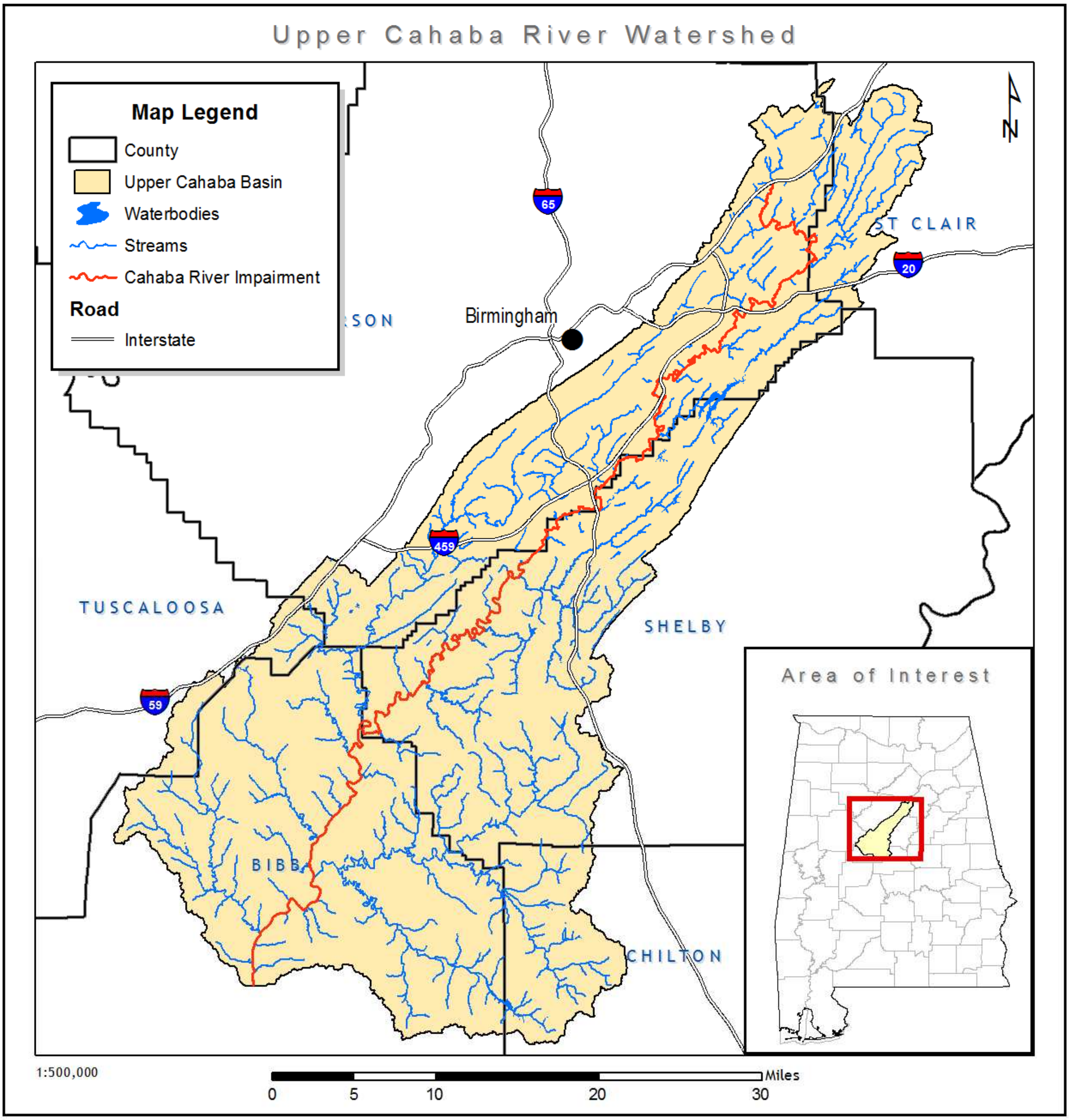
U

UAA - Use Attainability Analysis
UIC - Underground Injection Control
USDA - United Stated Department of Agriculture
USGS - United States Geological Survey
USEPA - United States Environmental Protection Agency
USFWS - United States Fish & Wildlife Services
UV - Ultraviolet Radiation

W

WCS - Watershed Characterization System
WET - Whole Effluent Toxicity
WLA - Wasteload Allocation
WMA - Wildlife Management Area
WPCP - Wastewater Pollution Control Plant
WQB - Water Quality Branch
WRDB - Water Resources Database
WTP - Water Treatment Plant
WWTF - Wastewater Treatment Facility
WWTP - Wastewater Treatment Plant
WY - Water Year

Map 1-1: Upper Cahaba River Watershed Map



Upper Cahaba River Watershed TMDL

For Siltation (Habitat Alteration)

1.0 EXECUTIVE SUMMARY

With headwaters originating just north and east of the City of Birmingham, the Cahaba River is recognized as the longest free-flowing river in the State of Alabama and boasts unique ecosystems rich in biological diversity. The Cahaba River Basin is a sub-basin of the Alabama River Basin, which eventually drains into the Mobile River, one of the largest primary stream drainage basins in North America. The Cahaba River spans nearly 194 miles through central Alabama and has a contributing drainage area of 1,824 square miles. Its headwaters are located within the Alabama Ridge and Valley physiographic region and eventually flow southwest into the East Gulf Coastal Plain. This is the only point within the 48 contiguous states where the geological landscape transitions abruptly from mountainous regions directly to a coastal plain. This accounts for the distinctive landscape and aesthetic beauty within the watershed, as well as its renowned biodiversity. The upper portion of the watershed, which drains a large part of Birmingham and surrounding suburbs, is a highly developed urban area which results in an effluent-dominated stream network.

The following report presents Total Maximum Daily Loads (TMDLs) of siltation for eight waterbody segments found on *Alabama's 2010 Section §303(d) List of Impaired Waterbodies* within the Cahaba River Watershed. Only one of the river segments (from Shades Creek to Buck Creek) was listed on the 1996 list. The original listing by the Alabama Department of Environmental Management (ADEM) in 1996 was for nutrients. In 1999, the U.S. Environmental Protection Agency (USEPA) added other parameters after reviewing ADEM's 1998 §303(d) list. In 2006, a nutrient TMDL was completed for the Cahaba River. This TMDL, however, specifically addresses the Upper Cahaba River Watershed siltation impairment, so no other pollutant parameters will be considered in this analysis.

1.1 TMDL at a Glance

- ***Water Quality Limited?*** Yes
- ***Hydrologic Unit Code(s):*** AL03150202-XXXX-XXX (See ***Table 2-1***)
- ***Counties:*** Bibb, Chilton, Jefferson, Shelby, St. Clair, Tuscaloosa
- ***Size of Watershed:*** 1025.48 mi^2 (656304.6 acres)
- ***Listing Date:*** 1998
- ***Cause of Impairment:*** Siltation (Habitat Alteration)
- ***WQ Constituent of Concern:*** Total Suspended Solids (TSS)
- ***Designated Uses Affected:*** F&W, PWS, OAW, S (See ***Table 2-1***)
- ***Major Source(s):*** Urban runoff, storm sewers, land development
- ***WQ Target:*** 220.3 lbs/acre/yr (70.5 tons/mi^2/yr)
- ***Required Reduction:*** 53 % (45 mg/l) (See ***Table 1-1***)
- ***Margin of Safety:*** Implicit

Past field studies demonstrate that, although fish and macroinvertebrate communities are healthy at some locations, siltation is contributing to the cause of reduced biological health at particular locations. The USEPA Region 4 final report (USEPA Region 4, 2004) summarized observed habitat degradation due to nutrient over-enrichment and siltation in all eight segments presented in ***Table 2-1***. The effects of nutrient enrichment are compounded due to impacts from siltation as a result of disturbances in surrounding land uses and urban hydrology (Shephard et al, 1994b). The available chemical, physical and biological monitoring data collected within the Cahaba River supports both the historical and present day impacts to the Cahaba River with respect to siltation and habitat alteration. Therefore, the Department warrants that the subject TMDL is necessary to bring the Cahaba River into compliance with applicable water quality standards. This includes ensuring that water quality criteria are achieved, fully supporting the designated uses of the river, and improving/preserving healthy habitat suitable for indigenous aquatic species. It should be noted that these segments of the Cahaba River are not listed as impaired for TSS. Rather, TSS serves as an indicator, or surrogate parameter, by which one can predict habitat alteration due to hydrologic conditions and sedimentation.

For siltation (habitat alteration), the water quality criteria are narrative and do not change depending upon the use classification of the waterbody. The use classifications for the impaired segments in the Upper Cahaba River Watershed are shown in ***Table 2-1*** and ***Map 2-2***. Excessive sedimentation has been one of the primary factors in habitat degradation within the Cahaba River Watershed. (USEPA Region 4, 2003a; O'Neil, 2002, Hartfield 2002, USFWS 2000, Shepard et al. 1994).

In general, the methodology utilized in developing this TMDL closely resembles the Shades Creek Siltation TMDL completed in 2004 by USEPA Region 4. The siltation target was based on work performed by the National Sediment Laboratory in determining sediment load curves by ecoregion for USEPA Region 4. This work involved gathering all of the long-term historical suspended-sediment data and peak flow data from the United States Geological Survey (USGS) to develop the loading characteristics of streams within the same ecoregion. A TMDL target of 24.7 Tonnes/km^2/yr (70.5 tons/mi^2/yr) was established from these extensive studies. This value represents the median value of average annual suspended-sediment loadings for stable reference sites in Ecoregion 67 and correspondes to a concentration of 45.1 mg/L.

To develop the siltation TMDL, a sediment loading curve approach was used to represent the existing sediment yield in the Upper Cahaba River Watershed. In order to be most protective of water quality, the highest observed sediment yield of 52.8 tonnes/km^2/yr (149.2 ton/mi^2/yr) was used. ***Table 1-1*** below displays a summary of the TMDL. The values have been converted to pounds per acre per year.

Table 1-1: Siltation TMDL Summary for the Cahaba River

WLA		LA (lbs/acre/yr)	MOS	TMDL (lbs/acre/yr)	Percent Reduction
TSS Concentration[a] (mg/L)	**TSS Yield[b] (lbs/acre/yr)**				
45	220.3 [c]	220.3	Implicit	220.3	53%

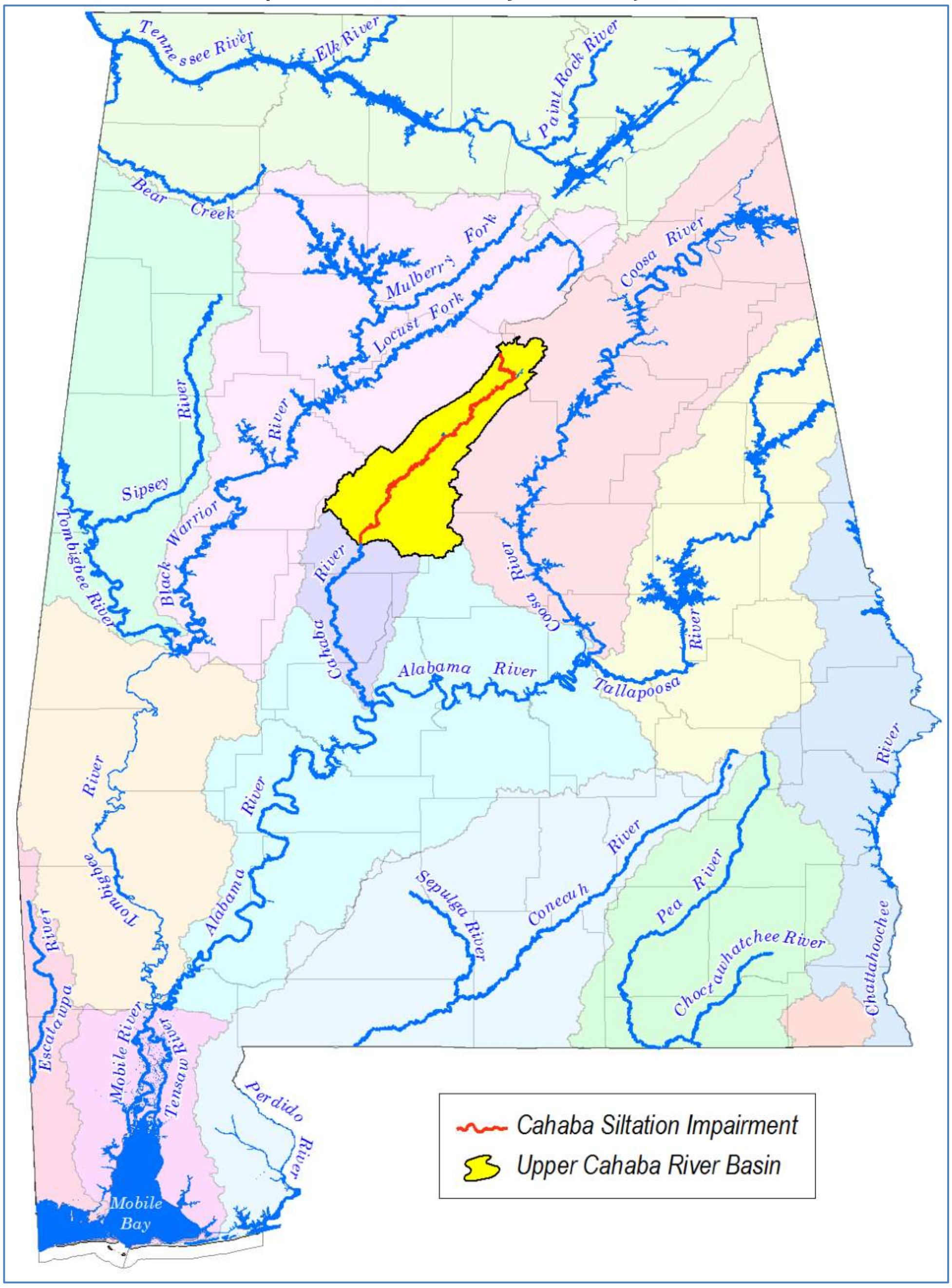
a. Existing and future NPDES Permits that utilize numeric limits for TSS shall not exceed 45 mg/L applied as a monthly average.
b. The allowable yield applies to all existing and future NPDES Permits that utilize BMPs to control sediment. Compliance with the TMDL is expected to be achieved through the implementation and maintenance of effective BMPs appropriate for site conditions.
c. A value of 220.3 lbs/acre/yr corresponds to 70.5 tons/mi^2/yr or 24.7 tonnes/km^2/yr.

2.0 WATERSHED DESCRIPTION

2.1 Geographical Location of the Impairment

The Cahaba River Basin is location in the central part of the State of Alabama. The siltation impairment of the Cahaba River is located in the Upper Cahaba Basin, which accounts for just over half of the total Cahaba River Basin area.

Map 2-1: Alabama's Major River Systems



2.2 Use Classification & General Information

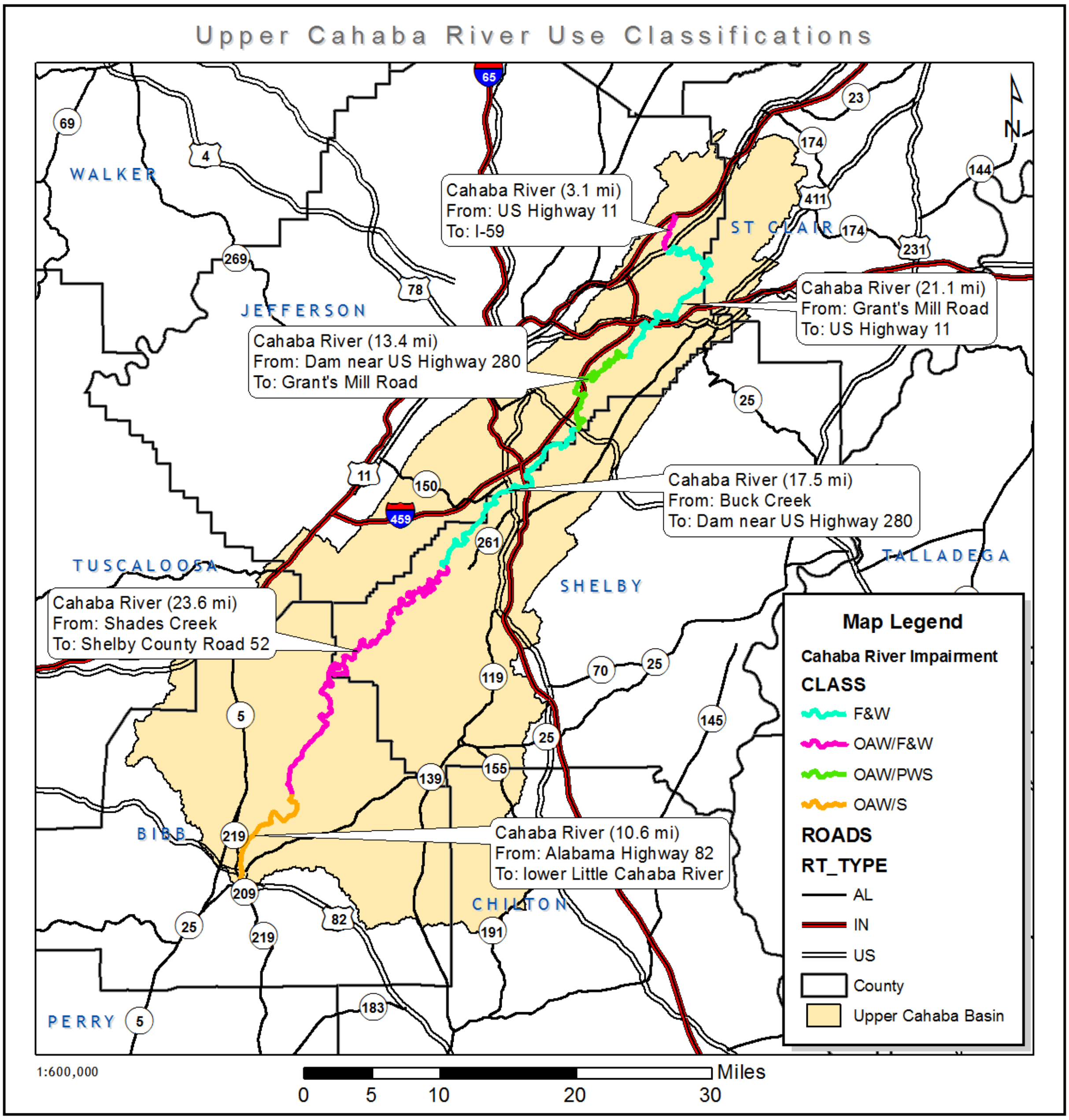
The Upper Cahaba River Watershed, which contains the §303(d)-listed segments of the Cahaba River for siltation and habitat alteration, is comprised of approximately 1,026 square miles in parts of St. Clair, Jefferson, Shelby and Bibb Counties, with small fractions in Tuscaloosa and Chilton Counties (See *Map 2-2*). A vast majority of surface waters located within the Cahaba River Basin hold a Fish and Wildlife (F&W) use classification. More specifically, the ~106 mile-long impaired segment of the Cahaba River mainstem is primarily F&W, but is also classified as an Outstanding Alabama Water (OAW) for nearly 64 miles of the 106 mile total. In addition, there is a ~13 mile segment of the upper Cahaba River that is classified as Public Water Supply (PWS) and a ~10 mile segment listed as Swimming (S).

Of the eight listed segments of the mainstem Cahaba River, all are listed as being impaired for siltation (habitat alteration). ***Table 2-1*** presents the listed segment assessment unit IDs along with the lengths of impairment, use classifications, cause(s) of impairment, the listing year, and geographical extents. ***Map 2-2*** on the following page presents a map of the Upper Cahaba River Watershed with the listed segments of the mainstem identified with their respective use classifications.

Table 2-1: 2012 §303(d) Listed Segments within the Upper Cahaba River Watershed

Waterbody Name	Miles	Designated Uses	Causes of Impairment	Original Listing	Segment Location (Downstream to Upstream)
Cahaba River Segment 1 (AL03150202-0101-102)	3.13	OAW / F&W	Siltation (habitat alteration)	1998	US Hwy 11 to I-59
Cahaba River Segment 2 (AL03150202-0104-102)	21.11	F&W	Siltation (habitat alteration)	1998	Grants Mill Road to US Hwy 11
Cahaba River Segment 3 (AL03150202-0204-102)	13.45	OAW / PWS	Siltation (habitat alteration)	1998	Dam near US Hwy 280 to Grants Mill Road
Cahaba River Segment 4 (AL03150202-0204-101)	17.46	F&W	Siltation (habitat alteration) Pathogens	1998	Buck Creek to Dam near US Hwy 280
Cahaba River Segment 5 (AL03150202-0206-102)	3.62	F&W	Siltation (habitat alteration Pathogens	1998	Shelby County Road 52 to Buck Creek
Cahaba River Segment 6 (AL03150202-0206-101)	23.61	OAW / F&W	Siltation (habitat alteration) Pathogens	1998	Shades Creek to Shelby County Road 52
Cahaba River Segment 7 (AL03150202-0407-100)	13.51	OAW / F&W	Siltation (habitat alteration)	1998	Lower Little Cahaba River to Shades Creek
Cahaba River Segment 8 (AL03150202-0503-102)	10.58	OAW / S	Siltation (habitat alteration)	1998	AL Hwy 82 to Lower Little Cahaba River

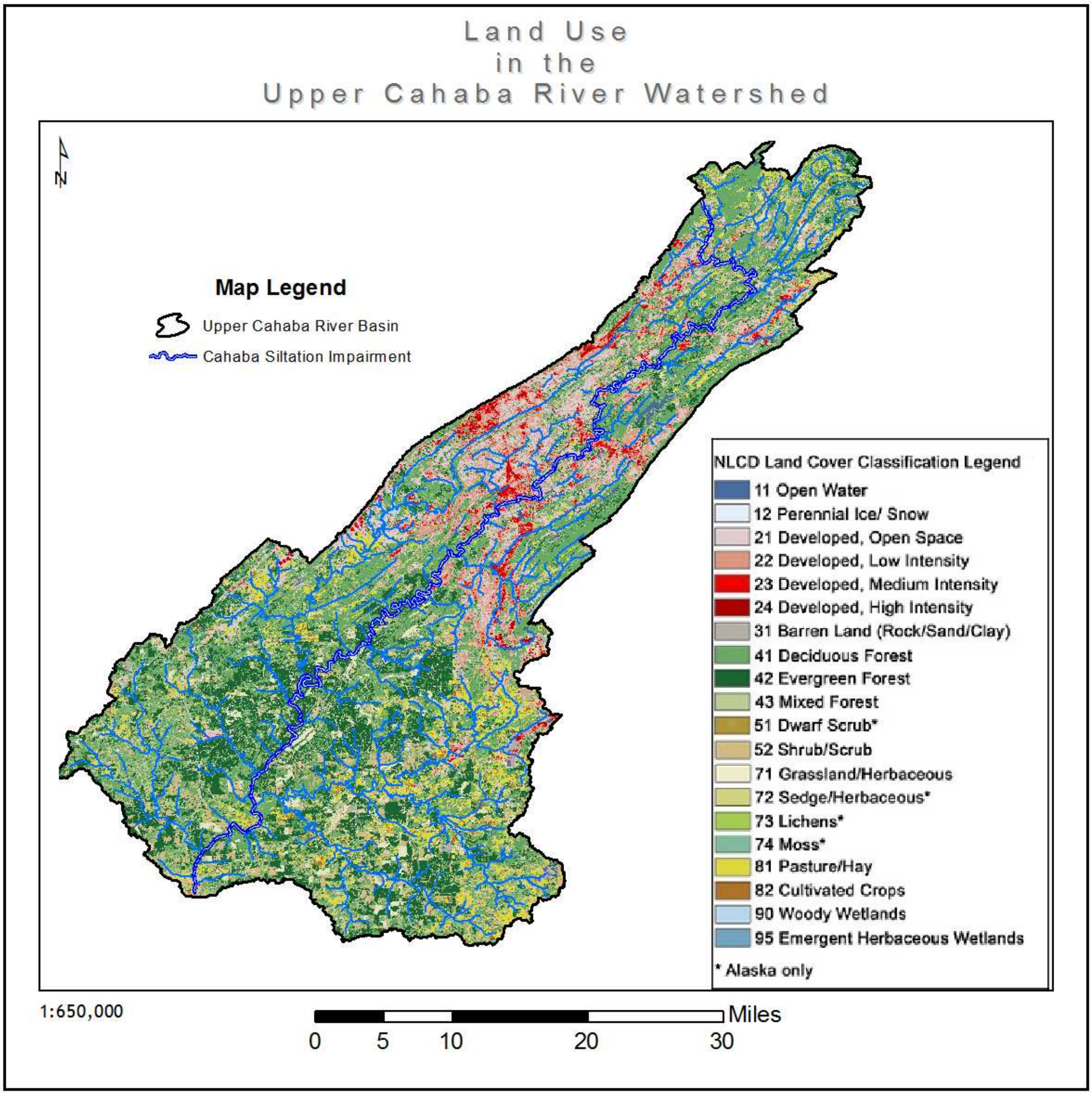
Map 2-2: §303(d) Listed Segments of the Cahaba River



2.3 Landuse Characteristics

The Cahaba River Basin is home to one of the largest residential and commercial areas in the State of Alabama. 2010 census data shows that the City of Hoover in south Jefferson County and adjacent communities in north Shelby County are some of the fastest growing areas in the state. The following land use map shows the 2006 NLCD land cover dataset for the Upper Cahaba River Watershed.

Map 2-3: Land Uses in the Upper Cahaba River Watershed



From this illustration, it is clearly evident that the developed urban areas are concentrated in the central and upper part of the sub-watershed, while the lower part is dominated by rural forested landscapes. Agricultural lands and cultivated crops are not prominent land use types in the Upper Cahaba River Watershed.

Figure 2-1: Land Uses by Percent Coverage

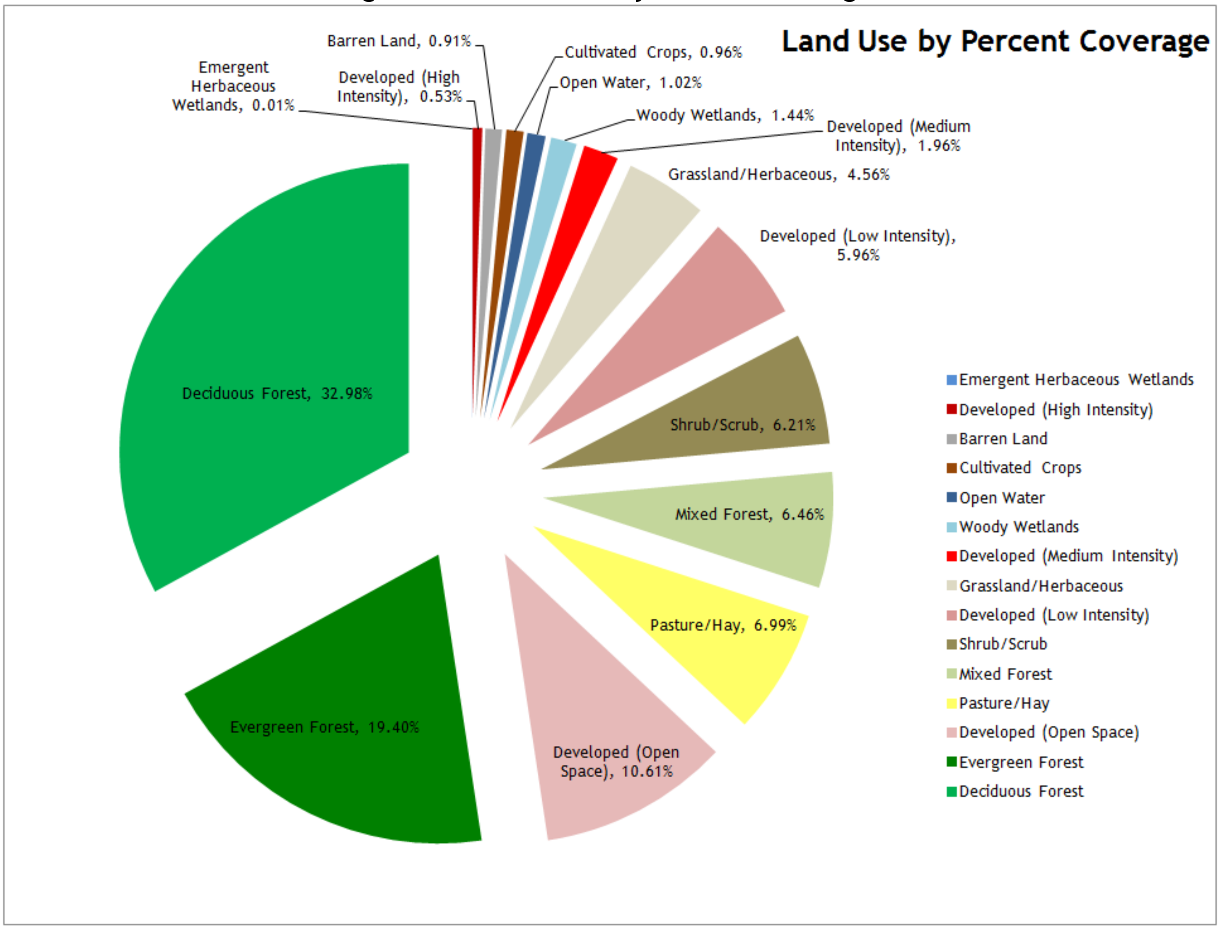


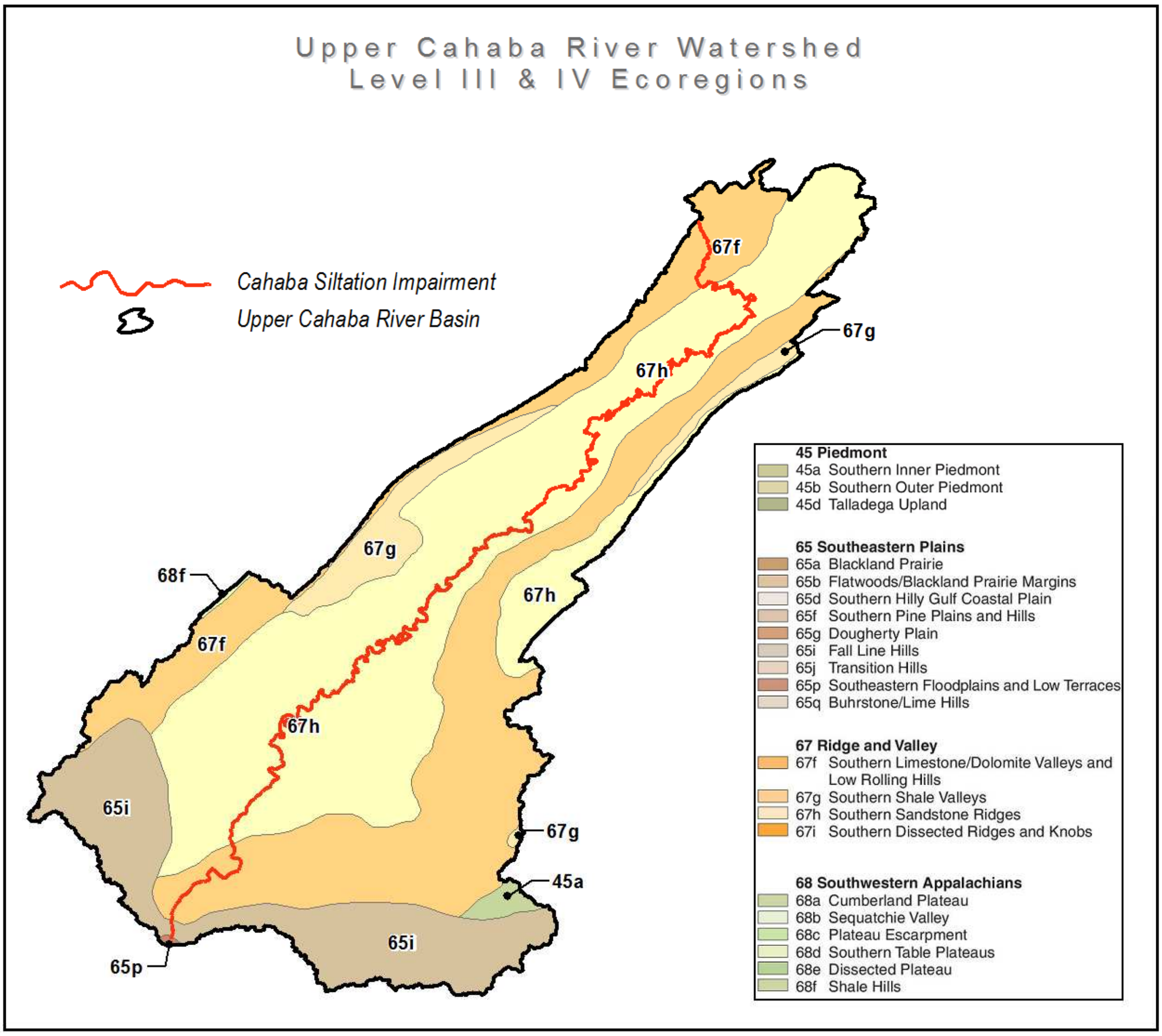
Table 2-2: Land Use Statistics

Class Description	Count (30m)	mi²	Acres	Percent
Emergent Herbaceous Wetlands	157	0.05	34.92	0.01%
Developed (High Intensity)	15590	5.42	3467.14	0.53%
Barren Land	26949	9.36	5993.32	0.91%
Cultivated Crops	28275	9.83	6288.21	0.96%
Open Water	30043	10.44	6681.41	1.02%
Woody Wetlands	42597	14.80	9473.35	1.44%
Developed (Medium Intensity)	57890	20.12	12874.44	1.96%
Grassland/Herbaceous	134695	46.81	29955.47	4.56%
Developed (Low Intensity)	176185	61.22	39182.63	5.96%
Shrub/Scrub	183525	63.77	40815.01	6.21%
Mixed Forest	190708	66.27	42412.47	6.46%
Pasture/Hay	206335	71.70	45887.83	6.99%
Developed (Open Space)	313532	108.95	69727.89	10.61%
Evergreen Forest	572943	199.09	127419.55	19.40%
Deciduous Forest	974253	338.55	216668.82	32.98%
TOTALS →	**2953677**	**1026.38**	**656882.45**	**100.00%**

2.4 Physiographic Regions & Ecoregions

The Cahaba River Basin lies within two primary physiographic regions: the Alabama Ridge and Valley Region, and the East Gulf Coastal Plain Region. The Upper Cahaba River Watershed lies almost completely within the Alabama Ridge and Valley, while the lower part of the watershed lies within the East Gulf Coastal Plain. The Ridge and Valley ecoregion is characterized by nearly parallel ridges and valleys formed by folding and faulting events. The predominant geologic materials are sandstone, limestone, shale, siltstone, chert, mudstone, dolomite, and marble. *Map 2-4* illustrates these regions.

Map 2-4: Ecoregions in the Upper Cahaba River Watershed



45a. The Southern Inner Piedmont is rolling to hilly, well-dissected upland containing mostly schist, gneiss, and granite bedrock. Mica schist and micaceous saprolite are typical.

65i. The Fall Line Hills are composed primarily of Cretaceous-age loamy and sandy sediments. It is mostly forested terrain of oak-hickory-pine on hills with 200-400 feet of relief.

65p. Southeastern Floodplains and Low Terraces comprise a riverine ecoregion of large sluggish rivers and backwaters with ponds, swamps, and oxbow lakes.

67f. The Southern Limestone/Dolomite Valleys and Low Rolling Hills form a heterogeneous region composed predominantly of limestone and cherty dolomite. Landforms are mostly undulating valleys and rounded ridges and hills, with many caves and springs.

67g. The Southern Shale Valleys consist of undulating to rolling valleys and some low, rounded hills and knobs that are dominated by shale. The soils formed in materials weathered from shale, shaly limestone, and clayey sediments, and tend to be deep, acidic, moderately well-drained, and slowly permeable.

67h. The Southern Sandstone Ridges region encompasses the major sandstone ridges, but these ridges also have areas of shale, siltstone, and conglomerate. The steep, forested ridges tend to have narrow crests, and the soils are typically stony, sandy, and of low fertility. The chemistry of streams flowing down the ridges can vary greatly depending on the geologic material.

68f. The Shale Hills ecoregion, sometimes called the Warrior Coal Field, has more shale and less sandstone than 68e. The soils generally have silt loam surfaces rather than sandy loams and have a silty clay or clayey subsoil. Although it has the lowest elevations in ecoregion 68, the surface features are characterized by extensive hills and mostly strongly sloping topography. The shale, siltstone, and sandstone are relatively impermeable, and streams do not have the base flow found in more permeable adjacent areas, such as 65i or 67f. The region is mostly forested, but coal mining is a major industry, and the extensive open-pit mines have altered the landscape, soils, and streams.

2.5 Soil Types

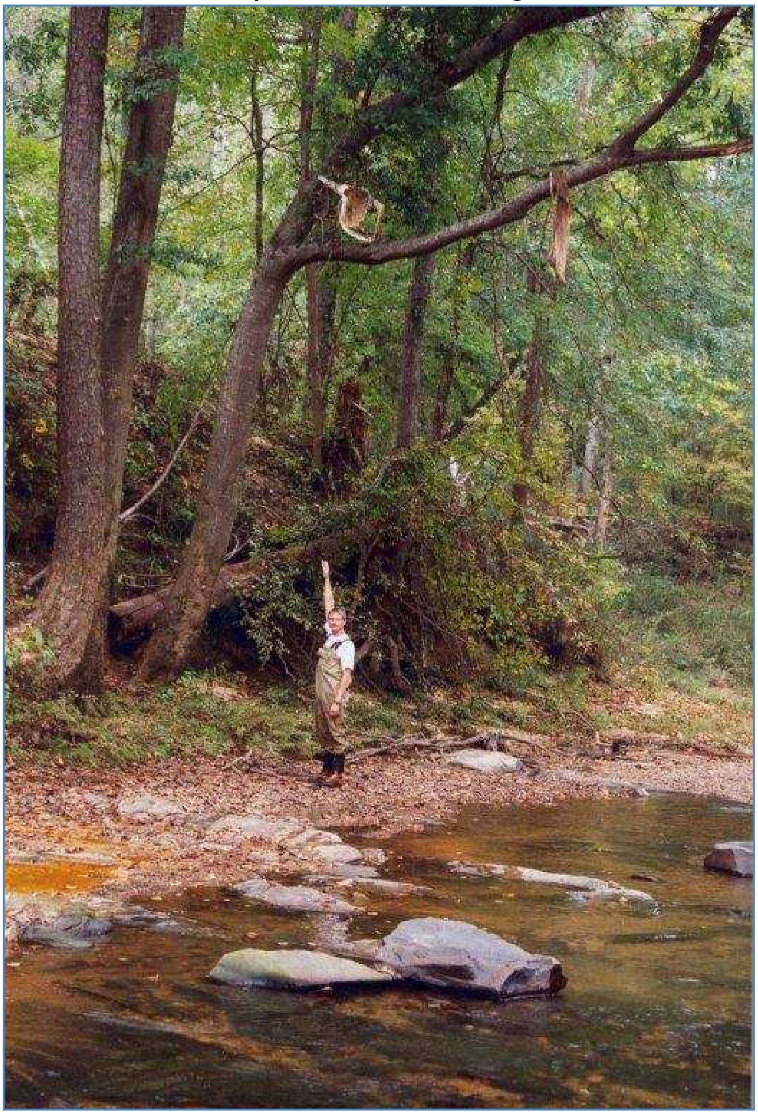
In general, the dominant soil types in the Upper Cahaba River Watershed are utilisols, which are characterized by well-developed horizons, a clay-rich B-horizon, and typically red or yellow colors due to the presence of iron. As a result of the drastic changes in geological formations and topography from the upper part of the watershed to the lower, there are five major soil provinces represented in the basin: soils of the limestone valley and uplands, soils of the Appalachian Plateau, soils of the Coastal Plain, soils of the Black Belt, and soils of the flood plains and terraces. In the Upper Cahaba River Watershed, soils of the limestone valleys and uplands are typically red clay loams, while the soils of the Appalachian Plateau are typically sandy loams.

2.6 Hydrology

The Cahaba River drains 1824 square miles and is the third largest tributary of the Alabama River in the Mobile River Basin. Over the 194 miles the river spans, elevation in the watershed varies from nearly 1100 feet above mean sea level in Shelby County to around 100 feet at the confluence of the Cahaba and Alabama Rivers in Dallas County.

Typical of many streams in Alabama, the Cahaba River displays high variability in streamflow, characterized by extreme low flows in late summer and early fall. The Cahaba River also exhibits increased peak flows and velocities due to the abundance of impervious surfaces within the upper part of the watershed, relatively low groundwater infiltration and retention rates, and large swings in streamflow due to the effluent-dominated nature of the watershed. All of these factors have the potential to exacerbate the siltation and habitat alteration issues present.

Picture 2-1: Debris Deposited in Tree during Extreme Flow Event



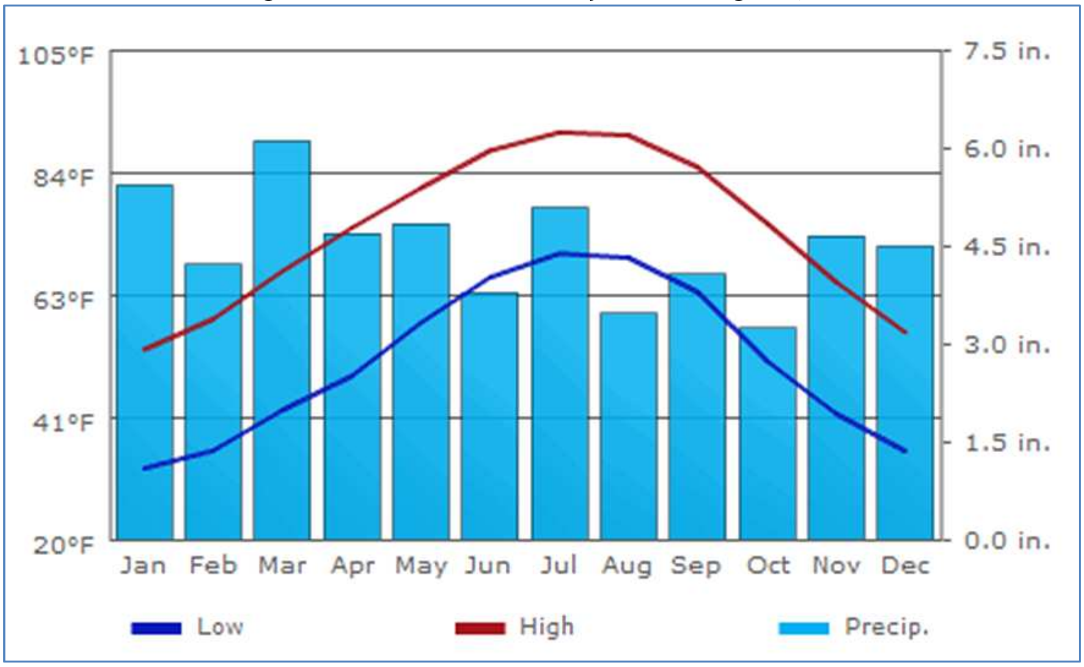
2.7 Slope and Erodibility

Due to the large changes in topography, the hydrological conditions listed above, and the amount of land disturbance present, the Upper Cahaba River Watershed is very susceptible to erosional processes which contribute to the siltation impairment.

2.8 Climate and Rainfall

The climate in central Alabama is typical of the southern temperate rainforests, which are characterized by long growing seasons, periods of intense rainfall, and generally mild temperatures. The annual average precipitation in the greater Birmingham area is around 54 inches. Rainfall is usually evenly distributed throughout the year, though the wettest month of the year tends to be March, with an average rainfall in excess of 6 inches.

Figure 2-2: Climate Summary for Birmingham, AL



(Climate Birmingham, 2012)

3.0 TMDL INTRODUCTION

3.1 Basis for §303(d) Listing Introduction

Section 303(d) of the Clean Water Act (CWA) as amended by the Water Quality Act of 1987 and USEPA's Water Quality Planning and Management Regulations *(Title 40 of the Code of Federal Regulations (CFR), Part 130*) requires states to identify waterbodies which are not meeting water quality standards applicable to their designated use classifications. The identified waters are prioritized based on severity of pollution with respect to those use classifications. TMDLs for all pollutants causing violation of applicable water quality standards are required to be determined for each identified segment. Such loads are established at levels necessary to implement the applicable water quality standards with seasonal variations and margins of safety. The TMDL process establishes the allowable loading of pollutants, or other quantifiable parameters for a waterbody, based on the relationship between pollution sources and instream water quality conditions. As a result, states can establish water-quality based controls to reduce pollution from both point and non-point sources in order to restore and maintain the quality of their water resources.

In 1996, ADEM identified one segment of the Cahaba River (Shades Creek to Buck Creek) on the 1996-§303(d) list as impaired for nutrients. In 1999, after consultation with the U.S. Fish and Wildlife Service (USFWS) and in consideration of impacts to threatened and endangered (T&E) species of mussels, snails, and fishes as required by the Endangered Species Act, the USEPA listed four segments of the mainstem Cahaba River to the 1998 303(d) List as impaired for siltation, three of which were listed for other habitat alteration and two additional segments as impaired for nutrients. In addition, ADEM added the segment from Buck Creek to Shades Creek as impaired for pathogens. The Cahaba Nutrient TMDL was completed and approved by EPA in 2006. A pathogen TMDL is scheduled to be completed in 2013. More information, including TMDL program information, Alabama's water quality standards, and the §303(d) list, can be found on ADEM's website:
http://adem.alabama.gov/programs/water/waterquality.cnt.

In 2004, ADEM restructured its assessment unit IDs in order to more precisely identify and track waterbody segments with respect to designated uses and to be consistent with new listing and reporting guidelines under Sections §303(d) and §305(b) of the Clean Water Act. As a result, the original four (4) listed segments have been broken into eight (8) segments. Though the segmentation and assessment unit IDs have changed, the use classifications of these waterbodies have remained the same as well as the corresponding water quality criteria necessary to support those uses. Once again, ***Table 2-1*** and ***Map 2-2*** show these segments, their use classifications, and the water quality parameters listed as impaired.

Table 3-1: List of Existing or Extirpated Threatened and Endangered Species in the §303(d) listed Segments of the Cahaba River (USFR, 1998) on the following page shows the threatened and endangered species cited by USFWS as being impacted in the Upper Cahaba River Watershed. In 2003, USFWS designated critical habitat in the Cahaba River extending from AL Hwy 82 at Centreville to Jefferson County Road 143 (and a few tributaries) for the southern acornshell, ovate clubshell, southern clubshell, upland combshell, triangular kidneyshell, Alabama moccasinshell, fine-lined pocketbook, and orange-nacre mucket mussels (USFWS, 2004).

Table 3-1: List of Existing or Extirpated Threatened and Endangered Species in the §303(d) listed Segments of the Cahaba River (USFR, 1998)

Listed Species	Common Name	Type	ESA Status	Found in Cahaba Basin
Lampsilis altilis	Fine-Lined Pocketbook	Mussel	Threatened	Yes
Ptychobranchus greeni	Triangular Kidneyshell	Mussel	Endangered	Yes
Lioplax cyclostomaformis	Cylindrical Lioplax	Snail	Endangered	Yes
Lepyrium showalteri	Flat Pebblesnail	Snail	Endangered	Yes
Leptoxis ampla	Round Rocksnail	Snail	Threatened	Yes
Medionidus acutissimus	Alabama Moccasinshell	Mussel	Threatened	No, Extirpated since 1973
Pleurobema decisum	Southern Clubshell	Mussel	Endangered	No, Extirpated since 1973
Epioblasma metatstiata	Upland Combshell	Mussel	Endangered	No, Extirpated since 1973
Notropis cahabae	Cahaba Shiner	Fish	Endangered	Yes
Percina aurolineata	Goldline Darter	Fish	Threatened	Yes
Lampsilis perovalis	Orange-nacre Mucket	Mussel	Threatened	Yes

3.2 Problem Definition

Even though T&E species were the primary driver for the listing in 1998, there has been an abundance of data and studies to affirm the listing decision. There have been several biological studies documenting impairment, a rapid geomorphic assessment (RGA), and a bed material study. In addition, water chemistry sampling results from Cahaba stations showed elevated turbidity and TSS levels when compared to ADEM's 2010 ecoregional reference stream guidelines. Both of these parameters are highly correlated with suspended-sediment and siltation issues.

Picture 3-1: Mid-channel Sediment Bar in the Cahaba River

3.2.1 Biology

There have been numerous biological studies performed in the Cahaba River Basin; *Table* 3-2 presents descriptions of several of these studies. Although all the studies do not agree completely, the majority of the historical and more recent data justifies the §303(d) listing and TMDL development.

Table 3-2: Biological Studies in the Upper Cahaba River Watershed

Author	Year	Study Name	Data Years
Howell, W.M. and Davenport, L.J. Samford University	2001 2002	Report on Fishes and Macroinvertebrates of the Upper Cahaba River and Three Additional Sites	2001
Geological Survey of Alabama	1994	Biomonitoring and Water Quality Studies in the Upper Cahaba River Drainage of Alabama, 1989-1994	1989-1994
Geological Survey of Alabama	1997	Water-Quality Assessment of the Lower Cahaba River Watershed, Alabama	1996
Geological Survey of Alabama	2002	A Biological Assessment of Selected Sites in the Cahaba River System, Alabama	2002
Jefferson County ESD	1999-2002	Cahaba River Water Quality Assessment Project + MOA Data	1999-2002
USEPA Region 4 SESD	2001	Cahaba and Little Cahaba Rivers: Biological and Water Quality Studies, Birmingham, AL	August 27-31, 2001
USEPA Region 4 SESD	2002	Cahaba River: Biological and Water Quality Studies, Birmingham, AL	March/April, July and September, 2002
Geological Survey of Alabama	2005	Hatchet Creek Regional Reference Watershed Study	2004
ADEM	2012	2005 Cahaba River Report (Results of Macroinvertebrate Community Assessments)	2005

Picture 3-2: Field Crew Using Seine Net in the Cahaba River

USEPA field studies during August 2001 and 2002 confirmed that all Cahaba River stations were affected by excessive sedimentation (USEPA Region 4 2001, USEPA Region 4 2003a). Habitat scores were ranked in the sub-optimal range because of a high degree of embeddedness and sediment deposition. Wolman pebble counts indicated a high percentage of fine sediments (<2 mm) as a quantitative measure of embeddedness.

Overall, the biological habitat impacts of excessive siltation are summarized as follows:

- Inhibits mussel feeding and reproduction
- Inhibits fish reproduction for certain species
- Altering of biological community structure

Historical impacts of siltation in the Cahaba are well-documented by Shepard et al. (1994), noting "many pooled areas were filled with sand and gravel, smothering whatever cobble and rocky microhabitats existed at one time." GSA reports that the section of river in closest proximity to the most highly-urbanized area featured a "poor substrate structure with few boulders and rubble, extensive silt and sand shoals, poor bank stability, and a generally uniform channel configuration." These habitat conditions corresponded to very poor to fair biological conditions. Conclusions were that "habitat degradation originated from excessive sedimentation due to residential, commercial, and road construction activities" and from siltation (embeddedness and bed load) from urbanized land areas, nutrients/eutrophication from nonpoint sources and municipal wastewater (O'Neil 2002, USEPA Region 4, 2003a).

The most recent USEPA field assessment report (USEPA Region 4, 2003a) describes how their field observations corroborate the theory of Lenat et al. (1979) that "greater sediment amounts that drastically change substrate type (i.e. from cobble-gravel to sand-silt) will change the number and type of taxa, thus altering community structure and species diversity." As siltation smothers the natural substrate, more sensitive macroinvertebrate taxa such as *ephemeroptera*, *plecoptera*, and *trichoptera* (EPT) that are potential "fish-food organisms" are displaced by burrowing species such as chironomid larvae (Erman and Erman, 1984).

Hartfield (2002) describes how the life cycle of the threatened and endangered mussels requires a host fish for mussel glochidia (larva) to parasitize prior to the juvenile phase. Thus, in addition to being smothered or buried by excessive sedimentation, mussel decline in the Cahaba Basin is linked to the survival of fish species, though which species may serve as host is unknown.

The comprehensive 2005 *Hatchet Creek Regional Reference Watershed Study* provided to ADEM by GSA presents compelling evidence of the suitability of Hatchet Creek as a regional reference watershed for large flowing river systems in upland regions of Alabama. Land disturbance within the Hatchet Creek Watershed is limited, along with urban disturbance. In addition, the highly forested areas and healthy stream system lend well to production of biotic communities. This study asserts that Hatchet Creek is indeed a suitable reference stream for the Cahaba River and goes on to say that both Hatchet Creek and the Cahaba River function in similar fashion with respect to hydrology at all ends of the flow spectrum. Habitat assessments of streams in the Hatchet Creek Watershed were generally in the optimal to sub-optimal range with low percentages of embeddedness and sediment deposition. When comparing these reference sites in the Hatchet Creek Watershed with selected sites in the Cahaba River Watershed, the Cahaba sites scored notably lower with respect to current biological conditions. Though species richness was nearly identical between the two systems, a lower abundance of specific species strongly indicates that biological condition is impaired in the Cahaba River and is ambient ("normal") in Hatchet Creek. Index of biotic integrity (IBI) scores for Hatchet Creek were in the *good* biological condition range, whereas only one Cahaba site scored in this range. The other Cahaba sites scored *fair* (O'neil & Shepard, 2005).

Following the 2004-2005 comparison of Hatchet Creek and the Cahaba River, additional intensive studies were performed by ADEM on the Cahaba mainstem to further assess the condition of macroinvertebrate communities. This study again confirmed that macroinvertebrate communities in the Cahaba River have consistently lower ratings when compared to reference streams. For instance, the additional Hatchet Creek macroinvertebrate assessments resulted in *excellent* ratings for most sites, while only two Cahaba sites received a *fair* rating and the remaining received *poor* or *very poor*. Likewise, EPT taxa richness metrics, or the number of Ephemeroptera (mayfly), Plecoptera (stonefly), and Trichopera (caddisfly), showed that the Cahaba sites displayed consistently lower numbers of Trichoptera than the reference streams and that the Plecopteran taxa were completely absent from all Cahaba River stations sampled. Following are illustrations highlighting results of the Biological Condition Scoring Criteria (BCSC) and EPT taxa richness metrics:

Figure 3-1: BCSC Comparison (ADEM, 2012)
(Results shown upstream to downstream with Hatchet on left & Cahaba on the right)

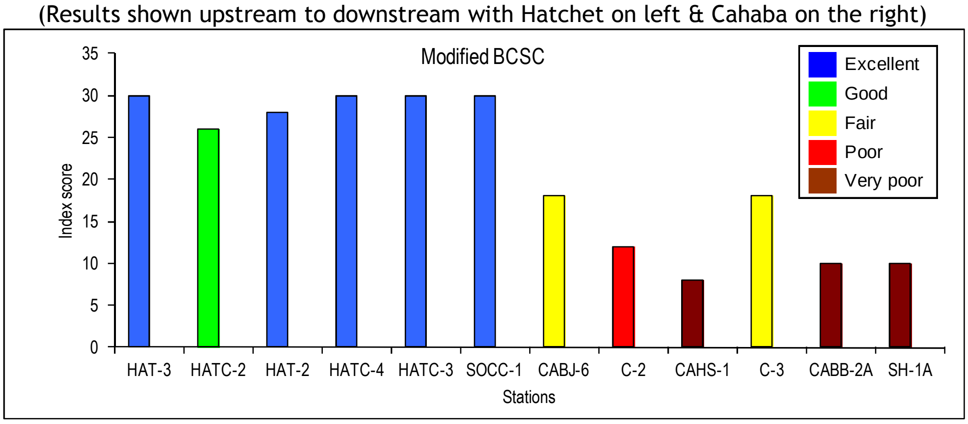
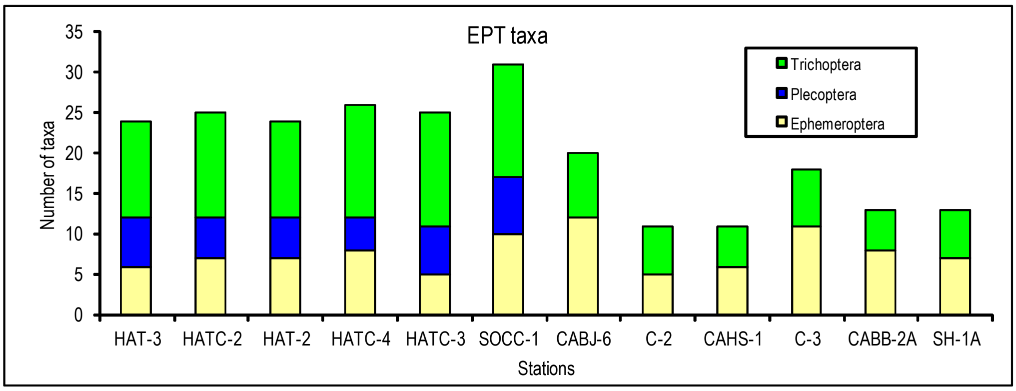


Figure 3-2: EPT Taxa Comparison (ADEM, 2012)



In conclusion, this most recent report states “The Cahaba River is listed as impaired by sedimentation (with respect to macroinvertebrate communities) due to indirect effects of attached filamentous algae and excessive bed load sedimentation covering stream substrates and filling the interstitial spaces critical for reproduction and feeding”(ADEM, 2012).

3.2.2 Morphology

In order to assess stream stability characteristics in the Cahaba River watershed, rapid geomorphic assessments (RGAs) were performed on the Cahaba River by Tetra Tech and Mississippi State University (Dr. William McAnally) with assistance by the National Sediment Laboratory. An RGA is a semi-quantitative assessment described by Simon et al. (2002) as a technique to utilize diagnostic criteria of channel form to infer dominant channel processes and the magnitude of channel instabilities. Granted that evaluations of this sort do not include an evaluation of watershed or upland conditions, however, stream channels act as conduits for energy, flow and materials as they move through the watershed and will reflect a balance or imbalance in the delivery of flow and sediment.

Picture 3-3: Example of an Unstable Bank on the Cahaba River

As such, unstable channels with failing streambanks are inherently a chronic source of sediment loading. When developing siltation TMDLs, it is necessary to determine if the majority of sediment in the stream is from land-based sources or evolving stream channels themselves. The RGA is a semi-quantitative tool that is useful for determining where in the Cahaba River watershed the dynamics of perturbed stream channel equilibrium and channel evolution dominate the total sediment loading to the Cahaba River.

The RGA employs a standard form in which each of the following criteria are evaluated and assigned a score:

- Primary bed material
- Bed/bank protection
- Degree of incision
- Degree of constriction
- Streambank erosion
- Streambank instability
- Established riparian vegetative cover
- Occurrence of bank accretion
- Stage of channel evolution

Figure 3-3: Five Stages of Channel Evolution (Schumm, 1977 & 1984)

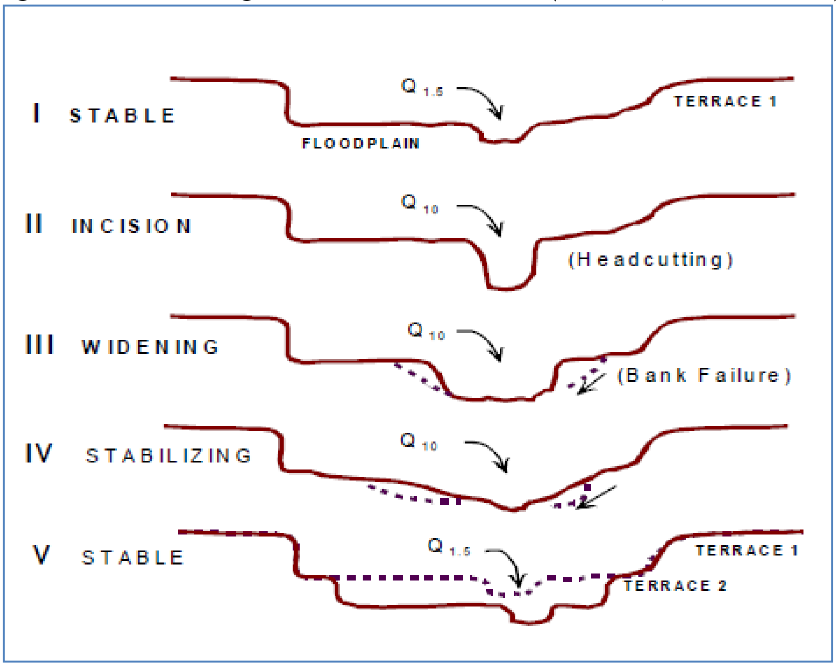


Figure 13-1 in the appendix shows this form and gives a brief description of each criterion. Points are assigned for each of the nine criteria and their sum – the channel stability index – indicates the degree of stability/instability. Indices less than 10 indicate a relatively stable reach and values above 20 indicate significant instability.

RGAs were performed at each of 29 sites on the Cahaba River and its tributaries during September 2003. *Map 3-1* depicts the RGA sites sampled and are also listed in *Table 3-3*. The analysis identified five sites as unstable, eleven sites as marginally stable, and thirteen as stable. In the Cahaba Basin, based on best professional judgment and field assessment, scores of less than 13.5 were determined to be comparatively stable, and scores between 13.5 and 20 are here considered as marginally stable.

Map 3-1: Rapid Geomorphic Assessment (RGA) Sites in the Cahaba River Watershed

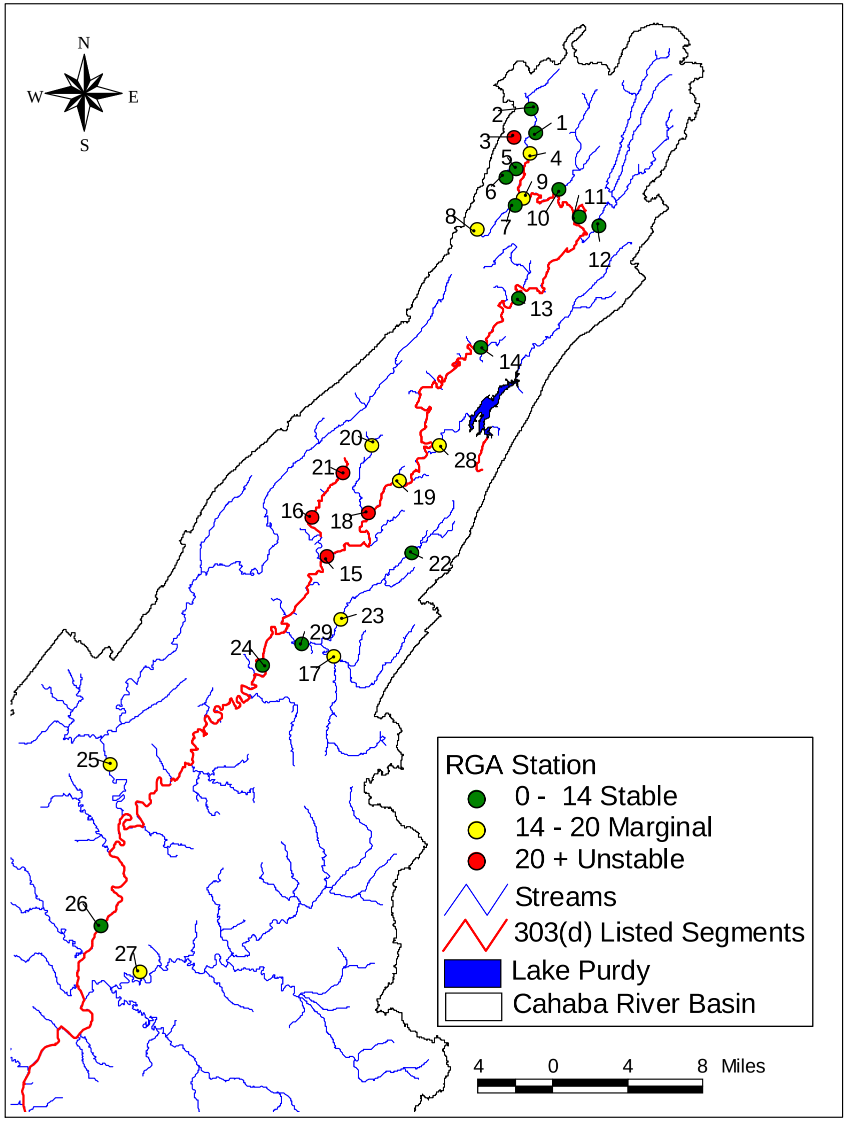


Table 3-3: RGA Sites in the Cahaba River Watershed

Station	Station Location
1	Cahaba R. @ Deerfoot Parkway
2	Cahaba R. next to Camp Rd off Deerfoot Pkwy
3	Unnamed Trib @ Cooper and Memory
4	Cahaba R @ HT Junior High, Trussville
5	Dry Creek off Green Rd
6	Dry Creek @ Chalkville Rd
7	Pinchgut Cr off Hwy 11 @ Roper
8	Pinchgut Cr off Hwy 11 @ Morris Spring
9	Cahaba R @ US Hwy 11 (USGS 02423130)
10	Little Cahaba Cr. @ Camp Coleman Road
11	Cahaba R. @ Roper Rd
12	Big Black Cr @ M. A. Lee
13	Cahaba R @ US Hwy 78
14	Cahaba R @ Grants Mill Rd
15	Cahaba R @ Bain's Bridge (USGS 02423500)
16	Patton Cr @ HW 150
17	Buck Cr @ Shelby County Rd 52
18	Little Shades Cr @ Old Rocky Ridge Rd
19	Cahaba @ Caldwell Mill Rd (USGS 02423425)
20	Little Shades Cr @ Sagewood Trace
21	Patton Cr @ Montgomery Hwy & Badham Dr.
22	Cahaba Valley Cr @ Hwy 119
23	Cahaba Valley Cr @ Cross Creek Rd
24	Cahaba R @ Shelby Co 52 (USGS 02423555)
25	Shades Cr @ Bibb Co 13
26	Cahaba R @ Bibb Co 24
27	Little Cahaba R @ Bibb Co 65
28	Little Cahaba R @ Cahaba Beach Lane
29	Buck Cr @ Hwy 261

In general, sites in the top and bottom of the Upper Cahaba River have stable banks compared to sites at Bain's Bridge (15), Little Shades Creek (18), and Patton Creek (16 and 21). This is an indication that chronic effects of unstable banks (as a result of elevated total volume runoff) is not the main source of impairment in the top of the watershed. Studies referenced in this report will document that the top of the watershed is impaired more as a result of acute pulses of sediment most likely from construction activities. Assessments were made in September 2003 after a wet spring and 100-year flood that occurred in May 2003. Although upper watershed streambanks were determined to be largely stable, significant hydraulic scour was observed in the vicinity of bridges, presumably exacerbated by the flood. *Table 3-4* summarizes the RGA results.

Table 3-4: Rapid Geomorphic Assessment (RGA) Stability Indices

Station*	Bed Material	Bed/Bank Protection	Incision	Constriction	Streambank Erosion		Streambank Instability		Vegetative Cover		Bank Accretion		Channel Evolution		Total Score	Evaluation
					L	R	L	R	L	R	L	R	Stage	Points		
1	1	1	3	1	0	0	0	0	1	1	1.5	1.5	VI	1.5	12.5	Stable
2	0	1	3	1	1	1	0	0	1	1	0.5	1	VI	1.5	12	Stable
3	1	1	4	2	1	2	1	1.5	1.5	1.5	1	0.5	III	2	20	Unstable
4	1	1	3	2	2	0	2	0.5	1	0.5	1	0	V	3	17	Marginal
5	1	0	2	1	0	1	0	0.5	0.5	0	0.5	0.5	II	1	8	Stable
6	1	0	2	0	0	0	0	0	2	2	1	1	II	1	10	Stable
7	1	1	3	1	0	1	0	0.5	0	0.5	1	1	VI	1.5	11.5	Stable
8	1	1	3	2	0	1	0.5	1	1	1.5	1.5	0.5	III	2	16	Marginal
9	3	0	4	1	1	0	0.5	0	0.5	0.5	1	1	IV	4	16.5	Marginal
10	0	1	4	0	0	1	0	0	0	0.5	1	0.5	I	0	8	Stable
11	1	1	4	0	0	1	0	0	0.5	0.5	2	2	I	0	12	Stable
12	1	1	3	0	1	1	0.5	0.5	1	1	2	1	I	0	13	Stable
13	4	1	2	0	1	0	0	0	1	0.5	2	2	I	0	13.5	Marginal
14	0	1	3	0	0	0	0	0	2	2	2	2	I	0	12	Stable
15	4	1	2	1	2	2	1.5	1.5	1.5	1.5	2	2	IV	4	26	Unstable
16	4	1	4	2	2	2	1.5	1.5	1.5	1.5	1.5	1.5	IV	4	28	Unstable
17	4	1	1	0	1	1	0.5	0.5	0.5	0.5	2	2	VI	1.5	15.5	Marginal
18	4	1	4	2	2	2	1.5	1.5	1.5	2	1	1	V	3	26.5	Unstable
19	3	1	4	1	1	1	0	0	1.5	1.5	1.5	0.5	V	3	19	Marginal
20	1	1	3	2	2	1	1.5	0	2	0.5	0.5	2	V	3	19.5	Marginal
21	1	1	4	0	2	2	1.5	1.5	2	2	1.5	1	V	3	22.5	Unstable
22	1	1	1	1	1	1	0.5	0.5	0.5	0.5	1.5	1.5	III	2	13	Stable
23	4	0	1	1	0	1	0	0.5	0.5	1	2	2	II	1	14	Marginal
24	4	1	1	1	0	0	0.5	0.5	0.5	0.5	1	1	I	0	11	Stable
25	2	1	3	1	1	1	0.5	0.5	0.5	1	1	2	I	0	14.5	Marginal
26	4	1	1	1	0	0	0.5	0.5	0.5	0.5	2	2	I	0	13	Stable
27	4	1	2	1	1	1	1	0.5	1	1	2	2	I	0	17.5	Marginal
28	1	1	4	1	1	0	1	0.5	1	1.5	1.5	0.5	VI	1.5	15.5	Marginal
29	3	1	3	0	1	0	0	0	0.5	0.5	1	0.5	VI	1.5	12	Stable

In addition to the RGAs, the comparative analysis in the 2005 Hatchet Creek study also illustrated the Cahaba's suseptability to erosional processes as well as its current impairment for siltation and habitat alteration. Compared to reference sites, the Cahaba sites exhibited a higher degree of embeddedness, marginal to poor bank condition/stability, and higher sediment deposition rates. The study goes on to state that about 50% of the sample reaches displayed intense bank scouring and that the effluent-dominated urban hydrology and sedimentation were adversly impacting these sites (O'neil & Shepard, 2005).

3.2.3 Bed Material

According to the Simon et al, 2004 report with regards to bed material in the Ridge and Valley Region and the Cahaba River Basin:

> *Using the same concept for bed material as was used for suspended sediment, sites from the Ridge and Valley (Ecoregion 67) were sorted into stable and unstable sites to determine a reference bed-material composition for coarse-grained reaches. Coarse-grained reaches are singled out because streams designated as impaired due to siltation impact spawning habitats and other biologic life functions by clogging interstitial spaces in gravel-cobble beds. Because a reasonably large number of stable sites were also located on Shades Creek, reference conditions developed for the Ridge and Valley can be directly compared to reference conditions along Shades Creek itself.*
>
> *A reference bed-material composition, therefore, is based on a measure of embeddedness; the percentage of materials finer than 2 mm (sand, silt and clay) in gravel or gravel/cobble-dominated streambeds. This applies then to 53 of the sites evaluated along Shades Creek. An implicit assumption in this technique is that the bi-modal particle-size distributions indicative of embeddedness are representative of the entire streambed and not characterizing coarse materials in one location on the bed and the fines in another. Bed-material data from both the Ridge and Valley and Shades Creek were filtered to include only those sites that are dominated by coarse-grained sediment (more than 50% of the streambed composed of materials coarser than 2 mm). Further sorting of the data into stable and unstable sites provided a means of comparing the degree of embeddedness in coarse-grained stream reaches. A reference value of 4%, based on the median percentage of streambed material finer than 2 mm, was determined for not only the Ridge and Valley but for Shades Creek as well.*

According to Ecoregion 67 reference site data cited by USEPA (USEPA Region 4 2003a), Ridge and Valley reference streams exhibit percent embeddedness in the range of 9 to 19 % with a mean of 11 % sand, silt and clay (<2 mm). Furthermore, according to the Simon et al, 2004 report the median value of the third quartile of reference streams in the Ridge and Valley is 16.6 % sand, silt and clay (<2mm). Findings at the most upstream Cahaba River site CR-1 at Goodner Mountain Road, near the most upstream extent of the §303(d)-listed segment, had 13.89 % fines (< 2 mm) and the best habitat scores of Cahaba River sites. Generally, evidence supports that low embeddedness levels of reference sites, corresponding to the approximate range of 11 to 16.6 % fines (< 2 mm) should be protective of reference conditions in gravel/cobble-dominated streambeds such as the Cahaba River. Sites whose embeddedness is significantly greater than this range may not be conducive to sensitive species.

The USEPA field personnel measured the particle size distributions (Wolman pebble counts) for bed-material on the Cahaba River in 2002. ***Table 3-5*** presents the percentage of bed-material finer than 2 mm (sand, silt and clay) collected at various stations on the Cahaba River and in its tributaries.

This study provides valuable insight into the discussion of sediment impairment caused by chronic loading versus acute loading. The RGA study referenced here is primarily a study of the stream structure and identifies chronic loading impacts as a result of total volume runoff. The RGA indicated that the top of the Upper Watershed around Trussville has stable banks. The Wolman USEPA study of bed material does not identify the source of sediment loading, but simply indicates impairment. Therefore, in a situation where a stream has a stable score for RGA and a negative score for bed material, it is a clear that the impairment is due to acute loadings.

Picture 3-4: Substrate in Riffle-Run of the Cahaba River

Table 3-5: Percentage of Bed Material Finer than 2 mm at Cahaba River Sites

Station	Date	Station Name	Water Surface Slope	Median Particle Size (D50) in mm	% Sands, Silts, & Clays (Particles < 2mm)
CR-1	9/11/2002	Cahaba River at CR 132	0.25%	20	13.89
CR-AT	9/11/2002	Cahaba River at US 11/SR 7	0.13%	15	29.73
CR-BT	9/11/2002	Cahaba River at CR 10 (Roper Rd)	0.24%	12	39.64
CR-AH	9/10/2002	Cahaba River at CR 29	0.07%	20	37.76
CR-BH	9/12/2002	Cahaba River off Old Rocky Ridge Rd; Riverford Dr.	0.01%	1	58.96
CR-6	9/9/2002	Cahaba River at Bains Bridge	0.02%	4	40.48
CR-7	9/10/2002	Cahaba River at CR 52	0.28%	2	50.00
SC-1	9/10/2002	Shades Creek at CR 12	0.27%	37	24.81

Map 3-2: Locations Sampled for Wolman pebble counts (USEPA R4, 2003a)

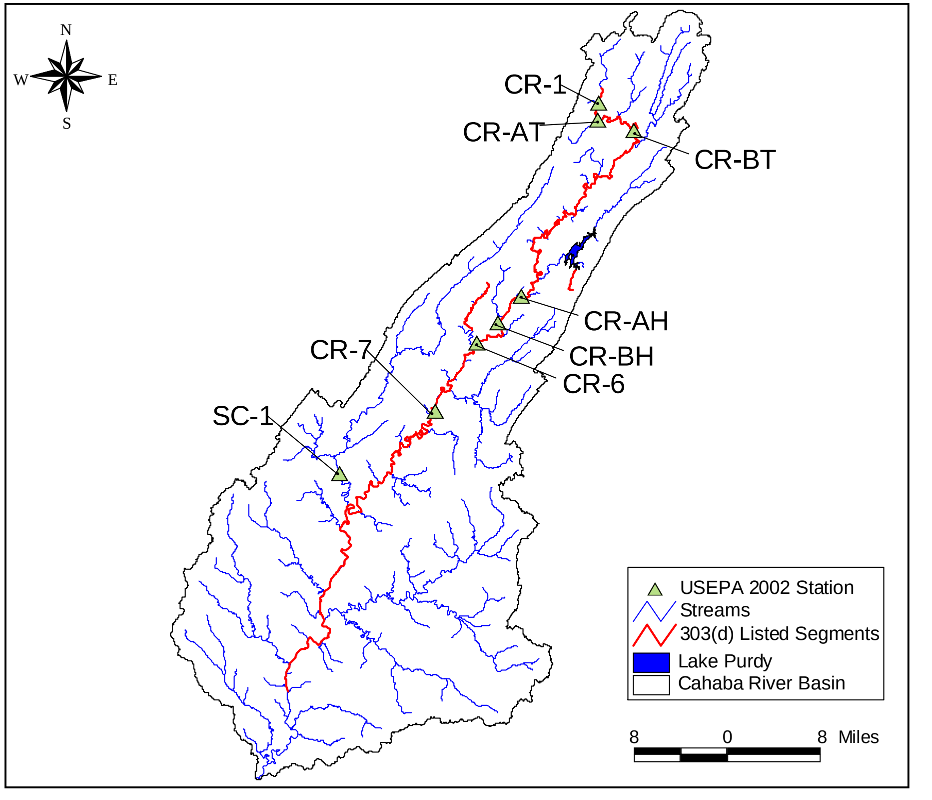


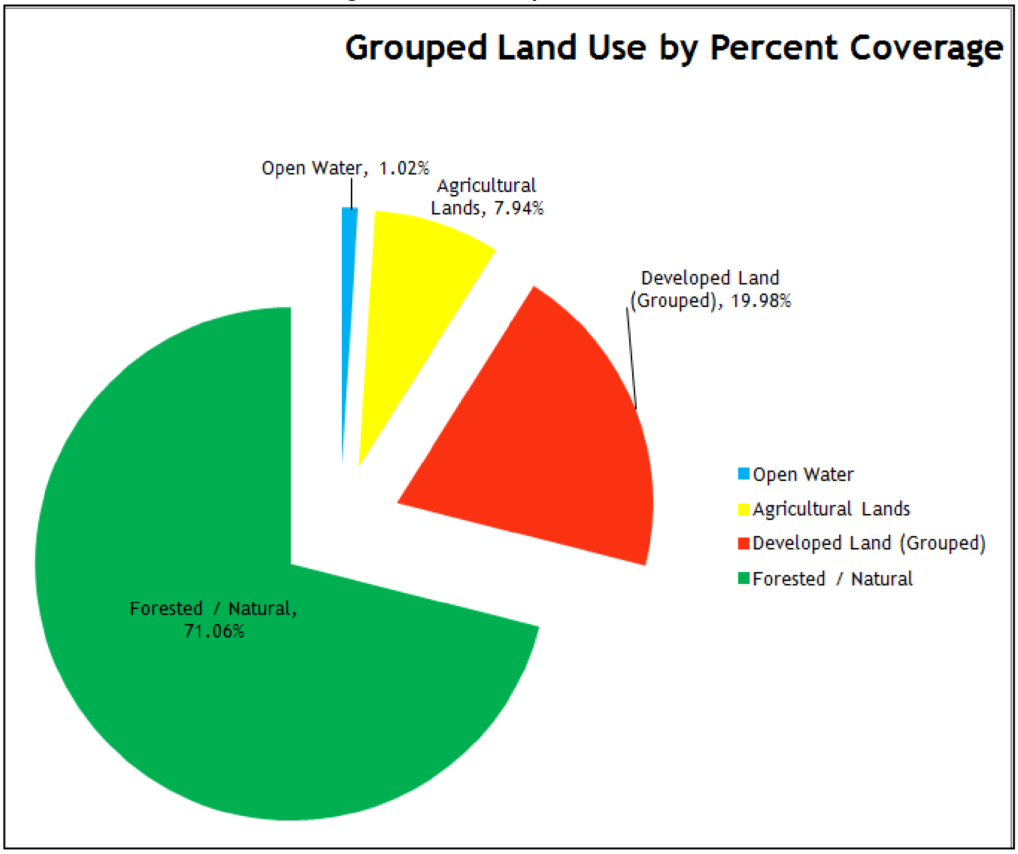
Table 3-6: Reference percent fines sands, silts, & clays (<2mm)

Station	Station Name	Water Surface Slope	Measured Percent Sands, Silts, & Clays (< 2mm)	Reference Percent Sands, Silts, & Clays (< 2mm)
CR-1	Cahaba River at CR 132 (Cahaba Reference Site)	0.25%	13.89	11-16.6
CR-AT	Cahaba River at US 11/SR 7	0.13%	29.73	11-16.6
CR-BT	Cahaba River at CR 10 (Roper Rd)	0.24%	39.64	11-16.6
CR-AH	Cahaba River at CR 29	0.07%	37.76	11-16.6
CR-BH	Cahaba River off Old Rocky Ridge Rd; Riverford Dr.	0.01%	58.96	11-16.6
CR-6	Cahaba River at Bains Bridge	0.02%	40.48	11-16.6
CR-7	Cahaba River at CR 52	0.28%	50.00	11-16.6
SC-1	Shades Creek at CR 12	0.27%	24.81	11-16.6

3.2.4 Urbanization and Land Use Change

Land Use in the Upper Cahaba River Watershed was discussed earlier. For this TMDL analysis, it is important to look at specific land uses that affect siltation and habitat alteration the greatest. After grouping the individual land uses, about 20% of the Upper Cahaba River Watershed is considered developed land (including barren land and active/abandoned mining operations), the vast majority of which is intensely concentrated in the upper portion of the watershed near the Cities of Birmingham and Hoover.

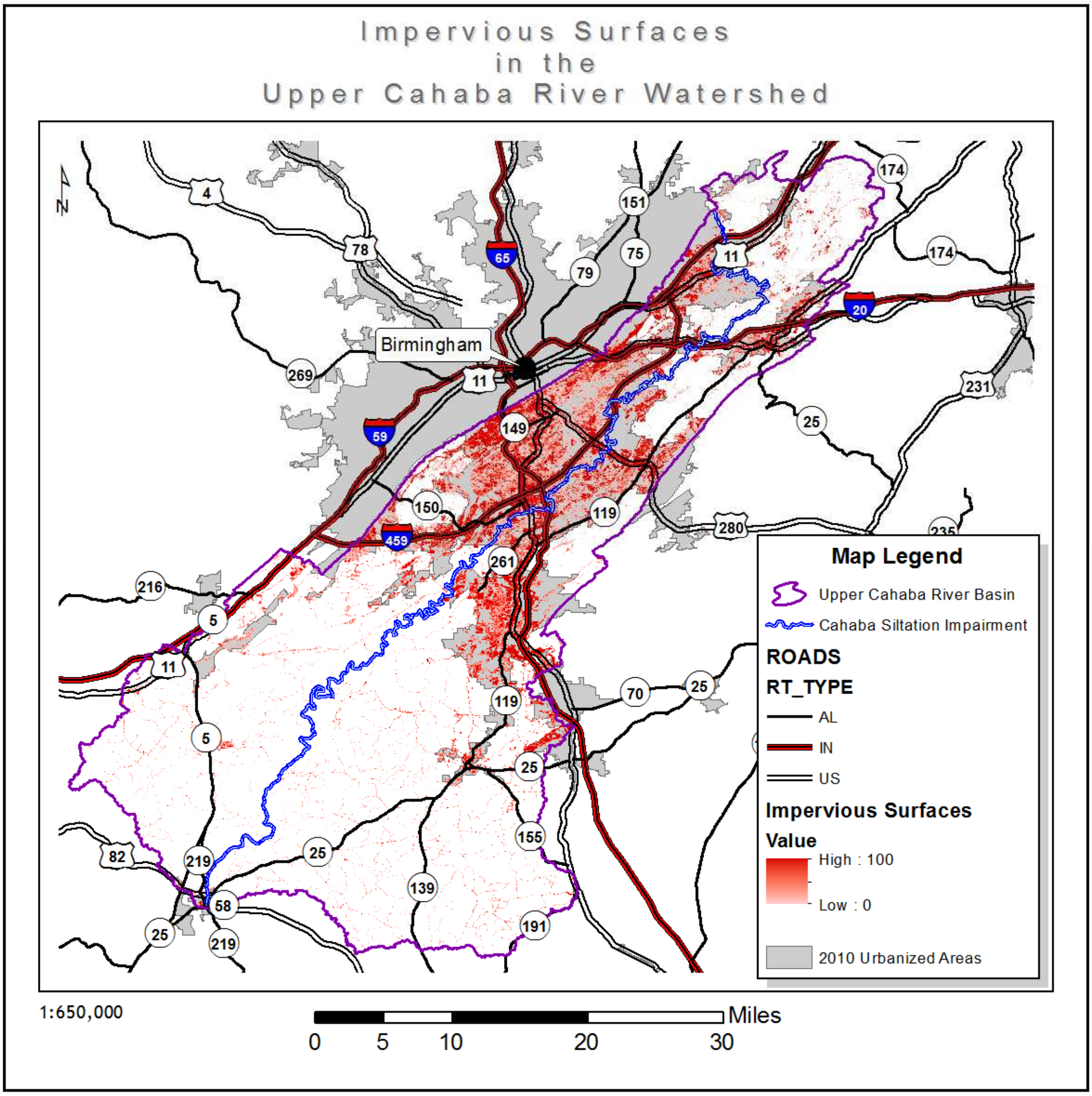
Figure 3-4: Grouped Landuses



By focusing on these developed lands as source of urban runoff and increased stream velocities and peak flow during storm events, we can gather a better idea of areas in the watershed that have the highest potential for these factors to adversely affect water quality and habitat health.

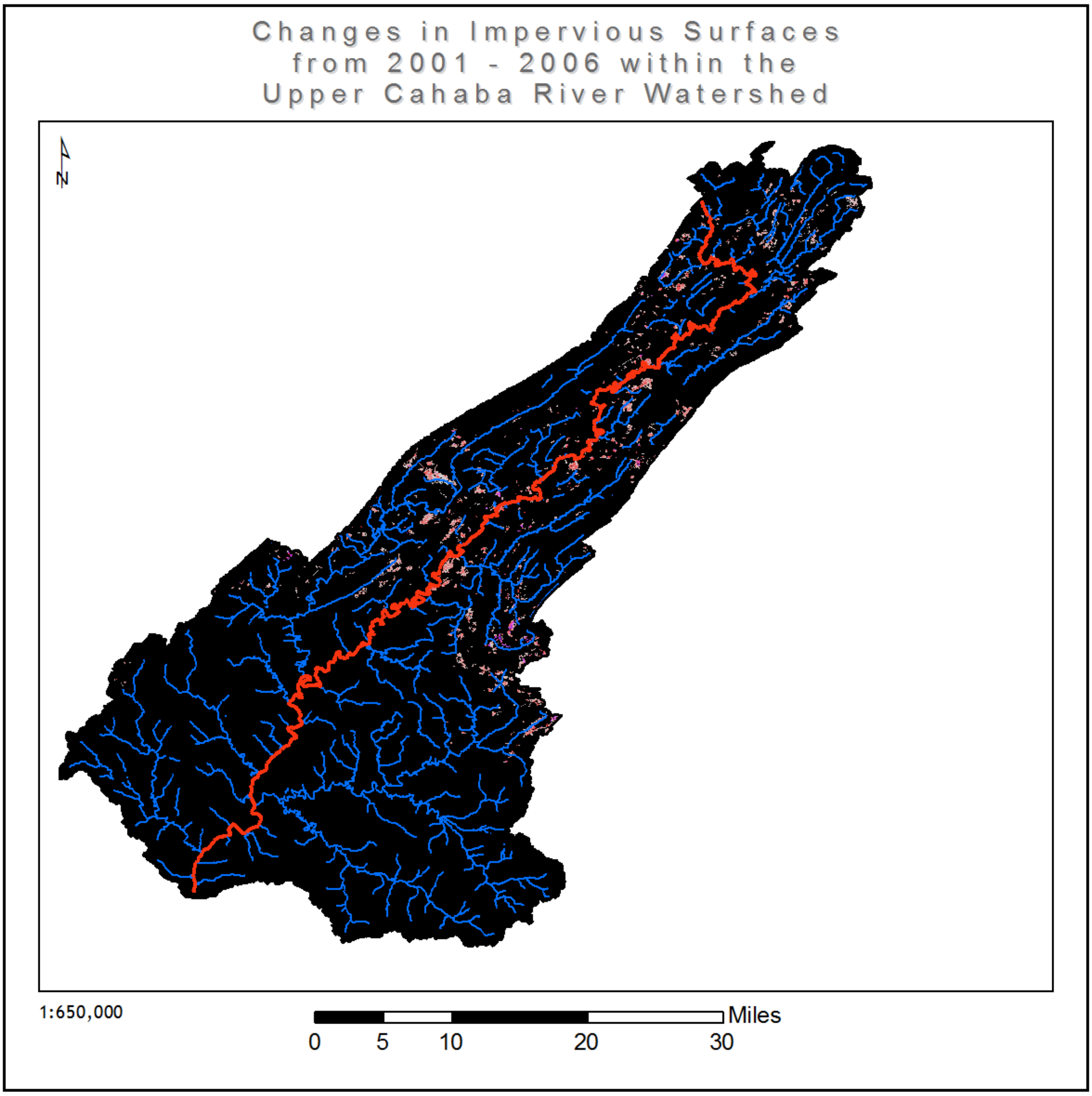
The following map, *Map 3-3*, depicts one of the main issues created by intensely developed lands - impervious surfaces. By reducing infiltration rates, increasing overall volume of stormwater, and lessening the total amount of retention areas, impervious surfaces play a large role in the hydrology of this urban watershed.

Map 3-3: Impervious Surfaces in the Upper Cahaba River Watershed



Finally, *Map 3-4* shows the increase in impervious surfaces over a relatively short 5-year period (2001 to 2006). Areas in black represent areas with no increase in impervious surfaces, while changed areas shaded in red based on the degree of imperviousness of the development. This shows that the changes in the Upper Cahaba Watershed have been almost completely residential and commercial development and are relatively concentrated in the upper part of the watershed. This figure is an indication that urbanization of the Cahaba River Watershed is certainly increasing over time and thus is considered one of the primary causes of habitat loss due to excess sediment and instream erosion.

Map 3-4: Increase in Impervious Surfaces (2001 - 2006)



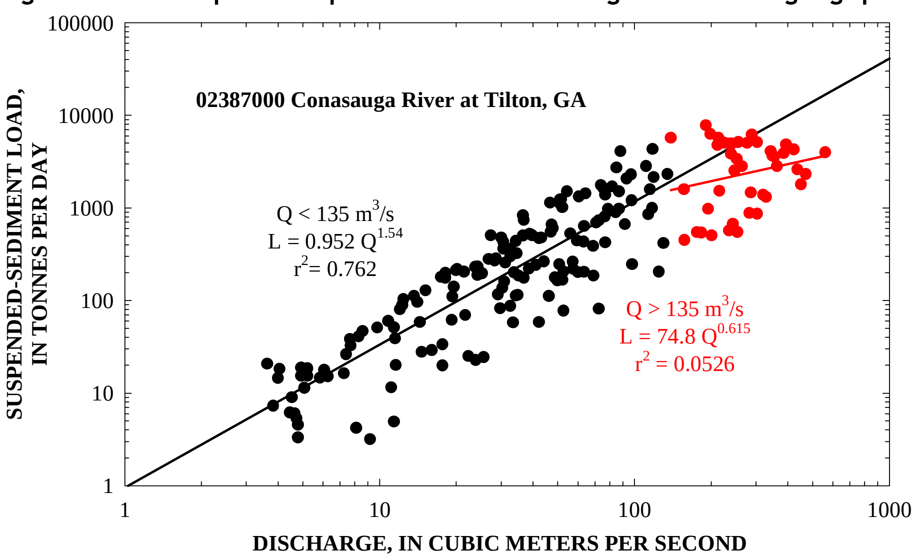
4.0 BASIS FOR TMDL DEVELOPMENT

4.1 Water Quality Target Identification

As stated previously, Alabama's water quality criteria do not include numeric water quality criteria for aquatic life protection due to sediment. Therefore, it is necessary to develop numeric targets based upon narrative criteria. In this TMDL report, numeric targets were established through the use of reference streams with a high-quality set of historical flow and suspended-sediment data available for each site. Reference stream sites were selected based on a set of criteria which indicated that the channels were not generating, transporting, or accumulating an excess of sediment. Historical suspended-sediment concentrations and streamflow from long-term USGS data were analyzed by personnel of the Channel and Watershed Process Research Unit (CWP) of the U.S. Department of Agriculture (USDA), Agricultural Research Service, and National Sedimentation Laboratory (ARS-NSL) on behalf of USEPA Region 4 to determine applicable suspended-sediment reference conditions and characteristic sediment yields for streams within the Ridge and Valley ecoregion streams. In the winter and spring of 2003 an extensive field study was conducted by the ARS-NSL to assess streambank stability, geotechnical characteristics of bank and bed materials, and the physical processes governing the sediment loads occurring in Shades Creek, a major tributary of the Cahaba River. Description of the siltation target identification and reference stream approach is as follows (Simon et al, 2004):

> *A suspended-sediment transport rating is developed (Porterfield, 1972; Glysson, 1987; Simon, 1989a) by plotting discharge versus concentration in log-log space and obtaining a power function by regression. Trends of these data (in log-log space) often increase linearly and then break off and increase more slowly at high discharges. A transport rating developed with a single power function commonly over-estimate concentrations at high flow rates, leading to errors in calculating the effective discharge. To alleviate this problem, a second or third linear (in log-log space) segment is sometimes developed with the upper end of data set (Figure 3-1). The division point between these data ranges was identified by eye, and a manual iterative procedure was carried out to ensure the division point was optimal. This procedure was followed for each of the 74 sites in the Ridge and Valley.*

Figure 4-1: Example of suspended-sediment rating relation in log-log space



Because the "effective discharge" is that discharge or range of discharges that shape channels and perform the most geomorphic work (transport the most sediment) over the long term it can serve as a useful indicator of regional suspended-sediment transport conditions for "reference" and impacted sites. In many parts of the United States, the effective discharge is approximately equal to the peak flow that occurs on average, about every 1.5 years (Q1.5; for example, Andrews, 1980; Andrews and Nankervis, 1995) and may be analogous to the bank full discharge in stable streams. The recurrence interval of the effective discharge calculated for 10 streams in Mississippi was about 1.5 years (Simon et al., 2002). For 17 ecoregions across the United States, the recurrence interval of the effective discharge ranged from 1.1 years to 2.3 years (Simon et al., 2003). The value for the Ridge and Valley was 1.1 years. Still, for consistency of analysis between ecoregions, the Q1.5 was used as a measure of establishing the effective discharge at the remaining study sites in the Ridge and Valley.

The suspended-sediment load at the Q1.5 was then obtained by using the transport rating developed for the site and by solving for the discharge of the Q1.5. For sites in Ecoregion 67 with peak flow and sediment-transport data, sediment load at the effective discharge was obtained directly from the rating relation. To normalize the data for watersheds of different size, the sediment load is divided by drainage area to obtain sediment yield (in T/d/km2). All rating relations are checked to be sure that the Q1.5 was within the measured bounds of the data set. If the Q1.5 is more than 100% greater than the maximum sampled discharge, the calculated sediment yield is not included in the data set. This was the case for six of the 74 stations in the Ridge and Valley leaving 68 stations where suspended-sediment loads could be calculated at the Q1.5.

Suspended-sediment yields at the effective discharge were calculated for each of the sites in the Ridge and Valley). The median suspended-sediment yield value at the Q1.5 for all sites is 2.78 T/d/km2 (Figure 3-2). Mean annual suspended-sediment yield for stable/reference sites in the Ridge and Valley is 24.7 T/y/km2.

Figure 4-2 and *Figure 4-3* show the distribution of reference suspended-sediment yields (SSC) and annual average SSC yields at $Q_{1.5}$ for the reference streams used in the 2003 Shades Creek Siltation TMDL.

Figure 4-2: Suspended-Sediment Yield at $Q_{1.5}$ for Ecoregion 67 reference streams (Simon et al., 2004)

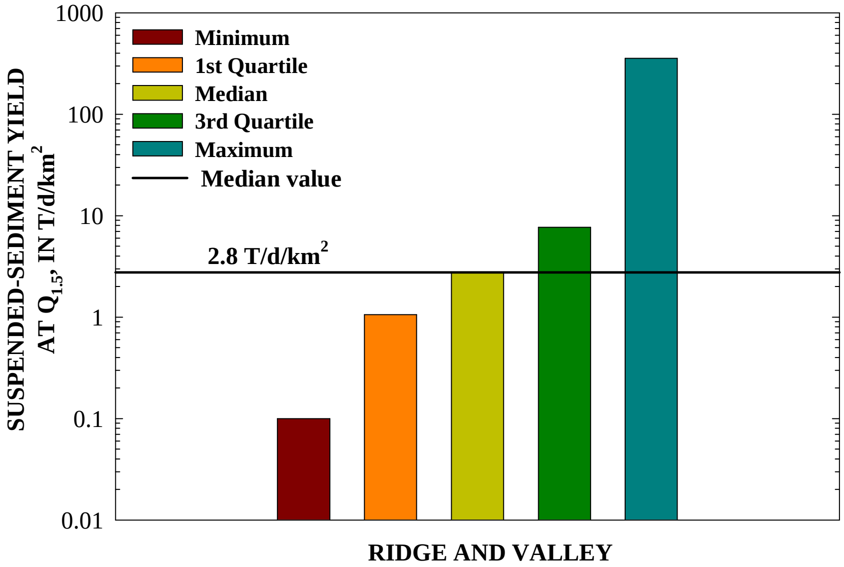
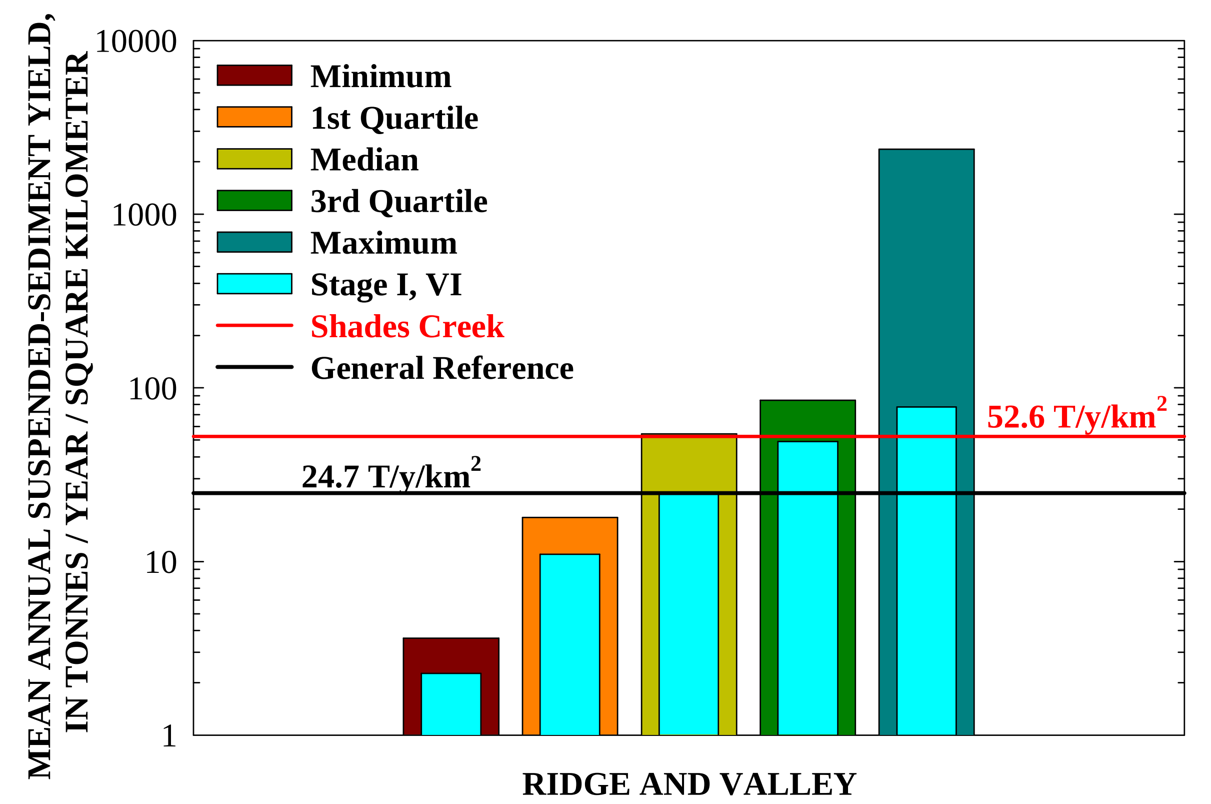


Figure 4-3: Comparison of mean annual suspended-sediment yield in "reference" streams in the Ridge and Valley and in Shades Creek. (Stage I and VI are stable stream channel stages).



These reference conditions were compared to existing loads in Shades Creek to determine the necessary load reductions in the TMDL. The same reference conditions were compared to the listed segments of the Cahaba River using historical flow data from certain U.S. Geological Survey (USGS) gaging stations in the Cahaba River and 1999-2002 total suspended solids (TSS) data collected by the Jefferson County Environmental Services Department (JCESD). The dataset was completed by adding ADEM data ranging from 1991 to 2012. The target of 24.7 metric tons per square kilometer per year corresponds to 70.5 US short tons per square mile per year, and a concentration of 45 mg/L. These calculations can be found in *Appendix 13.1: Target Calculations*. This concentration limit represents an annualized value calculated based on a long-term flow and TSS data. Therefore, for permitting purposes, it will apply to monthly average TSS limits but not to daily maximum requirments.

It has been noted that the long-term sediment data collected for the development of the ecoregion reference yield in the form of SSC is not precisely the same analytical technique as TSS. USGS researchers have cautioned that there are factors that contribute to differences between SSC and TSS datasets (Gray et al. 2000). Yet, both metrics are essentially measures of instream sediment loading that compare at very close to a 1:1 ratio. For the purposes of this TMDL, since ADEM and the regulated community in the Cahaba River measured TSS only and not SSC, the TSS datasets from ADEM and Jefferson County ESD were used to estimate the existing sediment loads in the Cahaba.

4.1.1 Q1.5 Discussion

The bankfull stage (or effective discharge) is defined as the maximum discharge that can be contained within the stream channel without overtopping the banks. It is generally accepted in this ecoregion that the bankfull stage correspondes to a streamflow event that occurs, on average, every 1.1 to 1.5 years. In order to be most conservative, the highest reoccurance interval of 1.5 years was used ($Q_{1.5}$). This value is important because it represents the discharge at which the largest proportion of suspended-sediment is transported over a long-term period.

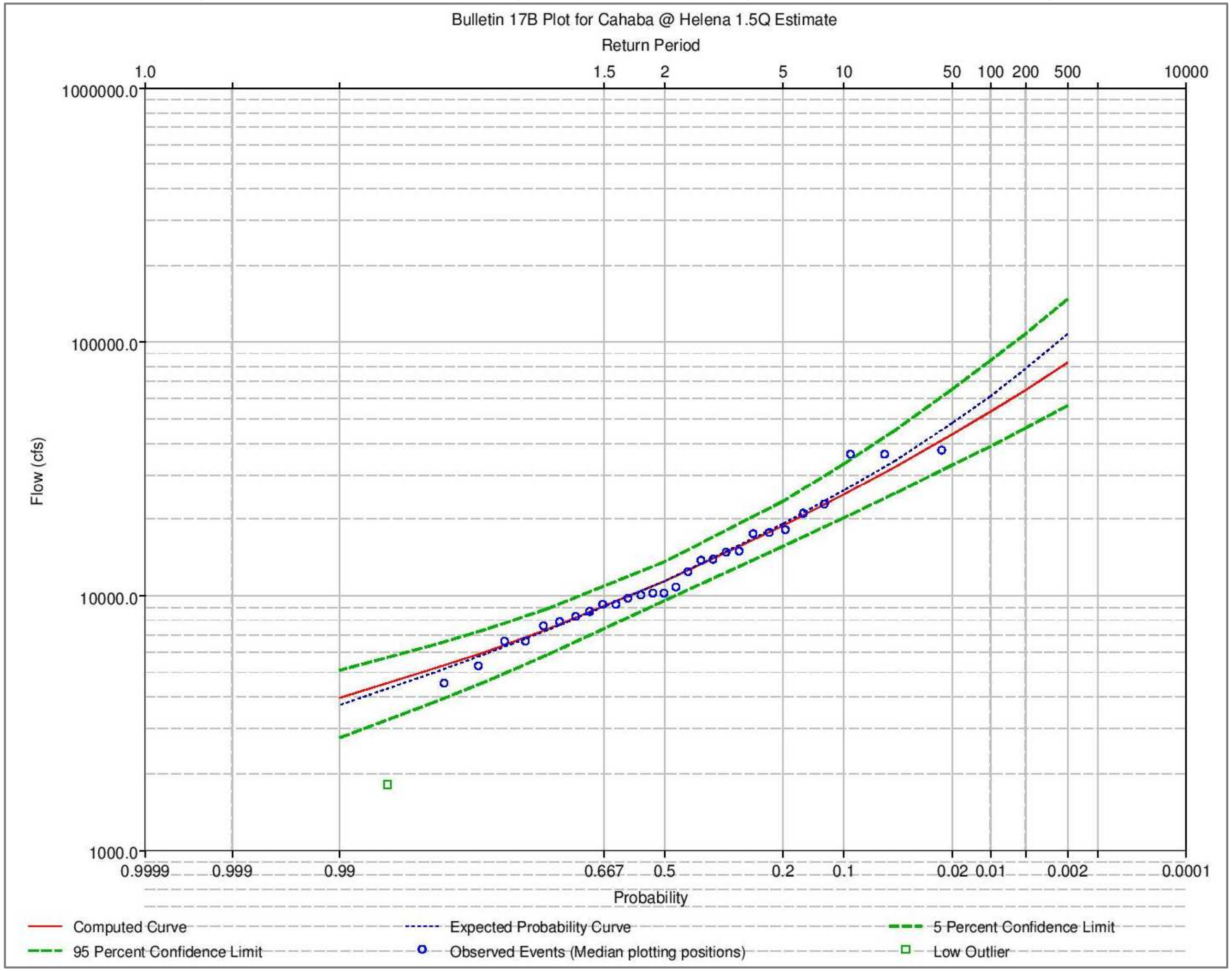
By using the $Q_{1.5}$ values for stable reference sites to set the TMDL target, a maximum sediment loading and corresponding concentration was established. When comparing the target, 45 mg/L, to calculated $Q_{1.5}$ values using the site-specific regression equations for the Cahaba River, it is easy to see that this number is considered very conservative and is protective of water quality. For instance, using the regression equation and the $Q_{1.5}$ for the Cahaba River near Helena (USGS 02423555) site yields a concentration of over 250 mg/L. This illustrates that for larger storm events and during periods of high flow, the 45 mg/l concentration-based limit is clearly a conservative target. As the data shows, during dry periods with little or no rainfall, instream TSS concentrations in the Cahaba River are typically well below the 45 mg/l benchmark. TSS concentrations typically increase with flow even in healthy streams, but usually have a much lower proportion of suspended-sediment due to their stable banks and relatively undisturbed channel hydraulics. In contrast, heavily impacted streams with poor stability and degraded channel features have a much higher proportion of suspended-sediment during higher flow events.

Figure 4-4 on the following page shows an example of a $Q_{1.5}$ analysis performed for the selected USGS stations included in this TMDL. These estimates were developed based on peak flow data obtained from USGS. ***Table 4-1*** below displays the results for each USGS site. The remaining $Q_{1.5}$ curves can be found in ***Appendix 13.3: Q1.5 Approximation & Results***.

Table 4-1: $Q_{1.5}$ Estimates for Selected USGS Stations

USGS Site ID	Waterbody	Drainage Area (mi²)	$Q_{1.5}$ (cfs)
02423130	Cahaba River @ Trussville, AL	19.7	2577
02423425	Cahaba River Near Cahaba Heights, AL	201	7475
02423496	Cahaba River Near Hoover, AL	226	7129
02423500	Cahaba River Near Acton, AL	230	9194
02423555	Cahaba River Near Helena, AL	335	9142

Figure 4-4: $Q_{1.5}$ Effective Discharge for USGS 02423555 (Cahaba River near Helena, AL)



4.2 Source Assessment

4.2.1 NPDES-Regulated Point Sources

An important part of the TMDL analysis is the identification of individual sources, source categories, or source subcategories of siltation in the watershed and the amount of pollutant loading contributed by each of these sources. Under the Clean Water Act, sources are broadly classified as either point or nonpoint sources. In 40 CFR 122.2, a point source is defined as a discernable, confined and discrete conveyance from which pollutants are or may be discharged to surface waters. The National Pollutant Discharge Elimination System (NPDES) program regulates point source discharges. Regulated point sources include: 1) municipal and industrial wastewater treatment facilities (WWTFs); 2) stormwater discharges associated with industrial activity (which includes construction activities); and 3) certain discharges from Municipal Separate Storm Sewer Systems (MS4s). A TMDL must provide Waste Load Allocations (WLAs) for all NPDES regulated point sources. For the purposes of this TMDL, all sources of sediment loading that are not subject to NPDES regulation will be considered nonpoint sources and addressed by the Load Allocation (LA) component of the TMDL.

> **Disclaimer:** The Department has gone to great lengths to identify any and all discharges affected by this TMDL in the *Appendix*. However, these tables only represent a snapshot in time and do not necessarily include ***every*** permittee/discharge affected. All current and future NPDES-regulated facilities located in the impaired portions of Cahaba River watershed must comply with applicable requirements of this TMDL. It should also be noted that a single permittee may have multiple outfalls, all of which will be addressed by this TMDL if they fall within the impairment area.

4.2.1.1 NPDES-Regulated Municipal, Semi-Public, & Private Facilities

There are many municipal, semipublic, and private wastewater treatment facilities (WWTFs) located within the Upper Cahaba River Watershed. Typically, these types of facilities are required to maintain monthly average TSS concentrations less than 30 mg/L. With respect to overall sediment loading, these levels are not significant compared to loadings generated during wet weather events. In addition, the TSS component of sewage treatment plant discharges is composed of primarily organic material and is considered to be different in nature than the sediments produced from erosional processes. Therefore, these types of facilities are not considered to be greatly impacting the Cahaba River with respect to sediment impairment and will not be included in the wasteload allocation (WLA) of this siltation TMDL.

4.2.1.2 NPDES-Regulated Industrial Facilities

NPDES-regulated industrial facilities typically discharge TSS that is inorganic in nature. Within the Upper Cahaba River Watershed, most industrial discharges are covered under general permits. The heavily industrialized areas of Birmingham are historically on the north and west areas of the city. The south and east areas of the city have been the primary areas of residential growth over the last 50 years. Considering these demographics, municipal and residential sources of sediment are more of a problem in the Upper Cahaba Watershed than industrial sources.

4.2.1.2.1 Industrial General Permits

There are fourteen types of general permits represented in the Upper Cahaba River Watershed; namely asphalt, lumber and wood, concrete, metals, transportation, food, landfill, paint, salvage/recycling, plastics and rubber, stone/glass/clay, NCCW (non-contact cooling water), petroleum, and water treatment. These operations comprise a total of ~424 active permits to approximately 890 discharge locations. These facilities have process water and/or stormwater discharges with the potential to have TSS loading.

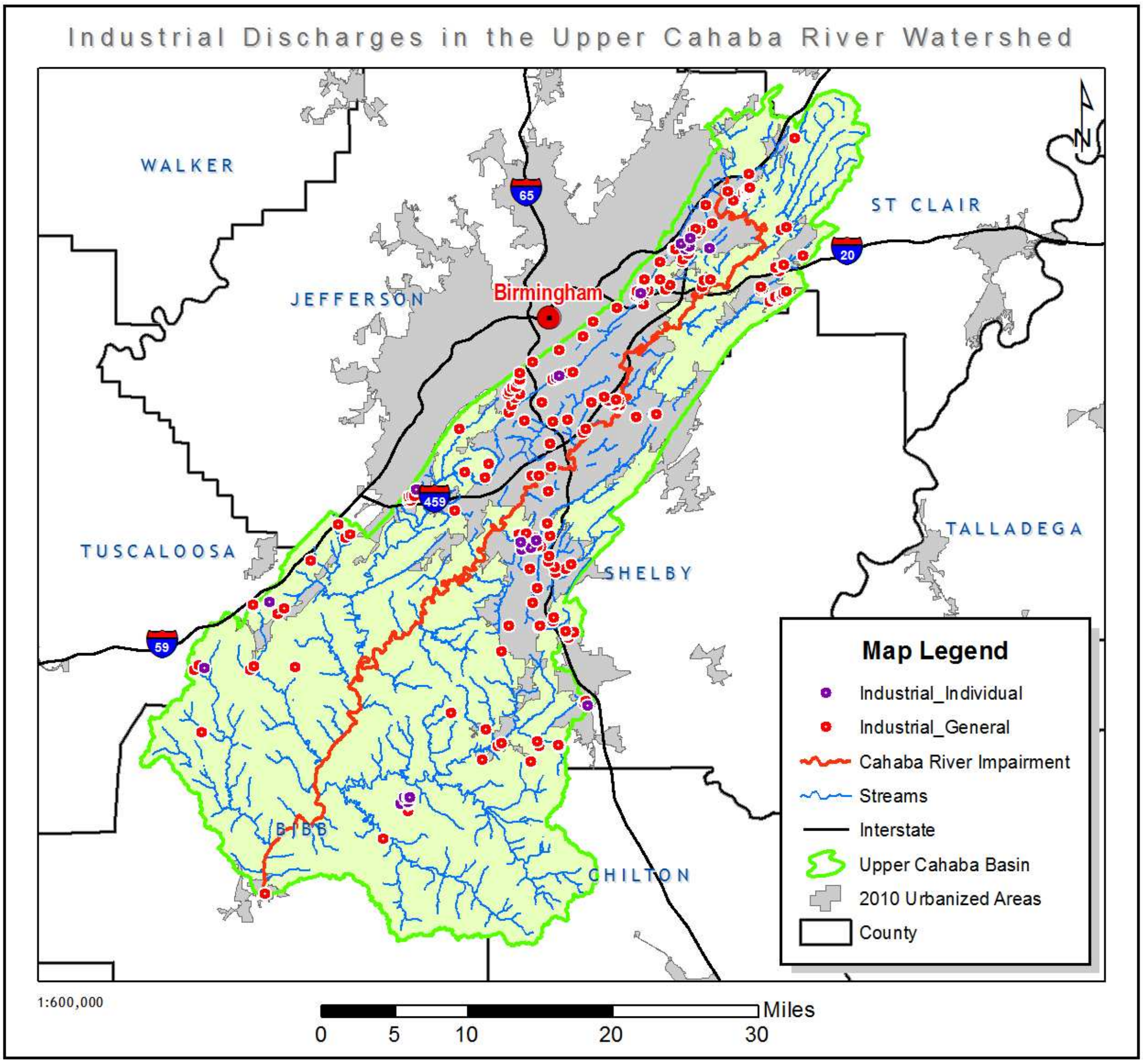
Facilities, such as concrete ready mix facilities, that produce process water must have operational containment in place and establish specific best management practices for the proper on-site handling of any sludge/solids removed from the process wastewater containment systems. The TSS limit on process water discharges is a daily maximum limit of 50 mg/L. Facilities that have potential stormwater sources of sediment must develop a Best Management Practices (BMP) Plan and implement the proper BMPs. They must identify potential sources of pollution which may reasonably be expected to affect the quality of stormwater discharges associated with industrial activity from the facility. In addition, the Stormwater Pollution Prevention Plan (SPPP) shall describe and ensure the implementation of practices which are to be used to reduce the pollutants in stormwater discharges associated with industrial activity at the facility and to assure compliance. On stormwater discharges, TSS is a “monitor only” parameter. New discharges shall have in place an impermeable containment and reclamation procedure/system for all process wastewater. See ***Appendix Table 2*** for a table listing all the facilities with a general industrial permit discharging to the Upper Cahaba River Watershed. See also ***Map 4-1*** on the following page for an illustration of all the industrial facilities with a general permit.

4.2.1.2.2 Industrial Individual Permits

There are eleven industrial individual permits in the Upper Cahaba River Watershed. These facilities have process water and/or stormwater discharges with the potential to have TSS loading. Individual permits are more stringent than general permits as they have lower limits and/or have a higher frequency requirement for reporting. In the subject watershed, the limits for individual industrial permits vary from “report” to 30 mg/L. The facilities with “report” only are not believed to have consistent and/or significant sediment concentrations in their discharge water.

Similar to general permits, individual permits must develop a Stormwater Pollution Prevention Plan (SPPP) and implement the proper BMPs. They must identify potential sources of pollution which may reasonably be expected to affect the quality of stormwater discharges associated with industrial activity from the facility. In addition, the SPPP shall describe and ensure the implementation of practices which are to be used to reduce the pollutants in stormwater discharges associated with industrial activity at the facility and to assure compliance. See ***Appendix Table 3*** for a table listing all the facilities with an individual industrial permit discharging to the Upper Cahaba River Watershed. See also ***Map 4-1: Industrial Discharges in the Upper Cahaba River Watershed*** for an illustration of all the industrial facilities.

Map 4-1: Industrial Discharges in the Upper Cahaba River Watershed



4.2.1.3 NPDES-Regulated Mining Facilities

NPDES-regulated mining facilities have the potential to discharge inorganic sediment and therefore are subject to this TMDL. The Upper Cahaba River Watershed has a diverse geologic landscape, and minerals mined include limestone, coal, sand and gravel, clay, and metallic ores. The discharges from these facilities are typically stormwater driven and, in nearly all cases, require a sediment treatment pond. Mining activities are permitted in cooperation with the Alabama Surface Mining Commission (ASMC), Alabama Department of Industrial Relations (ADIR) and ADEM. There are approximately 40 active mining permits with 465 permitted outfalls located within the watershed.

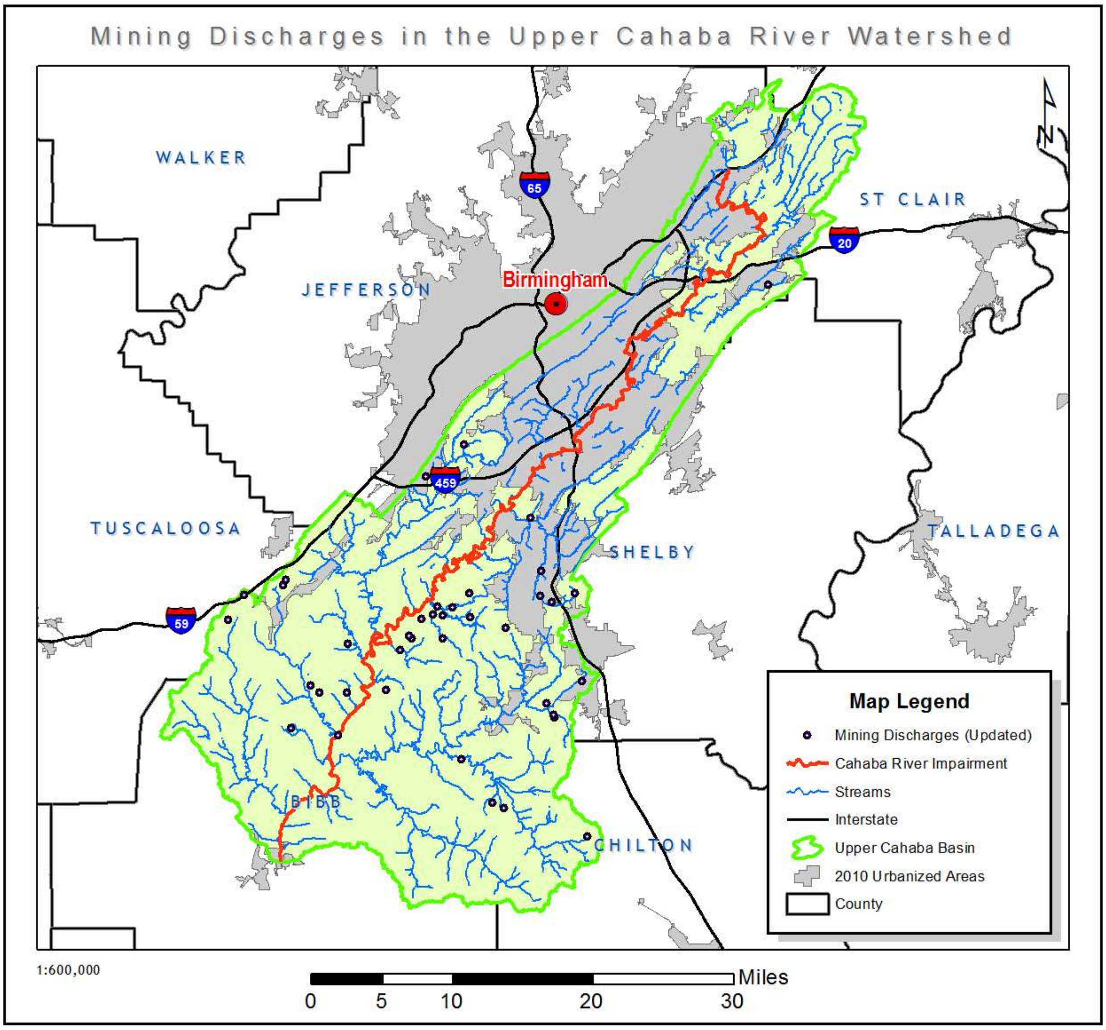
Mining facilities have both a monthly average and daily maximum TSS concentration limit. TSS limits vary by permit type and are shown in ***Table 4-2***.

Table 4-2: TSS Limits for Existing Mining Facilities in the Upper Cahaba River Watershed

Mining Facility Type	Monthly Average	Daily Maximum	Sampling Frequency
Coal	35 mg/l	70 mg/l	2 X / Month
Sand & Gravel	35 mg/l	70 mg/l	2 X / Month
Crushed Stone (Quarries)	25 mg/l	45 mg/l	2 X / Month
Shale / Common Clay	N/A	35 mg/l	2 X / Month

Considering the large area of disturbed drainage area, special attention must be given in all mining activities to proper BMP and treatment pond design, construction, and maintenance. When executed properly, these areas can sometimes improve the water quality of runoff from certain landuse types. However, if the permit requirements are not strictly followed, there can be significant sediment loading. See ***Appendix Table 4***: Mining Permits in Upper Cahaba Watershed for a tabular listing of all facilities with an individual mining permit discharging to the Upper Cahaba Watershed and ***Map 4-2*** for a map of active mining sites. Monthly average TSS values shall not exceed the 45 mg/L concentration limit requirement of this TMDL.

Map 4-2: Active Mining Operations in the Upper Cahaba Watershed



4.2.1.4 NPDES-Regulated Construction Stormwater General Permits

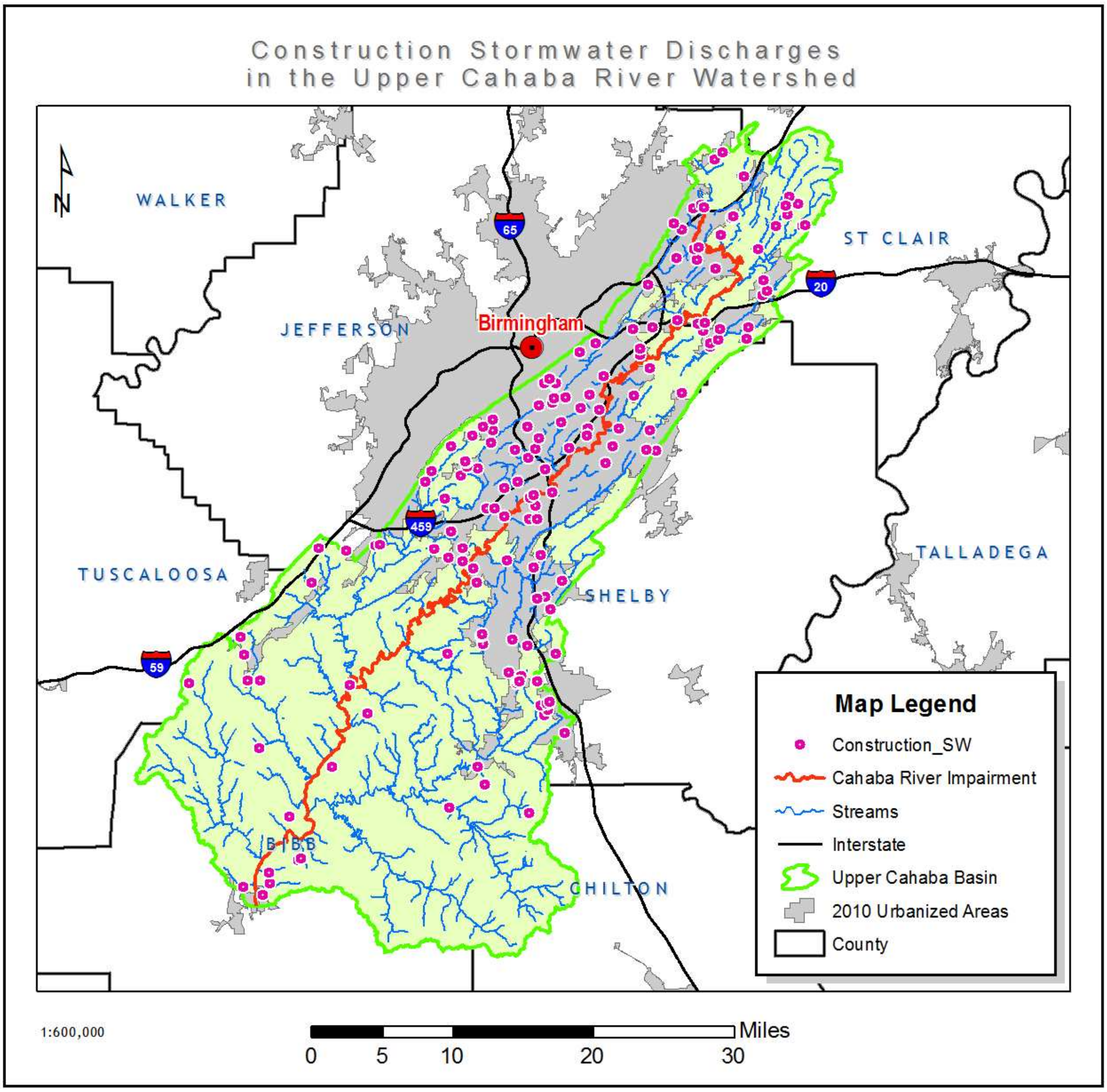
Discharges from construction activities that result in a total land disturbance of one acre or greater (including sites less than one acre but are part of a common plan of development or sale) are regulated through ADEM's Stormwater Management Branch. Permitted discharges are required to adhere to erosion and sediment controls which reduce stormwater velocity and volume, minimize amount of soil exposed, minimize stream crossings, provide and maintain buffers around surface waters, etc. Sediment and erosion control measures are site-specific and must meet or exceed the technical standards outlined in the *Alabama Handbook for Erosion Control*. A Construction Best Management Practices Plan (CBMPP) is required to be in place for all active projects or where continued land disturbance exists. This plan is to be maintained and updated for the life of the project. Where applicable, additional control measures may be required in order to achieve pollutant reductions consistent with an approved TMDL.

In addition to proper CBMPPs, discharges are also required to prepare, implement, and maintain a Spill Prevention Control and Countermeasures Plan (SPCC) where applicable. Sites are required to conduct regular monitoring and also are required to complete a full inspection no later than 72-hours after a qualifying rain event. Although not given a numeric TSS limit, some discharges are required to monitor for turbidity in the receiving stream(s) upstream of the project, just prior to discharge from the site(s), and immediately downstream of the mixing zone(s).

CBMPPs also mean full implementation and continued maintenance of effective structural and non-structural practices and planning/management strategies to ensure effective erosion and sediment control, and prevent/minimize the introduction of pollutants to stormwater and to treat stormwater to remove pollutants to the maximum extent practicable prior to discharge. CBMPs also mean the treatment of construction associated non-stormwater discharges including but not limited to, pit dewatering, and the proper handling and disposal of construction wastes, and prevention of the discharge of petroleum products, solvents, and other chemicals. CBMPPs also mean implementation of effective construction site nutrient management practices, temporary, annual, or perennial vegetation management, minimally disturbed natural riparian buffer area, fully vegetated filter strips, and streambank management practices. A CBMPP/BMP can be a single practice or more than one practice that combined will provide continuing effective treatment. Any management practice, structure, or procedure, that is not recognized by the Department as a BMP based on performance, not installed/implemented correctly, not maintained, not adequately or properly located/sited, not suitable for the specific site conditions, not designed or configured to control potential or existing site conditions where the BMP is located, including but not limited to, steep slopes or grades, soils, potential precipitation and size of drainage area, which is not consistent with effective erosion and sediment control, that does not meet or exceed recognized effective industry standard practices, or not consistent with the Alabama Handbook or other ADEM recognized BMP documents, is not considered or recognized as a BMP. The Alabama Handbook mentioned previously can be found here:
http://swcc.alabama.gov/pages/erosion_handbook.aspx.

See ***Appendix Table 5*** for a table listing all the Construction Stormwater (CSW) permits discharging to the Upper Cahaba Watershed and ***Map 4-3***: NPDES Construction Stormwater Discharges in the Upper Cahaba Watershed for a map of all the CSW permits.

Map 4-3: NPDES Construction Stormwater Discharges in the Upper Cahaba Watershed

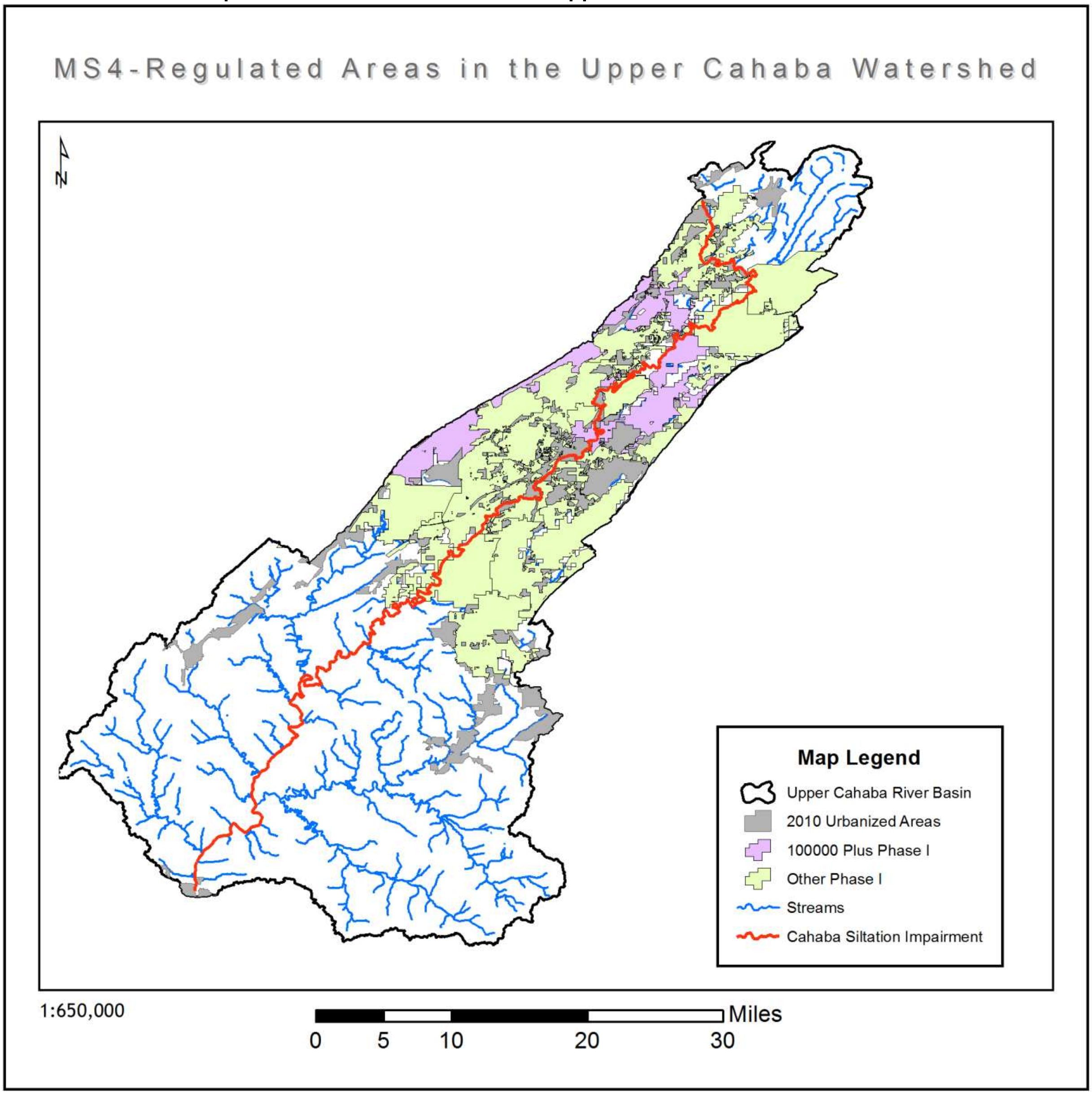


4.2.1.5 NPDES-Regulated Municipal Separate Storm Sewer Systems (MS4s)

The majority of the Upper Cahaba Watershed has been defined as a phase-I MS4 area. There are currently two phase-I permits within the upper Cahaba River watershed: Jefferson County & Shelby County. Pursuant to federal regulations all discharges that are regulated under phase-I or phase-II of the NPDES stormwater program are considered point sources and must be included in the WLA portion of the TMDL. Increased urbanization of the Upper Cahaba River Watershed is widely considered one of the primary causes for habitat loss and sedimentation within portions of the Cahaba River. As development increases in a watershed, so does impervious surfaces such as paved roads, parking lots, roofs, concrete storm drains, curb and gutter, and drive ways. With the increase of impervious surfaces, the total volume and stream power increases exponentially. This process can dramatically alter the stream morphology, bed characteristics, and habitat by blowing out stream sinuosity, degrading stream banks, depositing excess sediment, and scouring sensitive habitat.

MS4 permits do not have TSS limits, but are managed with BMPs and sampling. See ***Appendix Table 6*** for a detailed listing of all the MS4 permits discharging to the Upper Cahaba River Watershed and ***Map 4-4*** for a map of the MS4 area.

Map 4-4: MS4 Boundaries of the Upper Cahaba River Watershed



4.2.2 Nonpoint Sources

Each land use has the potential to contribute to sediment loading, however, these impacts are more likely to occur in areas with non-natural land uses (USEPA, 2003a), corresponding to acute events such as land disturbance caused by land development and construction, and chronic issues such as altered hydrology and magnified peak flows. As discussed in *Section 2.3* and *3.2.4*, the Upper Cahaba Watershed has areas of intense development, which contribute to both acute and chronic issues.

4.2.3 Source Discussion

Field observations by ADEM, Tetra Tech, Inc. and researchers from Mississippi State University indicate that excessive siltation in the Cahaba River seem to derive from two general causes:

Acute sediment loading—as a result of discrete land disturbances, generally of limited duration, and precipitation events that deliver "pulses" of fine sediments to the river, and
Chronic sediment loading—long-term stream channel instability caused by magnified urban hydrology due to high fractions of impervious area and resulting in excessive suspended-sediment and bed load after precipitation events.

Acute sediment loading can result from any land disturbances such as road or building construction or mass grading. Highly-weathered clay soils in the central Alabama region are very erodible. Even though best management practices are implemented in the watershed, often the fine sediments can defeat or overwhelm the minimum barriers of traditional silt fences. In cases where stormwater runoff controls are not adequately considered, the loading from a single rain event can effectively "smother" the riverbed in certain areas until natural stream processes transport the material downstream. In this way a "pulse" of fine material may progress down river.

Chronic sediment loading results from stream instability. This happens when banks are failing due to high peak flows and dissipating excessive stream power causing channel evolution. Chronic sediment loading can be measured as an annual average suspended-sediment load that is high compared to reference streams.

In the case of the Cahaba watershed, major streambank instabilities were observed at the Bain's Bridge site on the Cahaba River, and at sites on Little Shades Creek and Patton Creek, based on geomorphic assessments described in the following section. All of the unstable sites are in the vicinity of highly urbanized areas with high percentages of impervious land cover in the form of roads, parking lots, and roofs. Magnified peak runoff from these urban areas has caused irreversible changes in stream channel structure that will continue to evolve and discharge sediment. The natural process of channel evolution (Simon, 1992) may result in a re-stabilized channel over geologic time, but due to the extreme alteration of hydrologic conditions experienced in the middle Cahaba watershed, such a natural re-stabilization seems highly unlikely, unless the hydrologic conditions can be remediated to near pre-development conditions.

4.3 Data Availability

Total suspended-sediment data utilized in this TMDL report were collected by ADEM field personnel and Jefferson County Environmental Services Department (JCESD). This data varies by sample site, but generally ranges from 1991 – 2012. After establishing the relationship between TSS data and instantaneous flow data, daily average USGS flows were used in collaboration with the regression model to calculate annual load estimates. USGS Flows, available from http://waterdata.usgs.gov, included full years of record from 1990-2011.

For calculation of $Q_{1.5}$ values, the USGS record of peak flows was downloaded for the period of record of each gaging site from the USGS web page.

All data gathered for Cahaba TMDLs are housed in a Water Resources Database (WRDB) which encompasses field parameters, samples analyzed for water chemistry, meteorological information, discharge monitoring reports (DMRs) and GIS data. An effort was made to include data from all available sources for the most comprehensive assessment possible. The data gathered for this project was obtained with the cooperation of agencies such as the US Geological Survey (USGS), the Geological Survey of Alabama (GSA), Jefferson County Environmental Services Department (JCESD), the Birmingham Water Works and Sewer Board (BWWSB), the Cahaba River Society (CRS), the US Environmental Protection Agency, and the Cahaba River Basin Project Steering Committee (now known as the Cahaba River Basin Clean Water Partnership). A preliminary summary of the sampling locations and available data was prepared by Tetra Tech, Inc. in November 2002 (Tetra Tech, 2002).

5.0 Technical Approach

Establishing the relationship between instream water quality and source loading is an important component of TMDL development. It allows the determination of the relative contribution of sources to total pollutant loading and the evaluation of potential changes to water quality resulting from implementation of various management options. This relationship can be developed using a variety of techniques ranging from quantitative and qualitative assumptions based on scientific principles to numerical computer modeling.

For evaluating siltation loading, a sediment loading curve approach, comparing suspended-sediment loads with streamflow-duration at certain sites, was utilized to be consistent and comparable with the revised "Final Total Maximum Daily Load for Siltation, Turbidity, and Habitat Alteration in Shades Creek" (USEPA Region 4, 2004).

5.1 Sediment Loading Curve Approach

5.1.1 Flow and Suspended-Sediment Loading Curves

Based on the target reference yields derived by staff of the USDA/ARS National Sediment Laboratory, Channel and Watershed Process Research Unit and application of the target yields to the revised Shades Creek TMDL, a similar procedure was followed to derive suspended-sediment regressions based on measured TSS concentrations and USGS streamflow.

Suspended-sediment data were available for the Cahaba River from Jefferson County ESD data collection efforts and ADEM data. Samples of suspended-sediment concentrations were used in conjunction with the instantaneous discharge at the time of sample collection in order to compute suspended-sediment transport rates and mean annual suspended-sediment loads/yields. These metrics can be used to evaluate chronic suspended- sediment loading, on a long-term basis.

The siltation 303(d)-listed segments of the Cahaba River are divided into eight segments:

Table 5-1: Segmentation and Drainage Areas

Segment #	Segment Location (Downstream to Upstream)	Segment Drainage Area (mi2)	Total Drainage Area (mi2)
Segment 1	US Hwy 11 to I-59	19.7	19.7
Segment 2	Grants Mill Road to US Hwy 11	109.3	129
Segment 3	US Hwy 280 to Grants Mill Road	25	197 (154*)
Segment 4	Buck Creek to US Hwy 280	62	259
Segment 5	County Road 52 to Buck Creek	76	335
Segment 6	Shades Creek to County Road 52	86	421
Segment 7	Lower Little Cahaba River to Shades Creek	229	650
Segment 8	AL Hwy 82 to Lower Little Cahaba River	377	1,027

*Segment 3 has an effective drainage area of 154 sq. mi. excluding the Lake Purdy drainage

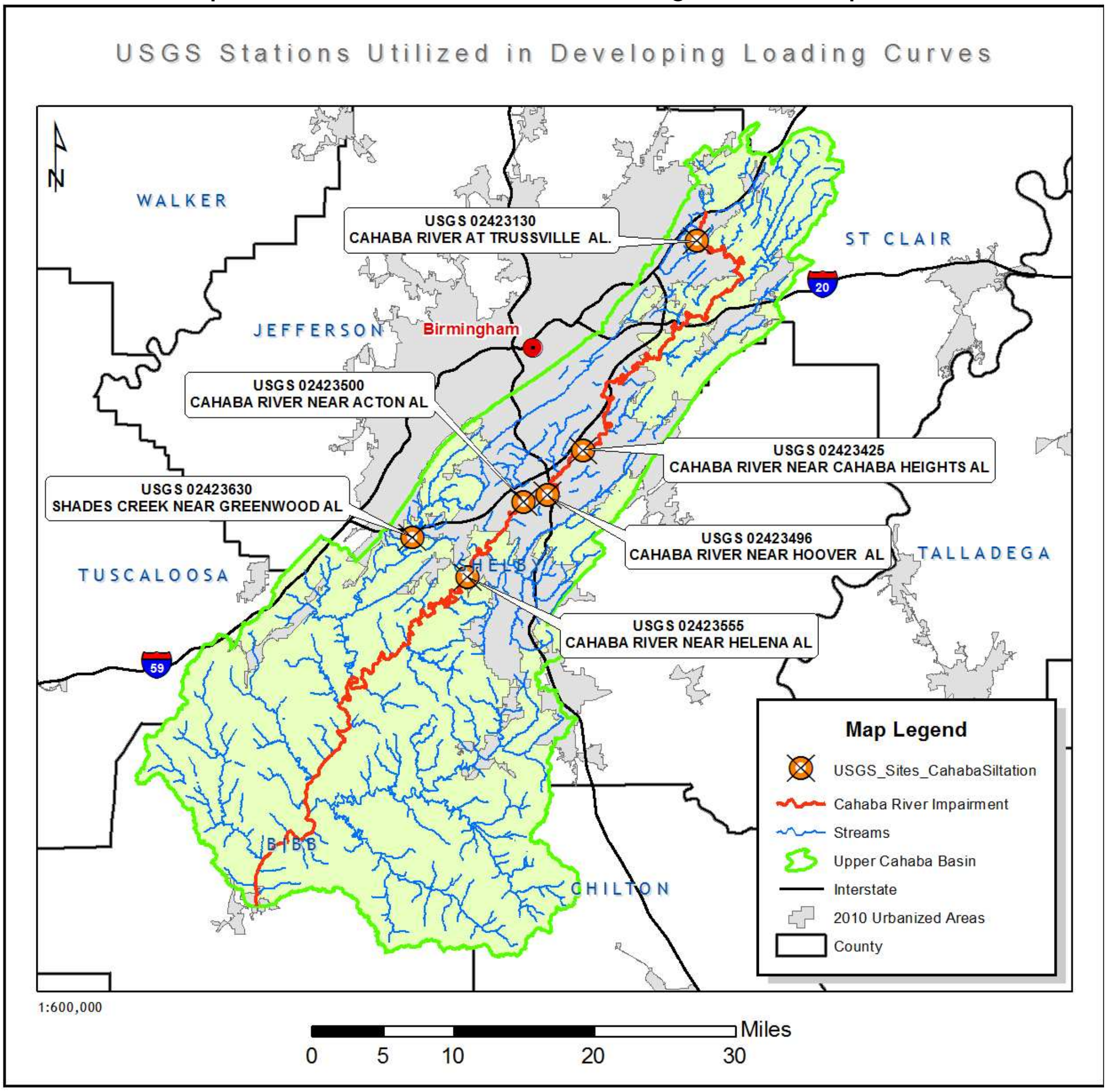
Despite a wealth of data collected in the Cahaba River Watershed in recent years, there are only five sites on the Cahaba River with an adequate amout of data to perform this loading curve analysis. This is because the loading curve and annual loading assessment requires TSS samples at a wide range of flows, particularly at higher flows, in addition to a long-term flow record. TSS data collected by ADEM and Jefferson County Environmental Services Department (JCESD) from 1991 – 2011 and long-term USGS streamflow were utilized in the loading curve analysis. The six USGS sites are shown in *Table 5-2*. A map of these sites is shown in *Map 5-1* and the data is shown in the *Appendix*.

Table 5-2: USGS Streamflow Gaging Sites with Flow Record Used in Loading Curves

USGS Site	Name	Drainage Area (mi^2)	Latitude	Longitude
02423130	Cahaba River at Trussville	19.7	33.6306	-86.5994
02423425	Cahaba River near Cahaba Heights	201 (152.5*)	33.4156	-86.7397
02423496	Cahaba River near Hoover	226	33.3692	-86.7842
02423500	Cahaba River near Acton	230	33.3625	-86.8133
02423555	Cahaba River near Helena	335	33.2844	-86.8825
02423630	Shades Creek near Greenwood (USEPA TMDL)	72.3	33.3261	-86.9497

*02423425 has effective drainage area of 152.5 sq. mi. excluding the Lake Purdy drainage

Map 5-1: USGS Stations Utilized in Loading Curve Development



5.1.2 Regression Analysis Calculations

Note that both English SI units and US customary units are discussed within this report. For the data analysis, all calculations were made using SI units and subsequently converted to US customary units. It is important to maintain one unit set during analysis.

A power function was developed by regression to relate sediment loads to mean daily streamflow for each of the USGS sites. The power functions have the following formula:

$$L = a * Q^b$$

Where ***L*** is suspended-sediment load in tonnes/day (or tons/day), ***Q*** represents daily average streamflow in m^3/s (or cfs) and ***a*** and ***b*** are regression constants.

Based on these equations, it is possible to estimate the sediment loads for any day with recorded mean daily streamflow. With a long-term flow record, the estimated load may be calculated for every day of the year, thus comprising an estimate of the total annual suspended-sediment load. There is a significant statistical random error associated with the calculation, but due to the high variability of sediment concentrations, this is the best possible estimate of suspended-sediment loading.

Daily suspended-sediment loads were calculated at each gage by applying the appropriate rating equation to the mean discharge for each day, giving a mean daily suspended-sediment load. Daily loads for calendar years 1990 - 2011 were used to determine mean annual suspended-sediment load, and then normalized by drainage area to obtain the annual suspended-sediment yield (tonnes/year/km^2).

Following is a brief summary of how the regression relationships were established:
1. Instantaneous TSS (mg/l) field measurements were plotted against corresponding real-time USGS flow (m^3/s) in $\log_{10}/\log_{10}$ space.
2. A regression equation based on a power function fit was used to relate TSS to flow.
3. USGS daily average flows were downloaded for all available years of record ranging from 1990 to 2011. Partial years were omitted as to avoid seasonal bias.
4. For each calendar year, sums for TSS Load (Tonnes/yr) and volume (m^3) were calculated.
5. These yearly sums were then divided by the drainage area (km^2)of their respective gaging site to yield a normalized average loading per unit area (Tonnes/km^2/yr).
6. The individual yearly values in step 5 were then summed and divided by the number of years, resulting in a normalized mean annual suspended-sediment load for each USGS site.
7. Mean annual TSS concentrations (mg/l) were also calculated by dividing the annual load value by the corresponding total annual volume for each station.
8. These values were then compared to median reference loads (i.e. the TMDL “target”) established for Ecoregion 67 and the Upper Cahaba River Basin.

Table 5-3 on the following page summarized the results of the regression analysis for each USGS station. These values used to represent existing conditions were then compared to the established TMDL target value in order to calculate the required load reductions (if any) for each segment. This approach represents the best available estimate of total suspended-sediment yields for the impaired watershed of the Upper Cahaba River Watershed. ***Figure 4-4*** shows the regression analysis results for the site from which the reduction requirements were calculated.

Table 5-3: Summary of Sediment-Transport Curve Results by Sampling Location

SI UNITS

USGS ID	Name	Alternate Name	Drainage Area (km²)	Regression Equation	Mean Annual Suspended Sediment (tonnes/yr)	Mean Annual Yield (tonnes/km²/yr)	Mean Annual TSS (mg/l)	Segments Represented
02423130	Cahaba River at Trussville, AL	Trussville	51	$L = 0.52*Q^{1.22}$	245	4.8	8.02	1
02423425	Cahaba River near Cahaba Heights, AL	Caldwell Mill Road	521 (395*)	$L = 0.48*Q^{1.45}$	6534	16.5	25.89	2,3
02423496	Cahaba River near Hoover, AL	Hoover	585	$L = 0.39*Q^{1.76}$	28783	49.2	86.6	4
02423500	Cahaba River near Acton, AL	Bains Bridge	596	$L = 0.37*Q^{1.57}$	13947	23.4	37.91	4
02423555	Cahaba River near Helena, AL	Shelby Co. Hwy 52	868	$L = 0.24*Q^{1.81}$	45816	52.8	85.65	5,6
02423630**	Shades Creek near Greensfield, AL	--	357	--	19700	52.6	77.6	7,8

*USGS Gage 02423425 has an effective drainage area of 152.5 excluding Lake Purdy drainage area

**Values adopted from 2004 Shades Creek Siltation / Habitat Alteration TMDL

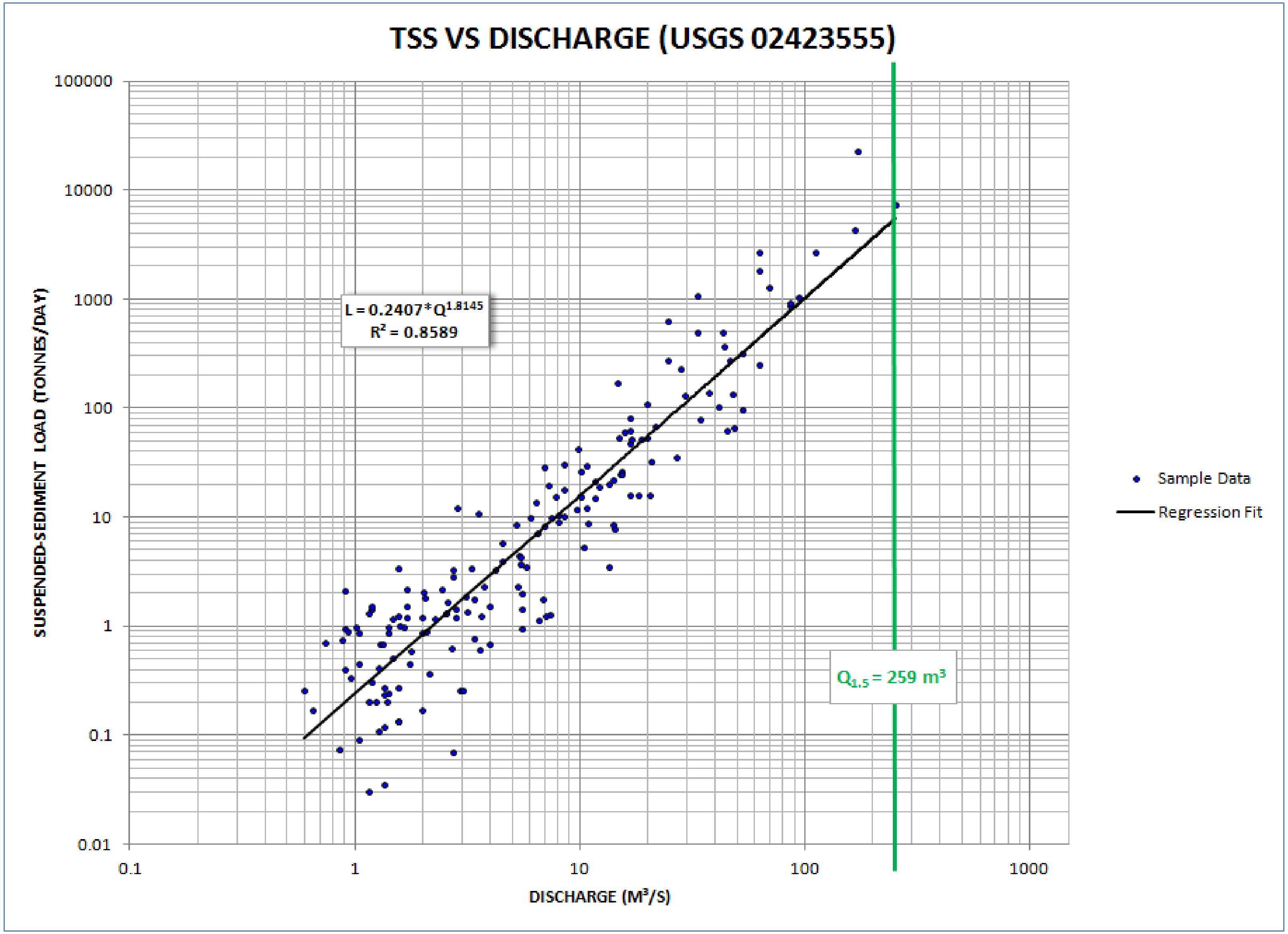
US STANDARD UNITS

USGS ID	Name	Alternate Name	Drainage Area (mi²)	Regression Equation	Mean Annual Suspended Sediment (tons/yr)	Mean Annual Yield (tons/mi²/yr)	Mean Annual TSS (mg/l)	Segments Represented
02423130	Cahaba River at Trussville, AL	Trussville	19.7	$L = 0.52*Q^{1.22}$	270	13.6	8.02	1
02423425	Cahaba River near Cahaba Heights, AL	Caldwell Mill Road	201 (152.5*)	$L = 0.48*Q^{1.45}$	7202	46.7	25.89	2,3
02423496	Cahaba River near Hoover, AL	Hoover	226	$L = 0.39*Q^{1.76}$	31727	138.9	86.6	4
02423500	Cahaba River near Acton, AL	Bains Bridge	230	$L = 0.37*Q^{1.57}$	15374	66.1	37.91	4
02423555	Cahaba River near Helena, AL	Shelby Co. Hwy 52	335	$L = 0.24*Q^{1.81}$	50503	149.2	85.65	5,6
02423630**	Shades Creek near Greensfield, AL	--	138	--	21716	148.6	77.6	7,8

*USGS Gage 02423425 has an effective drainage area of 152.5 excluding Lake Purdy drainage area

**Values adopted from 2004 Shades Creek Siltation / Habitat Alteration TMDL

Figure 5-1: Regression Analysis Results for Cahaba River near Helena (USGS 02423555)



The USGS stations used for the sediment yield calculations are not at the end points for each impaired segment, so yields for each segment cannot be precisely represented. The USGS sites do, however, offer a good representation of this watershed. The difference between the reference values (TMDL target) and the calculated existing loadings/concentrations were analyzed. The highest yield of all the USGS stations was observed at USGS 02423555 (Cahaba River near Helena, AL). This value, 52.8 T/km^2/yr (149.2 t/mi^2/yr), was used to calculate the required load reduction for this TMDL.

This value was then compared to the reference yield for stable streams introduced in *Water Quality Target Identification* (*Section 4.1*). This allows determination of the percent reduction in suspended-sediment required to meet the reference conditions for chronic siltation. Note that the reference yield 70.5 tons/mi^2/year corresponds to the USEPA reference yield of 24.7 metric tonnes/km^2/yr determined for Shades Creek. See *Table 5-4* below for the reductions necessary to meet the TMDL requirement.

Table 5-4: Required Reductions in Suspended-Sediment in the Upper Cahaba River Basin

USGS Gage	Station Name	Average Annual Load (tons/yr)	Annual Average Yield (tons/mi^2/yr)	Reference Annual Avg. Yield (tons/mi^2/yr)	Percent Reduction
02423555	CAHABA RIVER NEAR HELENA	50503	149.2	70.5	53%

a. Existing and future NPDES Permits that utilize numeric limits for TSS shall not exceed 45 mg/L applied as a monthly average.
b. The allowable yield applies to all existing and future NPDES Permits that utilize BMPs to control sediment. Compliance with the TMDL is expected to be achieved through the implementation and maintenance of effective BMPs appropriate for site conditions.
c. A value of 220.3 lbs/acre/yr corresponds to 70.5 tons/mi^2/yr or 24.7 tonnes/km^2/yr.

Since many land disturbances are much smaller than a square mile, it is helpful to characterize the required reductions on a smaller scale. The following table shows the same reductions requirements in terms of pounds per acre per year.

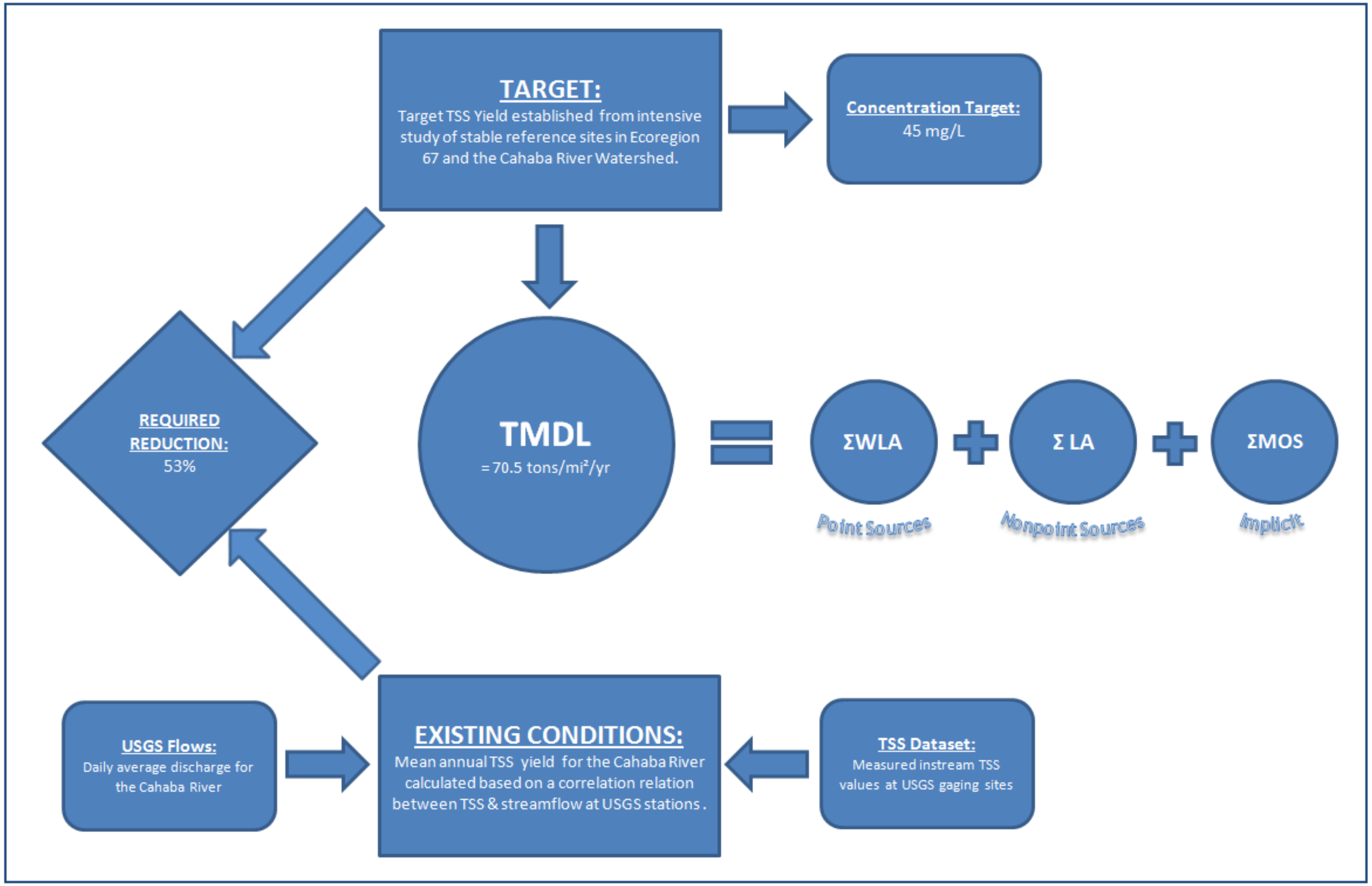
Table 5-5: Required Reductions in Suspended-Sediment in the Upper Cahaba Basin

USGS Gage	Station Name	Average Annual Load (tons/yr)	Annual Average Yield (lbs/acre/yr)	Reference Annual Avg. Yield (lbs/acre/yr)	Percent Reduction
02423555	CAHABA RIVER NEAR HELENA	50503	466.3	220.3	53%

a. Existing and future NPDES Permits that utilize numeric limits for TSS shall not exceed 45 mg/L applied as a monthly average.
b. The allowable yield applies to all existing and future NPDES Permits that utilize BMPs to control sediment. Compliance with the TMDL is expected to be achieved through the implementation and maintenance of effective BMPs appropriate for site conditions.
c. A value of 220.3 lbs/acre/yr corresponds to 70.5 tons/mi^2/yr or 24.7 tonnes/km^2/yr.

6.0 TMDL DEVELOPMENT AND SUMMARY

Figure 6-1: TMDL Development Diagram



This section presents the TMDL developed for siltation for the Cahaba River watershed. A TMDL is the total amount of a pollutant load that can be assimilated by the receiving water while still achieving water quality criteria, in this case Alabama's water quality criteria for aquatic life. TMDLs can be expressed in terms of mass per time or by other appropriate measures. TMDLs are comprised of the sum of individual wasteload allocations (WLAs) for point sources, load allocations (LAs) for nonpoint sources, and natural background levels. In addition, the TMDL must include a margin of safety (MOS), either implicitly or explicitly, that accounts for the uncertainty in the relationship between pollutant loads and the quality of the receiving waterbody. Conceptually, this definition is denoted by the equation:

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

Important Note: The TMDL, WLA, and LA values are represented in normalized loadings based on drainage areas. As such, they will not have the standard additive relationship of the equation listed above.

6.1 Numeric Targets for TMDLs

The TMDL endpoints represent the instream water quality targets used in quantifying the load reduction that maintains water quality standards. The TMDL endpoints can be a combination of water quality standards, both numeric and narrative, and surrogate parameters that would ensure the standards are being met.

The selected endpoint for chronic siltation loading is based on the reference yield 24.7 Tonnes/yr/km^2 introduced by USEPA Region 4 in the ***Final Total Maximum Daily Load for Siltation, Turbidity, and Habitat Alteration in Shades Creek*** (USEPA Region 4, November 2004). In other words, the reference yield of 24.7 Tonnes/yr/km^2 or 70.5 tons/mi^2/yr is the TMDL target for siltation. This sediment yield corresponds to a TSS concentration of 45.1 mg/L. To evaluate acute siltation loading, percent fines less than 2 mm is a measure of the typical substrate embeddedness that is a major characteristic of acute impairment. For acute siltation loading, recommendation of the range of embeddedness values of 11-16% sands, silts, & clays (<2 mm) seem to be protective of habitat and would be recommended for Cahaba sites.

6.2 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.

6.3 Margin of Safety

There are two methods for incorporating a MOS in the analysis: a) by implicitly incorporating the MOS using conservative assumptions to develop allocations; or b) by explicitly specifying a portion of the TMDL as the MOS and using the remainder for allocations. The Cahaba River Siltation TMDLs incorporate implicit margins of safety based on conservative assumptions in the development of the siltation target—that reference streams are stable and have sediment yields that should be protective of aquatic life and habitat.

6.4 Seasonal Variation

The seasonal variation is incorporated in the TMDL through the use of average annual loads. This includes high and low flow periods. The majority of sediment loads to the Cahaba River occur during high flow periods following precipitation events. A mean annual reference load is protective of chronic loading on the long-term, and a reference level of percent fines in bed sediment is protective of acute sediment loading from land disturbance.

6.5 Wasteload Allocations

The WLA portion of the TMDL is expressed as both a concentration and an annual average yield. Both of the allocations are of equal value and represented this way for permitting purposes. Some permitted facilities have more of a defined discharge point and concentration-based permitting and reporting is appropriate. Other areas have less defined discharge points and are managed most effectively with a best management practice (BMP) approach. It is more appropriate to apply TMDL allocations in terms of reductions and yields to these permits.

Any new discharges, including facility expansions and permit modifications, must also adhere to all applicable water quality standards for use classifications of their respective receiving stream. Likewise, future discharges and permits must also be consistent with load reductions stated within this TMDL document and any other approved TMDLs for those segments.

The LA portion of the TMDL applies to the nonpoint source loads that are not NPDES-regulated and are addressed through basin stakeholder effors, ADEM's nonpoint source program, EPA §319 initiatives, and many other state and federal agencies.

Table 6-1: TMDL Summary Table

WLA		LA (lbs/acre/yr)	MOS	TMDL (lbs/acre/yr)	Percent Reduction
TSS Concentration[a] (mg/L)	**TSS Yield[b] (lbs/acre/yr)**				
45	220.3 [c]	220.3	Implicit	220.3	53%

a. Existing and future NPDES Permits that utilize numeric limits for TSS shall not exceed 45 mg/L applied as a monthly average.
b. The allowable yield applies to all existing and future NPDES Permits that utilize BMPs to control sediment. Compliance with the TMDL is expected to be achieved through the implementation and maintenance of effective BMPs appropriate for site conditions.
c. A value of 220.3 lbs/acre/yr corresponds to 70.5 tons/mi^2/yr or 24.7 tonnes/km^2/yr

7.0 REQUIRED LOAD REDUCTIONS

Implementation of reductions for siltation will be sought through the NPDES permitting program and voluntary nonpoint source efforts. New growth and future permits will not be prohibited, but must meet either the concentration based limit of 45 mg/L and/or the elevated BMP plans that correspond to a 53% reduction.

7.1 NPDES Program

7.1.1 General Industrial Permits

General industrial permits as described above are a contributor of sediment to the system, but not believed to be a major source. The current permits and management approach is believed to be consistent with this TMDL and protective of water quality except for the TSS limit (monthly average TSS limit). Also, it is the recommendation of this TMDL that the permitting branch consider, where appropriate and as resources allow, to implement a modified inspection report and schedule for the facilities in these impaired watersheds. In addition, it is recommended that a permitting strategy be considered that would require repeat violators of an existing general permit be required to obtain an individual permit in lieu of their current general permit. For facilities with numeric TSS limits, monthly average TSS concentration limits shall not exceed 45 mg/L.

7.1.2 Individual Industrial Permits

Individual industrial permits as described above are a contributor of sediment to the system, but not a major source. The current permits and management approach is believed to be consistent with this TMDL and protective of water quality. However, it is the recommendation of this TMDL that the permitting branch consider, where appropriate and as resources allow, to implement a modified inspection report and schedule for the facilities in these impaired watersheds. In addition, that an enforcement strategy be considered that increases the penalty for repeat violators and questions the legitimacy of a renewal permit. For facilities with numeric TSS limits, monthly average TSS concentration limits shall not exceed 45 mg/L.

7.1.3 Mining Permits

Mining activities are a contributor of sediment to the system, but not believed to be a major source. The current permits and management approach is believed to be consistent with this TMDL and protective of water quality. As mentioned earlier, mining practices followed correctly and in their entirety, can sometimes improve the sediment load from certain land uses. But, if standard BMPs for these types of operations are not strictly followed, then the effects can be catastrophic and dramatic considering the large amount of land disturbance. Considering these issues and the critical habitat of the Upper Cahaba Watershed, this TMDL recommends that the permitting branch consider, where appropriate and as resources allow, implementing a modified inspection report and schedule for the facilities in these impaired watersheds. Monthly average TSS concentration limits shall not exceed 45 mg/L.

7.1.4 CSW Permits

New and existing construction storm water (CSW) NPDES permits that are located in the impaired portion of the Upper Cahaba Watershed must comply with this TMDL. Compliance will be demonstrated in the Construction Best Management Practice Plan (CBMPP) using appropriate BMPs. The CBMPPs will be evaluated to ensure that the BMPs are effective at minimizing erosion and sediment loss to the maximum extent practicable. CSW permits are not concentration-based, so all load reductions will be addressed through BMPs.

7.1.5 MS4 Permits

MS4 permits that are located in the Upper Cahaba Watershed must comply with this TMDL. MS4s are BMP-based and have no numeric TSS limits. Compliance will be demonstrated and documented with a stormwater management plan (SWMP). The SWMP will accomplish reductions to siltation by using additional and modified BMPs, eliminating illicit discharges, education outreach, and other nonpoint source related reductions. If reductions are not met, the municipality will be required to reevaluate and revise their SWMP until reductions are achieved. This TMDL suggests using sediment capturing methods and reducing volume of total runoff. Considering that the volume of runoff is the main problem in the sediment impairment, extra effort should be applied in the areas of reducing impervious surfaces, increasing bioretention areas, and stormwater capture and reuse.

7.2 Nonpoint Source Program

Voluntary, incentive-based mechanisms will be used, outside of the permitting programs, to implement NPS management measures. Cooperation and active participation by the general public and various industry, business, and environmental groups is critical to successful implementation of TMDLs. Local citizen-led and implemented management measures offer the most efficient and comprehensive avenue for reduction of loading rates from nonpoint sources. Therefore, TMDL implementation activities will be coordinated through interaction with local entities in conjunction with Clean Water Partnership efforts.

8.0 FOLLOW-UP MONITORING

ADEM has adopted a basin rotation approach to water quality management; an approach that divides Alabama's fourteen major river basins into five groups. Each year, ADEM's water quality resources are concentrated in one of the five basin groups. One goal is to continue to monitor impaired waters. Monitoring will help further characterize water quality conditions resulting from the implementation of best management practices and load reductions in the watershed. This monitoring will occur in each basin according the schedule shown in the table below.

Table 8-1: 5-Year Basin Rotation Monitoring Schedule for the State of Alabama

River Basin Group	Schedule
Escatawpa / Upper Tombigbee / Lower Tombigbee / Mobile	2011
Cahaba / Black Warrior	2012
Tennessee	2013
Choctawhatchee / Chipola / Perdido-Escambia / Chattahoochee	2014
Tallapoosa / Coosa / Alabama	2015

9.0 PUBLIC PARTICIPATION

As part of the public participation process, this TMDL will be placed on public notice and made available for review and comment. The public notice will be prepared and published in the four major daily newspapers in Montgomery, Huntsville, Birmingham, and Mobile, as well as submitted to persons who have requested to be on ADEM's postal and electronic mailing distributions. In addition, the public notice and subject TMDL will be made available on ADEM's Website: www.adem.state.al.us. The public can also request paper or electronic copies of the TMDL by contacting Mr. Chris Johnson at 334-271-7827 or cljohnson@adem.state.al.us. The public will be given an opportunity to review the TMDL and submit comments to the Department in writing. At the end of the public review period, all written comments received during the public notice period will become part of the administrative record. ADEM will consider all comments received by the public prior to final completion of this TMDL and subsequent submission to USEPA Region 4 for final approval.

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11.0 APPENDIX A: TSS DATA

Appendix Table 1: TSS Data (Jefferson County Environmental Services)

Station_ID	Date	Measured TSS (mg/L)	USGS Streamflow (CFS)	Sediment Load (tons/day)
Trussville	1/5/1999	1.5	313	1.3
Trussville	1/12/1999	4.1	210	2.3
Trussville	1/20/1999	5.4	170	2.5
Trussville	1/26/1999	2.6	380	2.7
Trussville	2/2/1999	12.3	955	31.7
Trussville	2/9/1999	4.9	193	2.5
Trussville	2/16/1999	1.1	100	0.3
Trussville	2/24/1999	2.8	179	1.4
Trussville	3/3/1999	63	936	159
Trussville	3/10/1999	5.4	551	8
Trussville	3/16/1999	6.7	624	11.3
Trussville	3/23/1999	2.8	187	1.4
Trussville	3/30/1999	1.8	141	0.7
Trussville	4/7/1999	2.1	206	1.2
Trussville	4/14/1999	1.7	88	0.4
Trussville	4/21/1999	5.9	91	1.4
Trussville	4/28/1999	114	298	91.6
Trussville	5/5/1999	16.9	61	2.8
Trussville	5/12/1999	2	94	0.5
Trussville	5/19/1999	11.9	147	4.7
Trussville	5/26/1999	6.8	51	0.9
Trussville	6/2/1999	20.1	116	6.3
Trussville	6/8/1999	142	106	40.6
Trussville	6/15/1999	43	810	93.9
Trussville	6/22/1999	2.5	65	0.4
Trussville	6/29/1999	38	3490	357.6
Trussville	7/7/1999	5.8	192	3
Trussville	7/13/1999	11.6	235	7.3
Trussville	7/20/1999	6.2	152	2.5
Trussville	7/27/1999	9.3	104	2.6
Trussville	8/3/1999	10.5	36	1
Trussville	8/10/1999	6.3	21	0.4
Trussville	8/17/1999	9.6	16	0.4
Trussville	8/24/1999	7.1	19	0.4
Trussville	8/31/1999	4.6	14	0.2
Trussville	9/21/1999	808	11	24
Trussville	10/5/1999	56	33	5
Trussville	10/12/1999	10.4	118	3.3

Station_ID	Date	Measured TSS (mg/L)	USGS Streamflow (CFS)	Sediment Load (tons/day)
Trussville	10/19/1999	3.5	18	0.2
Trussville	10/26/1999	1	12	0
Trussville	1/5/2000	13.2	205	7.3
Trussville	1/10/2000	121	731	238.5
Trussville	1/18/2000	8.4	117	2.6
Trussville	1/24/2000	5.9	588	9.4
Trussville	1/31/2000	2	276	1.5
Trussville	2/7/2000	3.2	108	0.9
Trussville	2/14/2000	170	170	77.9
Trussville	2/24/2000	1	76	0.2
Trussville	2/28/2000	7.8	336	7.1
Trussville	3/6/2000	1	130	0.4
Trussville	3/14/2000	10	382	10.3
Trussville	3/23/2000	12.9	376	13.1
Trussville	3/27/2000	3.8	221	2.3
Trussville	4/4/2000	54	6740	981.3
Trussville	4/12/2000	6.4	242	4.2
Trussville	4/17/2000	3.9	200	2.1
Trussville	4/24/2000	1.5	114	0.5
Trussville	5/1/2000	0.7	77	0.1
Trussville	5/8/2000	2.1	41	0.2
Trussville	5/16/2000	5.3	25	0.4
Trussville	5/23/2000	2.9	43	0.3
Trussville	5/31/2000	6.5	26	0.5
Trussville	6/7/2000	10.7	40	1.2
Trussville	6/13/2000	15.2	17	0.7
Trussville	6/20/2000	37	62	6.2
Trussville	6/27/2000	17.6	35	1.7
Trussville	7/5/2000	7.8	8.7	0.2
Trussville	7/11/2000	7	7.2	0.1
Trussville	7/18/2000	5.4	6	0.1
Trussville	7/25/2000	1	6.8	0
Trussville	8/1/2000	5.6	24	0.4
Trussville	8/7/2000	20	29	1.6
Trussville	8/14/2000	25	28	1.9
Trussville	8/21/2000	18	11	0.5
Trussville	8/28/2000	4.5	9.1	0.1
Trussville	9/5/2000	12	12	0.4

Station_ID	Date	Measured TSS (mg/L)	USGS Streamflow (CFS)	Sediment Load (tons/day)
Shelby Co. Hwy 52	4/7/1999	11.3	460	38.1
Shelby Co. Hwy 52	4/15/1999	14.2	868	47.9
Shelby Co. Hwy 52	4/15/1999	128	868	431.4
Shelby Co. Hwy 52	4/15/1999	292	868	984.1
Shelby Co. Hwy 52	4/16/1999	43	591	144.9
Shelby Co. Hwy 52	4/17/1999	32	376	107.8
Shelby Co. Hwy 52	4/18/1999	12.9	283	43.5
Shelby Co. Hwy 52	5/4/1999	4.9	99	16.5
Shelby Co. Hwy 52	5/5/1999	11.8	116	39.8
Shelby Co. Hwy 52	5/6/1999	376	1180	1267.2
Shelby Co. Hwy 52	5/7/1999	171	1180	576.3
Shelby Co. Hwy 52	5/8/1999	42	528	141.5
Shelby Co. Hwy 52	5/9/1999	50	345	168.5
Shelby Co. Hwy 52	6/22/1999	10.4	86	35
Shelby Co. Hwy 52	6/29/1999	341	8920	1149.2
Shelby Co. Hwy 52	7/7/1999	17.7	355	59.7
Shelby Co. Hwy 52	7/13/1999	44	555	148.3
Shelby Co. Hwy 52	7/20/1999	23.1	274	77.9
Shelby Co. Hwy 52	7/27/1999	15	160	50.6
Shelby Co. Hwy 52	8/3/1999	10.4	72	35
Shelby Co. Hwy 52	8/10/1999	8.2	60	27.6
Shelby Co. Hwy 52	8/17/1999	9.1	52	30.7
Shelby Co. Hwy 52	8/24/1999	9.2	55	31
Shelby Co. Hwy 52	8/31/1999	6.1	46	20.6
Shelby Co. Hwy 52	9/10/1999	1.7	49	5.7
Shelby Co. Hwy 52	9/14/1999	2.3	48	7.8
Shelby Co. Hwy 52	9/21/1999	6.8	58	22.9
Shelby Co. Hwy 52	9/28/1999	3.8	45	12.8
Shelby Co. Hwy 52	10/5/1999	49	100	165.1
Shelby Co. Hwy 52	10/12/1999	31	255	104.5
Shelby Co. Hwy 52	10/19/1999	7.3	56	24.6
Shelby Co. Hwy 52	10/26/1999	1	45	3.4
Shelby Co. Hwy 52	1/4/2000	24	302	80.9
Shelby Co. Hwy 52	1/11/2000	94	992	316.8
Shelby Co. Hwy 52	1/19/2000	9.1	192	30.7
Shelby Co. Hwy 52	1/25/2000	56	591	188.7
Shelby Co. Hwy 52	1/31/2000	6.3	504	21.2
Shelby Co. Hwy 52	2/8/2000	2.6	120	8.8

Station_ID	Date	Measured TSS (mg/L)	USGS Streamflow (CFS)	Sediment Load (tons/day)
Shelby Co. Hwy 52	2/15/2000	4.2	195	14.2
Shelby Co. Hwy 52	2/21/2000	1	104	3.4
Shelby Co. Hwy 52	2/29/2000	18.2	428	61.3
Shelby Co. Hwy 52	3/7/2000	15.6	262	52.6
Shelby Co. Hwy 52	3/13/2000	69	1640	232.5
Shelby Co. Hwy 52	3/15/2000	32	659	107.8
Shelby Co. Hwy 52	3/18/2000	13	379	43.8
Shelby Co. Hwy 52	3/19/2000	498	2200	1678.3
Shelby Co. Hwy 52	3/19/2000	336	2200	1132.4
Shelby Co. Hwy 52	3/20/2000	298	5920	1004.3
Shelby Co. Hwy 52	3/21/2000	117	3020	394.3
Shelby Co. Hwy 52	3/21/2000	124	3020	417.9
Shelby Co. Hwy 52	3/22/2000	99	1540	333.6
Shelby Co. Hwy 52	3/28/2000	17.2	478	58
Shelby Co. Hwy 52	3/29/2000	9.5	382	32
Shelby Co. Hwy 52	3/30/2000	31	700	104.5
Shelby Co. Hwy 52	3/30/2000	64	700	215.7
Shelby Co. Hwy 52	3/31/2000	37	761	124.7
Shelby Co. Hwy 52	4/1/2000	20	539	67.4
Shelby Co. Hwy 52	4/1/2000	19	539	64
Shelby Co. Hwy 52	4/2/2000	279	3930	940.3
Shelby Co. Hwy 52	4/11/2000	33	586	111.2
Shelby Co. Hwy 52	4/18/2000	21.5	410	72.5
Shelby Co. Hwy 52	4/25/2000	9.6	190	32.4
Shelby Co. Hwy 52	5/2/2000	4.5	140	15.2
Shelby Co. Hwy 52	5/9/2000	2.7	95	9.1
Shelby Co. Hwy 52	5/16/2000	3.8	63	12.8
Shelby Co. Hwy 52	5/23/2000	11.7	71	39.4
Shelby Co. Hwy 52	5/30/2000	1	55	3.4
Shelby Co. Hwy 52	6/6/2000	7.5	91	25.3
Shelby Co. Hwy 52	7/27/1999	15	160	50.6
Shelby Co. Hwy 52	8/3/1999	10.4	72	35
Shelby Co. Hwy 52	8/10/1999	8.2	60	27.6
Shelby Co. Hwy 52	8/17/1999	9.1	52	30.7
Shelby Co. Hwy 52	8/24/1999	9.2	55	31
Shelby Co. Hwy 52	8/31/1999	6.1	46	20.6
Shelby Co. Hwy 52	9/10/1999	1.7	49	5.7
Shelby Co. Hwy 52	9/14/1999	2.3	48	7.8

Station_ID	Date	Measured TSS (mg/L)	USGS Streamflow (CFS)	Sediment Load (tons/day)
Shelby Co. Hwy 52	9/21/1999	6.8	58	22.9
Shelby Co. Hwy 52	9/28/1999	3.8	45	12.8
Shelby Co. Hwy 52	10/5/1999	49	100	165.1
Shelby Co. Hwy 52	10/12/1999	31	255	104.5
Shelby Co. Hwy 52	10/19/1999	7.3	56	24.6
Shelby Co. Hwy 52	10/26/1999	1	45	3.4
Shelby Co. Hwy 52	1/4/2000	24	302	80.9
Shelby Co. Hwy 52	1/11/2000	94	992	316.8
Shelby Co. Hwy 52	1/19/2000	9.1	192	30.7
Shelby Co. Hwy 52	1/25/2000	56	591	188.7
Shelby Co. Hwy 52	1/31/2000	6.3	504	21.2
Shelby Co. Hwy 52	2/8/2000	2.6	120	8.8
Shelby Co. Hwy 52	2/15/2000	4.2	195	14.2
Shelby Co. Hwy 52	2/21/2000	1	104	3.4
Shelby Co. Hwy 52	2/29/2000	18.2	428	61.3
Shelby Co. Hwy 52	3/7/2000	15.6	262	52.6
Shelby Co. Hwy 52	3/13/2000	69	1640	232.5
Shelby Co. Hwy 52	3/15/2000	32	659	107.8
Shelby Co. Hwy 52	3/18/2000	13	379	43.8
Shelby Co. Hwy 52	3/19/2000	498	2200	1678.3
Shelby Co. Hwy 52	3/19/2000	336	2200	1132.4
Shelby Co. Hwy 52	3/20/2000	298	5920	1004.3
Shelby Co. Hwy 52	3/21/2000	117	3020	394.3
Shelby Co. Hwy 52	3/21/2000	124	3020	417.9
Shelby Co. Hwy 52	3/22/2000	99	1540	333.6
Shelby Co. Hwy 52	3/28/2000	17.2	478	58
Shelby Co. Hwy 52	3/29/2000	9.5	382	32
Shelby Co. Hwy 52	3/30/2000	31	700	104.5
Shelby Co. Hwy 52	3/30/2000	64	700	215.7
Shelby Co. Hwy 52	3/31/2000	37	761	124.7
Shelby Co. Hwy 52	4/1/2000	20	539	67.4
Shelby Co. Hwy 52	4/1/2000	19	539	64
Shelby Co. Hwy 52	4/2/2000	279	3930	940.3
Shelby Co. Hwy 52	4/11/2000	33	586	111.2
Shelby Co. Hwy 52	4/18/2000	21.5	410	72.5
Shelby Co. Hwy 52	4/25/2000	9.6	190	32.4
Shelby Co. Hwy 52	5/2/2000	4.5	140	15.2
Shelby Co. Hwy 52	5/9/2000	2.7	95	9.1

Station_ID	Date	Measured TSS (mg/L)	USGS Streamflow (CFS)	Sediment Load (tons/day)
Shelby Co. Hwy 52	5/16/2000	3.8	63	12.8
Shelby Co. Hwy 52	5/23/2000	11.7	71	39.4
Shelby Co. Hwy 52	5/30/2000	1	55	3.4
Shelby Co. Hwy 52	6/6/2000	7.5	91	25.3
Shelby Co. Hwy 52	7/27/1999	15	160	50.6
Shelby Co. Hwy 52	8/3/1999	10.4	72	35
Shelby Co. Hwy 52	8/10/1999	8.2	60	27.6
Shelby Co. Hwy 52	8/17/1999	9.1	52	30.7
Shelby Co. Hwy 52	8/24/1999	9.2	55	31
Shelby Co. Hwy 52	8/31/1999	6.1	46	20.6
Shelby Co. Hwy 52	9/10/1999	1.7	49	5.7
Shelby Co. Hwy 52	9/14/1999	2.3	48	7.8
Shelby Co. Hwy 52	9/21/1999	6.8	58	22.9
Shelby Co. Hwy 52	9/28/1999	3.8	45	12.8
Shelby Co. Hwy 52	10/5/1999	49	100	165.1
Shelby Co. Hwy 52	10/12/1999	31	255	104.5
Shelby Co. Hwy 52	10/19/1999	7.3	56	24.6
Shelby Co. Hwy 52	10/26/1999	1	45	3.4
Shelby Co. Hwy 52	1/4/2000	24	302	80.9
Shelby Co. Hwy 52	1/11/2000	94	992	316.8
Shelby Co. Hwy 52	1/19/2000	9.1	192	30.7
Shelby Co. Hwy 52	1/25/2000	56	591	188.7
Shelby Co. Hwy 52	1/31/2000	6.3	504	21.2
Shelby Co. Hwy 52	2/8/2000	2.6	120	8.8
Shelby Co. Hwy 52	2/15/2000	4.2	195	14.2
Shelby Co. Hwy 52	2/21/2000	1	104	3.4
Shelby Co. Hwy 52	2/29/2000	18.2	428	61.3
Shelby Co. Hwy 52	3/7/2000	15.6	262	52.6
Shelby Co. Hwy 52	3/13/2000	69	1640	232.5
Shelby Co. Hwy 52	3/15/2000	32	659	107.8
Shelby Co. Hwy 52	3/18/2000	13	379	43.8
Shelby Co. Hwy 52	3/19/2000	498	2200	1678.3
Shelby Co. Hwy 52	3/19/2000	336	2200	1132.4
Shelby Co. Hwy 52	3/20/2000	298	5920	1004.3
Shelby Co. Hwy 52	3/21/2000	117	3020	394.3
Shelby Co. Hwy 52	3/21/2000	124	3020	417.9
Shelby Co. Hwy 52	3/22/2000	99	1540	333.6
Shelby Co. Hwy 52	3/28/2000	17.2	478	58

Station_ID	Date	Measured TSS (mg/L)	USGS Streamflow (CFS)	Sediment Load (tons/day)
Shelby Co. Hwy 52	3/29/2000	9.5	382	32
Shelby Co. Hwy 52	3/30/2000	31	700	104.5
Shelby Co. Hwy 52	3/30/2000	64	700	215.7
Shelby Co. Hwy 52	3/31/2000	37	761	124.7
Shelby Co. Hwy 52	4/1/2000	20	539	67.4
Shelby Co. Hwy 52	4/1/2000	19	539	64
Shelby Co. Hwy 52	4/2/2000	279	3930	940.3
Shelby Co. Hwy 52	4/11/2000	33	586	111.2
Shelby Co. Hwy 52	4/18/2000	21.5	410	72.5
Shelby Co. Hwy 52	4/25/2000	9.6	190	32.4
Shelby Co. Hwy 52	5/2/2000	4.5	140	15.2
Shelby Co. Hwy 52	5/9/2000	2.7	95	9.1
Shelby Co. Hwy 52	5/16/2000	3.8	63	12.8
Shelby Co. Hwy 52	5/23/2000	11.7	71	39.4
Shelby Co. Hwy 52	5/30/2000	1	55	3.4
Shelby Co. Hwy 52	6/6/2000	7.5	91	25.3
Shelby Co. Hwy 52	7/27/1999	15	160	50.6
Shelby Co. Hwy 52	8/3/1999	10.4	72	35
Shelby Co. Hwy 52	8/10/1999	8.2	60	27.6
Shelby Co. Hwy 52	8/17/1999	9.1	52	30.7
Shelby Co. Hwy 52	8/24/1999	9.2	55	31
Shelby Co. Hwy 52	8/31/1999	6.1	46	20.6
Shelby Co. Hwy 52	9/10/1999	1.7	49	5.7
Shelby Co. Hwy 52	9/14/1999	2.3	48	7.8
Shelby Co. Hwy 52	9/21/1999	6.8	58	22.9
Shelby Co. Hwy 52	9/28/1999	3.8	45	12.8
Shelby Co. Hwy 52	10/5/1999	49	100	165.1
Shelby Co. Hwy 52	10/12/1999	31	255	104.5
Shelby Co. Hwy 52	10/19/1999	7.3	56	24.6
Shelby Co. Hwy 52	10/26/1999	1	45	3.4
Shelby Co. Hwy 52	1/4/2000	24	302	80.9
Shelby Co. Hwy 52	1/11/2000	94	992	316.8
Shelby Co. Hwy 52	1/19/2000	9.1	192	30.7
Shelby Co. Hwy 52	1/25/2000	56	591	188.7
Shelby Co. Hwy 52	1/31/2000	6.3	504	21.2
Shelby Co. Hwy 52	2/8/2000	2.6	120	8.8
Shelby Co. Hwy 52	2/15/2000	4.2	195	14.2
Shelby Co. Hwy 52	2/21/2000	1	104	3.4

Station_ID	Date	Measured TSS (mg/L)	USGS Streamflow (CFS)	Sediment Load (tons/day)
Shelby Co. Hwy 52	2/29/2000	18.2	428	61.3
Shelby Co. Hwy 52	3/7/2000	15.6	262	52.6
Shelby Co. Hwy 52	3/13/2000	69	1640	232.5
Shelby Co. Hwy 52	3/15/2000	32	659	107.8
Shelby Co. Hwy 52	3/18/2000	13	379	43.8
Shelby Co. Hwy 52	3/19/2000	498	2200	1678.3
Shelby Co. Hwy 52	3/19/2000	336	2200	1132.4
Shelby Co. Hwy 52	3/20/2000	298	5920	1004.3
Shelby Co. Hwy 52	3/21/2000	117	3020	394.3
Shelby Co. Hwy 52	3/21/2000	124	3020	417.9
Shelby Co. Hwy 52	3/22/2000	99	1540	333.6
Shelby Co. Hwy 52	3/28/2000	17.2	478	58
Shelby Co. Hwy 52	3/29/2000	9.5	382	32
Shelby Co. Hwy 52	3/30/2000	31	700	104.5
Shelby Co. Hwy 52	3/30/2000	64	700	215.7
Shelby Co. Hwy 52	3/31/2000	37	761	124.7
Shelby Co. Hwy 52	4/1/2000	20	539	67.4
Shelby Co. Hwy 52	4/1/2000	19	539	64
Shelby Co. Hwy 52	4/2/2000	279	3930	940.3
Shelby Co. Hwy 52	4/11/2000	33	586	111.2
Shelby Co. Hwy 52	4/18/2000	21.5	410	72.5
Shelby Co. Hwy 52	4/25/2000	9.6	190	32.4
Shelby Co. Hwy 52	5/2/2000	4.5	140	15.2
Shelby Co. Hwy 52	5/9/2000	2.7	95	9.1
Shelby Co. Hwy 52	5/16/2000	3.8	63	12.8
Shelby Co. Hwy 52	5/23/2000	11.7	71	39.4
Shelby Co. Hwy 52	5/30/2000	1	55	3.4
Shelby Co. Hwy 52	6/6/2000	7.5	91	25.3
Shelby Co. Hwy 52	7/27/1999	15	160	50.6
Shelby Co. Hwy 52	8/3/1999	10.4	72	35
Shelby Co. Hwy 52	8/10/1999	8.2	60	27.6
Shelby Co. Hwy 52	8/17/1999	9.1	52	30.7
Shelby Co. Hwy 52	8/24/1999	9.2	55	31
Shelby Co. Hwy 52	8/31/1999	6.1	46	20.6
Shelby Co. Hwy 52	9/10/1999	1.7	49	5.7
Shelby Co. Hwy 52	9/14/1999	2.3	48	7.8
Shelby Co. Hwy 52	9/21/1999	6.8	58	22.9
Shelby Co. Hwy 52	9/28/1999	3.8	45	12.8

Station_ID	Date	Measured TSS (mg/L)	USGS Streamflow (CFS)	Sediment Load (tons/day)
Shelby Co. Hwy 52	10/5/1999	49	100	165.1
Shelby Co. Hwy 52	10/12/1999	31	255	104.5
Shelby Co. Hwy 52	10/19/1999	7.3	56	24.6
Shelby Co. Hwy 52	10/26/1999	1	45	3.4
Shelby Co. Hwy 52	1/4/2000	24	302	80.9
Shelby Co. Hwy 52	1/11/2000	94	992	316.8
Shelby Co. Hwy 52	1/19/2000	9.1	192	30.7
Shelby Co. Hwy 52	1/25/2000	56	591	188.7
Shelby Co. Hwy 52	1/31/2000	6.3	504	21.2
Shelby Co. Hwy 52	2/8/2000	2.6	120	8.8
Shelby Co. Hwy 52	2/15/2000	4.2	195	14.2
Shelby Co. Hwy 52	2/21/2000	1	104	3.4
Shelby Co. Hwy 52	2/29/2000	18.2	428	61.3
Shelby Co. Hwy 52	3/7/2000	15.6	262	52.6
Shelby Co. Hwy 52	3/13/2000	69	1640	232.5
Shelby Co. Hwy 52	3/15/2000	32	659	107.8
Shelby Co. Hwy 52	3/18/2000	13	379	43.8
Shelby Co. Hwy 52	3/19/2000	498	2200	1678.3
Shelby Co. Hwy 52	3/19/2000	336	2200	1132.4
Shelby Co. Hwy 52	3/20/2000	298	5920	1004.3
Shelby Co. Hwy 52	3/21/2000	117	3020	394.3
Shelby Co. Hwy 52	3/21/2000	124	3020	417.9
Shelby Co. Hwy 52	3/22/2000	99	1540	333.6
Shelby Co. Hwy 52	3/28/2000	17.2	478	58
Shelby Co. Hwy 52	3/29/2000	9.5	382	32
Shelby Co. Hwy 52	3/30/2000	31	700	104.5
Shelby Co. Hwy 52	3/30/2000	64	700	215.7
Shelby Co. Hwy 52	3/31/2000	37	761	124.7
Shelby Co. Hwy 52	4/1/2000	20	539	67.4
Shelby Co. Hwy 52	4/1/2000	19	539	64
Shelby Co. Hwy 52	4/2/2000	279	3930	940.3
Shelby Co. Hwy 52	4/11/2000	33	586	111.2
Shelby Co. Hwy 52	4/18/2000	21.5	410	72.5
Shelby Co. Hwy 52	4/25/2000	9.6	190	32.4
Shelby Co. Hwy 52	5/2/2000	4.5	140	15.2
Shelby Co. Hwy 52	5/9/2000	2.7	95	9.1
Shelby Co. Hwy 52	5/16/2000	3.8	63	12.8
Shelby Co. Hwy 52	5/23/2000	11.7	71	39.4

Station_ID	Date	Measured TSS (mg/L)	USGS Streamflow (CFS)	Sediment Load (tons/day)
Shelby Co. Hwy 52	5/30/2000	1	55	3.4
Shelby Co. Hwy 52	6/6/2000	7.5	91	25.3
Shelby Co. Hwy 52	7/27/1999	15	160	50.6
Shelby Co. Hwy 52	8/3/1999	10.4	72	35
Shelby Co. Hwy 52	8/10/1999	8.2	60	27.6
Shelby Co. Hwy 52	8/17/1999	9.1	52	30.7
Shelby Co. Hwy 52	8/24/1999	9.2	55	31
Shelby Co. Hwy 52	8/31/1999	6.1	46	20.6
Shelby Co. Hwy 52	9/10/1999	1.7	49	5.7
Shelby Co. Hwy 52	9/14/1999	2.3	48	7.8
Shelby Co. Hwy 52	9/21/1999	6.8	58	22.9
Shelby Co. Hwy 52	9/28/1999	3.8	45	12.8
Shelby Co. Hwy 52	10/5/1999	49	100	165.1
Shelby Co. Hwy 52	10/12/1999	31	255	104.5
Shelby Co. Hwy 52	10/19/1999	7.3	56	24.6
Shelby Co. Hwy 52	10/26/1999	1	45	3.4
Shelby Co. Hwy 52	1/4/2000	24	302	80.9
Shelby Co. Hwy 52	1/11/2000	94	992	316.8
Shelby Co. Hwy 52	1/19/2000	9.1	192	30.7
Shelby Co. Hwy 52	1/25/2000	56	591	188.7
Shelby Co. Hwy 52	1/31/2000	6.3	504	21.2
Shelby Co. Hwy 52	2/8/2000	2.6	120	8.8
Shelby Co. Hwy 52	2/15/2000	4.2	195	14.2
Shelby Co. Hwy 52	2/21/2000	1	104	3.4
Shelby Co. Hwy 52	2/29/2000	18.2	428	61.3
Shelby Co. Hwy 52	3/7/2000	15.6	262	52.6
Shelby Co. Hwy 52	3/13/2000	69	1640	232.5
Shelby Co. Hwy 52	3/15/2000	32	659	107.8
Shelby Co. Hwy 52	3/18/2000	13	379	43.8
Shelby Co. Hwy 52	3/19/2000	498	2200	1678.3
Shelby Co. Hwy 52	3/19/2000	336	2200	1132.4
Shelby Co. Hwy 52	3/20/2000	298	5920	1004.3
Shelby Co. Hwy 52	3/21/2000	117	3020	394.3
Shelby Co. Hwy 52	3/21/2000	124	3020	417.9
Shelby Co. Hwy 52	3/22/2000	99	1540	333.6
Shelby Co. Hwy 52	3/28/2000	17.2	478	58
Shelby Co. Hwy 52	3/29/2000	9.5	382	32
Shelby Co. Hwy 52	3/30/2000	31	700	104.5

Station_ID	Date	Measured TSS (mg/L)	USGS Streamflow (CFS)	Sediment Load (tons/day)
Shelby Co. Hwy 52	3/30/2000	64	700	215.7
Shelby Co. Hwy 52	3/31/2000	37	761	124.7
Shelby Co. Hwy 52	4/1/2000	20	539	67.4
Shelby Co. Hwy 52	4/1/2000	19	539	64
Shelby Co. Hwy 52	4/2/2000	279	3930	940.3
Shelby Co. Hwy 52	4/11/2000	33	586	111.2
Shelby Co. Hwy 52	4/18/2000	21.5	410	72.5
Shelby Co. Hwy 52	4/25/2000	9.6	190	32.4
Shelby Co. Hwy 52	5/2/2000	4.5	140	15.2
Shelby Co. Hwy 52	5/9/2000	2.7	95	9.1
Shelby Co. Hwy 52	5/16/2000	3.8	63	12.8
Shelby Co. Hwy 52	5/23/2000	11.7	71	39.4
Shelby Co. Hwy 52	5/30/2000	1	55	3.4
Shelby Co. Hwy 52	6/6/2000	7.5	91	25.3
Shelby Co. Hwy 52	7/27/1999	15	160	50.6
Shelby Co. Hwy 52	8/3/1999	10.4	72	35
Shelby Co. Hwy 52	8/10/1999	8.2	60	27.6
Shelby Co. Hwy 52	8/17/1999	9.1	52	30.7
Shelby Co. Hwy 52	8/24/1999	9.2	55	31
Shelby Co. Hwy 52	8/31/1999	6.1	46	20.6
Shelby Co. Hwy 52	9/10/1999	1.7	49	5.7
Shelby Co. Hwy 52	9/14/1999	2.3	48	7.8
Shelby Co. Hwy 52	9/21/1999	6.8	58	22.9
Shelby Co. Hwy 52	9/28/1999	3.8	45	12.8
Shelby Co. Hwy 52	10/5/1999	49	100	165.1
Shelby Co. Hwy 52	10/12/1999	31	255	104.5
Shelby Co. Hwy 52	10/19/1999	7.3	56	24.6
Shelby Co. Hwy 52	10/26/1999	1	45	3.4
Shelby Co. Hwy 52	1/4/2000	24	302	80.9
Shelby Co. Hwy 52	1/11/2000	94	992	316.8
Shelby Co. Hwy 52	1/19/2000	9.1	192	30.7
Shelby Co. Hwy 52	1/25/2000	56	591	188.7
Shelby Co. Hwy 52	1/31/2000	6.3	504	21.2
Shelby Co. Hwy 52	2/8/2000	2.6	120	8.8
Shelby Co. Hwy 52	2/15/2000	4.2	195	14.2
Shelby Co. Hwy 52	2/21/2000	1	104	3.4
Shelby Co. Hwy 52	2/29/2000	18.2	428	61.3
Shelby Co. Hwy 52	3/7/2000	15.6	262	52.6

Station_ID	Date	Measured TSS (mg/L)	USGS Streamflow (CFS)	Sediment Load (tons/day)
Shelby Co. Hwy 52	3/13/2000	69	1640	232.5
Shelby Co. Hwy 52	3/15/2000	32	659	107.8
Shelby Co. Hwy 52	3/18/2000	13	379	43.8
Shelby Co. Hwy 52	3/19/2000	498	2200	1678.3
Shelby Co. Hwy 52	3/19/2000	336	2200	1132.4
Shelby Co. Hwy 52	3/20/2000	298	5920	1004.3
Shelby Co. Hwy 52	3/21/2000	117	3020	394.3
Shelby Co. Hwy 52	3/21/2000	124	3020	417.9
Shelby Co. Hwy 52	3/22/2000	99	1540	333.6
Shelby Co. Hwy 52	3/28/2000	17.2	478	58
Shelby Co. Hwy 52	3/29/2000	9.5	382	32
Shelby Co. Hwy 52	3/30/2000	31	700	104.5
Shelby Co. Hwy 52	3/30/2000	64	700	215.7
Shelby Co. Hwy 52	3/31/2000	37	761	124.7
Shelby Co. Hwy 52	4/1/2000	20	539	67.4
Shelby Co. Hwy 52	4/1/2000	19	539	64
Shelby Co. Hwy 52	4/2/2000	279	3930	940.3
Shelby Co. Hwy 52	4/11/2000	33	586	111.2
Shelby Co. Hwy 52	4/18/2000	21.5	410	72.5
Shelby Co. Hwy 52	4/25/2000	9.6	190	32.4
Shelby Co. Hwy 52	5/2/2000	4.5	140	15.2
Shelby Co. Hwy 52	5/9/2000	2.7	95	9.1
Shelby Co. Hwy 52	5/16/2000	3.8	63	12.8
Shelby Co. Hwy 52	5/23/2000	11.7	71	39.4
Shelby Co. Hwy 52	5/30/2000	1	55	3.4
Shelby Co. Hwy 52	6/6/2000	7.5	91	25.3
Shelby Co. Hwy 52	6/13/2000	1.9	44	6.4
Shelby Co. Hwy 52	6/20/2000	35	125	118
Shelby Co. Hwy 52	6/26/2000	10.5	60	35.4
Shelby Co. Hwy 52	7/11/2000	11	33	37.1
Shelby Co. Hwy 52	7/18/2000	12	32	40.4
Shelby Co. Hwy 52	7/24/2000	9.5	37	32
Shelby Co. Hwy 52	8/2/2000	19	213	64
Shelby Co. Hwy 52	8/9/2000	13	41	43.8
Shelby Co. Hwy 52	8/16/2000	11	36	37.1
Shelby Co. Hwy 52	8/23/2000	10	31	33.7
Shelby Co. Hwy 52	8/30/2000	27	32	91
Shelby Co. Hwy 52	9/7/2000	5.2	32	17.5

Station_ID	Date	Measured TSS (mg/L)	USGS Streamflow (CFS)	Sediment Load (tons/day)
Bain's Bridge	1/5/1999	14.8	745	29.7
Bain's Bridge	1/12/1999	7.6	329	6.7
Bain's Bridge	1/20/1999	6.4	232	4
Bain's Bridge	1/26/1999	23.3	671	42.2
Bain's Bridge	2/2/1999	43	2570	298
Bain's Bridge	2/9/1999	11.8	411	13.1
Bain's Bridge	2/16/1999	5.1	238	3.3
Bain's Bridge	2/24/1999	8.5	325	7.4
Bain's Bridge	3/10/1999	21.8	1390	81.7
Bain's Bridge	3/23/1999	7.5	415	8.4
Bain's Bridge	4/7/1999	6.9	460	8.6
Bain's Bridge	4/14/1999	2.7	175	1.3
Bain's Bridge	4/21/1999	7.2	181	3.5
Bain's Bridge	4/28/1999	19.9	420	22.5
Bain's Bridge	5/5/1999	8.1	116	2.5
Bain's Bridge	5/12/1999	12.2	234	7.7
Bain's Bridge	5/19/1999	56	323	48.8
Bain's Bridge	5/26/1999	10.2	104	2.9
Bain's Bridge	6/8/1999	13.5	141	5.1
Bain's Bridge	6/15/1999	469	1920	2427.8
Bain's Bridge	7/7/1999	12.2	355	11.7
Bain's Bridge	7/13/1999	38	555	56.9
Bain's Bridge	7/20/1999	10.4	274	7.7
Bain's Bridge	7/27/1999	5.8	160	2.5
Bain's Bridge	8/3/1999	7.9	72	1.5
Bain's Bridge	8/10/1999	6.4	60	1
Bain's Bridge	8/17/1999	7.4	52	1
Bain's Bridge	8/24/1999	4.4	55	0.7
Bain's Bridge	8/31/1999	2	46	0.2
Bain's Bridge	9/7/1999	6.2	49	0.8
Bain's Bridge	9/14/1999	1.8	48	0.2
Bain's Bridge	9/21/1999	6.8	58	1.1
Bain's Bridge	9/28/1999	3.3	45	0.4
Bain's Bridge	10/5/1999	21.4	100	5.8
Bain's Bridge	10/12/1999	25	255	17.2
Bain's Bridge	10/19/1999	9.7	56	1.5
Bain's Bridge	10/26/1999	1.3	45	0.2
Bain's Bridge	1/4/2000	25.4	170	123.3
Bain's Bridge	1/11/2000	68	707	330
Bain's Bridge	1/19/2000	8.6	102	41.7
Bain's Bridge	1/25/2000	51	448	247.5
Bain's Bridge	1/31/2000	7.8	353	37.9
Bain's Bridge	2/8/2000	4.9	58	23.8
Bain's Bridge	2/15/2000	0.1	126	0.5
Bain's Bridge	2/21/2000	1.9	49	9.2
Bain's Bridge	2/29/2000	17.8	270	86.4
Bain's Bridge	3/7/2000	10.9	157	52.9
Bain's Bridge	3/13/2000	66	1090	320.3
Bain's Bridge	3/21/2000	99	1990	480.5
Bain's Bridge	3/28/2000	47	312	228.1
Bain's Bridge	4/11/2000	13.1	423	63.6
Bain's Bridge	4/18/2000	11.9	298	57.8
Bain's Bridge	4/25/2000	8.6	131	41.7
Bain's Bridge	5/2/2000	4.2	73	20.4
Bain's Bridge	5/9/2000	4.6	35	22.3
Bain's Bridge	5/16/2000	0.4	29	1.9
Bain's Bridge	5/23/2000	5.9	34	28.6
Bain's Bridge	5/30/2000	6	29	29.1
Bain's Bridge	6/6/2000	6.9	40	33.5
Bain's Bridge	6/13/2000	5.4	25	26.2
Bain's Bridge	6/20/2000	29	67	140.7
Bain's Bridge	6/27/2000	6	42	29.1
Bain's Bridge	7/11/2000	12	23	58.2
Bain's Bridge	7/18/2000	3.9	25	18.9
Bain's Bridge	7/24/2000	13	33	63.1
Bain's Bridge	8/2/2000	6.9	217	33.5
Bain's Bridge	8/9/2000	5.8	44	28.1
Bain's Bridge	8/16/2000	17	26	82.5
Bain's Bridge	8/23/2000	8.5	23	41.3
Bain's Bridge	8/30/2000	2	21	9.7
Bain's Bridge	9/7/2000	3.4	22	16.5
Hoover	1/5/1999	14.2	382	14.6
Hoover	1/12/1999	8.7	203	4.8
Hoover	1/20/1999	8	127	2.7
Hoover	1/26/1999	23.5	455	28.8
Hoover	2/2/1999	28.9	1750	136.4

Station_ID	Date	Measured TSS (mg/L)	USGS Streamflow (CFS)	Sediment Load (tons/day)
Hoover	2/9/1999	13.1	283	10
Hoover	2/16/1999	6.2	119	2
Hoover	2/24/1999	6.7	218	3.9
Hoover	3/3/1999	97	1390	363.5
Hoover	3/10/1999	23.8	916	58.8
Hoover	3/16/1999	31	1060	88.6
Hoover	3/23/1999	6.1	274	4.5
Hoover	3/30/1999	1.8	207	1
Hoover	4/7/1999	5.8	288	4.5
Hoover	4/7/1999	11.4	288	8.9
Hoover	4/14/1999	5.4	84	1.2
Hoover	4/15/1999	3.2	499	4.3
Hoover	4/15/1999	377	499	507.2
Hoover	4/15/1999	57	499	76.7
Hoover	4/16/1999	30	403	32.6
Hoover	4/17/1999	19.2	234	12.1
Hoover	4/18/1999	15.7	164	6.9
Hoover	4/21/1999	2.2	89	0.5
Hoover	4/28/1999	53	311	44.4
Hoover	5/4/1999	4.4	46	0.5
Hoover	5/5/1999	10.3	49	1.4
Hoover	5/5/1999	5.6	49	0.7
Hoover	5/6/1999	464	861	1077.1
Hoover	5/6/1999	91	861	211.2
Hoover	5/7/1999	112	770	232.5
Hoover	5/8/1999	135	373	135.8
Hoover	5/9/1999	22.9	231	14.3
Hoover	5/12/1999	13.3	105	3.8
Hoover	5/19/1999	66	238	42.4
Hoover	5/26/1999	8	53	1.1
Hoover	6/2/1999	11.6	173	5.4
Hoover	6/8/1999	14.8	87	3.5
Hoover	6/15/1999	358	1720	1660.2
Hoover	6/22/1999	8.7	62	1.5
Hoover	6/30/1999	108	2940	856.1
Hoover	7/7/1999	19.3	253	13.2
Hoover	7/13/1999	34	441	40.4
Hoover	7/20/1999	14.3	236	9.1

Station_ID	Date	Measured TSS (mg/L)	USGS Streamflow (CFS)	Sediment Load (tons/day)
Hoover	7/27/1999	7.5	92	1.9
Hoover	8/3/1999	9.4	42	1.1
Hoover	8/10/1999	7	31	0.6
Hoover	8/17/1999	5.8	28	0.4
Hoover	8/24/1999	2.5	31	0.2
Hoover	8/31/1999	4.2	25	0.3
Hoover	9/10/1999	8.1	28	0.6
Hoover	9/14/1999	1.2	27	0.1
Hoover	9/21/1999	4.6	32	0.4
Hoover	9/28/1999	2	23	0.1
Hoover	10/5/1999	15	33	1.3
Hoover	10/12/1999	23	128	7.9
Hoover	10/19/1999	6.8	26	0.5
Hoover	10/26/1999	3.1	25	0.2
Hoover	1/4/2000	38	170	17.4
Hoover	1/11/2000	76	707	144.9
Hoover	1/19/2000	11	102	3
Hoover	1/25/2000	44	448	53.1
Hoover	2/2/2000	3.9	220	2.3
Hoover	2/8/2000	2.7	58	0.4
Hoover	2/15/2000	0.4	126	0.1
Hoover	2/22/2000	1	41	0.1
Hoover	2/29/2000	17.5	270	12.7
Hoover	3/7/2000	12	157	5.1
Hoover	4/15/1999	377	499	507.2
Hoover	4/15/1999	57	499	76.7
Hoover	4/16/1999	30	403	32.6
Hoover	4/17/1999	19.2	234	12.1
Hoover	4/18/1999	15.7	164	6.9
Hoover	4/21/1999	2.2	89	0.5
Hoover	4/28/1999	53	311	44.4
Hoover	5/4/1999	4.4	46	0.5
Hoover	5/5/1999	10.3	49	1.4
Hoover	5/5/1999	5.6	49	0.7
Hoover	5/6/1999	464	861	1077.1
Hoover	5/6/1999	91	861	211.2
Hoover	5/7/1999	112	770	232.5
Hoover	5/8/1999	135	373	135.8

Station_ID	Date	Measured TSS (mg/L)	USGS Streamflow (CFS)	Sediment Load (tons/day)
Hoover	5/9/1999	22.9	231	14.3
Hoover	5/12/1999	13.3	105	3.8
Hoover	5/19/1999	66	238	42.4
Hoover	5/26/1999	8	53	1.1
Hoover	6/2/1999	11.6	173	5.4
Hoover	6/8/1999	14.8	87	3.5
Hoover	6/15/1999	358	1720	1660.2
Hoover	6/22/1999	8.7	62	1.5
Hoover	6/30/1999	108	2940	856.1
Hoover	7/7/1999	19.3	253	13.2
Hoover	7/13/1999	34	441	40.4
Hoover	7/20/1999	14.3	236	9.1
Hoover	7/27/1999	7.5	92	1.9
Hoover	8/3/1999	9.4	42	1.1
Hoover	8/10/1999	7	31	0.6
Hoover	8/17/1999	5.8	28	0.4
Hoover	8/24/1999	2.5	31	0.2
Hoover	8/31/1999	4.2	25	0.3
Hoover	9/10/1999	8.1	28	0.6
Hoover	9/14/1999	1.2	27	0.1
Hoover	9/21/1999	4.6	32	0.4
Hoover	9/28/1999	2	23	0.1
Hoover	10/5/1999	15	33	1.3
Hoover	10/12/1999	23	128	7.9
Hoover	10/19/1999	6.8	26	0.5
Hoover	10/26/1999	3.1	25	0.2
Hoover	1/4/2000	38	170	17.4
Hoover	1/11/2000	76	707	144.9
Hoover	1/19/2000	11	102	3
Hoover	1/25/2000	44	448	53.1
Hoover	2/2/2000	3.9	220	2.3
Hoover	2/8/2000	2.7	58	0.4
Hoover	2/15/2000	0.4	126	0.1
Hoover	2/22/2000	1	41	0.1
Hoover	2/29/2000	17.5	270	12.7
Hoover	3/7/2000	12	157	5.1
Hoover	3/14/2000	35	717	67.7
Hoover	3/15/2000	4.5	503	6.1
Hoover	3/18/2000	12.4	247	8.3
Hoover	3/19/2000	115	1530	474.4
Hoover	3/19/2000	701	1530	2891.7
Hoover	3/20/2000	370	4890	4878.1
Hoover	3/21/2000	77	1990	413.1
Hoover	3/21/2000	105	1990	563.4
Hoover	3/22/2000	37	1000	99.8
Hoover	3/28/2000	13.6	312	11.4
Hoover	3/29/2000	9	242	5.9
Hoover	3/30/2000	139	622	233.1
Hoover	3/30/2000	53	622	88.9
Hoover	3/31/2000	39	601	63.2
Hoover	4/1/2000	19	408	20.9
Hoover	4/2/2000	362	2900	2830.4
Hoover	4/6/2000	65	1770	310.2
Hoover	4/11/2000	16.7	423	19
Hoover	4/18/2000	9.2	298	7.4
Hoover	4/25/2000	6.7	131	2.4
Hoover	5/2/2000	6	73	1.2
Hoover	5/9/2000	2.9	35	0.3
Hoover	5/16/2000	9.8	29	0.8
Hoover	5/23/2000	1.1	34	0.1
Hoover	5/30/2000	5.9	29	0.5
Hoover	6/6/2000	7	40	0.8
Hoover	6/13/2000	30	25	2
Hoover	6/20/2000	110	67	19.9
Hoover	6/26/2000	15.1	28	1.1
Hoover	7/6/2000	4.6	23	0.3
Hoover	7/11/2000	5.4	23	0.3
Hoover	7/18/2000	3.3	25	0.2
Hoover	7/25/2000	5.4	33	0.5
Hoover	8/2/2000	9.6	217	5.6
Hoover	8/9/2000	11	44	1.3
Hoover	8/16/2000	16	26	1.1
Hoover	8/23/2000	14	23	0.9
Hoover	8/30/2000	7.3	21	0.4
Hoover	9/7/2000	9.5	22	0.6
Caldwell Mill Road	1/12/1999	8.3	185	4.1

Station_ID	Date	Measured TSS (mg/L)	USGS Streamflow (CFS)	Sediment Load (tons/day)
Caldwell Mill Road	1/20/1999	11	120	3.6
Caldwell Mill Road	1/26/1999	25	417	28.1
Caldwell Mill Road	2/2/1999	25	1810	122
Caldwell Mill Road	2/9/1999	8.9	247	5.9
Caldwell Mill Road	2/16/1999	4.6	98	1.2
Caldwell Mill Road	2/24/1999	4.3	193	2.2
Caldwell Mill Road	3/10/1999	19	928	47.5
Caldwell Mill Road	3/23/1999	5.1	243	3.3
Caldwell Mill Road	4/7/1999	7.5	251	5.1
Caldwell Mill Road	4/14/1999	4.2	75	0.8
Caldwell Mill Road	4/15/1999	3.1	401	3.4
Caldwell Mill Road	4/15/1999	37	401	40
Caldwell Mill Road	4/15/1999	13.7	401	14.8
Caldwell Mill Road	4/15/1999	3.1	401	3.4
Caldwell Mill Road	4/15/1999	37	401	40
Caldwell Mill Road	4/15/1999	13.7	401	14.8
Caldwell Mill Road	4/16/1999	88	345	81.9
Caldwell Mill Road	4/17/1999	14.6	201	7.9
Caldwell Mill Road	4/18/1999	10.7	144	4.2
Caldwell Mill Road	4/21/1999	5	81	1.1
Caldwell Mill Road	4/28/1999	36	273	26.5
Caldwell Mill Road	5/4/1999	2.4	34	0.2
Caldwell Mill Road	5/5/1999	4.1	36	0.4
Caldwell Mill Road	5/5/1999	3.6	36	0.3
Caldwell Mill Road	5/6/1999	47	808	102.4
Caldwell Mill Road	5/6/1999	89	808	193.9
Caldwell Mill Road	5/7/1999	67	738	133.3
Caldwell Mill Road	5/8/1999	112	324	97.8
Caldwell Mill Road	5/9/1999	15	203	8.2
Caldwell Mill Road	5/12/1999	8.2	93	2.1
Caldwell Mill Road	5/19/1999	30	211	17.1
Caldwell Mill Road	5/26/1999	7.1	40	0.8
Caldwell Mill Road	6/8/1999	8	71	1.5
Caldwell Mill Road	6/15/1999	73	1750	344.4
Caldwell Mill Road	6/29/1999	156	8380	3524.6
Caldwell Mill Road	7/7/1999	9.9	231	6.2
Caldwell Mill Road	7/13/1999	15.7	393	16.6
Caldwell Mill Road	7/20/1999	8.8	233	5.5

Station_ID	Date	Measured TSS (mg/L)	USGS Streamflow (CFS)	Sediment Load (tons/day)
Caldwell Mill Road	7/27/1999	9.1	81	2
Caldwell Mill Road	8/3/1999	9.2	26	0.6
Caldwell Mill Road	8/10/1999	5.7	12	0.2
Caldwell Mill Road	8/17/1999	10.8	9.9	0.3
Caldwell Mill Road	8/24/1999	6.2	13	0.2
Caldwell Mill Road	8/31/1999	4.4	8.3	0.1
Caldwell Mill Road	9/7/1999	15	27	1.1
Caldwell Mill Road	9/14/1999	2.1	16	0.1
Caldwell Mill Road	9/21/1999	4.3	19	0.2
Caldwell Mill Road	9/28/1999	0.6	7.3	0
Caldwell Mill Road	10/5/1999	28	19	1.4
Caldwell Mill Road	10/12/1999	31	129	10.8
Caldwell Mill Road	10/19/1999	7.9	13	0.3
Caldwell Mill Road	10/26/1999	4	17	0.2
Caldwell Mill Road	1/4/2000	13.6	136	5
Caldwell Mill Road	1/11/2000	40	616	66.4
Caldwell Mill Road	1/19/2000	12.2	76	2.5
Caldwell Mill Road	1/25/2000	33	386	34.3
Caldwell Mill Road	1/31/2000	7.5	302	6.1
Caldwell Mill Road	2/8/2000	2.4	34	0.2
Caldwell Mill Road	2/15/2000	3.9	107	1.1
Caldwell Mill Road	2/21/2000	5.7	25	0.4
Caldwell Mill Road	2/29/2000	24	236	15.3
Caldwell Mill Road	3/7/2000	22.9	131	8.1
Caldwell Mill Road	3/13/2000	41	1080	119.4
Caldwell Mill Road	3/15/2000	11.7	442	13.9
Caldwell Mill Road	3/18/2000	8.3	222	5
Caldwell Mill Road	3/19/2000	60	1400	226.5
Caldwell Mill Road	3/19/2000	171	1400	645.5
Caldwell Mill Road	3/20/2000	496	4730	6325.4
Caldwell Mill Road	3/21/2000	65	1940	340
Caldwell Mill Road	3/22/2000	20.7	994	55.5
Caldwell Mill Road	3/28/2000	6.6	277	4.9
Caldwell Mill Road	3/29/2000	6.8	220	4
Caldwell Mill Road	3/30/2000	61	594	97.7
Caldwell Mill Road	3/30/2000	19.8	594	31.7
Caldwell Mill Road	3/30/2000	61	594	97.7
Caldwell Mill Road	3/30/2000	19.8	594	31.7

Station_ID	Date	Measured TSS (mg/L)	USGS Streamflow (CFS)	Sediment Load (tons/day)
Caldwell Mill Road	3/31/2000	19.7	537	28.5
Caldwell Mill Road	4/1/2000	11	359	10.6
Caldwell Mill Road	4/2/2000	290	2750	2150.2
Caldwell Mill Road	4/11/2000	5.4	376	5.5
Caldwell Mill Road	4/17/2000	4.5	316	3.8
Caldwell Mill Road	4/24/2000	5	138	1.9
Caldwell Mill Road	5/1/2000	6	45	0.7
Caldwell Mill Road	5/8/2000	1.2	18	0.1
Caldwell Mill Road	5/16/2000	2.9	10	0.1
Caldwell Mill Road	5/23/2000	14.9	16	0.6
Caldwell Mill Road	5/31/2000	1.8	29	0.1
Caldwell Mill Road	6/7/2000	6.5	18	0.3
Caldwell Mill Road	6/13/2000	2	10	0.1
Caldwell Mill Road	6/20/2000	11.6	47	1.5
Caldwell Mill Road	6/27/2000	3.7	27	0.3
Caldwell Mill Road	7/11/2000	4.3	6.6	0.1
Caldwell Mill Road	7/18/2000	5	7.5	0.1
Caldwell Mill Road	7/24/2000	7.5	25	0.5
Caldwell Mill Road	8/2/2000	5.1	83	1.1
Caldwell Mill Road	8/9/2000	7.1	35	0.7
Caldwell Mill Road	8/16/2000	4.1	9.9	0.1
Caldwell Mill Road	8/23/2000	3.1	6.9	0.1
Caldwell Mill Road	8/30/2000	0.2	7.3	0
Caldwell Mill Road	9/7/2000	32	7.7	0.7

12.0 APPENDIX B: NPDES PERMIT INFORMATION

Disclaimer: The Department has gone to great lengths to identify any and all discharges affected by this TMDL. However, these tables only represent a snapshot in time and do not necessarily include ***every*** permittee/discharge affected. All current and future NPDES-regulated facilities located in the impaired portions of Cahaba River watershed must comply with applicable requirements of this TMDL. It should also be noted that a single permittee may have multiple outfalls, all of which will be addressed by this TMDL if they fall within the impairment area.

Appendix Table 2: Industrial General Permits

Permit Number	Facility Name	Receiving Water	County
AL0081019	Cooper Marine and Timberlands	WARRIOR RIVER	Jefferson
ALG020001	Warrior Roofing Manufacturing Inc	WARRIOR RIVER	Tuscaloosa
ALG020005	APAC Mid-South, Inc.	Buck Creek	Shelby
ALG020006	Dunn Construction Co Inc	Village Creek	Jefferson
ALG020007	Black Warrior Roofing Inc	BLACK WARRIOR RIVER	Tuscaloosa
ALG020008	Southeastern Asphalt Products Inc	BLACK WARRIOR RIVER	Tuscaloosa
ALG020033	Dunn Construction Co Inc	Five Mile Creek	Jefferson
ALG020047	S T Bunn Construction Co Inc	Cypress Creek	Tuscaloosa
ALG020056	Ergon Terminaling Inc	Short Creek	Jefferson
ALG020057	Warrior Asphalt Refining Corporation		Tuscaloosa
ALG020076	Gac Springville Inc	Little Canoe Creek	St Clair
ALG020077	QMA Products Inc	BLACK WARRIOR RIVER	Tuscaloosa
ALG020088	Dunn Construction Co Inc	Buck Creek	Shelby
ALG020104	TAMKO Building Products, Inc.	BLACK WARRIOR RIVER	Tuscaloosa
ALG020113	Good Hope Contracting Inc	Village Creek	Jefferson
ALG020136	Good Hope Contracting Co Inc	MUCKLEROY CREEK	St Clair
ALG020161	Kelly Construction Co Inc	Shoal Creek	Shelby
ALG020164	Quality Asphalt	Five Mile Creek	Jefferson
ALG020194	Dunn Construction Company, Inc.	Buck Creek	Shelby
ALG020196	Wiregrass Construction Company, Inc.	Dry Creek	Shelby
ALG030009	Woods Surfside Marina	Logan Martin Reservoir	St Clair
ALG060005	Scott Davis Chip Co Inc	Haysop Creek	Bibb
ALG060007	W G Sullivan Lumber Co Inc	TILLY BRANCH	Tuscaloosa
ALG060019	Kykenkee, Inc.	Cahaba River	Bibb
ALG060027	Fitts Industries Inc	BLACK WARRIOR RIVER	Tuscaloosa
ALG060040	Kykenkee Inc	Rum Creek	Tuscaloosa
ALG060082	Cahaba Veneer Inc	Cahaba River	Bibb
ALG060100	Georgia Pacific Wood Products South LLC	Yellow Leaf Creek	Chilton
ALG060222	Kykenkee, Inc.	BANKS CREEK	Tuscaloosa
ALG060228	Cooper Marine and Timberlands	WARRIOR RIVER	Jefferson
ALG060250	Scotts Co	Hill Creek	Tuscaloosa
ALG060285	Legacy Cabinets LLC	Eastaboga Creek	St Clair
ALG060310	United Plywoods And Lumber Inc	NABORS BRANCH	Jefferson
ALG060390	Rose Lumber Company LLC	Two Mile Creek	Tuscaloosa
ALG060391	Wards Cabinetry LLC	Cedar Creek	Chilton
ALG060396	Sims Bark Company Inc	Haysop Creek	Bibb
ALG060401	Woodgrain Millwork, Inc.	Shoal Creek	Shelby
ALG060452	Cahaba Pressure Treated Forest Products	SIX MILE CREEK	Bibb
ALG110008	North Alabama Concrete	MORGAN CREEK	Tuscaloosa
ALG110021	Bama Concrete Products Co Inc	Cribbs Mill Creek	Tuscaloosa
ALG110062	Warrior Operations Inc	Locust Fork	Jefferson
ALG110064	Ready Mix Usa LLC	VALLEY CREEKSTORM SEWER	Jefferson
ALG110066	Ready Mix Usa LLC	Shades Creek	Jefferson
ALG110067	Kirkpatrick Concrete Inc Bessemer	Valley Creek	Jefferson
ALG110071	West Alabama Concrete Inc	Mill Creek	Tuscaloosa
ALG110080	Ready Mix Usa LLC	WARRIOR RIVER	Tuscaloosa
ALG110108	Mitchell Concrete Pipe Company Inc	Buck Creek	Shelby
ALG110109	Kirkpatrick Concrete Inc	Village Creek	Jefferson
ALG110113	Kirkpatrick Concrete Inc	Stinking Creek	Jefferson
ALG110114	Shelby Concrete Co Inc	Yellow Leaf Creek	Chilton
ALG110116	Bama Concrete Birmingham	Cahaba River	Jefferson
ALG110117	Bama Concrete	Cahaba River	Jefferson
ALG110160	Sherman Industries, LLC	LAKE PURDY	Shelby
ALG110161	Hanson Pipe & Precast, LLC	Cahaba Valley Creek	Shelby
ALG110162	Sherman Industries, LLC	Dry Creek	Shelby
ALG110163	Sherman Industries, LLC	Dry Creek	Jefferson
ALG110204	Ready Mix Usa LLC	Buxahatchee Creek	Shelby
ALG110208	Southern Company Services	COOSA RIVER	Shelby
ALG110221	Ready Mix Usa LLC	POLEY BRIDGE CREEK	Chilton
ALG110231	Quikrete Companies Inc	Shades Creek	Jefferson
ALG110235	Kirkpatrick Concrete Inc	WEST BRANCH FISHING CREEKSS	St Clair
ALG110247	Ready Mix Usa LLC	PEA VINE CREEK	Shelby
ALG110261	Bama Concrete	Buck Creek	Shelby
ALG110263	Kirkpatrick Concrete Inc	KERR BRANCH	St Clair
ALG110266	Kirkpatrick Concrete Inc	Buck Creek	Shelby
ALG110269	Ready Mix Usa LLC	Buck Creek	Shelby
ALG110272	Ready Mix Usa LLC	Five Mile Creek	Jefferson
ALG110273	Ready Mix Usa LLC	LITTLE NORTH FORK CREEK	Shelby
ALG110290	Sherman Industries, LLC	LITTLE CAHABA	Jefferson
ALG110291	Valmont Newmark	Cribbs Mill Creek	Tuscaloosa
ALG110297	Kirkpatrick Concrete Inc	Muddy Prong	Shelby
ALG110299	Bama Concrete Products Co Inc	GILES LAKE	Bibb
ALG110315	Kirkpatrick Concrete Inc	Newfound Creek	Jefferson
ALG110316	Ready Mix Usa LLC	VILLAGE CREEKSTORM SEWER	Jefferson
ALG110330	Ready Mix Usa LLC	Little Hurricane Creek	Tuscaloosa
ALG110331	Throckmorton Precast Concrete Inc	Clear Creek	Chilton
ALG110342	Bama Concrete Products Co Inc	Cahaba River	Bibb
ALG110357	Sherman Industries, LLC	Buck Creek	Shelby
ALG110369	Seales Concrete	Mulberry Creek	Chilton
ALG110372	Bama Concrete Products Co Inc	Five Mile Creek	Jefferson
ALG110378	Ready Mix USA	Big Black Creek	St Clair
ALG110386	Freeman Septic Tank Inc	Yellow Leaf Creek	Shelby
ALG110389	Webb Concrete And Building Materials	WEST BRANCH FISHING CREEK	St Clair
ALG110400	All American Concrete Company	Village Creek	Jefferson
ALG110402	Hanson Pipe & Precast, LLC	Cahaba Valley Creek	Shelby
ALG110403	Modular Connections LLC	Moore Brook	Jefferson
ALG110404	Wells Septic Tank Service Inc	Leather Creek	St Clair
ALG110411	Bama Concrete Products Co., Inc.	TATER HILL CREEK	Tuscaloosa
ALG110440	Block USA	Buck Creek	Shelby
ALG110447	McCarthy-Improvement Company, Inc.	Patton Creek	Jefferson
ALG110448	Ready Mix USA, LLC	Dry Creek	Shelby
ALG110453	APAC Tennessee, Inc. Memphis Division	Village Creek	Jefferson
ALG120010	National Metals Inc	Little Cahaba River	Jefferson
ALG120012	Steward Machine Company Inc	Village Creek	Jefferson
ALG120013	Steward Machine Company Inc	Village Creek	Jefferson
ALG120014	M And B Metal Products Co Inc	Dry Creek	Jefferson
ALG120038	Steel City Bolt And Screw LLC	Shades Creek	Jefferson
ALG120041	Anderson Electrical Products Inc	Little Cahaba River	Jefferson

Permit Number	Facility Name	Receiving Water	County
ALG120044	Dag Partners	Rum Creek	Shelby
ALG120050	Hanna Steel Corporation	TATER HILL CREEK	Tuscaloosa
ALG120054	Kaiser Aircraft Indutries, Inc.	Village Creek	Jefferson
ALG120082	Metso Minerals Inc	Village Creek	Jefferson
ALG120083	Hardie Tynes Inc	Village Creek	Jefferson
ALG120084	Ikg Industries	Dry Creek	Jefferson
ALG120086	Alabama Metal Industries Corp	Valley Creek	Jefferson
ALG120093	Metalplate Galvanizing Lp	T VALLEY CREEK	Jefferson
ALG120094	Metalplate Galvanizing Lp	Village Creek	Jefferson
ALG120097	Thompson Fabricating Co Inc	DRAINAGE DITCH FIVE MILE CREEK	Jefferson
ALG120113	W J Bullock Inc	Opossum Creek	Jefferson
ALG120117	Southern Heat Exchange Corp	WARRIOR RIVER	Tuscaloosa
ALG120135	Tommie Corporation	GALE CREEK	Chilton
ALG120139	Altec Industries Inc	Village Creek	Jefferson
ALG120146	Hudco Development, LLC	Rice Creek	Jefferson
ALG120161	Western Pipe Services	HUEY CREEK	Jefferson
ALG120162	Bayliss Machine And Welding Co	Village Creek	Jefferson
ALG120170	Ebsco Industries Inc	KERR BRANCH	St Clair
ALG120187	Amerex Corporation	Little Cahaba River	Jefferson
ALG120188	Hanna Steel Corp	Opossum Creek	Jefferson
ALG120190	Metrock Steel And Wire Co Inc		Shelby
ALG120195	L B Foster Company	Valley Creek	Jefferson
ALG120200	Vulcan Threaded Products Inc	Cahaba Valley Creek	Shelby
ALG120205	Nutec Metal Finishing LLC	FIVE MILE CREEK CUNNINGHAM CR	Jefferson
ALG120213	Self Industries Inc	PINCHGCREEK	Jefferson
ALG120217	Berman Bros Iron And Metal Co	Village Creek	Jefferson
ALG120220	Southeastern Plate Works LLC	Cunningham Creek	Jefferson
ALG120239	Fontaine Trailer Co	Little Canoe Creek	St Clair
ALG120243	Dayton Superior Manufacturing	Cunningham Creek	Jefferson
ALG120246	Alabama Copper And Bronze Co Inc	Cunningham Creek	Jefferson
ALG120260	Maclean Bethea Power Products Inc	Buck Creek	Shelby
ALG120264	Schreiber LLC	Cahaba River	Jefferson
ALG120268	Precision Husky Corp	Little Cahaba River	St Clair
ALG120276	White Fab Inc	Village Creek	Jefferson
ALG120291	Tubular Products Company	Cunningham Creek	Jefferson
ALG120292	Birmingham Fastener Inc	Village Creek	Jefferson
ALG120296	Mc B Steel Inc	Valley Creek	Jefferson
ALG120323	Dogan Metal Products	Cribbs Mill Creek	Tuscaloosa
ALG120342	Vulcan Electro Coating Inc	UT Waxahtachee Creek	Shelby
ALG120347	Mid South Steel Inc	Cahaba Valley Creek	Shelby
ALG120348	Alco Machine Company Inc	Village Creek	Jefferson
ALG120349	Southeastern Anodizing Co Inc	WALNCREEK	Chilton
ALG120351	Daniel Industrial Metals	Cahaba River	Jefferson
ALG120353	Mercedes-Benz U.S. International, Inc	Hurricane Creek	Tuscaloosa
ALG120359	M And J Materials Inc	LITTLE CAHABA CREEK	Jefferson
ALG120361	ZF Lemforder Corp	TATER HILL CREEK	Tuscaloosa
ALG120365	JWF Industries Inc	Little Cahaba River	Jefferson
ALG120366	Kennedy Galvanizing Inc	Turkey Creek	Jefferson
ALG120367	Western Threaders Inc	Shades Creek	Jefferson
ALG120368	Kmac Industrial Recharge	Village Creek	Jefferson
ALG120372	Deb Corporation	Cahaba River	Jefferson
ALG120376	Meadowcraft Inc	Cunningham Creek	Jefferson
ALG120389	Scholar Craft Products Inc	Shades Creek	Jefferson
ALG120394	Steelscape Inc	Opossum Creek	Jefferson
ALG120397	Southern Natural Gas Co	Cunningham Creek	Jefferson
ALG120410	Equipment Fabricators Inc	Dry Creek	St Clair
ALG120416	2 K Steel Products Inc	LOCUST BRANCH	St Clair
ALG120418	ickman Williams And Company Of Kentuck	Village Creek	Jefferson
ALG120420	Southeast Fabricators Inc	COTTONDALE CREEK	Tuscaloosa
ALG120431	Sph Crane And Hoist Inc	Valley Creek	Jefferson
ALG120436	J And L Fabricators	Dry Creek	Jefferson
ALG120438	Barron Fan Technology Inc	Buck Creek	Shelby
ALG120439	Southeastern Plateworks	BARTON BRANCH	Jefferson
ALG120442	Oxylance Inc	Village Creek	Jefferson
ALG120444	C And B Piping Inc	Dry Creek	Jefferson
ALG120451	Nicholson Manufacturing Company	FISHING CREEK	St Clair
ALG120453	Jordan Machine Company	Five Mile Creek	Jefferson
ALG120455	Vance Tool And Die Inc	Village Creek	Jefferson
ALG120456	Industrial Galvanizers America Inc	LOCUST BRANCH	St Clair
ALG120468	Clark Substations LLC	Camp Branch	Shelby
ALG120469	Maclean Power Systems	Camp Branch	Shelby
ALG120472	SMI Steel Inc	VILLAGE CREEKSTORM SEWER	Jefferson
ALG120487	ISE Innomotive Systems Us Inc	TATER HILL CREEK	Tuscaloosa
ALG120496	U S Pipe And Foundry Co Inc		Jefferson
ALG120498	H And E Equipment Services LLC	Cahaba River	Jefferson
ALG120499	Guzzler Manufacturing, Inc.	Dry Creek	Jefferson
ALG120500	Douglas Manufacturing Co Inc	WEST BRANCH FISHING CREEK	St Clair
ALG120507	Gardner Denver Nash LLC	Cahaba River	Jefferson
ALG120514	Gestamp Alabama Inc	Mud Creek	Jefferson
ALG120516	Brion Hardin Construction Co Inc	MOODY SWAMP	Tuscaloosa
ALG120518	Flex-N-Gate Alabama, LLC	Mill Creek	Jefferson
ALG120525	Process Equipment Barron Industries	BISHOP CREEK	Shelby
ALG120526	Process Equipment Barron Industries Inc	Five Mile Creek	Jefferson
ALG120529	ernametals Tricon Metals and Services, In	Shades Creek	Jefferson
ALG120664	Mike's Fabricating, Incorporated	Little Cahaba River	St Clair
ALG120665	USA Rail, LLC	Buxahatchee Creek	Shelby
ALG120692	Glidewell Specialties Foundry Co Inc	Buxahatchee Creek	Shelby
ALG140006	Evergreen Transport, LLC		Shelby
ALG140007	Golden Flake Snack Foods Inc	Valley Creek	Jefferson
ALG140024	Greene Group Inc	TATER HILL CREEK	Tuscaloosa
ALG140026	Material Delivery Service Inc	Dry Creek	Shelby
ALG140042	Jim Walter Resources Inc	DANIEL HANNA MILL CREEKS	Tuscaloosa
ALG140051	Material Delivery Service Inc	FISHING CREEK	St Clair
ALG140084	Csx Transportation Inc	Five Mile Creek	Jefferson
ALG140092	Pemberton Truck Lines Inc	Valley Creek	Jefferson
ALG140099	Southern Haulers LLC	Camp Branch	Shelby
ALG140113	Cb Transport Inc	Village Creek	Jefferson
ALG140114	BNSF Railway Company	Village Creek	Jefferson

Permit Number	Facility Name	Receiving Water	County
ALG140124	Waste Management Of Alabama Inc	MOODY SWAMP	Tuscaloosa
ALG140129	Western Express Inc	Village Creek	Jefferson
ALG140130	Robbie D Wood Inc	Opossum Creek	Jefferson
ALG140131	Alabama Power Company	Dry Creek	Jefferson
ALG140132	Alabama Power Company	LITTLE SHADES CREEK	Jefferson
ALG140133	Alabama Power Company	LICK CREEK	Jefferson
ALG140134	Alabama Power Company	Crooked Creek	Jefferson
ALG140143	Norfolk Southern Railway Company	Shades Creek	Jefferson
ALG140151	M And S Cartage Inc	COTTONDALE CREEK	Tuscaloosa
ALG140154	Commercial Hauling Co Inc	VILLAGE CREEKSTORM SEWER	Jefferson
ALG140164	Milan Express Co Inc	Five Mile Creek	Jefferson
ALG140226	Ups Ground Freight Inc	Cahaba River	Jefferson
ALG140280	Oneal Steel Inc	Village Creek	Jefferson
ALG140281	Southern Cal Transport Inc	Black Creek	Jefferson
ALG140308	Abf Freight System Inc	Village Creek	Jefferson
ALG140339	United Parcel Service	Five Mile Creek	Jefferson
ALG140340	United Parcel Service	LITTLE SHADES CREEK	Jefferson
ALG140355	United Parcel Service	Cribbs Mill Creek	Tuscaloosa
ALG140361	Church Transportation And Logistics	Valley Creek	Jefferson
ALG140372	Bfi Waste Systems Of North America Inc	Valley Creek	Jefferson
ALG140384	Wti	BLACK WARRIOR RIVER	Tuscaloosa
ALG140388	Birmingham Southern Railroad Co	Opossum Creek	Jefferson
ALG140389	Birmingham Southern Railroad Co	Opossum Creek	Jefferson
ALG140390	Birmingham Terminal Railway, LLC	Village Creek	Jefferson
ALG140392	Schwerman Trucking Co	Dry Creek	Jefferson
ALG140423	Waggoners Trucking	Little Cahaba River	St Clair
ALG140428	Barnett Transportation Inc		Tuscaloosa
ALG140437	Greyhound Lines, Inc.	Valley Creek	Jefferson
ALG140450	Avis Car And Truck Rentals Inc	TATER HILL CREEK	Tuscaloosa
ALG140453	Birmingham Airport Authority	Village Creek	Jefferson
ALG140463	Tuscaloosa City Of	BLACK WARRIOR RIVER	Tuscaloosa
ALG140473	Allied Systems Ltd	Village Creek	Jefferson
ALG140492	Federal Express Corp	Shades Creek	Jefferson
ALG140515	Nichols Concrete Equipment Co Inc	PEAVINE CREEK	Shelby
ALG140520	Lelco Inc	Shoal Creek	Shelby
ALG140527	Walter Ray Smith	LAKE TUSCALOOSA	Tuscaloosa
ALG140546	Riverside Marina Inc	Logan Martin Reservoir	St Clair
ALG140592	H N Donahoo Contracting Co	Valley Creek	Jefferson
ALG140595	Delta Dump Truck Inc	Village Creek	Jefferson
ALG140639	Birmingham Steel Erectors	Village Creek	Jefferson
ALG140650	Birmingham Logistics, LLC	Shades Creek	Jefferson
ALG140651	Hornady Transportation LLC	BARTON BRANCH	Jefferson
ALG140674	Nes Rentals	Buck Creek	Shelby
ALG140684	Material Delivery Service Inc	Five Mile Creek	Jefferson
ALG140706	Mercury Air Group Dba Mercury Air Center	Village Creek	Jefferson
ALG140710	T K Stanley Inc	Cypress Creek	Tuscaloosa
ALG140724	Federal Express Corp	FIVE MILE CREEKSTORM SEWER	Jefferson
ALG140736	Sysco Food Services Of Central Alabama	Camp Branch	Shelby
ALG140737	Rail Conn Inc	Falls Creek	Jefferson

Permit Number	Facility Name	Receiving Water	County
ALG140739	Boyd Brothers Transportation Inc	Black Creek	Jefferson
ALG140760	Con Way Transportation Services Inc	Shades Creek	Jefferson
ALG140765	Apache Machine And Supply Company	Five Mile Creek	Jefferson
ALG140787	Fedex Freight East Inc Birmingham	Opossum Creek	Jefferson
ALG140788	Carmax Autosuperstores Inc	Cahaba River	Shelby
ALG140794	Federal Express Corp	Shades Creek	Jefferson
ALG140799	Amoco Food Shop	Buck Creek	Shelby
ALG140800	Bessemer City Of	Halls Creek	Jefferson
ALG140803	Miller and Company, LLC	Locust Fork	Jefferson
ALG140812	Gary Stricklin	Newfound Creek	Jefferson
ALG140816	Rolling Frito Lay Sales Lp	Cypress Creek	Tuscaloosa
ALG140819	Fedex Ground Package Systems Inc	Abes Creek	Jefferson
ALG140822	Rolling Frito Lay Sales LP	Shades Creek	Jefferson
ALG140829	Hanna Truck Line Inc	TATER HILL CREEK	Tuscaloosa
ALG140837	Pro Fire G And W Diesel Inc	PEAVINE CREEK	Shelby
ALG140839	S K And B Inc	LITTLE LICK CREEK	Jefferson
ALG140842	Harbert Management Corporation	Village Creek	Jefferson
ALG140843	Automotive Services Group LLC	EAST LAKESTORM SEWER	Jefferson
ALG140846	Nelson Brothers LLC	FLAT ROCK CREEK	Jefferson
ALG140850	Ingram Equipment Co LLC	PEAVINE CREEK	Shelby
ALG140853	Goo Goo Car Wash	Shades Creek	Jefferson
ALG140857	Goo Goo Car Wash	Cahaba River	Shelby
ALG140859	Wood Fruitticher Grocery Company	PINCH GCREEK	Jefferson
ALG140864	Norfolk Southern Railway Company	Shoal Creek	Shelby
ALG140865	Norfolk Southern Railway Co	Shanty Branch	Tuscaloosa
ALG140868	Automotive Services Group LLC	Pinch Gut Creek	Jefferson
ALG140870	Trussville Express Wash	Pinchgut Creek	Jefferson
ALG140888	BE & K Construction-A KBR Company	Buck Creek	Shelby
ALG140897	BFI Waste Services LLC	Shades Creek	Jefferson
ALG140928	B & G Equipment and Supply	Stinking Creek	Jefferson
ALG140931	Guzzler Manufacturing, Inc.	Dry Creek	Jefferson
ALG150021	Peco Foods Inc		Tuscaloosa
ALG150072	Barber Milk Inc.	Shades Creek	Jefferson
ALG150122	Ventura Foods LLC	VILLAGE CREEKDRAINAGE DITCH	Jefferson
ALG150122	Ventura Foods LLC	VILLAGE CREEKDRAINAGE DITCH	Jefferson
ALG150144	Birmingham Hide And Tallow Co Inc	Valley Creek	Jefferson
ALG150149	Milner Milling Inc	Village Creek	Jefferson
ALG150150	Buffalo Rock Co Inc	Shades Creek	Jefferson
ALG160004	Veolia ES Star Ridge Landfill , Inc	Big Black Creek	St Clair
ALG160004	Veolia ES Star Ridge Landfill , Inc	Black Creek	St Clair
ALG160005	Phifer Incorporated		Tuscaloosa
ALG160146	TAMKO Building Products, Inc.	BLACK WARRIOR RIVER	Tuscaloosa
ALG160151	Birmingham City Of	Five Mile Creek	Jefferson
ALG170005	Akzo Nobel Coatings Inc	Village Creek	Jefferson
ALG170012	JVC America, Inc.	COTTONDALE CREEK	Tuscaloosa
ALG170013	Stevens Graphics Inc	Shades Creek	Jefferson
ALG170023	Induron Coatings Inc	Village Creek	Jefferson
ALG170024	Benjamin Moore	FISHING CREEKSTORM SEWER	St Clair
ALG180002	Becker Iron And Metal Co	Village Creek	Jefferson

Permit Number	Facility Name	Receiving Water	County
ALG180016	Standard Iron And Metal Inc	Village Creek	Jefferson
ALG180021	Abc Parts Inc	Five Mile Creek	Jefferson
ALG180028	Frankies Auto Parts Inc	Village Creek	Jefferson
ALG180029	Chase Motors And Auto Parts Inc	Valley Creek	Jefferson
ALG180030	Astro Auto Dismantlers Inc	Village Creek	Jefferson
ALG180032	B And S Auto Parts	Blue Creek	Jefferson
ALG180037	A P Clements Inc	Five Mile Creek	Jefferson
ALG180046	Woodstock Auto Salvage	CAFFEE CREEK	Bibb
ALG180061	Shah Inc	VALLEY CREEKSTORM SEWER	Jefferson
ALG180063	Finley Avenue Auto Parts	Village Creek	Jefferson
ALG180071	Bagwell Auto Parts Inc	Five Mile Creek	Jefferson
ALG180072	Fultondale Auto Salvage Inc	Black Creek	Jefferson
ALG180073	Moore Coal Company Inc	Halls Creek	Jefferson
ALG180074	Palmer Bros Auto Parts Inc	Cahaba River	Jefferson
ALG180075	Clint Palmer Auto Parts	Cahaba River	Jefferson
ALG180076	Stinnett Enterprises	CAFFEE CREEK	Bibb
ALG180089	Auto Recks Inc	MOODY SWAMP BRANCH	Tuscaloosa
ALG180092	Colemans Auto Parts Inc	Valley Creek	Jefferson
ALG180096	Fritz Enterprises Inc	Opossum Creek	Jefferson
ALG180099	Metal Management Alabama Inc	Village Creek	Jefferson
ALG180102	Bermco Aluminum	Valley Creek	Jefferson
ALG180106	C And R Auto Parts Inc	Village Creek	Jefferson
ALG180110	Brothers Recycling Co Inc	Village Creek	Jefferson
ALG180164	Troys Sellers Auto Parts Inc	COTTONDALE CREEK	Tuscaloosa
ALG180189	Skeltons Garage And Auto Parts	QUARLES LAKE	Tuscaloosa
ALG180302	Macs Auto Parts Of Ala Inc	Little Canoe Creek	St Clair
ALG180326	Johnny Spradlin Auto Parts Inc	Village Creek	Jefferson
ALG180333	Universal Cycle Salvage	Coal Creek	Jefferson
ALG180357	Westover Salvage Inc	Muddy Prong	Shelby
ALG180358	Lkq Birmingham Inc	Village Creek	Jefferson
ALG180360	Sellers Auto Sales And Service	BEE CREEK	Tuscaloosa
ALG180375	Antonio Auto Sales Inc	Village Creek	Jefferson
ALG180380	Tuscaloosa Iron And Metals Co Inc	Cribbs Mill Creek	Tuscaloosa
ALG180402	Kimerling Truck Parts And Equipment Co	Village Creek	Jefferson
ALG180405	Garcia's Inc., LLC	Dry Creek	Shelby
ALG180410	Clarks Auto And Electric	Wolf Creek	St Clair
ALG180413	Liberty Iron And Metal	Mill Creek	Tuscaloosa
ALG180426	Temberson And Son Scrap Inc	Cribbs Mill Creek	Tuscaloosa
ALG180433	Jordan Scrap Inc	Village Creek	Jefferson
ALG160004	Veolia ES Star Ridge Landfill, Inc	Big Black Creek	St Clair
ALG180458	Ellison Auto Sales Inc	RAM BRANCH	Chilton
ALG180466	R W Duncan Ltd Inc	Valley Creek	Jefferson
ALG180467	Bobby Park Truck And Equipment Inc	Rum Creek	Tuscaloosa
ALG180472	J B Halls Garage	Sipsey River	Tuscaloosa
ALG180491	J And J Recycling	Poley Creek	Chilton
ALG180522	Matthews Foreign Care Parts Inc	Village Creek	Jefferson
ALG180538	H R H Metals Inc	Little Cahaba River	St Clair
ALG180546	Lakeside Salvage Co	Logan Martin Reservoir	St Clair
ALG180548	Troy Sellers Auto Parts Inc	COTTONDALE CREEK	Tuscaloosa

Permit Number	Facility Name	Receiving Water	County
ALG180569	Mitchells Service Center	T BEAR CREEK	Tuscaloosa
ALG180575	Highway 22 Auto Sales	GOOSE POND CREEK	Chilton
ALG180582	Tingle Auto Parts Inc	ROCK CASTLE CREEK	Tuscaloosa
ALG180585	Waste Recycling Inc	Cypress Creek	Tuscaloosa
ALG180606	Pull A Part Of Alabama LLC	VILLAGE CREEKSS VILLAGE CRK	Jefferson
ALG180625	C And D Auto Parts	Mud Creek	Tuscaloosa
ALG180645	Floyd F Macon Used Cars And Parts	Rabbit Branch	St Clair
ALG180654	Auto Outlet Inc	Gulf Creek	Tuscaloosa
ALG180658	Pegasus National Inc	Village Creek	Jefferson
ALG180662	Recycling Unlimited Inc	WAXAHATCHEE CREEK	Shelby
ALG180663	Saginaw Recycling LLC	Blue Creek	Shelby
ALG180669	Tci Of Alabama LLC	FISHING CREEK	St Clair
ALG180672	D and B Recycling	JIMS BRANCH	Shelby
ALG180680	S L & E Auto Parts	Oldham Creek	Bibb
ALG180720	J&J Metals and Salvage, Inc	Cooley Creek	Tuscaloosa
ALG180736	Cecil Gibson Salvage Yard	Haysop Creek	Bibb
ALG180744	Les Schmitt Auto Sales	Cahaba River	Jefferson
ALG180746	Highway 11 Auto and Towing	CAFFEE CREEK	Bibb
ALG200029	Specification Rubber Products Inc	Buck Creek	Shelby
ALG200073	Carpets And Rugs Backing And Supplies In	PINCHGCREEK	Jefferson
ALG200075	Plastipak Packaging Inc	HICKS SPRING	Jefferson
ALG200078	Homeland Vinyl Products	BARTON BRANCH	Jefferson
ALG200080	Recticel Interiors North America Inc	TATER HILL CREEK	Tuscaloosa
ALG230001	Refractory Sales And Service Co Inc	SHADES CREST CREEK	Jefferson
ALG230018	Reno Refractories Inc	Turkey Creek	Jefferson
ALG230023	Bpi Inc	Valley Creek	Jefferson
ALG230032	Rock Wool Manufacturing Company	Dry Creek	Jefferson
ALG230034	Rock Wool Manufacturing Company	Dry Creek	Jefferson
ALG230035	Boral Bricks Inc	Shades Creek	Jefferson
ALG230037	Riverside Refractories Inc	SEDDON DYE CREEKS	St Clair
ALG230038	Glasforms Inc	BARTON BRANCH	Jefferson
ALG230039	Durawear Corp	Stinking Creek	Jefferson
ALG230048	W R Grace And Co	Shades Creek	Jefferson
ALG230055	Jenkins Brick Company Inc	Kelly Creek	St Clair
ALG230056	Hill And Griffith Company	Village Creek	Jefferson
ALG230061	Supreme Cores Alabama	Buck Creek	Shelby
ALG230065	Oldcastle Surfaces, Inc.	Dodd Branch	Shelby
ALG240072	TAMKO Building Products, Inc.	BLACK WARRIOR RIVER	Tuscaloosa
ALG250005	Regions Bank	Valley Creek	Jefferson
ALG250011	Bellsouth Telecommunications	Cahaba River	Jefferson
ALG250013	Bellsouth Telecommunications	CHASE LAKE	Shelby
ALG250014	Samford University	Shades Creek	Jefferson
ALG250016	Affinity Hospital LLC	Shades Creek	Jefferson
ALG250024	Harbert Realty Services	Valley Creek	Jefferson
ALG250026	Vef VBre Spe LLC	Valley Creek	Jefferson
ALG250036	Pro Assurance Group	Shades Creek	Jefferson
ALG250037	Southern Boulevard Corp	GRIFFIN BROOK	Jefferson
ALG250039	Vestavia Hills Board Of Education	LITTLE SHADES CREEK	Jefferson
ALG250041	Daniel Realty Services LLC	Cahaba River	Jefferson

Permit Number	Facility Name	Receiving Water	County
ALG250042	Daniel Realty Services LLC Cp Venture Ii	Cahaba River	Jefferson
ALG250043	Cousins Daniel LLC	Shades Creek	Jefferson
ALG250044	Cousins Daniel LLC	Shades Creek	Jefferson
ALG250050	Bellsouth Telecommunications Colonnade	Cahaba River	Jefferson
ALG250052	Princeton Baptist Medical Center	VALLEY CREEKSTORM SEWER	Jefferson
ALG250056	Colonial Properties Trust	Cahaba River	Jefferson
ALG250057	Colonial Properties Trust	PRIVATE LAKES CAHABA RIVER	Jefferson
ALG250058	Colonial Properties Trust	Cahaba River	Jefferson
ALG250059	Colonial Properties Trust	Cahaba River	Jefferson
ALG250060	Colonial Properties Trust	Cahaba River	Jefferson
ALG250061	Avondale Properties Lp	Patton Creek	Jefferson
ALG250062	Regions Bank	Village Creek	Jefferson
ALG250063	Internal Revenue Service Building	Shades Creek	Jefferson
ALG250066	West Oxmoor Tower, LLC	Shades Creek	Jefferson
ALG250067	Beacon Ridge, LLC	Shades Creek	Jefferson
ALG250076	Daniel Realty Services, LLC	Cahaba River	Jefferson
ALG250077	Daniel Realty Services, LLC	Cahaba River	Jefferson
ALG250078	Daniel Realty Services, LLC	Cahaba River	Jefferson
ALG250088	Blue Cross Blue Shield of Alabama	LITTLE SHADES CREEK	Jefferson
ALG340001	Colonial Pipeline Co	VINE WARD CRKS CAHABA R CLEAR	Shelby
ALG340207	Veterans Oil Inc	Shades Creek	Jefferson
ALG340339	McPherson Companies Inc	LITTLE CAHABA CREEK	Jefferson
ALG340370	Plantation Pipe Line Company	PRAIRIE BROOK	Shelby
ALG340483	B And J Food Mart	Cahaba River	Jefferson
ALG340551	2 Azians Inc	King Creek	Shelby
ALG340605	Green Pond Grocery	CAFFEE CREEK	Bibb
ALG340614	Hollingsworth Oil Company, Inc.	Halls Creek	Jefferson
ALG640005	Clanton Water and Sewer Board	Walnut Creek	Chilton
ALG640027	Water Works Board for the City of Leeds	Little Cahaba River	St Clair
ALG670101	Southern Natural Gas Co	Wolf Creek	State-Wide
ALG670106	Southern Natural Gas Co	IION C WOLF C T BARBEE C BARBEE	State-Wide
ALG670163	Southern Natural Gas Co	Cahaba, Lee, Buck, Uts	Jefferson

Appendix Table 3: Industrial Individual Permits in Upper Cahaba Watershed

Permit Number	Facility Name	Receiving Water	County
AL0081507	Alabama Pigments Company, LLC	CAFFEE CREEK	Bibb
AL0058971	Boral Bricks Inc	Shades Creek	Jefferson
AL0055395	Cahaba Pressure Treated Forest Products Inc.	Little Cahaba River	Bibb
AL0076163	Ccl Label, Inc.	Shades Creek	Jefferson
AL0055247	City of Birmingham	Stinking Creek	Jefferson
AL0078018	Conrad Yelvington Distributors Inc	Dry Creek	Shelby
AL0079332	Cox Wood Of Alabama	BANKS CREEK	Tuscaloosa
AL0061603	Plantation Pipe Line Company	PRAIRIE BROOK	Shelby
AL0074276	Research Solutions Group, Inc.	Cahaba Valley Creek	Chilton
AL0076741	Research Solutions Group, Inc.	PRAIRIE BROOK	Shelby
AL0080837	Samford University	Shades Creek	Jefferson

Appendix Table 4: Mining Permits in Upper Cahaba Watershed

NPDES	PermitteeName	ReceivingS	County
AL0001996	Vulcan Construction Materials, LP	Roy Branch	Shelby
AL0002046	Vulcan Construction Materials, LP	Dry Creek	Shelby
AL0002631	Cheney Lime & Cement Company	Buck Creek	Shelby
AL0003336	Lhoist North America of Alabama, LLC	Dry Creek	Shelby
AL0003638	Lehigh Cement Company LLC	Dry Creek	Jefferson
AL0024252	Argos Cement LLC	Dry Creek	Shelby
AL0024422	Martin Marietta Materials, Inc.	Shoal Creek	Shelby
AL0024457	Carmeuse Lime and Stone, Inc.	Camp Branch	Shelby
AL0024473	Lhoist North America of Alabama, LLC	Buck Creek	Shelby
AL0029068	Superior Products Inc	MOHORN CREEK	Chilton
AL0053601	Vulcan Construction Materials, LP	Dry Creek	Shelby
AL0057576	Henry Brick Company, Inc.	Splawn Branch	Bibb
AL0058076	Pyne Rock Corporation	ROCKY BROOK	Jefferson
AL0058327	Boral Bricks Inc	Shades Creek	Jefferson
AL0061786	Tacoa Minerals, LLC	Savage Creek	Shelby
AL0061808	Tacoa Minerals, LLC	Shades Creek	Bibb
AL0062766	Woodstock Trucking Company, Inc.	CAFFEE CREEK	Bibb
AL0067253	Alabama Pigments Company	CAFFEE CREEK	Bibb
AL0067784	Martin Marietta Materials, Inc.	BANKS CREEK	Tuscaloosa
AL0067831	Lhoist North America of Alabama, LLC	Mahan Creek	Bibb
AL0068217	Superior Products, Inc.	Splawn Branch	Chilton
AL0068829	Martin Marietta Materials, Inc	Buck Creek	Shelby
AL0069108	Tacoa Minerals, LLC	Piney Woods Creek	Shelby
AL0073164	Tuscaloosa Resources, Inc.	Piney Woods Creek	Shelby
AL0074039	Hope Coal Co Inc	Murry Creek	Shelby
AL0074829	Thompson South 1, LLC	CAFFEE CREEK	Bibb
AL0076236	Evergreen Mining, LLC	Piney Woods Creek	Shelby
AL0076295	Tacoa Minerals, LLC	Cahaba River	Bibb
AL0076767	Desmond Development Co., LLC	BANKS CREEK	Tuscaloosa
AL0076864	Cdx Gas, LLC	Four Mile Creek	Bibb
AL0077241	Thompson South 1, LLC	Pratt Creek	Bibb
AL0078221	Kodiak Mining Company, LLC	Savage Creek	Shelby
AL0079189	Twin Pines II, LLC	Piney Woods Creek	Shelby
AL0079197	Twin Pines II, LLC	Piney Woods Creek	Shelby
AL0079308	Lhoist North America of Alabama, LLC	Dry Creek	Shelby
AL0079464	Yeshic, LLC	Murry Creek	Shelby
AL0079472	Tacoa Minerals, LLC	Savage Creek	Shelby
AL0079511	Tacoa Minerals, LLC	Cahaba River	Bibb
AL0079545	Tacoa Minerals, LLC	Cahaba River	Bibb
AL0079588	Tacoa Minerals, LLC	Savage Creek	Bibb

Appendix Table 5: Construction Stormwater Permits in the Upper Cahaba River Watershed

Permit Number	Facility/Site Name	County
ALR107282	Wadsworth Oil - McCalla	Jefferson
ALR107285	Dollar General - Bessemer (Super Hwy), AL	Jefferson
ALR107288	Dollar General - Bessemer (19th Street), AL	Jefferson
ALR107309	Turkey Creek Townhomes and Retail	Jefferson
ALR107314	Gorgas- Taft Coal 161 kV TL	Jefferson
ALR107316	Mountain Brook High School Property	Jefferson
ALR107344	EB-HSIP 0025(524) PS1150	Shelby
ALR107346	Habersham Place Lots 16 & 17	Shelby
ALR107360	Five Mile Road - Phase I	Jefferson
ALR107365	Buhl Elementary School	Tuscaloosa
ALR107372	Kings Loop Subdivision (Phase I)	Tuscaloosa
ALR107379	North Shelby County WWTP	Shelby
ALR107380	Holt Fill Site	Tuscaloosa
ALR107385	Hargrove Road Site	Tuscaloosa
ALR107392	Springer Road	Tuscaloosa
ALR107394	Kitchen Road	Tuscaloosa
ALR107397	Providence Place Apartments	Tuscaloosa
ALR107399	Magnolia Drive Development	Tuscaloosa
ALR107407	Ballantrae - Selected Lots	Shelby
ALR107411	Tove Industrial Park	Jefferson
ALR107414	Timberline Golf Course	Shelby
ALR107416	Cross Creek	Jefferson
ALR107417	White/Deerfoot Development	Jefferson
ALR107418	Erwin Elementary School	Jefferson
ALR107419	Tuggle Hill Elementary	Jefferson
ALR107421	US Highway 280 Driveway Turnout	Shelby
ALR107429	Word of God	Shelby
ALR107435	BR-7920(600) PS1157	Tuscaloosa
ALR107438	Boatright Clanton Facility	Chilton
ALR107439	Buckner Barrels	St Clair
ALR107440	Bessemer Storage Facility	Jefferson
ALR107441	Bridge Replacement on Alliance Road	Jefferson
ALR107446	Moody Swamp Tributary No. 3 Drainage Improveme	Tuscaloosa
ALR107447	Simpson Property	Shelby
ALR107449	Southern Research Institute-ERC Building	Jefferson
ALR107452	The Ledges at Weatherly	Shelby
ALR107455	New Retail Development	Chilton
ALR107468	Bama Bud, Harpersville	Shelby
ALR107469	Lacey's Grove: Lot #88-93,95-97,216	Shelby
ALR107470	Cahaba Manor: Lots 6,7,8,10,11,13,14,16,17,26,27	Shelby
ALR107471	Winchester Hills: Lot #9,10,12,13,16,136-139	Jefferson
ALR107472	Chesire Parc: Various Lots	Jefferson
ALR107474	Camden Cove, Various Lots	Shelby
ALR107475	Brookhaven: Lot #903-905, 951-955	St Clair
ALR107476	Maxwell Manor Lots 22, 28-31, 39, 74-78	Tuscaloosa
ALR107489	King's Loop Subdivision Phase II	Tuscaloosa
ALR107490	Family Dollar-Bessemer	Jefferson
ALR107499	The Cottages of Danberry	Shelby
ALR107508	Murphy's Lane Replacement	Jefferson
ALR107525	University of Alabama Indoor Tennis Facility	Tuscaloosa
ALR107527	UA - 2011 Campus Paving Project	Tuscaloosa
ALR107540	Magnolia Trace Development	St Clair
ALR107553	UA Science & Engineering Complex, Phase IV	Tuscaloosa
ALR107555	Nex Oxmoor K-8 School	Jefferson
ALR107560	Mountain Brook Municipal Complex	Shelby
ALR107563	APD-0471 (471) Soil Disposal Area	Jefferson
ALR107568	Savannah Pointe - Phase II	St Clair
ALR107579	Brooklane Drive Widening	Jefferson
ALR107581	Ross Bridge	Jefferson
ALR107582	BRF-0269 (500) PS 1033	Jefferson
ALR107600	Jet-Pep #26	Jefferson
ALR107601	Enterprise Rent A Car Skyland Blvd	Tuscaloosa
ALR107602	New Psychiatric Hospital Site Project	Tuscaloosa
ALR107605	Pelham Dam	Shelby
ALR107613	UAB Steam Plant Package B-2	Jefferson
ALR107615	Dollar General - Tarrant, AL	Jefferson
ALR107625	North Sector Grayson Valley Townhomes	Jefferson
ALR107627	AT&T Project #7807876	Tuscaloosa
ALR107641	South Tuscaloosa - Eutaw 115kV TL	Tuscaloosa
ALR107645	Coalburg Road	Jefferson
ALR107647	Old Jasper Road Bridge	Tuscaloosa
ALR107653	Phi Delta Theta - Alabama Alpha Chapter	Tuscaloosa
ALR107657	Shades Mountain Baptist Church	Jefferson
ALR107665	Highland Park	Tuscaloosa
ALR107666	Samford University	Jefferson
ALR107667	Foxfield Estates	Jefferson
ALR107672	Metal Works Retail Center	Tuscaloosa
ALR107677	Lake Purdy Well Project	Jefferson
ALR107682	James Hill Phase III	Jefferson
ALR107695	Daniel Payne Industrial Park Site Grading	Jefferson
ALR107698	Valley Creek WWTP	Jefferson
ALR107703	County Road 17 Widening and Bridge Replacement	Shelby

Permit Number	Facility/Site Name	County
ALR107707	Tuscaloosa Facility	Tuscaloosa
ALR107708	Lakeshore Parkway Improvements and Indust Acess	Jefferson
ALR107710	McCalla Trace	Jefferson
ALR107721	Northwood Gardens	Tuscaloosa
ALR107731	Water Works Landing-US Hwy 82 & Jack Warner Pkw	Tuscaloosa
ALR107732	Bluff Park	Tuscaloosa
ALR107737	Brookhaven Development	St Clair
ALR107741	Wedgworth-Tyler Road Subdivision	Jefferson
ALR107745	HPP-A146(901) PS1219	Bibb
ALR107748	Twelve Oaks	St Clair
ALR107753	McDonald's Restaurant - Dennison Ave	Jefferson
ALR107759	Stonegate Garden Homes	Jefferson
ALR107762	Alberta School Demolition	Tuscaloosa
ALR107772	Fontaine Subdivision	Jefferson
ALR107775	99-305-632-171-101 PS1222	Tuscaloosa
ALR107782	Margaret Garden Home Residential Development	St Clair
ALR107785	Forest Glen SD-Conerstone Lots	Tuscaloosa
ALR107786	Communication Line Install-AT&T Project 7928340	Tuscaloosa
ALR107787	American Family Care	Jefferson
ALR107790	HPP-A146(901) PS1220	Bibb
ALR107796	Sonny's Tunnel Carwash	Tuscaloosa
ALR107804	The Province at Tuscaloosa	Tuscaloosa
ALR107810		Jefferson
ALR107821	Huffman High School	Jefferson
ALR107826	Westlawn Middle School Site Demolition	Tuscaloosa
ALR107831	Caffee Creek Subdivision	Bibb
ALR107833	North Campus Substation	Tuscaloosa
ALR107837	Pembrooke Subdivision	Tuscaloosa
ALR107848	Highway 70 Widening	Shelby
ALR107849	Piper II	Bibb
ALR107853	Baptist Health System Dr. Office	Shelby
ALR107857	Walgreens - Clairmont Ave and 32nd St South	Jefferson
ALR107858	Shelby County Hwy 70 Landfill, Cell 4 Construction	Shelby
ALR107863	Weatherly Station Apartments and Commercial Cen	Shelby
ALR107875	Hussey Site	Tuscaloosa
ALR107877	Highway 78 Warehouse	Jefferson
ALR107879	Fair Park Redevelopment	Jefferson
ALR107882	Convenant Classical School & Daycare	Shelby
ALR107884	Chesapeake	Shelby
ALR107890	Wolf Creek Waste Area A	St Clair
ALR107892	Communication Line Install - AT & T Project # 8020	Tuscaloosa

Permit Number	Facility/Site Name	County
ALR107898	Southfield Garden Pit	Shelby
ALR107903	Horizons	St Clair
ALR107911	Powder Plant Storage Facility	Jefferson
ALR107919	IM-I065(363) PS 1136	Shelby
ALR107937	Communication Line Install AT&T Project 8244910	Tuscaloosa
ALR107946	Deer Wood Forest	Chilton
ALR107947	29 Seven	Jefferson
ALR107949	Bojangles' Moody	St Clair
ALR107956	Trillium	Jefferson
ALR107958	Ross Bridge II Apartments	Jefferson
ALR107965	Liberty Park	Jefferson
ALR107967	IM-NHF-I020(324)	Jefferson
ALR107983		Tuscaloosa
ALR107992	Dry Hollow DS	Bibb
ALR107993	Logan Martin Site Maintenance	St Clair
ALR107996	Masters Road Replacement	St Clair
ALR107997	BJCC Parking Lot Addition	Jefferson
ALR108001	22" North Main Line Loop Replacement (digs 1-5)	Jefferson
ALR108002	New Life Baptist Church, Inc	Bibb
ALR108004	Southfield Gardens	Shelby
ALR108005	Silver Creek Sector III, Phase II Lots 351-354, 356-3	Shelby
ALR108020	Sigma Chi Faternity	Tuscaloosa
ALR108026	Chapel Lane Extension	Jefferson
ALR108035	Victory Christian Fellowship Church	Jefferson
ALR108046	Martin Rocha	Shelby
ALR108047	Legacy Springs 90-92,103-106,143-145,259-266,295	St Clair
ALR108055	Lakes at Hidden Forest Ph I & II	Bibb
ALR108056		St Clair
ALR108058	Autumn Drive	Shelby
ALR108062	Golden Meadow Subdivision	Shelby
ALR108076	Smith Glen Lots 8,470,471,473,474	Jefferson
ALR108077	Biscayne Hills Sewer Relocation	Tuscaloosa
ALR108078	Trussville Springs	Jefferson
ALR108079	1-20 thru 1-22, 1-53 thru 1-60, 1-175 thru 1-177, 2-	Bibb
ALR108080	Lake Cyrus (Lots 48, 52, 59, 64-67, 72, 169, 172, 40	Jefferson
ALR108081	Cottages at Beaver Creek Lot 12 - 18, 22	St Clair
ALR108082	Glenn Cross	Jefferson
ALR108083	Kings Ridge Subdivision Lots 19,21,24-24,56	Tuscaloosa
ALR108084	Polo Crossings Lots 8, 10, 77, 122, 137, 140, 152	Shelby
ALR108085	Belle Meade Lots	Tuscaloosa
ALR108089	Chesser Plantation -142 Development lots only	Shelby

Permit Number	Facility/Site Name	County
ALR108092	Hometown Bank - Pinson, AL branch	Jefferson
ALR108093	Forestdale FD 5347	Jefferson
ALR108099	Cotswold Lots 601-614, 618-630, 633-639, 703-711,	Jefferson
ALR108100	Greenwood Park Project	Jefferson
ALR108103	Former Shredders, Inc. Facility	Jefferson
ALR108108	Lenox North Lots 1-100	Tuscaloosa
ALR108129	Clay Recreational Facility	Jefferson
ALR108131	Southern Trace: The Ridge Lot #811,849; Phase I Lo	Jefferson
ALR108139	Stoney Brook Apartments	Jefferson
ALR108180	Calera Middle School	Shelby
ALR108185	Chelsea Park 7,8, 9,10-12 and main road	Shelby
ALR108191	Hwy 43 Commercial Development	Tuscaloosa
ALR108192	Forest Glen SD Lots 289 and 386	Tuscaloosa
ALR108197	Forest Glen SD Lots 83, 92, 174, 175, 257	Tuscaloosa
ALR108214	Linndale Road Spoils Area	Jefferson
ALR108226	Simmons Addition to Roebuck Plaza	Jefferson
ALR108236	Crestwood Park	Jefferson
ALR108237	Forest Glen SD Lots 224, 225, 256	Tuscaloosa
ALR108242	The Yard	Jefferson
ALR108247	STPAA-0139(503) PS1240	Bibb
ALR108254	Former Stockham Valves Property - Lot 6	Jefferson
ALR108270	Oxmoor Ridge Subdivision	Jefferson
ALR108273	Cahaba Manor	Jefferson
ALR108279	Baptist Medical Center Princeton	Jefferson
ALR108281	Charles A. Brown Elementary	Jefferson
ALR108286	Honeywell International, Inc.	Jefferson
ALR108287		Shelby
ALR108287		Shelby
ALR108289	Grand Ridge	Tuscaloosa
ALR108308	Tapestry Park Apartments	Jefferson
ALR108314	JCHA Hickory Ridge	Jefferson
ALR108317	MPT Hanger	Jefferson
ALR108330	Cove at Overton	Jefferson
ALR108331	Rushing Spring Baptist Church	Jefferson
ALR108337	Center Point High School - Athletics Facility	Jefferson
ALR108338	Jubilee Townhomes	St Clair
ALR108341	Martin Brook	Shelby
ALR108342	Riverchase United Methodist Church	Shelby
ALR108347	Stone Creek Sector 5	St Clair
ALR108348	Ross Bridge Southwest Sector	Jefferson
ALR108351	WCR Development	Jefferson

Permit Number	Facility/Site Name	County
ALR108359	Briarwood Presbyterian Church Youth Barn Renovat	Jefferson
ALR108360	Rosedale Courts Phase I	Tuscaloosa
ALR108367	Longmeadow	Jefferson
ALR108374	Friar Lane Storm Project	Jefferson
ALR108397	US Highway 11N	Tuscaloosa
ALR108402	YMCA - Homewood	Jefferson
ALR108415	Shiloh Creek Subdivision	Shelby
ALR108425	The Village at Highland Lakes	Shelby
ALR108426	The Narrow Reach, Sector 3	Shelby
ALR108446	Parkside Baseball Park	Jefferson
ALR108447		Shelby
ALR108449	Woodland Ridge	Jefferson
ALR108457		Tuscaloosa
ALR108461	Bessemer Regional Airport	Jefferson
ALR108462	Extend Siding at Vance, AL	Tuscaloosa
ALR108465	Alden Glen Sector 1 lots, & Sector 2 lots	St Clair
ALR108470	Riverwalk Place Condominium	Tuscaloosa
ALR108474	Enon Baptist Church	Jefferson
ALR108484	Blue Rain Express Car Wash	Shelby
ALR108486	Longmeadow Subdivision	Jefferson
ALR108487	Birmingham Airport, Taxiway A Realignment	Jefferson
ALR108498		Jefferson
ALR108509	McDonald's Restaurant	Tuscaloosa
ALR108518	Fred's Discount Retail Store	Jefferson
ALR108545	St. Clair Hospital & Access Road	St Clair
ALR108557	3rd Ave. West Birmingham Dollar General Store	Jefferson
ALR108561	Russell Hall Addition & Renovations	Tuscaloosa
ALR108564	Oak Hill Phase II	St Clair
ALR108575	Miller- Hill	Jefferson
ALR108576	Waterstone Phase I Lot 55,58,105,106 Phase 2 lots	Shelby
ALR108579	I-20 Water Line Project	Jefferson
ALR108581	Target @ Brookwood Village Mall	Jefferson
ALR108584	Magella-North Helena 230 kV Insulator Changeout	Jefferson
ALR108587	South Clanton DS	Chilton
ALR108588	SEGCO Stream Restoration and Slope Repair	Shelby
ALR108602	Market Place at BJCC	Jefferson
ALR108605	Valley View Baptist Church	Tuscaloosa
ALR108606	Chelsea Elementary	Shelby
ALR108607	UA East Quad Energy Plant	Tuscaloosa
ALR108614		Bibb
ALR108618	Hoover High School	Jefferson

Permit Number	Facility/Site Name	County
ALR108623	IM-I059 (351) PS1166	Jefferson
ALR108630	Chelsea Park Sector 6 lots 2-4, 20-68, 92-96,98-101	Shelby
ALR108638	Wendy's Restaurant	Shelby
ALR108640	Woodstock Industrial Site	Jefferson
ALR108641	Cahaba Sports	Jefferson
ALR108646	River Bluff Site	Tuscaloosa
ALR108647	McDonald's Restaurant	Jefferson
ALR108648	McDonald's Restaurant - Montclair Road	Jefferson
ALR108649	Bemco Aluminum	Jefferson
ALR108653	Lumpkin 147 Site, Hwy 31, Calera, AL	Shelby
ALR108654	AKM Commerce Park	Shelby
ALR108655	Polymet	Shelby
ALR108656	Shelby County Road 265	Shelby
ALR108667	Living River: A Retreat on the Cahaba	Bibb
ALR108678	Concord Elementary School	Jefferson
ALR108690	Brent Senior Center	Bibb
ALR108693	Gardendale Dollar General	Jefferson
ALR108695	The Heights	Shelby
ALR108696	157 Acres	Shelby
ALR108697		Shelby
ALR108699	VACCA Campus AL Dept of Youth Services - Bham , A	Jefferson
ALR108702	IM-1059(333) PS1147	Jefferson
ALR108710	Acton Road Self Storage	Shelby
ALR108716	Cottages at Bethune Lake	Jefferson
ALR108719	Tanglewood by the Creek	Chilton
ALR108721	Montevallo Water and Sewer Water Main Extension	Shelby
ALR108729	Kumi Manufacturing Alabama, LLC	Chilton
ALR108735	APD-ACAPD-0471(501) PS1253	Jefferson
ALR108739	Alabama Truck & Equipment Inc	Tuscaloosa
ALR108748	Stoney Meadows Subdivision Phase 1	Jefferson
ALR108751	Life Time Fitness - Vestavia Hills	Jefferson
ALR108752	Faurecia Building Expansion	Tuscaloosa
ALR108756	Leeds Retail Center	Jefferson
ALR108760	Emerald Ridge	Shelby
ALR108763	NHF-0006(530) PS1264	Bibb
ALR108769	Primrose School Chace Lake	Jefferson
ALR108774	Trussville Greenways	Jefferson
ALR108775	Helena Elementary School	Shelby
ALR108789	Helena High School	Shelby
ALR108790	Blendstar Birmingham Terminal Facility	Jefferson
ALR108796	YMA Project in Steele, AL	Jefferson

Permit Number	Facility/Site Name	County
ALR108810		Shelby
ALR108811	Apartments at Lakeshore Crossings	Jefferson
ALR108812	Buckner Barrels	St Clair
ALR108813	Col. Robert L. Howard State Veterans Homes	St Clair
ALR108814	Jefferson Avenue SW	Jefferson
ALR108819	Cooper Green Housing Development	Jefferson
ALR108828	McKinnon Motors	Chilton
ALR108832	Bill Lunceford Road	Tuscaloosa
ALR108842		Tuscaloosa
ALR108845	Peavine Bridge Replacement	Shelby
ALR108862	Ketona - Center Point 115kV TL Storm Damage	Jefferson
ALR108865	Family Dollar - Center Point, AL	Jefferson
ALR108871	Springville Sports Complex	St Clair
ALR108872	Leeds - Clay 230kV TL Storm Damage	Jefferson
ALR108873	Miller - ACIPCo/Boyles 230kV TL	Jefferson
ALR108877		Jefferson
ALR108879	1st Missionary Baptist Church of Hueytown	Jefferson
ALR108884		Jefferson
ALR108894	Bankhead - Tuscaloosa 115kv TL	Tuscaloosa
ALR108896	Trinity Medical Center - Proposed 280 Campus	Jefferson
ALR108897	Cardiovascular Associates	Jefferson
ALR108898	Chelsea Park - Sectors 1-6 & Commercial Sector	Shelby
ALR108902	Namasco Steel	Jefferson
ALR108910	Bent River, Phase 4	Shelby
ALR108911	The Enclave Subdivision, Lots 16,17,19,35,36,40,42	Shelby
ALR108919	The Summit	Tuscaloosa
ALR108922	Krispy Kreme	Tuscaloosa
ALR108923		Tuscaloosa
ALR108925	Grants Mill Crossing - Phase 2	Jefferson
ALR108926	Spring Valley	Jefferson
ALR108932	Morris Prime Commercial Development	Jefferson
ALR108939	Lot 5, Stormy Acres, Phase II	Tuscaloosa
ALR108950	Longview Plant	Shelby
ALR108957	Turnout Access to AL Hwy 174 at MP 1	St Clair
ALR108958	Concord Highland Baptist Church	Jefferson
ALR108960		Tuscaloosa
ALR108963	Forest Glen	Tuscaloosa
ALR108966	Caring Days	Tuscaloosa
ALR108968	Northside Medical Physicians Office	St Clair
ALR108974	Tannehill Preserve	Jefferson
ALR108979	Graymont Subdivision	Tuscaloosa

Permit Number	Facility/Site Name	County
ALR108982		Jefferson
ALR108983	Taylors Ferry Rd. Water Lines	Jefferson
ALR108985	APCO ECU Chelsea Branch	Shelby
ALR108989	Church of the Highlands Greystone Campus	Shelby
ALR109004		Tuscaloosa
ALR109025		Tuscaloosa
ALR109034	YMCA Alabaster	Shelby
ALR109035	Hidden Meadows Development LLC	Tuscaloosa
ALR109037	Lock 17 Road (County Road 59)	Tuscaloosa
ALR109056		Shelby
ALR109066	Jackson Square	Jefferson
ALR109068	2010 System Improvements Proposal "C"	Tuscaloosa
ALR109069	Patton Chapel Road	Shelby
ALR109077	New Waldrop Road #1	St Clair
ALR109078	Bird Waste Area	St Clair
ALR109096		St Clair
ALR109112	Chesser Plantation	Shelby
ALR109113	Chelsea Preserve	Shelby
ALR109114	Highland Lakes Development	Shelby
ALR109115	Dunnavant Square	Shelby
ALR109126		Jefferson
ALR109131	Double Bridge Road (GAD12014)	St Clair
ALR109136		Jefferson
ALR109138	Morin Actuator	Jefferson
ALR109143	Legacy Springs	St Clair
ALR109144	Woodland Rdge Estates	St Clair
ALR109145	Ridgefield Development	St Clair
ALR109148		Tuscaloosa
ALR109150		Jefferson
ALR160033	Commercial Subdivision	Jefferson
ALR160139	McAdory School Road Project	Jefferson
ALR160172	ALDOT Borrow Pit Site #1	Chilton
ALR160629	Riverwoods	Shelby
ALR160638	The Preserve	Jefferson
ALR160661	Timberline Golf Course	Shelby
ALR160672	Wynlake Subdivision	Shelby
ALR160673	Mt. Laurel Development	Shelby
ALR161432	Weyerhauser Pit	Tuscaloosa
ALR161455	Chapel Hills	Jefferson
ALR161742	Joseph Chert Pit	Shelby
ALR161862	Rogers Pit Site	Tuscaloosa

Permit Number	Facility/Site Name	County
ALR161927	Universal Heights Site	Tuscaloosa
ALR161963	Chert Pit	Tuscaloosa
ALR162023	Old Fayette Road Pit	Tuscaloosa
ALR162067	Rosser Farms Selected Lots	Jefferson
ALR163222	Jones Pit	Tuscaloosa
ALR163243	ALDOT Borrow Pit Site #2	Chilton
ALR163387	Oscar Kent Property - Highway 78	Jefferson
ALR163783	Riverbend	Bibb
ALR164097	Camp Ketona	Jefferson
ALR164448	Administratiion Building-Elyton Village	Jefferson
ALR164589	All Activity Vehicle Assembly Plant	Tuscaloosa
ALR164881	Kinsale Garden Homes	Shelby
ALR165781	Coupland Construction Borrow Pit	St Clair
ALR165834	Maintenance Shop Chert Pit	St Clair
ALR166190	Lacey's Grove	Shelby
ALR166637	Smith Glen	Jefferson
ALR166888	Mill Creek Motocross	St Clair
ALR166949	Southern Trace	Jefferson
ALR167624	Misty Ridge Commercial	Jefferson
ALR167853	Taylor Bug Hwy 43 Borrow Site	Tuscaloosa
ALR168173	Sister Servants of the Eternal Word Site Improveme	Jefferson
ALR169147	Pumphouse Village	Jefferson
ALR169676	Russell's Addition to Pump House Road	Jefferson
ALR169734	Black Creek Station	Jefferson
ALR16A039	Rast Construction Inc. Property - Kilsby	Jefferson
ALR16B714	NDL	St Clair
ALR16C018	Beers Property	Jefferson
ALR16C172	The Summit	Tuscaloosa
ALR16C270	Cobble Hill Subdivision	Jefferson
ALR16C723	Alabaster Quarry	Shelby
ALR16C843	Southpointe Ridge	Shelby
ALR16D356	Hidden Woods Subdivision	Tuscaloosa
ALR16D696	Indian Creek Road	Tuscaloosa
ALR16E169	Trussville Assisted Living	Jefferson
ALR16E338	Mountain Top Enterprises, Inc.	Jefferson
ALR16E933	Brook Manor Condos - Lots 3, 6, 7, 8 and 13-16 (8 L	Jefferson
ALR16EAU8	North Haven Road Site	Tuscaloosa
ALR16EB04	Former Goldkist Facility	Jefferson
ALR16EB08	Chace Lake	Jefferson
ALR16EB54	Beams Pit	Tuscaloosa
ALR16EBGY	Yellow Creek Pit East	Tuscaloosa

Permit Number	Facility/Site Name	County
ALR16EBH1	Jones Pit East	Tuscaloosa
ALR16EBPR	Rex Lake Road Widening	Jefferson
ALR16EC55	CVS Pharmacy #75461	Shelby
ALR16ECCP	Children's Hospital Expansion	Jefferson
ALR16ECLL	Quarry #1	Tuscaloosa
ALR16ECP1	Winchester Hills Subdivision	Jefferson
ALR16ECVR	Lowetown Borrow Pit - 2009	Jefferson
ALR16ECWT	Skyridge Place	Tuscaloosa
ALR16EDJK	Rocky Branch Drive Home Excavation Site	Bibb
ALR16EDLF	Miller Site	Tuscaloosa
ALR16EDMH	Whispering Ridge	Shelby
ALR16EDPB	Union Chapel Road Site	Tuscaloosa
ALR16EDPP	Dogwood Road Chert Pit	Bibb
ALR16EDVX	Walnut Grove Sector 2	Jefferson
ALR16EDWB	Shades Mountain Filter Plant Phase 2 Upgrade	Jefferson
ALR16EE91	Pit #1	Chilton
ALR16EEDJ	Roper Road DS 115kV TL	Jefferson
ALR16EEDW	Pit #1	Tuscaloosa
ALR16EEKB	Kim Property	Jefferson
ALR16EEKM	Goldwire Heights	Jefferson
ALR16EENE	Parker High School	Jefferson
ALR16EESS	Jefferson Ave CMAQ-7045 (600)	Jefferson
ALR16EEVC	US Hwy 280 Geotechnical Study	Jefferson
ALR16EEVR	IM-NHF-I065(393) PS1095	Jefferson
ALR16EEYJ	Watkins Brook Flood Hazard Mitigation, Phase II	Jefferson
ALR16EEYS	Brookwood Medical Center	Jefferson
ALR16EF99	Browder Borrow Pit	Bibb
ALR16EFE3	Caddis Pit	Tuscaloosa
ALR16EFET	Woodstock-3	Bibb
ALR16EFGL	VA Medical Center Tuscaloosa	Tuscaloosa
ALR16EFJH	Foster's Grocery Store	Tuscaloosa
ALR16EG43	Kingston Elementary School	Jefferson
ALR16EG82	A New Facility for Hope Animal Clinic	Jefferson
ALR16EGA7	Hutchins Pit	Tuscaloosa
ALR16EGK6	McCalla Trace Selected Lots	Jefferson
ALR16EGME	STPAA-0025(521) PS1049	Bibb
ALR16EGNH	Woodlawn United Methodist Church	Jefferson
ALR16EGNR	Birmingham Zoo	Jefferson
ALR16EGP4	Harbert International Warehouse & Office	Jefferson
ALR16EGPH	Powder Plant Chert Pit	Jefferson
ALR16EGRA	Bessemer Regional Airport	Jefferson

Permit Number	Facility/Site Name	County
ALR16EGRC	Bessemer Regional Airport AWOS	Jefferson
ALR16EGS1	Metro Mini Storage New Buildings Project	Jefferson
ALR16EGSP	Doss Ferry IV & V, Various Lots	Jefferson
ALR16EGT7	Birmingham Shuttlesworth International Airport Te	Jefferson
ALR16EGTP	Cooper Green Park Renovation	Jefferson
ALR16EGUH	The Hill Apartments	Jefferson
ALR16EGUK	CHS Birmingham Data Center	Jefferson
ALR16EGUL	Brookwood High School Expansion	Tuscaloosa
ALR16EGUM	Wolf Creek Waste Area -B	St Clair
ALR16EGUS	Kykenkee Bark Plant	Tuscaloosa
ALR16EGWH	Avondale Park Renovations	Jefferson
ALR16EGWN	6531, LLC 12ac Project	Jefferson
ALR16EGWU	Former CAPCO Facility	St Clair
ALR16EGX3	North Clay Baptist Church	Jefferson
ALR16EGX5	Taylor Circle Drainage Project	Tuscaloosa
ALR16EGXC	Retail Development Brookwood Village	Jefferson
ALR16EGXV	Ross Ridge, Parcel K	Jefferson
ALR16EGYW	The University of Alabama University Police Center	Tuscaloosa
ALR16EGYX	ALID Food Store	Shelby
ALR16EH00	Cahaba Beach Dog Park Offsite Fill Site	Shelby
ALR16EH02	Davis Barn and Arena	Shelby
ALR16EH13	Kendall Electric - New Facility	Tuscaloosa
ALR16EH21	DCH Spine Care	Tuscaloosa
ALR16EH33	Proposed Birmingham Regional Intermodal Facility	Jefferson
ALR16EH39	The Healing Place Church - Trussville, AL	Jefferson
ALR16EH43	Midfield High School	Jefferson
ALR16EH53	Rex Lake Road South Commercial Property Parcel 3	Jefferson
ALR16EH63	Elrod Waste Pit	Tuscaloosa
ALR16EH64	Hwy 43 Borrow Pit	Tuscaloosa
ALR16EH81	Carson Road Chert Pit	Jefferson
ALR16EH95	Martin Pit #1	Tuscaloosa
ALR16EHA8	Cunningham Pit	Tuscaloosa
ALR16EHAE	Deerfoot Baptist Church Overflow Parking Pit	Jefferson
ALR16EHAF	Twin Oaks Property	Tuscaloosa
ALR16EHAK	Wesley Chert Pit	Bibb
ALR16EHAY	216 Borrow Pit	Tuscaloosa
ALR16EHB1	Marvel Gob Fire Emergency	Bibb
ALR16EHB2	Jefferson County Landfill No. 1 (South Borrow Area	Jefferson

***NOTE:** *Construction Stormwater permits are generally much shorter lived than other NPDES permits. As a result, the active permit data summarized previously is extremely subject to change. Also, permits recently applied for (pending status) that lacked verified outfall coordinates were included in the results, but they may not necessarily fall within the watershed boundary as they could only be queried by county. New, extended, or expanded discharge permits must also comply with this TMDL.*

Appendix Table 6: Municipal Separate Stormwater Sewer Systems (MS4) Phase I Permits in the Upper Cahaba Watershed

Permit ID	Facility	Receiving	County
ALS000001	Storm Water Management Authority (SWMA)	Upper Cahaba Watershed	Jefferson
ALS000003	Shelby County Commission	Upper Cahaba Watershed	Shelby

13.0 APPENDIX C: SUPPORTING DOCUMENTS & CALCULATIONS

Figure 13-1: Standard Rapid Geomorphic Assessment Scoring Form (Simon et al. 2002)

RAPID GEOMORPHIC ASSESSMENT (RGA) FORM
CHANNEL STABILITY RANKING SCHEME

Station Name____

Station Description____

Date__________ Crew________________________ Pebble count taken: Y / N

Pics (circle): u/s, d/s, x-sec, LB, RB Slope________ Pattern: meander/ straight/ braided

1. Primary bed material

Bedrock	Boulder/Cobble	Gravel	Sand	Silt/Clay
0	1	2	3	4

2. Bed/bank protection

Yes	No	(with) 1 bank protected	2 banks protected
0	1	2	3

3. Degree of incision (relative elev. of “normal” low water if floodplain/terrace is 100%)

0-10%	11-25%	26-50%	51-75%	76-100%
4	3	2	1	0

4. Degree of constriction (relative decrease in top-bank width from up to down stream)

0-10%	11-25%	26-50%	51-75%	76-100%
0	1	2	3	4

5. Streambank erosion (dominant process each bank)

	None	fluvial	mass wasting (failures)
Inside or left	0	1	2
Outside or right	0	1	2

6. Streambank instability (percent of each bank failing)

	0-10%	11-25%	26-50%	51-75%	76-100%
Inside or left	0	0.5	1	1.5	2
Outside or right	0	0.5	1	1.5	2

7. Established riparian vegetative cover (woody or stabilizing perennial grasses each bank)

	0-10%	11-25%	26-50%	51-75%	76-100%
Inside or left	2	1.5	1	0.5	0
Outside or right	2	1.5	1	0.5	0

8. Occurrence of bank accretion (percent of each bank with fluvial deposition)

	0-10%	11-25%	26-50%	51-75%	76-100%
Inside or left	2	1.5	1	0.5	0
Outside or right	2	1.5	1	0.5	0

9. Stage of channel evolution (I and VI generally < 11 total score)

I	II	III	IV	V	VI
0	1	2	4	3	1.5

10. SUM OF ALL VALUES ⟶ [ ]

13.1 Target Calculations

Figure 13-2: Normalized Loading Unit Conversion Calculation

Normalized Loading Conversion Calculation:

$$24.7\ \frac{\text{Tonnes}}{\text{km}^2} \times \frac{1}{0.386102}\ \frac{\text{km}^2}{\text{mi}^2} \times \frac{1.102311\ \text{tons (US Short Ton)}}{1\ \text{Tonne (metric)}} = \mathbf{70.5178}\ \frac{\textbf{tons}}{\textbf{mi}^2}\ \text{(per year)}$$

Figure 13-3: Concentration Limit Calculations

Concentration Limit Calculations:

Known Values: Drainage Area = 1027 mi² Normalized Load = 70.5 tons/mi²/yr
Q = 1630 ft³/s *

Loading (tons/mi²/yr) = Concentration (mg/L) x Flow (ft³/s)
L = C x Q

$$\text{Non-normalized Load} = 70.5\ \frac{\frac{\text{tons}}{\text{mi}^2}}{\text{yr}} \times 1027\ \text{mi}^2 = \mathbf{72{,}404\ tons/yr}$$

$$\text{If } L = C \times Q, \text{ then } C = 72404\ \frac{\text{tons}}{\text{yr}} \times \frac{1}{1630}\ \frac{\text{s}}{\text{ft}^3} \times \frac{1}{86400}\ \frac{\text{d}}{\text{s}} \times \frac{1}{365.25}\ \frac{\text{yr}}{\text{d}} \times \frac{9.07E{+}08}{1}\ \frac{\text{mg}}{\text{ton}} \times \frac{1}{28.317}\ \frac{\text{ft}^3}{\text{L}}$$

$$= 45.09431 \approx \mathbf{45.1\ mg/L}$$

*Flow established in Shades Creek Study

13.2 $Q_{1.5}$ Approximation & Results

In order to approximate the effective discharge for each of the USGS sites, peak flow data was obtained from the USGS website. This data was then imported into the US Army Corps of Engineers' (ASACE) Hydrologic Engineering Center (HEC) computer program where the analysis was performed. *Appendix Table 7* below summarizes the $Q_{1.5}$ flow estimations by USGS site:

Appendix Table 7: $Q_{1.5}$ Estimates for Selected USGS Stations

USGS Site ID	Waterbody	Drainage Area (mi²)	$Q_{1.5}$ (cfs)
02423130	Cahaba River @ Trussville, AL	19.7	2577
02423425	Cahaba River Near Cahaba Heights, AL	201	7475
02423496	Cahaba River Near Hoover, AL	226	7129
02423500	Cahaba River Near Acton, AL	230	9194
02423555	Cahaba River Near Helena, AL	335	9142

See the following pages for the resulting flow-probability curves for each site.

Figure 13-4: Q1.5 Effective Discharge for USGS 02423130 (Cahaba River @ Trussville, AL)

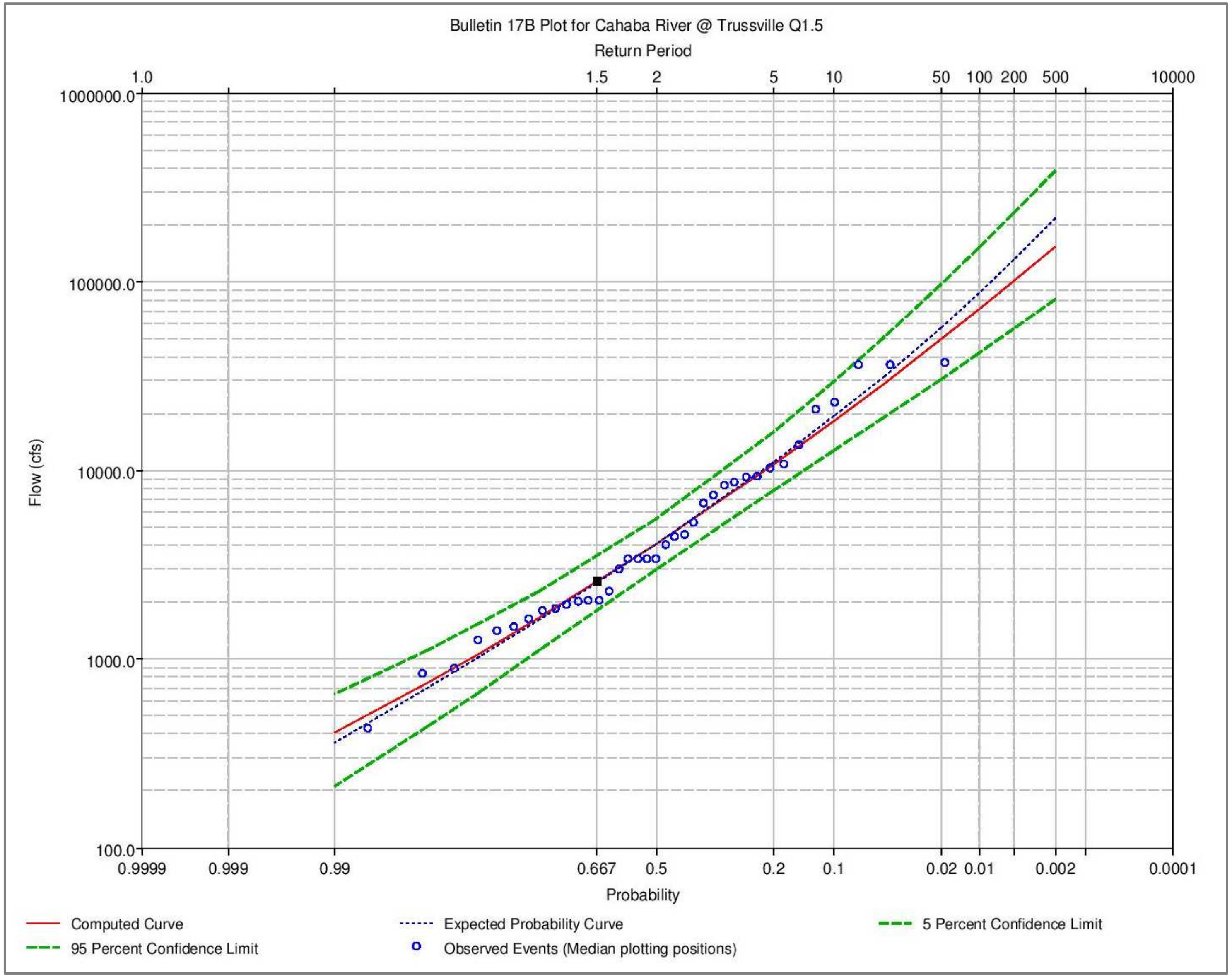


Figure 13-5: Q1.5 Effective Discharge for USGS 02423425 (Cahaba River near Cahaba Heights, AL)

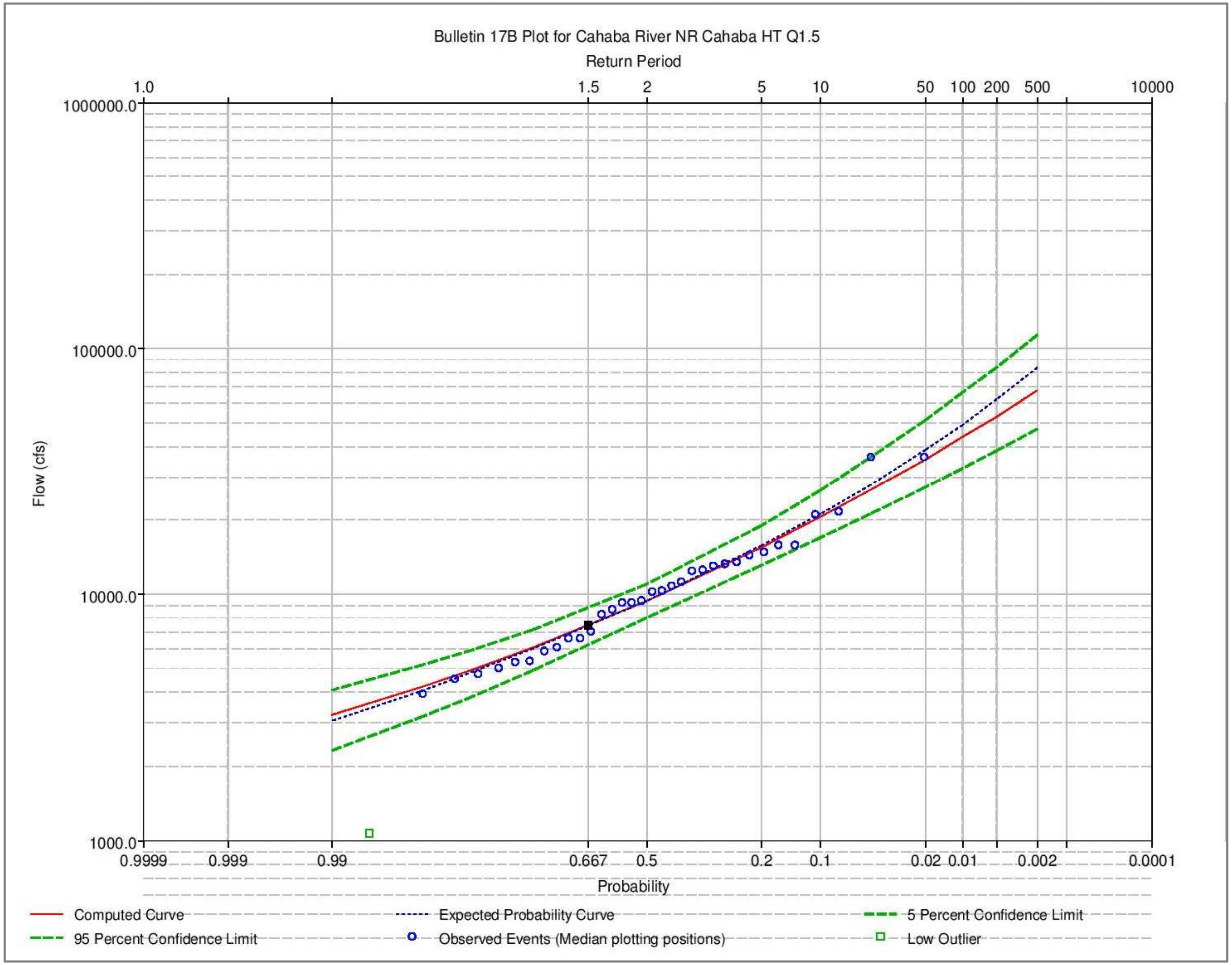


Figure 13-6: Q1.5 Effective Discharge for USGS 02423496 (Cahaba River near Hoover, AL)

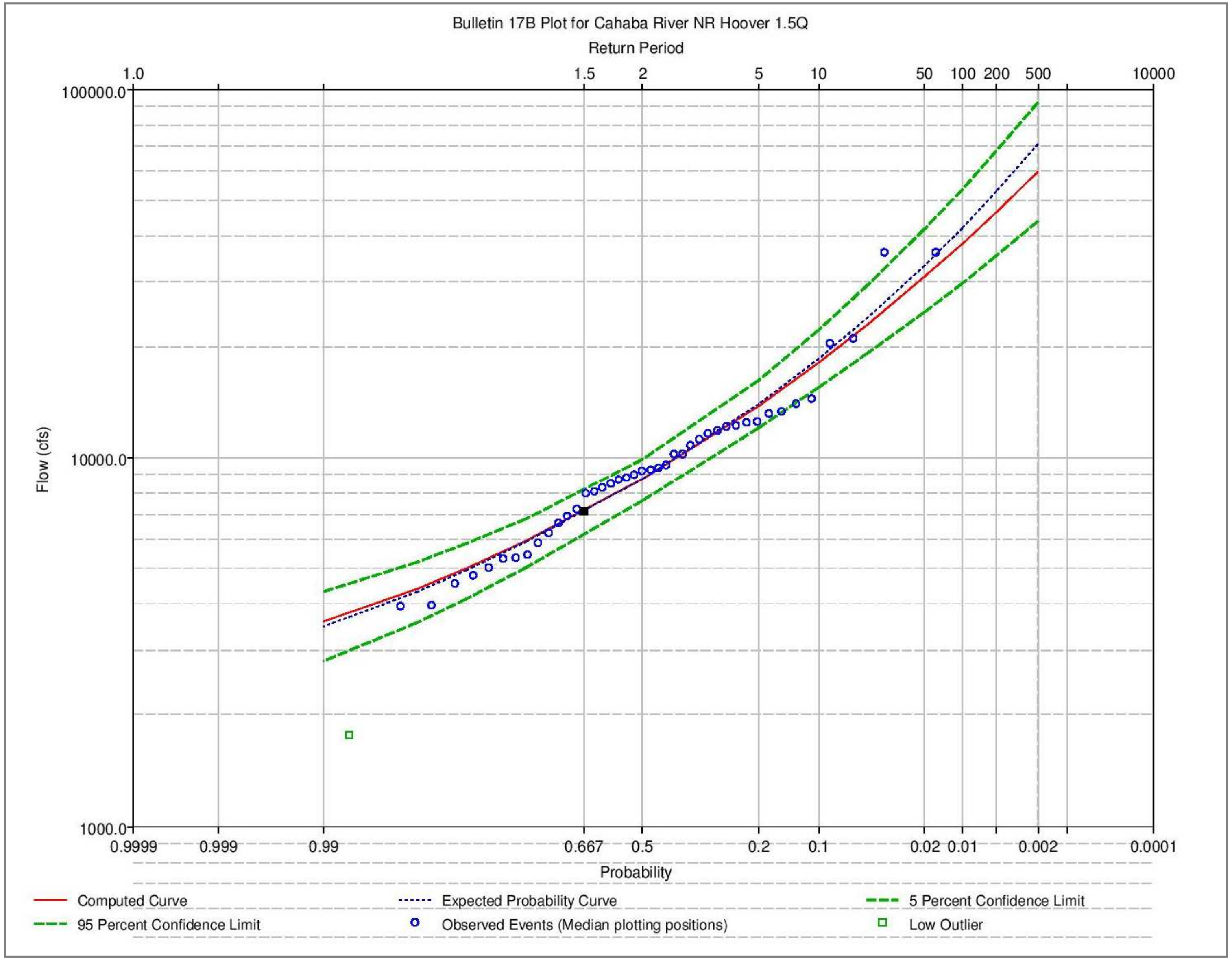


Figure 13-7: Q1.5 Effective Discharge for USGS 02423500 (Cahaba River near Acton, AL)

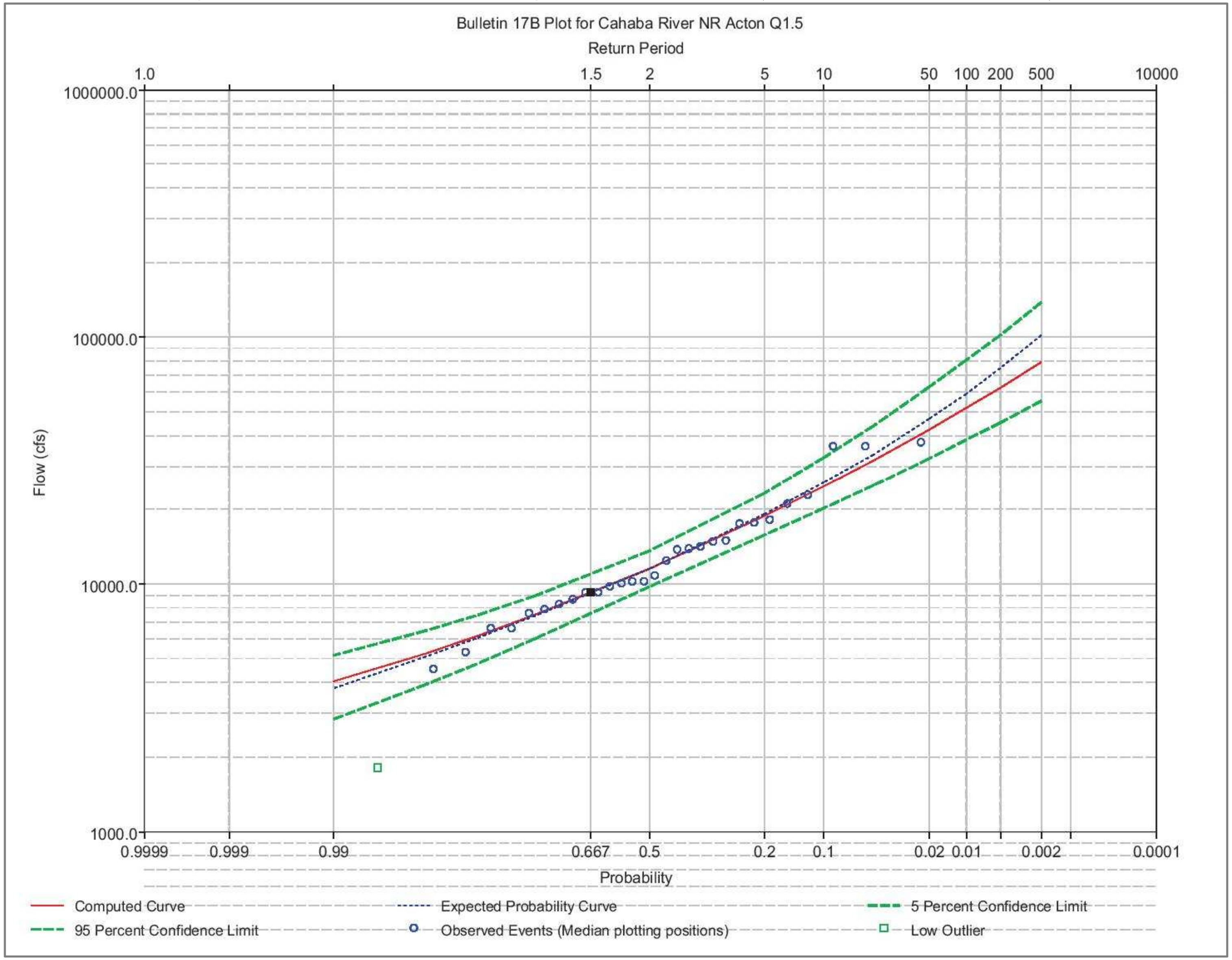
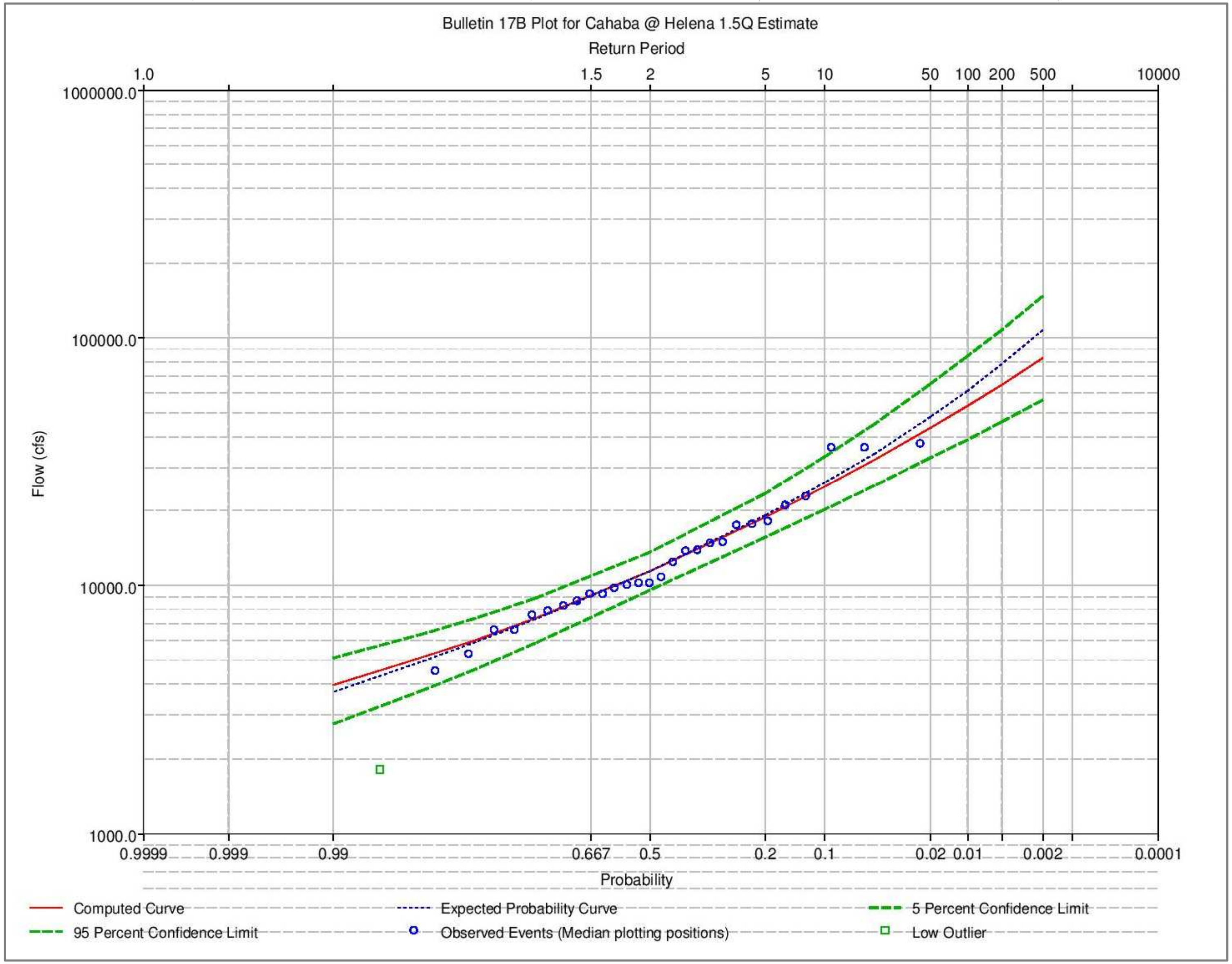


Figure 13-8: Q1.5 Effective Discharge for USGS 02423555 (Cahaba River near Helena, AL)



13.3 Sediment-transport Curves & Calculations

Figure 13-9: Sediment-transport Curve for USGS 02423130

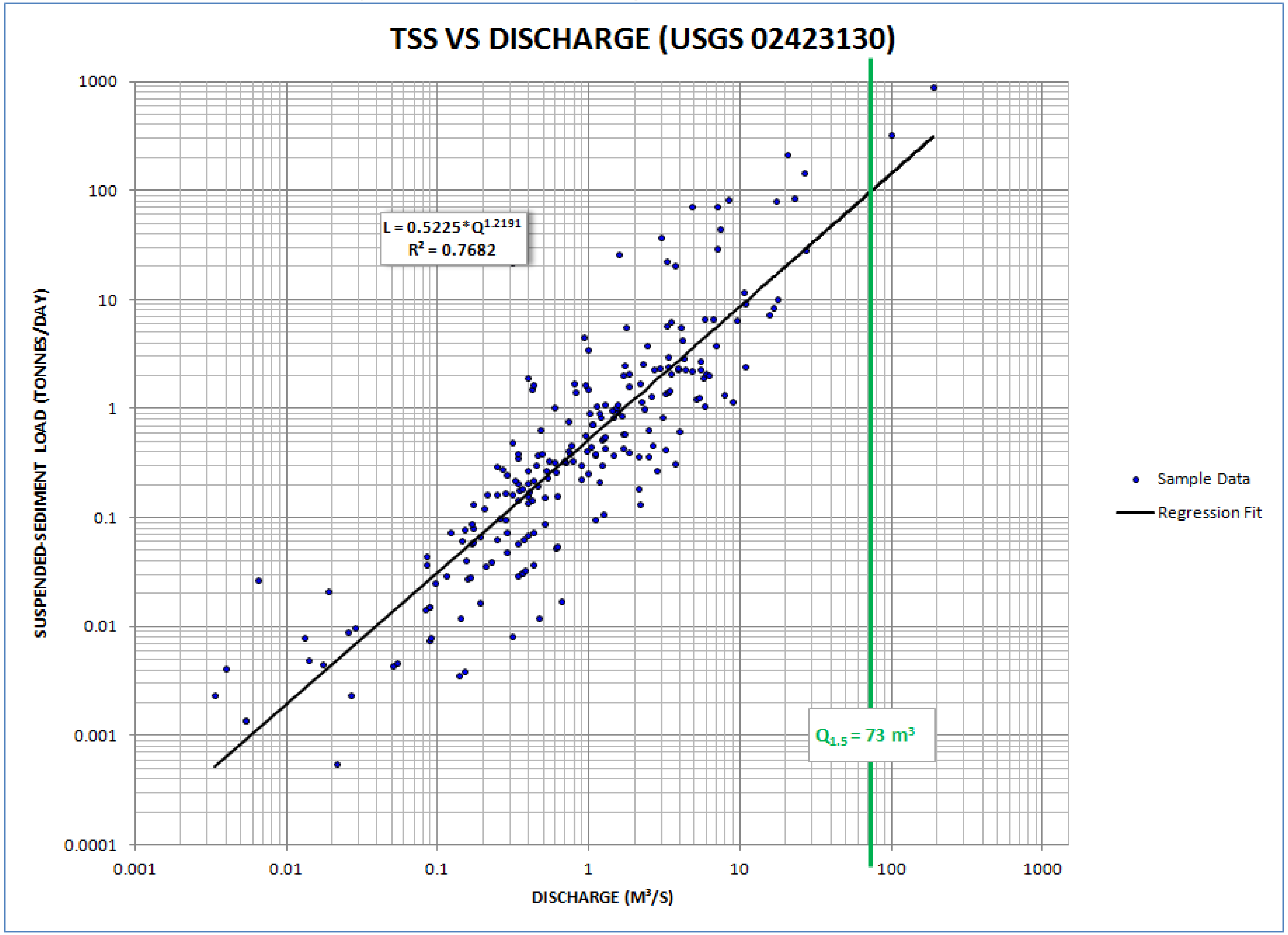


Figure 13-10: Sediment-transport Curve for USGS 02423425

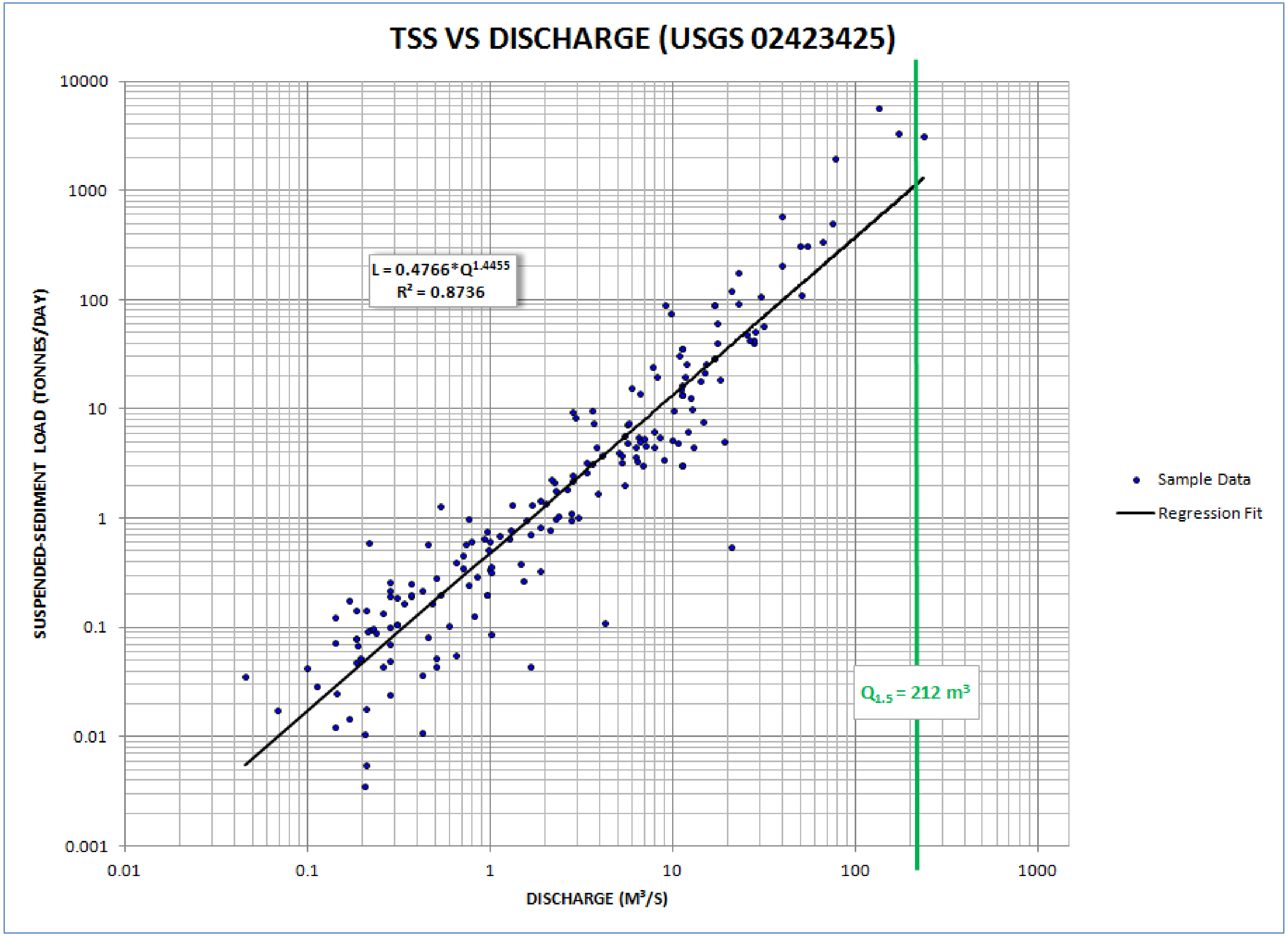


Figure 13-11: Sediment-transport Curve for USGS 02423496

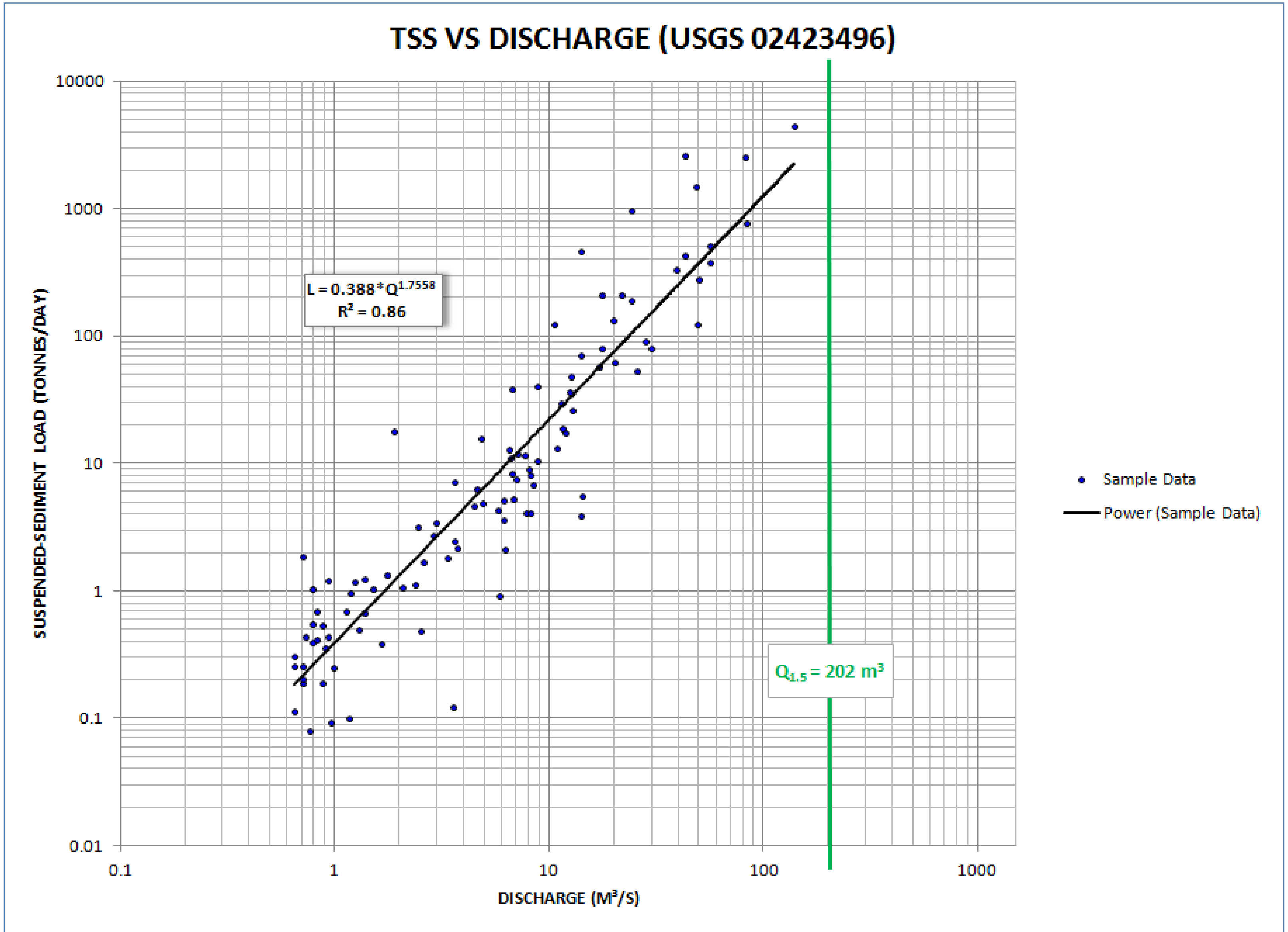


Figure 13-12: Sediment-transport Curve for USGS 02423500

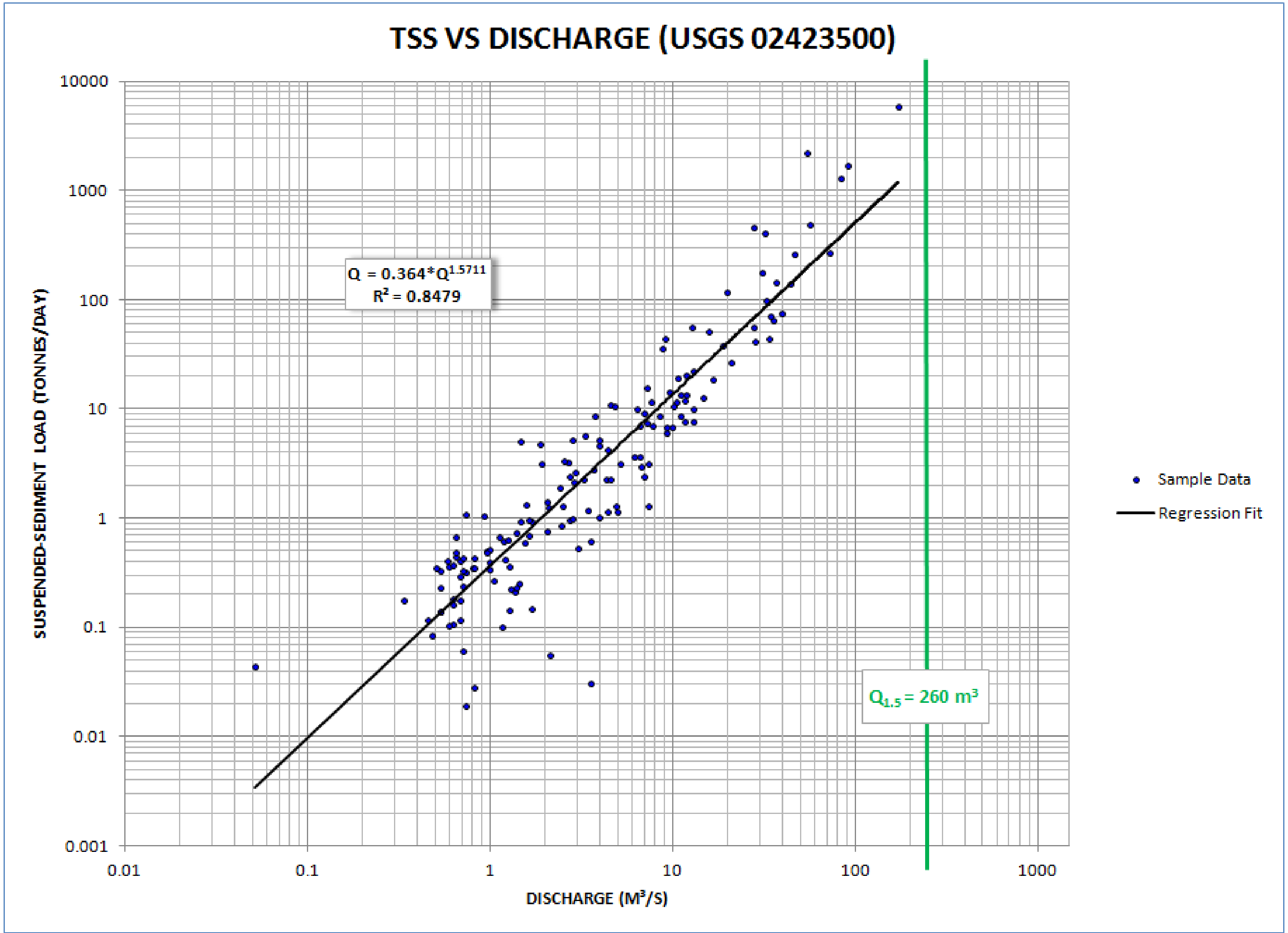
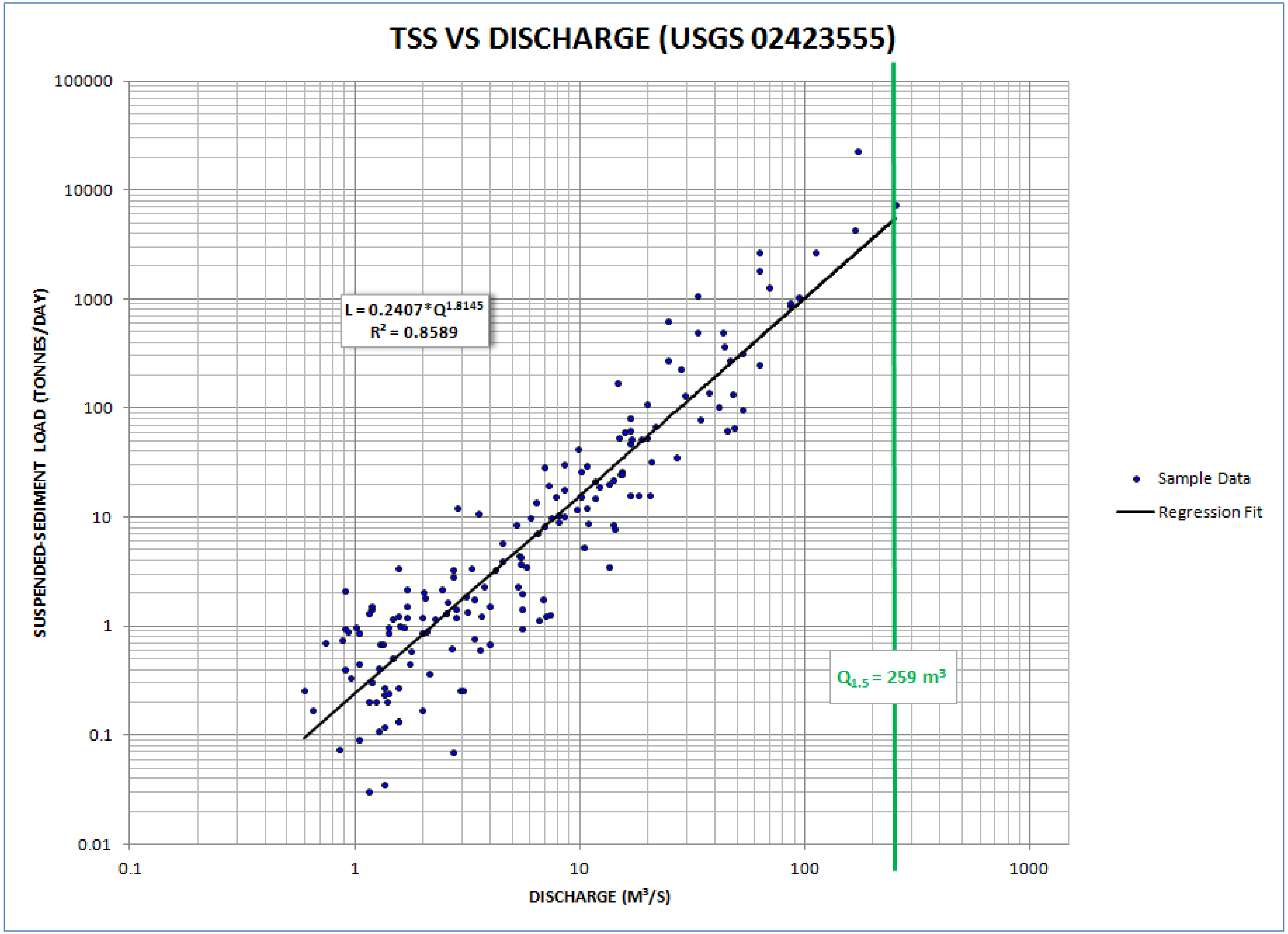


Figure 13-13: Sediment-transport Curve for USGS 02423555



14.0 APPENDIX D: SUPPORTING PHOTOS

Picture 14-1: Cahaba River @ USGS 02423130 Upstream (8/25/2010)

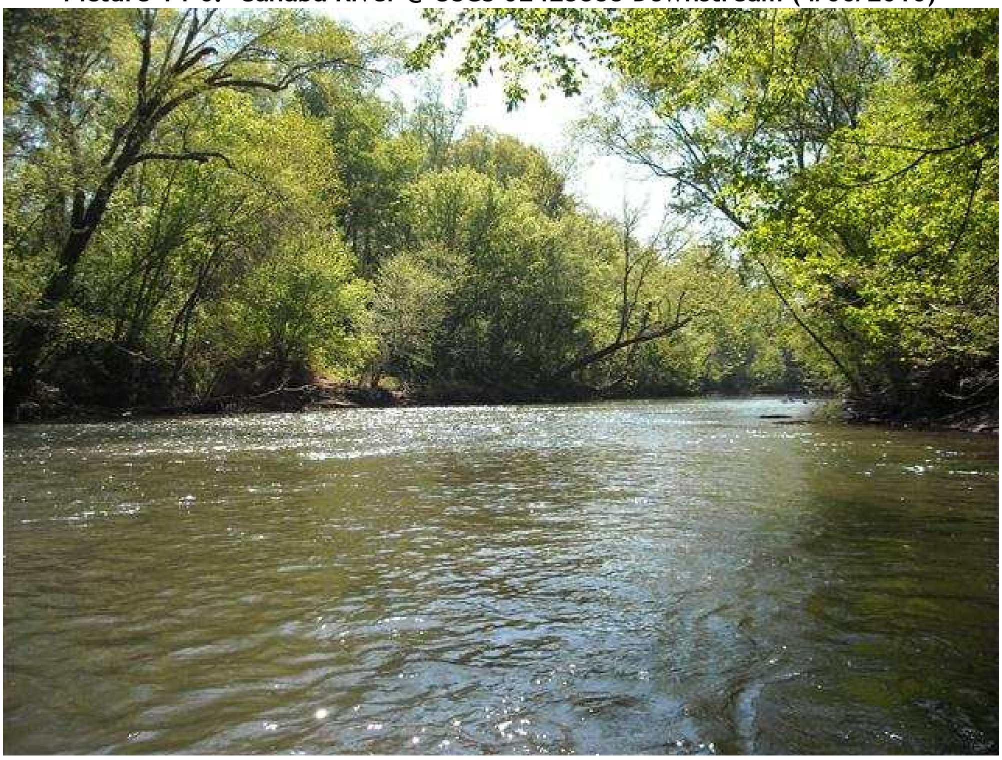
Picture 14-2: Cahaba River @ USGS 02423130 Downstream (8/252010)

Picture 14-3: Cahaba River near USGS 02423425 Upstream (7/8/2010)

Picture 14-4: Cahaba River near USGS 02423425 Downstream (7/8/2010)

Picture 14-5: Cahaba River @ USGS 02423555 Upstream (4/06/2010)

Picture 14-6: Cahaba River @ USGS 02423555 Downstream (4/06/2010)



Picture 14-7: Cahaba River @ USGS 02423500 Upstream (4/13/2010)

Picture 14-8: Cahaba River @ USGS 02423500 Downstream (4/13/2010)

Picture 14-9: Sediment Deposits in the Cahaba River

Picture 14-10: Debris Collected on Streambank after Storm Event