Total Maximum Daily Load

Evaluation

for

Seventy-Two Stream Segments

in the

Oconee River Basin

for

Fecal Coliform

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

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

January 2007

Table of Contents

List of Tables

List of Figures

List of Appendixes

EXECUTIVE SUMMARY

The State of Georgia assesses its water bodies for compliance with water quality standards criteria established for their designated uses as required by the Federal Clean Water Act (CWA). Assessed water bodies are placed into one of three categories with respect to designated uses: 1) supporting, 2) partially supporting, or 3) not supporting. These water bodies are found on Georgia's 305(b) list as required by that section of the CWA that defines the assessment process, and are published in *Water Quality in Georgia* (GA EPD, 2000 – 2001). This document is available on the Georgia Environmental Protection Division (GA EPD) website.

Some of the 305(b) partially and not supporting water bodies are also assigned to Georgia's 303(d) list, also named after that section of the CWA. Water bodies on the 303(d) list are required to have a Total Maximum Daily Load (TMDL) evaluation for the water quality constituent(s) in violation of the water quality standard. The TMDLs in this document are based on the draft 2006 303(d) listing, which is available on the GA EPD website. This document also includes revised TMDLs for the segments that were included in the 2002 Oconee River Basin Fecal Coliform TMDL. The TMDL process establishes the allowable pollutant loadings or other quantifiable parameters for a water body based on the relationship between pollutant sources and instream water quality conditions. This allows water quality-based controls to be developed to reduce pollution and restore and maintain water quality.

The State of Georgia has identified seventy-two (72) stream segments located in the Oconee River Basin as water quality limited due to fecal coliform. A stream is placed on the partial support list if more than 10% of the samples exceed the fecal coliform criteria and on the not support list if more than 25% of the samples exceed the standard. Water quality samples collected within a 30-day period that have a geometric mean in excess of 200 counts per 100 milliliters during the period May through October, or in excess of 1,000 counts per 100 milliliters during the period November through April, are in violation of the bacteria water quality standard. There is also a single sample maximum criteria (4,000 counts per 100 milliliters) for the months of November through April. The water use classification of all of the impacted streams is Fishing.

An important part of the TMDL analysis is the identification of potential source categories. Sources are broadly classified as either point or nonpoint sources. A point source is defined as a discernable, confined, and discrete conveyance from which pollutants are or may be discharged to surface waters. Nonpoint sources are diffuse, and generally, but not always, involve accumulation of fecal coliform bacteria on land surfaces that wash off as a result of storm events.

The process of developing fecal coliform TMDLs for the Oconee River Basin listed segments includes the determination of the following:

- The current critical fecal coliform load to the stream under existing conditions;
- The TMDL for similar conditions under which the current critical load was determined; and
- The percent reduction in the current critical fecal coliform load necessary to achieve the TMDL.

The calculation of the fecal coliform load at any point in a stream requires the fecal coliform concentration and stream flow. The availability of water quality and flow data varies considerably among the listed segments. The Loading Curve Approach was used to determine

the current fecal coliform load and TMDL. The fecal coliform loads and required reductions for each of the listed segments are summarized in the table below.

Management practices that may be used to help reduce fecal coliform source loads include:

- Compliance with NPDES permit limits and requirements;
- Adoption of NRCS Conservation Practices; and
- Application of Best Management Practices (BMPs) appropriate to reduce nonpoint sources.

The amount of fecal coliform delivered to a stream is difficult to determine. However, by requiring and monitoring the implementation of these management practices, their effects will improve stream water quality, and represent a beneficial measure of TMDL implementation.

Fecal Coliform Loads and Required Fecal Coliform Load Reductions

Stream Segment	Current Load (counts/ 30 days)	TMDL Components					Percent Reduction
		WLA (counts/ 30 days)[1]	WLAsw (counts/ 30 days)	LA (counts/ 30 days)	MOS (counts/ 30 days)	TMDL (counts/ 30 days)	
Allen Creek - Monroe Driver to 1 mile d/s GA. Hwy 11	8.19E+13		1.30E+12	6.30E+12	8.44E+11	8.44E+12	57
Allen Creek - 1 mile d/s GA Hwy 11 to Middle Oconee River	1.47E+13		4.01E+11	2.46E+12	3.18E+11	3.18E+12	78
Apalachee River - Headwaters to Apalachee Road	1.42E+12		5.89E+11	1.68E+11	8.41E+10	8.41E+11	41
Apalachee River - Williamson Creek to Marburg Creek	3.59E+13		1.88E+12	4.33E+12	6.90E+11	6.90E+12	81
Apalachee River - Marburg Creek to Lake Oconee	3.71E+14		8.82E+12	9.42E+13	1.14E+13	1.14E+14	69
Beaverdam Creek	2.82E+14			6.34E+13	7.05E+12	7.05E+13	75
Big Cedar Creek	3.52E+13			5.66E+12	6.29E+11	6.29E+12	82
Big Indian Creek	5.28E+14			7.93E+13	8.81E+12	8.81E+13	83
Big Sandy Creek - Headwaters to Little Sandy Creek	1.15E+13			2.86E+12	3.18E+11	3.18E+12	72
Big Sandy Creek - Little Sandy Creek (near Madison) to Hard Labor Creek	1.54E+14			9.02E+12	1.00E+12	1.00E+13	93
Big Sandy Creek - Porter Creek to Oconee River	8.55E+13			3.08E+13	3.42E+12	3.42E+13	60
Bluff Creek	2.99E+13			1.02E+13	1.13E+12	1.13E+13	62
Brooklyn Creek	2.14E+12			1.74E+11	4.97E+10	2.49E+11	88
Buffalo Creek	5.10E+13			2.51E+13	2.79E+12	2.79E+13	45
Calls Creek	1.06E+14	7.03E+10	2.30E+13	1.92E+13	4.70E+12	4.70E+13	56
Carver Creek	4.03E+12		3.13E+11	8.95E+10	4.48E+10	4.48E+11	89
Carr Creek	1.54E+11		6.32E+10	1.81E+10	9.03E+09	9.03E+10	41
Cedar Creek - King Branch to Glady Creek	1.47E+12			9.48E+11	1.05E+11	1.05E+12	28
Cedar Creek - Glady Creek to Big Cedar Creek	1.53E+12			9.87E+11	1.10E+11	1.10E+12	28
Cedar Creek - Headwaters to Oconee River, Athens	5.29E+12		2.82E+11	8.05E+10	4.02E+10	4.02E+11	92
Cedar Creek - Headwaters to Winder Reservoir	9.57E+13		5.88E+09	7.50E+11	8.39E+10	8.39E+11	95

Stream Segment	Current Load (counts/ 30 days)	TMDL Components					Percent Reduction
		WLA (counts/ 30 days)[1]	WLAsw (counts/ 30 days)	LA (counts/ 30 days)	MOS (counts/ 30 days)	TMDL (counts/ 30 days)	
Chandler Creek	1.76E+13			2.07E+12	2.30E+11	2.30E+12	87
Cloverhurst Branch	2.16E+12		1.12E+12	3.19E+11	1.60E+11	1.60E+12	26
E. T. Creek	1.52E+11		4.66E+10	1.58E+10	6.93E+09	6.93E+10	55
East Fork Trail Creek	3.17E+11		8.73E+10	2.49E+10	1.25E+10	1.25E+11	61
Fishing Creek	1.92E+13			3.94E+12	4.37E+11	4.37E+12	77
Hunnicutt Creek (aka Mitchell Bridge Branch)	6.10E+11		1.16E+11	3.31E+10	1.65E+10	1.65E+11	73
Kingswood Branch	7.85E+10		9.88E+09	2.82E+09	1.41E+09	1.41E+10	82
Little Commissioner Creek	6.61E+12	8.85E+10		4.37E+12	4.95E+11	4.95E+12	25
Little Mulberry Creek	9.14E+12		9.77E+11	1.05E+12	2.25E+11	2.25E+12	75
Little River - Shoal Creek to Gap Creek	5.40E+12			3.57E+12	3.96E+11	3.96E+12	27
Little River - Gap Creek to Big Indian Creek	5.83E+11			3.74E+11	4.15E+10	4.15E+11	29
Little River - Glady Creek to Lake Sinclair	2.74E+13	2.73E+10		1.17E+13	1.30E+12	1.30E+13	52
Little River - Social Circle to Nelson Creek	1.17E+12	1.03E+11		6.38E+11	8.23E+10	8.23E+11	30
Little Sugar Creek	4.41E+12			1.37E+12	1.52E+11	1.52E+12	65
Marburg Creek	3.33E+12	7.44E+10		2.30E+12	2.64E+11	2.64E+12	21
Middle Oconee River - Dosters Creek to Mulberry River	9.49E+13		2.51E+12	1.77E+13	2.24E+12	2.24E+13	76
Middle Oconee River - Mulberry River to Big Bear Creek	4.89E+13		2.92E+12	1.80E+13	2.32E+12	2.32E+13	53
Middle Oconee River - Big Bear Creek to McNutt Creek	1.34E+14		5.81E+12	2.53E+13	3.46E+12	3.46E+13	74
Middle Oconee River - McNutt Creek to North Oconee River	7.18E+13		1.05E+13	4.12E+13	5.74E+12	5.74E+13	20
Mulberry River - Mulberry Creek to Little Mulberry River	3.27E+13		1.88E+12	5.43E+12	8.12E+11	8.12E+12	75
Mulberry River - Little Mulberry River to Middle Oconee	3.41E+13	1.19E+10	1.36E+12	6.98E+12	9.29E+11	9.29E+12	73
Murder Creek	4.82E+12	2.28E+10		2.25E+12	2.53E+11	2.53E+12	48

Stream Segment	Current Load (counts/ 30 days)	TMDL Components					Percent Reduction
		WLA (counts/ 30 days)[1]	WLAsw (counts/ 30 days)	LA (counts/ 30 days)	MOS (counts/ 30 days)	TMDL (counts/ 30 days)	
North Bypass Branch	8.75E+09		2.97E+09	8.48E+08	4.24E+08	4.24E+09	52
North Oconee River - Buffington Mill Creek to Chandler Creek	1.73E+14			9.60E+12	1.07E+12	1.07E+13	94
North Oconee River - Chandler Creek to Bordens Creek	3.51E+13			6.51E+12	7.23E+11	7.23E+12	79
North Oconee River - Bordens Creek to Curry Creek	1.17E+13			7.63E+12	8.48E+11	8.48E+12	27
North Oconee River - Jackson County to Sandy Creek	9.36E+13		7.09E+11	2.21E+13	2.53E+12	2.53E+13	73
North Oconee River - Sandy Creek to Trail Creek, Athens	4.38E+13		7.09E+11	2.21E+13	2.57E+12	2.57E+13	41
North Oconee River - Trail Creek to Oconee River	2.30E+15	1.59E+12	1.44E+12	2.17E+13	1.70E+14	1.70E+15	76
North Walnut Creek - Gainesville U/s Hall County Camp	4.89E+11		3.73E+12	2.29E+13	1.28E+10	1.28E+11	74
North Walnut Creek - Gainesville D/s Hall County Camp	1.45E+13		1.79E+09	1.13E+11	6.89E+11	6.89E+12	52
Oconee River - Confluence of North & Middle Oconee Rivers	3.05E+14	3.00E+11	1.81E+13	8.73E+13	1.17E+13	1.17E+14	61
Oconee River - Barnett Shoals to Lake Oconee	2.70E+14		1.29E+13	7.03E+13	9.24E+12	9.24E+13	66
Oconee River - Long Branch to Turkey Creek	2.80E+15	4.35E+11		1.22E+15	1.35E+14	1.35E+15	52
Pond Fork - Headwaters to East Pond Fork	5.58E+12			8.81E+11	9.79E+10	9.79E+11	82
Pond Fork - East Pond Fork to Middle Oconee River	9.30E+12			2.69E+12	2.98E+11	2.98E+12	68
Richland Creek - U/s Greensboro to Interstate 20	3.63E+11			2.60E+11	2.88E+10	2.88E+11	20
Richland Creek - Interstate 20 to Beaverdam Creek	5.09E+13			2.95E+12	3.28E+11	3.28E+12	94
Rooty Creek	2.33E+13	5.96E+10		6.54E+11	7.93E+10	7.93E+11	97
Sugar Creek	6.05E+12			1.62E+12	1.80E+11	1.80E+12	70
Tanyard Creek	9.39E+11		3.77E+10	1.08E+10	5.38E+09	5.38E+10	94
Town Creek - Penfield to Lake Oconee	1.48E+12			7.13E+11	7.93E+10	7.93E+11	46
Town Creek - Hwy. 15 to Richland Creek, Greensboro	8.72E+11	6.01E+10		2.57E+11	3.52E+10	3.52E+11	60
Trail Creek	2.35E+14		4.11E+13	1.17E+13	5.87E+12	5.87E+13	75

Stream Segment	Current Load (counts/ 30 days)	TMDL Components					Percent Reduction
		WLA (counts/ 30 days)[1]	WLAsw (counts/ 30 days)	LA (counts/ 30 days)	MOS (counts/ 30 days)	TMDL (counts/ 30 days)	
Tributary to Little River	4.29E+11			2.43E+10	2.70E+09	2.70E+10	94
Tributary to North Walnut Creek	2.48E+12		4.25E+11	6.47E+11	1.19E+11	1.19E+12	52
Turkey Creek - Horse Branch to Rocky Creek	7.87E+11	6.05E+10		5.57E+11	6.86E+10	6.86E+11	13
Turkey Creek - Rocky Creek to Oconee River	4.27E+12			3.69E+12	4.10E+11	4.10E+12	4
Walnut Creek	5.30E+12		1.22E+11	1.08E+12	1.34E+11	1.34E+12	75
West Fork Trail Creek	8.77E+11		3.65E+11	1.09E+11	5.27E+10	5.27E+11	40
Wheeler Creek	1.16E+12		2.54E+11	1.70E+11	4.71E+10	4.71E+11	59

Notes: [1] The assigned fecal coliform load from each NPDES permitted facility for WLA was determined as the product of the fecal coliform permit limit and the facility average monthly discharge at the time of the critical load.

1.0 INTRODUCTION

1.1 Background

The State of Georgia assesses its water bodies for compliance with water quality standards criteria established for their designated uses as required by the Federal Clean Water Act (CWA). Assessed water bodies are placed into one of three categories with respect to designated uses: 1) supporting, 2) partially supporting, or 3) not supporting. These water bodies are found on Georgia's 305(b) list as required by that section of the CWA that addresses the assessment process, and are published in *Water Quality in Georgia* (GA EPD, 2000 – 2001). This document is available on the Georgia Environmental Protection Division (GA EPD) website.

Some of the 305(b) partially and not supporting water bodies are also assigned to Georgia's 303(d) list, also named after that section of the CWA. Water bodies on the 303(d) list are required to have a Total Maximum Daily Load (TMDL) evaluation for the water quality constituent(s) in violation of the water quality standard. The TMDLs in this document are based on the draft 2006 303(d) listing, which is available on the GA EPD website. This document also includes revised TMDLs for the segments that were included in the 2002 Oconee River Basin Fecal Coliform TMDL. The TMDL process establishes the allowable loading of pollutants or other quantifiable parameters for a water body based on the relationship between pollution sources and in-stream water quality conditions. This allows water quality based controls to be developed to reduce pollution and restore and maintain water quality.

The list identifies the waterbodies as either partially supporting or not supporting their designated use classifications, due to exceedances of water quality standards for fecal coliform bacteria. Fecal coliform bacteria are used as an indicator of the potential presence of pathogens in a stream. Table 1 presents the thirty-four streams of the Oconee River Basin included on the draft 2006 303(d) list for exceedances of the fecal coliform standard criteria. A total of fourteen stream segments were listed as partially supporting their designated use and nineteen stream segments were listed as not supporting their designated use on the draft 2006 303(d) list. Table 2 lists the thirty-eight streams segments in the Oconee River Basin where the TMDLs are being revised.

1.2 Watershed Description

The Oconee River Basin is located in central Georgia, occupying an area of approximately 5,326 square miles. The Oconee River basin falls within the Level III Piedmont and Southeastern Plains Ecoregions. The Upper (above Lake Sinclair) Oconee River watershed is located primarily in the Level IV Southern Outer Piedmont Subecoregion, with small portions of the headwaters extending up into the Southern Inner Piedmont Subecoregion. The City of Athens is the major populated area in the Upper Oconee River watershed. The Lower Oconee River watershed is a multifaceted watershed with portions of the watershed located in the Level IV Southern Outer Piedmont, the Sand Hills, the Coastal Plain Red Uplands and the Atlantic Southern Loam Plains. There is also a corridor, running the length of the Lower Oconee River and extending (approximately) one half to two miles inland on each side of the River, which lies in the Southeastern Floodplains and Low Terraces Subecoregion. The City of Milledgeville is the major populated area in the Lower Oconee River watershed. Typical characteristics for these Subecoregions are as follows:

Table 1. Water Bodies Listed on the Draft 2006 303(d) List for Fecal Coliform Bacteria in the Oconee River Basin

Stream Segment	Location	Segment Length (miles)	Designated Use	Listing
Allen Creek	1 mile d/s GA Hwy 11 to Middle Oconee River (Jackson Co)	8	Fishing	PS
Apalachee River	Headwaters to Apalachee Road (Gwinnett Co)	6	Fishing	NS
Big Sandy Creek	Headwaters to Little Sandy Creek (Oconee Co)	10	Fishing	NS
Big Sandy Creek	Little Sandy Creek (near Madison) to Hard Labor Creek (Morgan Co)	6	Fishing	PS
Bluff Creek	D/S Wiggins Road to Oconee River (Washington Co)	4	Fishing	NS
Brooklyn Creek	Headwaters to Middle Oconee River Athens (Clarke Co)	2	Fishing	NS
Buffalo Creek	Keg Creek to Oconee River (Washington Co)	10	Fishing	PS
Calls Creek	Lumpkin Branch to Middle Oconee River (Oconee Co)	4	Fishing	NS
Carver Creek	Tributary to Trail Creek, Athens (Clarke Co)	1	Fishing	NS
Cedar Creek	King Branch to Glady Creek (Jasper/Jones Co)	11	Fishing	PS
Cedar Creek	Glady Creek to Big Cedar Creek (Jones Co)	3	Fishing	NS
Chandler Creek	Headwaters to North Oconee River (Hall/Jackson Co)	11	Fishing	NS
Cloverhurst Branch	Athens (Clarke Co)	2	Fishing	NS
E. T. Creek	Headwaters to North Walnut Creek, Gainesville (Hall Co)	1	Fishing	PS
Fishing Creek	McWhorter Creek to Lake Oconee (Green Co)	4	Fishing	NS
Hunnicutt Creek (aka Mitchell Bridge Branch)	Headwaters to Middle Oconee River, Athens (Clarke Co)	1	Fishing	PS
Kingswood Branch	Tributary to McNutt Creek, Athens (Clark Co)	1	Fishing	NS
Little Mulberry River	Headwaters to Mulberry River (Gwinnett/Barrow Co)	11	Fishing	PS
Little River	Gap Creek to Big Indian Creek (Putnam Co)	5	Fishing	PS
Middle Oconee River	Dosters Creek to Mulberry River (Jackson Co)	8	Fishing	PS
Middle Oconee River	McNutt Creek to North Oconee River (Clarke/Oconee Co)	4	Fishing	PS
Mulberry River	Mulberry Creek to Little Mulberry River (Hall/Jackson/Barrow Co)	9	Fishing	PS
Murder Creek	Wolf Creek to Lake Sinclair (Putnam Co)	10	Fishing	NS
North Bypass Branch	Tributary to Middle Oconee River, Athens (Clarke Co)	2	Fishing	NS
North Oconee River	Buffington Mill Creek to Chandler Creek (Hall/Jackson Co)	10	Fishing	PS
Pond Fork	Headwaters to East Pond Fork (Hall/Jackson Co)	5	Fishing	PS
Pond Fork	East Pond Fork to Middle Oconee River (Jackson Co)	6	Fishing	PS
Richland Creek	U/S Greensboro to Interstate 20 (Greene Co)	9	Fishing	NS
Sugar Creek	South Sugar Creek to Lake Oconee (Morgan Co)	7	Fishing	NS
Town Creek	Penfield to Lake Oconee (Greene Co)	7	Fishing	NS
Trail Creek	East Fork Trail Creek to North Oconee River, Athens (Clarke Co)	2	Fishing	NS
Tributary to Little River	Eatonton to Little River (Putnam Co)	3	Fishing	NS
West Fork Trail Creek	Athens (Clarke Co)	3	Fishing	NS
Wheeler Creek	Headwaters to Duncan Creek (Gwinnett /Barrow Co)	5	Fishing	NS

Notes:
PS = Partially Supporting designated uses
NS = Not Supporting designated uses

Table 2. Water Bodies with Revised TMDLs for Fecal Coliform Bacteria in the Oconee River Basin

Stream Segment	Location	Segment Length (miles)	Designated Use
Allen Creek	Monroe Drive to 1 mile d/s GA. Hwy 11, (Gainesville/Hall/Jackson Co)	9	Fishing
Apalachee River	Williamson Creek to Marburg Creek (Barrow/Walton Co)	7	Fishing
Apalachee River	Marburg Creek to Lake Oconee (Oconee/Monroe/Greene Co)	35	Fishing
Beaverdam Creek	Oliver Creek to Lake Oconee, S of Greensboro (Greene Co)	4	Fishing
Big Cedar Creek	Hog Creek to Lake Sinclair (Jones/Putnam/Baldwin Co)	11	Fishing
Big Indian Creek	I-20 to Little Indian Creek (Morgan Co)	11	Fishing
Big Sandy Creek	Porter Creek to Oconee River (Wilkinson/Laurens Co)	14	Fishing
Carr Creek	Headwaters to North Oconee River, Athens (Clarke Co)	2	Fishing
Cedar Creek	Headwaters to Oconee River, Athens (Clarke Co)	4	Fishing
Cedar Creek	Headwaters to Winder Reservoir (Barrow Co)	4	Fishing
East Fork Trail Creek	Headwaters to West Fork Trail Creek (Clarke Co)	3	Fishing
Little Commissioner Creek	Ga Hwy 18 to Commissioner Creek (Wilkinson Co)	9	Fishing
Little River	Shoal Creek to Gap Creek (Morgan/Putnam Co)	14	Fishing
Little River	Glady Creek to Lake Sinclair (Putnam Co)	8	Fishing
Little River	Social Circle to Nelson Creek (Walton/Newton Co)	3	Fishing
Little Sugar Creek	Headwaters to Lake Oconee (Morgan Co)	9	Fishing
Marburg Creek	Masseys Lake to Apalachee River (Barrow Co)	7	Fishing
Middle Oconee River	Mulberry River to Big Bear Creek (Jackson/Clarke Co)	11	Fishing
Middle Oconee River	Big Bear Creek to McNutt Creek (Clarke Co)	12	Fishing
Mulberry River	Little Mulberry River to Middle Oconee River (Barrow Co)	18	Fishing
North Oconee River	Chandler Creek to Bordens Creek (Jackson Co)	12	Fishing
North Oconee River	Bordens Creek to Curry Creek (Jackson Co)	8	Fishing
North Oconee River	Jackson County to Sandy Creek (Clarke Co)	5	Fishing
North Oconee River	Sandy Creek to Trail Creek, Athens (Clarke Co)	2	Fishing/ Drinking Water
North Oconee River	Trail Creek to Oconee River (Clarke Co)	8	Fishing
North Walnut Creek	Gainesville (U/S Hall County Camp) (Hall Co)	2	Fishing
North Walnut Creek	Gainesville (D/S Hall County Camp) (Hall Co)	1	Fishing
Oconee River	Confluence of North & Middle Oconee Rivers, Athens to Barnett Shoals Dam (Clarke/Oconee Co)	4	Fishing
Oconee River	Barnett Shoals to Lake Oconee (Oconee/Greene Co)	16	Fishing

Stream Segment	Location	Segment Length (miles)	Designated Use
Oconee River	Long Branch to Turkey Creek (Laurens Co)	9	Fishing
Richland Creek	Interstate 20 to Beaverdam Creek (Greene Co)	8	Fishing
Rooty Creek	Rd. S926 Eatonton to Little Creek (Putnam Co)	9	Fishing
Tanyard Creek	U/S North Oconee River, Athens (Clarke Co)	1	Fishing
Town Creek	Hwy. 15 to Richland Creek, Greensboro (Greene Co)	4	Fishing
Tributary to North Walnut Creek	Gainesville (Hall Co)	1	Fishing
Turkey Creek	Horse Branch to Rocky Creek (Laurens Co)	10	Fishing
Turkey Creek	Rocky Creek to Oconee River (Laurens Co)	11	Fishing
Walnut Creek	Caney Fork to Middle Oconee River (Hall/Jackson Co)	14	Fishing

Notes:
PS = Partially Supporting designated uses
NS = Not Supporting designated uses

- Southern Inner Piedmont - this region contains mostly rolling to hilly upland; mainly pine and hardwood woodlands and fine textured, low nutrient and low organic content soils.

- Southern Outer Piedmont - this region contains lower elevations and less relief than Southern Inner Piedmont, with mostly red clayey soils; southern most boundary occurs at the fall line; major forest type is loblolly short-leafed pine.

- Sand Hills – rolling to hilly, highly dissected coastal plain belt; generally low nutrient sand and clay soils.

- Coastal Plain Red Uplands - this region contains mostly well drained soils composed of red sand and clay; the majority of the land is utilized as cropland or pasture.

- Atlantic Southern Loam Plains - this region contains soils ranging from poorly drained to excessively drained; longleaf pine, oak and some distinctive evergreen shrubs are common vegetation.

- Southeastern Floodplains and Low Terraces – this region contains large sluggish rivers and backwaters with ponds, swamps and oxbow lakes; terraces are typically covered by oak forests, while forests of bald cypress and water tupelo grow in the swamps and river areas.

The Oconee River Basin includes two United States Geologic Survey (USGS) eight-digit hydrologic units, HUC 03070101 (Upper Oconee River watershed), and HUC 03070102 (Lower Oconee River watershed. The Upper Oconee Basin is made up of the Oconee River, Apalachee River, Indian Creek, and Murder Creek subwatersheds. These converge at Lake Sinclair. The Oconee River flows south and southeast, runs through the City of Dublin, and then travels approximately 110 miles until it finally joins the Ocmulgee River near the City of Hazlehurst, to form the Altamaha River. The Altamaha River then continues in a southeastern

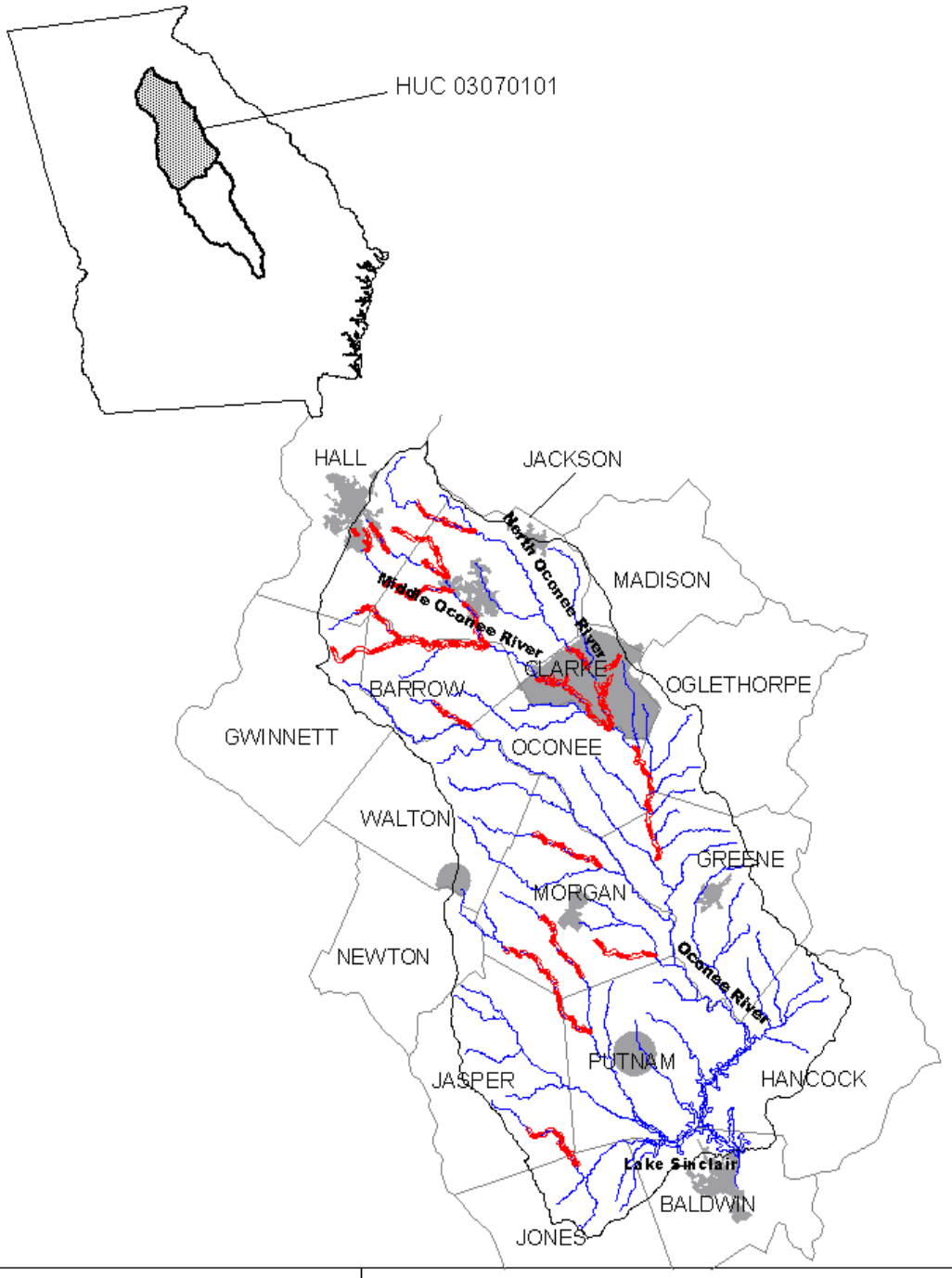
direction to the Atlantic Ocean. Figures 1-2 show the locations of these sub-basins, the listed segments within each sub-basin, and the associated counties within each sub-basin.

The land use characteristics of the Oconee River Basin watersheds were determined using data from the National Land Cover Dataset (NLCD) for Georgia. This coverage was produced from Landsat Thematic Mapper digital images developed in 2001. Land use classification is based on a modified Anderson level one and two system. Table 3 lists the watershed land coverage distribution of the 74 stream segments.

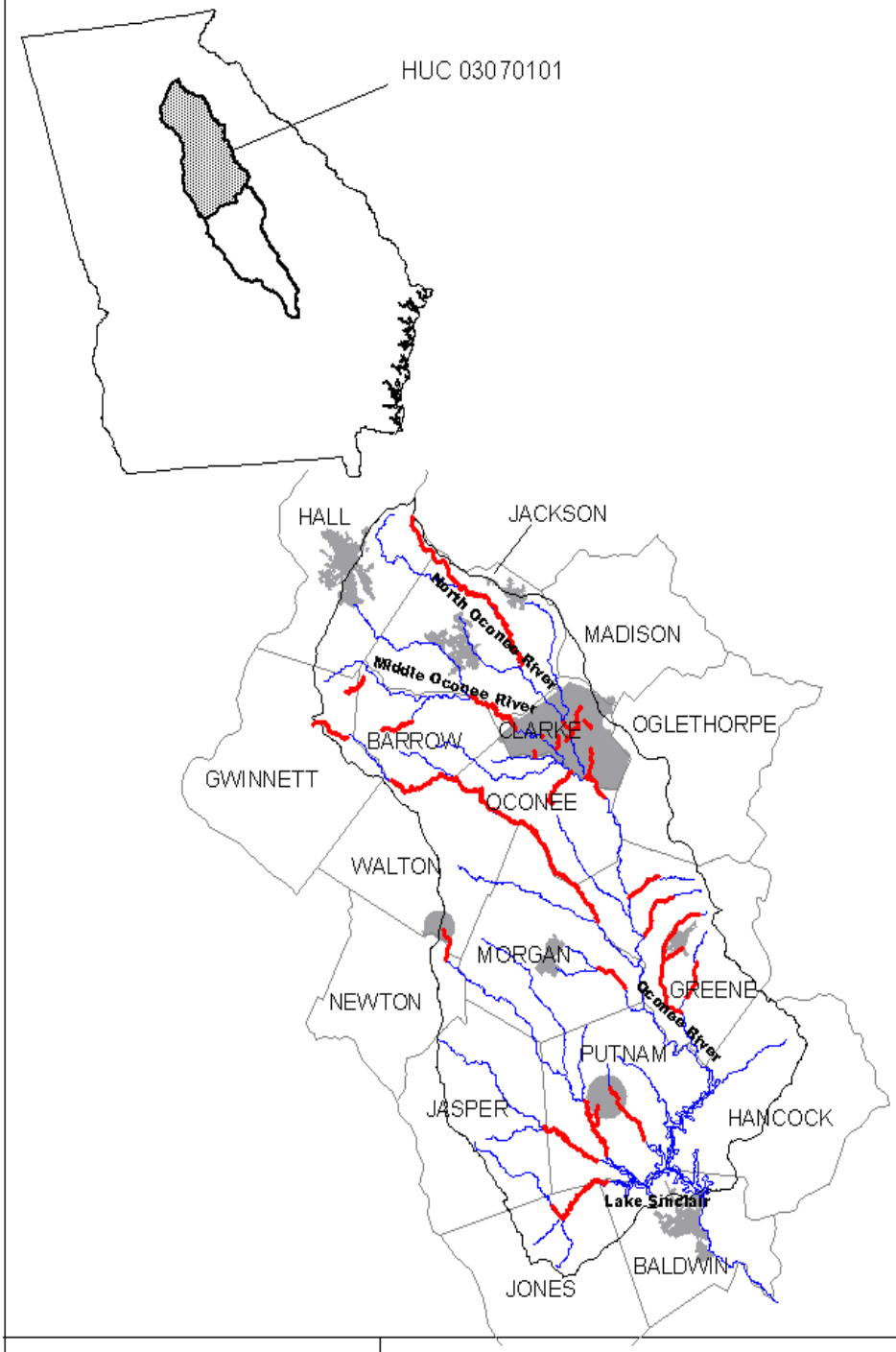
1.3 Water Quality Standard

The water use classification for the listed stream segments in the Oconee River Basin is Fishing. The criterion violated is listed as fecal coliform. The potential cause(s) listed include urban runoff, nonpoint sources, and municipal facilities. The use classification water quality standards for fecal coliform bacteria, as stated in the *State of Georgia's Rules and Regulations for Water Quality Control*, Chapter 391-3-6-.03(6)(c)(iii) (GA EPD, 2005), are:

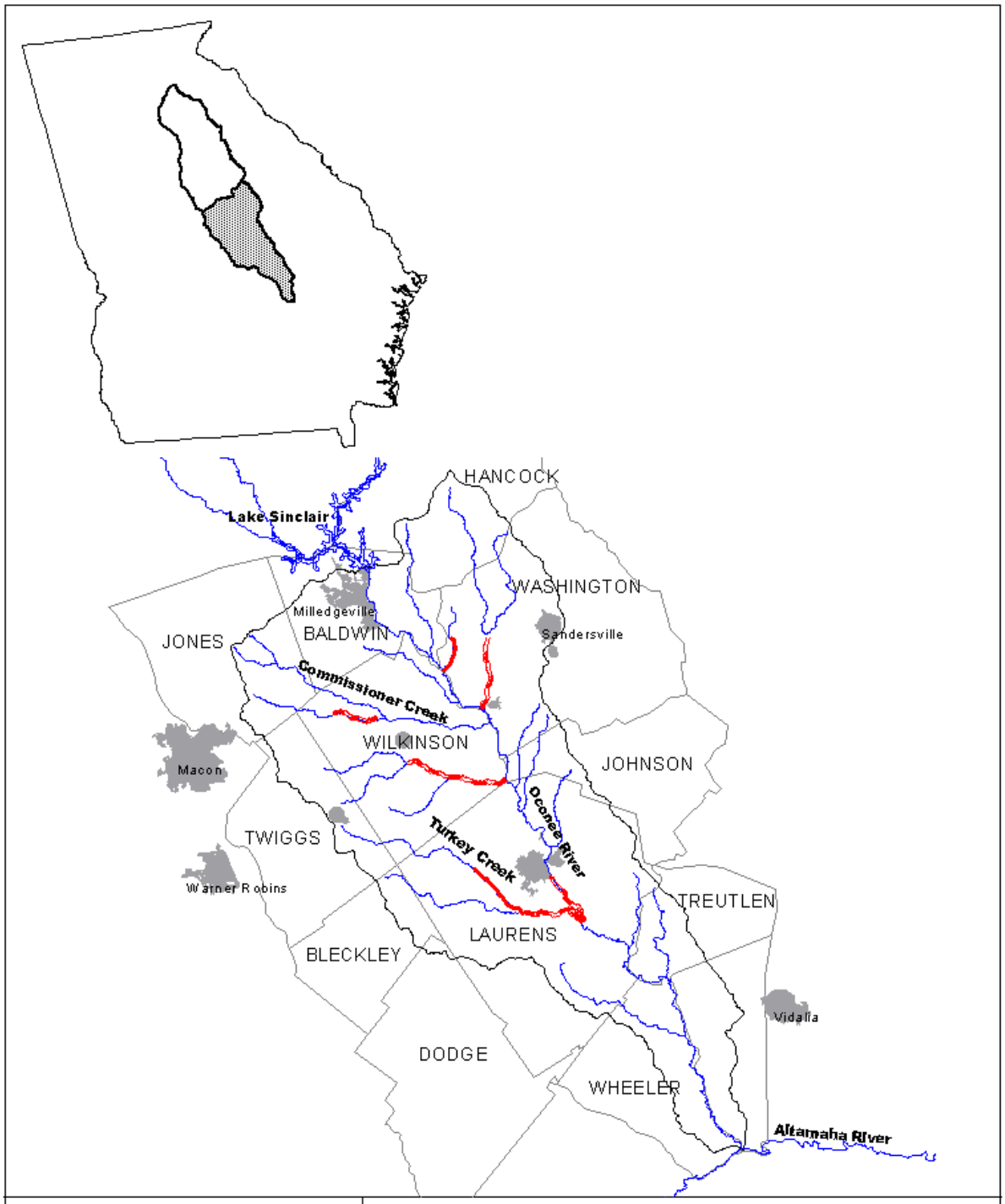
Bacteria: For the months of May through October, when water contact recreation activities are expected to occur, fecal coliform not to exceed a geometric mean of 200 per 100 ml based on at least four samples collected from a given sampling site over a 30-day period at intervals not less than 24 hours. Should water quality and sanitary studies show fecal coliform levels from non-human sources exceed 200/100 ml (geometric mean) occasionally, then the allowable geometric mean fecal coliform shall not exceed 300 per 100 ml in lakes and reservoirs and 500 per 100 ml in free flowing freshwater streams. For the months of November through April, fecal coliform not to exceed a geometric mean of 1,000 per 100 ml based on at least four samples collected from a given sampling site over a 30-day period at intervals not less than 24 hours and not to exceed a maximum of 4,000 per 100 ml for any sample. The State does not encourage swimming in surface waters since a number of factors, which are beyond the control of any State regulatory agency, contribute to elevated levels of fecal coliform. For waters designated as approved shellfish harvesting waters by the appropriate State agencies, the requirements will be consistent with those established by the State and Federal agencies responsible for the National Shellfish Sanitation Program. The requirements are found in the National Shellfish Sanitation Program Manual of Operation, Revised 1988, Interstate Shellfish Sanitation Conference, U. S. Department of Health and Human Services (PHS/FDA), and the Center for Food Safety and Applied Nutrition. Streams designated as generally supporting shellfish are listed in Paragraph 391-3-6-.03(14).



TMDL Evaluation - Fecal Coliform Oconee River Basin	Figure 1. Partially Supporting Stream Segments in HUC 03070101



TMDL Evaluation - Fecal Coliform Oconee River Basin	Figure 2. Not Supporting Stream Segments in HUC 03070101



TMDL Evaluation - Fecal Coliform Oconee River Basin	Figure 3. Impaired Stream Segments in HUC 03070102

Table 3. Oconee River Basin Land Coverage

Stream/Segment	Landuse Categories - Acres (Percent)												
	Open Water	Low Intensity Residential	High Intensity Residential	High Intensity Commercial, Industrial, Transportation	Bare Rock, Sand, Clay	Quarries, Strip Mines, Gravel Pits	Forest	Row Crops	Pasture, Hay	Other Grasses (Urban, recreational; e.g. parks, lawns)	Woody Wetlands	Emergent Herbaceous Wetlands	Total
Allen Creek Monroe Drive to 1 mile d/s of GA Hwy 11	42	869	950	715	134	307	6,885	6	2,792	1,096	134	0	13,929
	(0.3)	(6.2)	(6.8)	(5.1)	(1.0)	(2.2)	(49.4)	(0.0)	(20.0)	(7.9)	(1.0)	(0.0)	(100.0)
Allen Creek 1 mi d/s GA Hwy 11 to Middle Oconee River	74	1,023	1,032	748	193	307	7,896	63	3,647	1,323	318	0	16,624
	(0.4)	(6.2)	(6.2)	(4.5)	(1.2)	(1.8)	(47.5)	(0.4)	(21.9)	(8.0)	(1.9)	(0.0)	(100.0)
Apalachee River Headwaters to Apalachee River	17	768	956	149	63	99	1,849	0	514	208	176	0	4,799
	(0.4)	(16.0)	(19.9)	(3.1)	(1.3)	(2.1)	(38.5)	(0.0)	(10.7)	(4.3)	(3.7)	(0.0)	(100.0)
Apalachee River Williamson Creek to Marburg Creek	183	3,281	3,512	509	624	267	18,072	16	12,172	3,467	2,298	1	44,404
	(0.4)	(7.4)	(7.9)	(1.1)	(1.4)	(0.6)	(40.7)	(0.0)	(27.4)	(7.8)	(5.2)	(0.0)	(100.0)
Apalachee River Marburg Creek to Lake Oconee	1,111	9,634	5,805	987	1,784	900	75,337	452	41,984	15,670	8,858	4	162,526
	(0.7)	(5.9)	(3.6)	(0.6)	(1.1)	(0.6)	(46.4)	(0.3)	(25.8)	(9.6)	(5.5)	(0.0)	(100.0)
Beaverdam Creek	354	1,362	307	30	263	467	14,549	141	3,739	3,031	997	0	25,240
	(1.4)	(5.4)	(1.2)	(0.1)	(1.0)	(1.9)	(57.6)	(0.6)	(14.8)	(12.0)	(4.0)	(0.0)	(100.0)
Big Cedar Creek	471	3,432	141	6	352	728	65,161	27	5,499	8,319	3,269	5	87,410
	(0.5)	(3.9)	(0.2)	(0.0)	(0.4)	(0.8)	(74.5)	(0.0)	(6.3)	(9.5)	(3.7)	(0.0)	(100.0)
Big Indian Creek	313	1,512	260	20	188	0	11,937	95	6,343	2,747	1,527	1	24,942
	(1.3)	(6.1)	(1.0)	(0.1)	(0.8)	(0.0)	(47.9)	(0.4)	(25.4)	(11.0)	(6.1)	(0.0)	(100.0)
Big Sandy Creek Porter Creek to Oconee River	1,056	4,910	563	189	109	3,716	135,968	4,985	5,288	20,695	17,239	1,113	195,833
	(0.5)	(2.5)	(0.3)	(0.1)	(0.1)	(1.9)	(69.4)	(2.5)	(2.7)	(10.6)	(8.8)	(0.6)	(100.0)
Big Sandy Creek Little Sandy Creek to Hard Labor Ck	264	1,827	184	24	342	0	16,451	209	16,597	4,335	2,471	1	42,704
	(0.6)	(4.3)	(0.4)	(0.1)	(0.8)	(0.0)	(38.5)	(0.5)	(38.9)	(10.2)	(5.8)	(0.0)	(100.0)
Bluff Creek	187	192	66	0	1	524	6,101	329	365	1,919	548	90	10,321
	(1.8)	(1.9)	(0.6)	(0.0)	(0.0)	(5.1)	(59.1)	(3.2)	(3.5)	(18.6)	(5.3)	(0.9)	(100.0)
Brooklyn Creek	3	575	433	221	0	0	204	0	4	0	3	0	1,443
	(0.2)	(39.8)	(30.0)	(15.3)	(0.0)	(0.0)	(14.1)	(0.0)	(0.3)	(0.0)	(0.2)	(0.0)	(100.0)

Stream/Segment	Landuse Categories - Acres (Percent)												
	Open Water	Low Intensity Residential	High Intensity Residential	High Intensity Commercial, Industrial, Transportation	Bare Rock, Sand, Clay	Quarries, Strip Mines, Gravel Pits	Forest	Row Crops	Pasture, Hay	Other Grasses (Urban, recreational; e.g. parks, lawns)	Woody Wetlands	Emergent Herbaceous Wetlands	Total
Buffalo Creek	1,281	5,783	871	366	485	3,644	120,310	3,241	9,712	23,192	17,421	893	187,200
	(0.7)	(3.1)	(0.5)	(0.2)	(0.3)	(1.9)	(64.3)	(1.7)	(5.2)	(12.4)	(9.3)	(0.5)	(100.0)
Calls Creek	52	979	523	137	22	11	2,262	5	1,403	478	79	0	5,953
	(0.9)	(16.4)	(8.8)	(2.3)	(0.4)	(0.2)	(38.0)	(0.1)	(23.6)	(8.0)	(1.3)	(0.0)	(100.0)
Carr Creek	32	565	463	196	13	116	553	2	85	67	22	2	2,115
	(1.5)	(26.7)	(21.9)	(9.3)	(0.6)	(5.5)	(26.1)	(0.1)	(4.0)	(3.2)	(1.0)	(0.1)	(100.0)
Carver Creek	0	243	136	35	2	0	302	1	48	119	22	0	909
	(0.0)	(26.7)	(15.0)	(3.9)	(0.2)	(0.0)	(33.2)	(0.1)	(5.3)	(13.1)	(2.4)	(0.0)	(100.0)
Cedar Creek Headwaters to Winder Road	43	497	1,063	241	22	128	1,643	1	1,337	327	99	0	5,402
	(0.8)	(9.2)	(19.7)	(4.5)	(0.4)	(2.4)	(30.4)	(0.0)	(24.8)	(6.1)	(1.8)	(0.0)	(100.0)
Cedar Creek Headwaters to Oconee River, Athens	11	869	495	144	16	0	1,086	0	136	94	61	0	2,913
	(0.4)	(29.8)	(17.0)	(4.9)	(0.5)	(0.0)	(37.3)	(0.0)	(4.7)	(3.2)	(2.1)	(0.0)	(100.0)
Cedar Creek King Branch to Glady Creek	238	1,558	73	6	212	115	30,272	16	2,534	4,131	1,436	1	40,591
	(0.6)	(3.8)	(0.2)	(0.0)	(0.5)	(0.3)	(74.6)	(0.0)	(6.2)	(10.2)	(3.5)	(0.0)	(100.0)
Cedar Creek Glady Creek to Big Cedar Creek	238	1,604	73	6	215	120	31,695	16	2,549	4,161	1,560	1	42,238
	(0.6)	(3.8)	(0.2)	(0.0)	(0.5)	(0.3)	(75.0)	(0.0)	(6.0)	(9.9)	(3.7)	(0.0)	(100.0)
Chandler Creek	33	477	319	65	49	0	4,910	6	4,616	823	275	0	11,573
	(0.3)	(4.1)	(2.8)	(0.6)	(0.4)	(0.0)	(42.4)	(0.1)	(39.9)	(7.1)	(2.4)	(0.0)	(100.0)
Clovehurst Branch	0	66	141	54	0	0	4	0	1	0	0	0	269
	(0.0)	(24.5)	(52.4)	(20.1)	(0.0)	(0.0)	(1.5)	(0.0)	(0.4)	(0.0)	(0.0)	(0.0)	(100.0)
E. T. Creek	0	18	6	10	4	0	226	0	5	19	0	0	287
	(0.0)	(6.3)	(2.1)	(3.5)	(1.4)	(0.0)	(78.7)	(0.0)	(1.7)	(6.6)	(0.0)	(0.0)	(100.0)
East Fork Trail Creek	31	509	457	283	11	0	1,277	40	663	401	112	1	3,786
	(0.8)	(13.4)	(12.1)	(7.5)	(0.3)	(0.0)	(33.7)	(1.1)	(17.5)	(10.6)	(3.0)	(0.0)	(100.0)
Fishing Creek	133	667	35	3	149	517	17,427	20	1,183	3,565	1,251	6	24,956
	(0.5)	(2.7)	(0.1)	(0.0)	(0.6)	(2.1)	(69.8)	(0.1)	(4.7)	(14.3)	(5.0)	(0.0)	(100.0)

Stream/Segment	Landuse Categories - Acres (Percent)												
	Open Water	Low Intensity Residential	High Intensity Residential	High Intensity Commercial, Industrial, Transportation	Bare Rock, Sand, Clay	Quarries, Strip Mines, Gravel Pits	Forest	Row Crops	Pasture, Hay	Other Grasses (Urban, recreational; e.g. parks, lawns)	Woody Wetlands	Emergent Herbaceous Wetlands	Total
Hunnicutt Creek (aka Mitchell Bridge Branch)	6	407	248	95	22	0	524	0	12	22	19	0	1,356
	(0.4)	(30.0)	(18.3)	(7.0)	(1.6)	(0.0)	(38.6)	(0.0)	(0.9)	(1.6)	(1.4)	(0.0)	(100.0)
Kingswood Branch	3	144	105	71	2	0	77	0	10	10	5	0	426
	(0.7)	(33.8)	(24.6)	(16.7)	(0.5)	(0.0)	(18.1)	(0.0)	(2.3)	(2.3)	(1.2)	(0.0)	(100.0)
Little Commissioner Creek	316	1,241	328	198	1	1,024	20,588	587	1,434	3,081	2,397	201	31,396
	(1.0)	(4.0)	(1.0)	(0.6)	(0.0)	(3.3)	(65.6)	(1.9)	(4.6)	(9.8)	(7.6)	(0.6)	(100.0)
Little Mulberry River	117	1,840	2,075	169	226	150	8,234	0	4,878	1,313	506	1	19,510
	(0.6)	(9.4)	(10.6)	(0.9)	(1.2)	(0.8)	(42.2)	(0.0)	(25.0)	(6.7)	(2.6)	(0.0)	(100.0)
Little River Social Circle to Nelson Creek	14	356	177	46	51	0	2,375	70	1,010	388	114	0	4,601
	(0.3)	(7.7)	(3.8)	(1.0)	(1.1)	(0.0)	(51.6)	(1.5)	(22.0)	(8.4)	(2.5)	(0.0)	(100.0)
Little River Shoal Creek to Gap Creek	734	3,602	633	92	752	66	39,558	708	18,212	8,002	3,641	13	76,012
	(1.0)	(4.7)	(0.8)	(0.1)	(1.0)	(0.1)	(52.0)	(0.9)	(24.0)	(10.5)	(4.8)	(0.0)	(100.0)
Little River Gap Creek to Big Indian Creek	799	4,078	645	92	822	66	46,833	723	19,865	9,096	4,437	13	87,469
	(0.9)	(4.7)	(0.7)	(0.1)	(0.9)	(0.1)	(53.5)	(0.8)	(22.7)	(10.4)	(5.1)	(0.0)	(100.0)
Little River Glady Creek to Lake Sinclair	1,762	9,784	1,615	343	1,657	149	110,112	932	36,060	19,213	9,380	22	191,028
	(0.9)	(5.1)	(0.8)	(0.2)	(0.9)	(0.1)	(57.6)	(0.5)	(18.9)	(10.1)	(4.9)	(0.0)	(100.0)
Little Sugar	328	826	36	18	308	0	11,239	103	5,050	2,693	695	0	21,298
	(1.5)	(3.9)	(0.2)	(0.1)	(1.4)	(0.0)	(52.8)	(0.5)	(23.7)	(12.6)	(3.3)	(0.0)	(100.0)
Marburg Creek	18	143	214	36	16	90	909	0	550	173	95	0	2,243
	(0.8)	(6.4)	(9.5)	(1.6)	(0.7)	(4.0)	(40.5)	(0.0)	(24.5)	(7.7)	(4.2)	(0.0)	(100.0)
Middle Oconee River Dosters Creek to Mulberry River	992	11,691	10,278	2,228	1,279	1,151	69,446	134	41,203	11,734	5,525	31	155,691
	(0.6)	(7.5)	(6.6)	(1.4)	(0.8)	(0.7)	(44.6)	(0.1)	(26.5)	(7.5)	(3.5)	(0.0)	(100.0)
Middle Oconee River Mulberry River to Big Bear Creek	1,446	18,229	15,100	2,970	1,807	1,599	105,628	227	59,191	16,642	7,276	34	230,147
	(0.6)	(7.9)	(6.6)	(1.3)	(0.8)	(0.7)	(45.9)	(0.1)	(25.7)	(7.2)	(3.2)	(0.0)	(100.0)
Middle Oconee River Big Bear Creek to McNutt Creek	1,579	23,347	17,983	4,043	1,932	1,730	117,057	255	64,168	18,456	8,121	37	258,706
	(0.6)	(9.0)	(7.0)	(1.6)	(0.7)	(0.7)	(45.2)	(0.1)	(24.8)	(7.1)	(3.1)	(0.0)	(100.0)

Stream/Segment	Landuse Categories - Acres (Percent)												
	Open Water	Low Intensity Residential	High Intensity Residential	High Intensity Commercial, Industrial, Transportation	Bare Rock, Sand, Clay	Quarries, Strip Mines, Gravel Pits	Forest	Row Crops	Pasture, Hay	Other Grasses (Urban, recreational; e.g. parks, lawns)	Woody Wetlands	Emergent Herbaceous Wetlands	Total
Middle Oconee River McNutt Creek to North Oconee	1,938	29,348	21,513	5,186	2,228	1,850	135,706	362	76,367	21,388	9,929	40	305,853
	(0.6)	(9.6)	(7.0)	(1.7)	(0.7)	(0.6)	(44.4)	(0.1)	(25.0)	(7.0)	(3.2)	(0.0)	(100.0)
Mulberry River Mulberry Creek to Little Mulberry River	239	4,422	3,450	470	410	448	21,419	24	8,436	2,631	831	3	42,782
	(0.6)	(10.3)	(8.1)	(1.1)	(1.0)	(1.0)	(50.1)	(0.1)	(19.7)	(6.1)	(1.9)	(0.0)	(100.0)
Mulberry River Little Mulberry River to Middle Oconee	400	4,060	4,286	589	383	303	22,884	32	17,806	4,563	2,281	2	57,588
	(0.7)	(7.1)	(7.4)	(1.0)	(0.7)	(0.5)	(39.7)	(0.1)	(30.9)	(7.9)	(4.0)	(0.0)	(100.0)
Murder Creek	1,143	6,365	393	97	957	674	82,695	187	18,887	14,642	5,423	2	131,464
	(0.9)	(4.8)	(0.3)	(0.1)	(0.7)	(0.5)	(62.9)	(0.1)	(14.4)	(11.1)	(4.1)	(0.0)	(100.0)
North Bypass Branch	0	29	15	0	2	0	11	0	0	1	0	0	57
	(0.0)	(50.9)	(26.3)	(0.0)	(3.5)	(0.0)	(19.3)	(0.0)	(0.0)	(1.8)	(0.0)	(0.0)	(100.0)
North Oconee River Buffington Mill Ck to Chandler Ck	93	2,227	1,290	317	183	92	22,277	3	7,796	3,066	782	0	38,126
	(0.2)	(5.8)	(3.4)	(0.8)	(0.5)	(0.2)	(58.4)	(0.0)	(20.4)	(8.0)	(2.1)	(0.0)	(100.0)
North Oconee River Chandler Creek to Bordens Creek	212	3,713	2,297	555	374	92	36,218	16	17,201	5,572	2,179	4	68,433
	(0.3)	(5.4)	(3.4)	(0.8)	(0.5)	(0.1)	(52.9)	(0.0)	(25.1)	(8.1)	(3.2)	(0.0)	(100.0)
North Oconee River Bordens Creek to Curry Creek	363	5,198	2,997	855	533	94	46,781	42	22,410	7,508	3,515	15	90,312
	(0.4)	(5.8)	(3.3)	(0.9)	(0.6)	(0.1)	(51.8)	(0.0)	(24.8)	(8.3)	(3.9)	(0.0)	(100.0)
North Oconee River Jackson County to Sandy Creek	620	6,541	3,286	1,088	666	2	51,912	75	30,797	9,371	5,987	76	110,421
	(0.6)	(5.9)	(3.0)	(1.0)	(0.6)	(0.0)	(47.0)	(0.1)	(27.9)	(8.5)	(5.4)	(0.1)	(100.0)
North Oconee River Sandy Creek to Trail Creek	1,245	10,144	5,501	1,844	937	54	69,489	179	44,764	12,594	7,455	94	154,300
	(0.8)	(6.6)	(3.6)	(1.2)	(0.6)	(0.0)	(45.0)	(0.1)	(29.0)	(8.2)	(4.8)	(0.1)	(100.0)
North Oconee River Trail Creek to Oconee River	1,382	13,301	8,393	3,124	1,012	169	75,056	223	46,267	13,409	7,820	99	170,253
	(0.8)	(7.8)	(4.9)	(1.8)	(0.6)	(0.1)	(44.1)	(0.1)	(27.2)	(7.9)	(4.6)	(0.1)	(100.0)
North Walnut Creek Gainesville U/S Hall County Camp	0	41	59	57	6	2	315	0	36	49	2	0	567
	(0.0)	(7.2)	(10.4)	(10.1)	(1.1)	(0.4)	(55.6)	(0.0)	(6.3)	(8.6)	(0.4)	(0.0)	(100.0)
North Walnut Creek Gainesville D/S Hall County Camp	1	77	111	98	17	2	775	0	174	98	13	0	1,367
	(0.1)	(5.6)	(8.1)	(7.2)	(1.2)	(0.1)	(56.7)	(0.0)	(12.7)	(7.2)	(1.0)	(0.0)	(100.0)

Stream/Segment	Landuse Categories - Acres (Percent)												
	Open Water	Low Intensity Residential	High Intensity Residential	High Intensity Commercial, Industrial, Transportation	Bare Rock, Sand, Clay	Quarries, Strip Mines, Gravel Pits	Forest	Row Crops	Pasture, Hay	Other Grasses (Urban, recreational; e.g. parks, lawns)	Woody Wetlands	Emergent Herbaceous Wetlands	Total
Oconee River (N & Mid Oconee River) to Barnett Shoals	3,812	50,045	34,118	9,654	3,610	2,139	235,269	716	137,225	38,615	19,837	143	535,180
	(0.7)	(9.4)	(6.4)	(1.8)	(0.7)	(0.4)	(44.0)	(0.1)	(25.6)	(7.2)	(3.7)	(0.0)	(100.0)
Oconee River Barnett Shoals to Lake Oconee	5,041	56,074	35,234	9,844	4,391	3,252	319,341	1,090	158,024	52,417	25,598	172	670,477
	(0.8)	(8.4)	(5.3)	(1.5)	(0.7)	(0.5)	(47.6)	(0.2)	(23.6)	(7.8)	(3.8)	(0.0)	(100.0)
Oconee River Long Branch to Turkey Creek	7,125	36,585	8,513	3,339	2,188	13,084	574,893	34,105	62,647	102,974	109,095	6,846	961,401
	(0.7)	(3.8)	(0.9)	(0.3)	(0.2)	(1.4)	(59.8)	(3.5)	(6.5)	(10.7)	(11.3)	(0.7)	(100.0)
Pond Fork Headwaters to East Pond Fork	13	404	322	62	30	0	2,518	0	1,613	315	141	0	5,417
	(0.2)	(7.5)	(5.9)	(1.1)	(0.6)	(0.0)	(46.5)	(0.0)	(29.8)	(5.8)	(2.6)	(0.0)	(100.0)
Pond Fork East Pond Fork to Middle Oconee	61	953	751	151	82	0	8,383	1	6,227	1,205	630	0	18,442
	(0.3)	(5.2)	(4.1)	(0.8)	(0.4)	(0.0)	(45.5)	(0.0)	(33.8)	(6.5)	(3.4)	(0.0)	(100.0)
Richland Creek U/S Greensboro to Interstate 20	123	1,395	494	188	214	0	11,169	45	3,573	1,967	391	0	19,560
	(0.6)	(7.1)	(2.5)	(1.0)	(1.1)	(0.0)	(57.1)	(0.2)	(18.3)	(10.1)	(2.0)	(0.0)	(100.0)
Richland Creek Interstate 20 to Beaverdam Creek	855	2,128	558	198	441	77	21,319	55	4,628	3,028	620	2	33,910
	(2.5)	(6.3)	(1.6)	(0.6)	(1.3)	(0.2)	(62.9)	(0.2)	(13.6)	(8.9)	(1.8)	(0.0)	(100.0)
Rooty Creek	231	1,035	267	138	135	205	10,103	30	5,478	2,213	503	0	20,337
	(1.1)	(5.1)	(1.3)	(0.7)	(0.7)	(1.0)	(49.7)	(0.1)	(26.9)	(10.9)	(2.5)	(0.0)	(100.0)
Sugar Creek	262	1,592	633	188	306	0	12,070	88	6,661	2,483	925	0	25,208
	(1.0)	(6.3)	(2.5)	(0.7)	(1.2)	(0.0)	(47.9)	(0.3)	(26.4)	(9.9)	(3.7)	(0.0)	(100.0)
Tanyard Creek	0	61	226	148	0	0	2	0	0	1	0	0	439
	(0.0)	(13.9)	(51.5)	(33.7)	(0.0)	(0.0)	(0.5)	(0.0)	(0.0)	(0.2)	(0.0)	(0.0)	(100.0)
Town Creek Penfield to Lake Oconee	180	708	14	0	156	0	13,602	11	1,541	1,807	944	0	18,963
	(0.9)	(3.7)	(0.1)	(0.0)	(0.8)	(0.0)	(71.7)	(0.1)	(8.1)	(9.5)	(5.0)	(0.0)	(100.0)
Town Creek Hwy 15 to Richland Creek	60	691	400	159	47	0	2,311	41	1,147	482	23	0	5,361
	(1.1)	(12.9)	(7.5)	(3.0)	(0.9)	(0.0)	(43.1)	(0.8)	(21.4)	(9.0)	(0.4)	(0.0)	(100.0)
Trail Creek	56	1,409	1,189	566	21	0	2,997	41	998	648	203	1	8,130
	(0.7)	(17.3)	(14.6)	(7.0)	(0.3)	(0.0)	(36.9)	(0.5)	(12.3)	(8.0)	(2.5)	(0.0)	(100.0)

Stream/Segment	Landuse Categories - Acres (Percent)												
	Open Water	Low Intensity Residential	High Intensity Residential	High Intensity Commercial, Industrial, Transportation	Bare Rock, Sand, Clay	Quarries, Strip Mines, Gravel Pits	Forest	Row Crops	Pasture, Hay	Other Grasses (Urban, recreational; e.g. parks, lawns)	Woody Wetlands	Emergent Herbaceous Wetlands	Total
Tributary to Little River	15	56	0	0	20	0	1,214	0	121	257	17	0	1,700
	(0.9)	(3.3)	(0.0)	(0.0)	(1.2)	(0.0)	(71.4)	(0.0)	(7.1)	(15.1)	(1.0)	(0.0)	(100.0)
Tributary to North Walnut Creek	0	23	20	16	1	0	130	0	36	12	0	0	238
	(0.0)	(9.7)	(8.4)	(6.7)	(0.4)	(0.0)	(54.6)	(0.0)	(15.1)	(5.0)	(0.0)	(0.0)	(100.0)
Turkey Creek Horse Branch to Rocky Creek	155	3,285	600	140	0	11	47,931	6,974	7,296	5,017	7,178	336	78,923
	(0.2)	(4.2)	(0.8)	(0.2)	(0.0)	(0.0)	(60.7)	(8.8)	(9.2)	(6.4)	(9.1)	(0.4)	(100.0)
Turkey Creek Rocky Branch to Oconee River	677	10,027	2,366	310	4	164	111,104	36,082	21,950	18,962	26,540	1,381	229,566
	(0.3)	(4.4)	(1.0)	(0.1)	(0.0)	(0.1)	(48.4)	(15.7)	(9.6)	(8.3)	(11.6)	(0.6)	(100.0)
Walnut Creek	638	8,481	7,736	1,059	793	751	44,303	56	26,242	7,194	3,112	5	100,370
	(0.6)	(8.4)	(7.7)	(1.1)	(0.8)	(0.7)	(44.1)	(0.1)	(26.1)	(7.2)	(3.1)	(0.0)	(100.0)
West Fork Trail Creek	25	527	388	184	6	0	1,322	1	326	234	77	0	3,091
	(0.8)	(17.0)	(12.6)	(6.0)	(0.2)	(0.0)	(42.8)	(0.0)	(10.5)	(7.6)	(2.5)	(0.0)	(100.0)
Wheeler Creek	2	490	286	7	54	0	1,309	0	294	153	92	1	2,687
	(0.1)	(18.2)	(10.6)	(0.3)	(2.0)	(0.0)	(48.7)	(0.0)	(10.9)	(5.7)	(3.4)	(0.0)	(100.0)

2.0 WATER QUALITY ASSESSMENT

Stream segments are placed on the 303(d) list as partially supporting or not supporting their water use classification based on water quality sampling data. A stream is placed on the partial support list if more than 10% of the samples exceed the fecal coliform criteria and on the not support list if more than 25% of the samples exceed the standard. Water quality samples collected within a 30-day period that have a geometric mean in excess of 200 counts per 100 milliliters during the period May through October, or in excess of 1000 counts per 100 milliliters during the period November through April, are in violation of the bacteria water quality standard. There is also a single sample maximum criterion (4000 counts per 100 milliliters) for the months of November through April.

Fecal coliform data were collected during calendar years 1999 and 2004. Sources of these data include the following:

- United States Geological Survey (USGS) basin water quality data, 1999 and 2004;
- Georgia Environmental Protection Division (GA EPD) Trend Monitoring data, 2004;
- University of Georgia data, 2001-2002;
- Gwinnett County data, 2001-2005;
- Gainesville data, 2003-2004; and
- Spill data, 1994-1995.

These sources contained enough information to calculate a 30-day geometric mean. The data used for these TMDLs are presented in Appendix A.

3.0 SOURCE ASSESSMENT

An important part of the TMDL analysis is the identification of potential source categories. Sources are broadly classified as either point or nonpoint sources. A point source is defined as a discernable, confined, and discrete conveyance from which pollutants are or may be discharged to surface waters. Nonpoint sources are diffuse, and generally, but not always, involve accumulation of fecal coliform bacteria on land surfaces that wash off as a result of storm events.

3.1 Point Source Assessment

Title IV of the Clean Water Act establishes the National Pollutant Discharge Elimination System (NPDES) permit program. Basically, there are two categories of NPDES permits: 1) municipal and industrial wastewater treatment facilities, and 2) regulated storm water discharges.

3.1.1 Wastewater Treatment Facilities

In general, industrial and municipal wastewater treatment facilities have NPDES permits with effluent limits. These permit limits are either based on federal and state effluent guidelines (technology-based limits) or on water quality standards (water quality-based limits).

The EPA has developed technology-based guidelines, which establish a minimum standard of pollution control for municipal and industrial discharges without regard for the quality of the receiving waters. These are based on Best Practical Control Technology Currently Available (BPT), Best Conventional Control Technology (BCT), and Best Available Technology Economically Achievable (BAT). The level of control required by each facility depends on the type of discharge and the pollutant.

The EPA and the states have also developed numeric and narrative water quality standards. Typically, these standards are based on the results of aquatic toxicity tests and/or human health criteria and include a margin of safety. Water quality-based effluent limits are set to protect the receiving stream. These limits are based on water quality standards that have been established for a stream based on its intended use and the prescribed biological and chemical conditions that must be met to sustain that use.

Municipal and industrial wastewater treatment facilities' discharges may contribute fecal coliform to receiving waters. There are 30 NPDES permitted discharges with flows greater than 0.1 MGD identified in the Oconee River Basin that discharge treated municipal wastewater. Table 4 provides the monthly average discharge flows and fecal coliform concentrations for the municipal and industrial treatment facilities, obtained from calendar year 2004 Discharge Monitoring Report (DMR) data. The permitted flow and fecal coliform concentrations for these facilities are also included in this table.

Combined sewer systems convey a mixture of raw sewage and storm water in the same conveyance structure to the wastewater treatment plant. These are considered a component of municipal wastewater treatment facilities. When the combined sewage exceeds the capacity of the wastewater treatment plant, the excess is diverted to a combined sewage overflow (CSO) discharge point. There are no permitted CSO outfalls in the Oconee River Basin.

Table 4. NPDES Facilities Discharging Fecal Coliform in the Oconee River Basin

Facility Name	NPDES Permit No.	Receiving Stream	Actual 2003 Discharge		NPDES Permit Limits		Number of Violations Jan 2001 - Jan 2005
			Average Monthly Flow (MGD)[1]	Geometric Mean (No./100 mL)[2]	Average Monthly Flow (MGD)	Average Monthly FC (No./100mL)	
Athens Middle Oconee	GA0021733	Middle Oconee River	4.10	28.7	6.0	200	
Athens North Oconee	GA0021725	North Oconee River	7.54	6.4	10.7	200	
Athens/Clarke County Cedar Cr	GA0034584	Oconee River	1.57	6.1	2.0	200	
Dublin WPCP	GA0025569	Oconee River	1.59	79.9	4.0	200	
Dudley WPCP	GA0023957	Turkey Creek	0.09	162.9	0.1	200	4
Eatonton East WPCP	GA0032271	Rooty Creek Tributary	0.29	57.5	0.3	200	
Eatonton West WPCP	GA0032263	Little River Tributary	0.22	61.6	0.4	200	
Glenwood WPCP	GA0021377	Peterson Creek Tributary	0.14	1876.4	0.1	200	
Gordon WPCP	GA0020397	Little Commissioner Creek	0.23	320.1	0.8	200	3
Gray Wolf Creek WPCP	GA0026085	Wolf Creek	0.21	19.3	0.4	200	
Greensboro South	GA0021351	Town Creek	0.29	23.6	1.0	200	
Hoschton WPCP	GA0035980	Mulberry River	0.06	873.0	0.1	200	
Jackson County Water And Sewerage Authority	GA0002712	Middle Oconee River	NF	NF	0.1	200	
Jefferson Pond (Year 2005 Data)	GA0023132	Curry Creek Tributary	0.10	454.3	0.5	200	5
Jeffersonville WPCP	GA0020940	Turkey Creek	0.27	701.9	0.3	200	
Laurens Park Mills	GA0003697	Oconee River	0.47	1.0	NL	400	
Madison Northside	GA0023159	Mile Br To Hard Labor Creek	0.08	94.4	0.1	200	
Madison Southside	GA0023141	Horse Branch	0.51	38.9	0.7	200	
Milledgeville WPCP	GA0030775	Oconee River	4.18	24.9	10.5	200	

Facility Name	NPDES Permit No.	Receiving Stream	Actual 2003 Discharge		NPDES Permit Limits		Number of Violations Jan 2001 - Jan 2005
			Average Monthly Flow (MGD)[1]	Geometric Mean (No./100 mL)[2]	Average Monthly Flow (MGD)	Average Monthly FC (No./100mL)	
Monroe Jacks Creek	GA0047171	Jacks Creek	1.66	13.8	3.4	200	
Monticello Pearson Creek	GA0020141	Pearson Creek	0.07	5529.9	0.17	200	11
Monticello White Oak	GA0020150	White Oak Creek	0.06	2849.2	0.115	200	12
Mount Vernon WPCP	GA0033758	Limestone Creek	0.16	333.9	0.27	200	2
Oconee County-Calls Creek	GA0050211	Calls Creek	0.31	20.3	0.4	200	
Rock Eagle 4-H Center	GA0022233	Glady Creek	0.005	52.0	0.155	200	
Sandersville WPCP	GA0032051	Tanyard Creek Tributary	0.64	11.3	1.7	200	
Social Circle	GA0026107	Little River Tributary	0.46	38.8	0.65	138	
Soperton WPCP	GA0020826	Little Red Bluff Creek	0.37	94.7	0.4	200	2
Statham WPCP	GA0020044	Barber Creek	0.06	499.8	0.15	200	
Winder Marburg Creek	GA0023191	Marburg Creek Tributary	0.46	8.2	0.6	200	

Source: GA EPD Regional Offices

Notes: [1] Values shown are the annual average of the monthly average flows.
[2] Values shown are the annual average of the monthly geometric means.
NF = No flow reported
NL = No permit flow limit

3.1.2 Regulated Storm Water Discharges

Some storm water runoff is covered under the NPDES Permit Program. It is considered a diffuse source of pollution. Unlike other NPDES permits that establish end-of-pipe limits, storm water NPDES permits establish controls "to the maximum extent practicable" (MEP). Currently, regulated storm water discharges that may contain fecal coliform bacteria consist of those associated with industrial activities including construction sites disturbing one acre or greater, and large, medium, and small municipal separate storm sewer systems (MS4s) that serve populations of 50,000 or more.

Storm water discharges associated with industrial activities are currently covered under a General Storm Water NPDES Permit. This permit requires visual monitoring of storm water discharges, site inspections, implementation of Best Management Practices (BMPs), and record keeping.

Storm water discharges from MS4s are very diverse in pollutant loadings and frequency of discharge. At present, all cities and counties within the state of Georgia that had a population of greater than 100,000 at the time of the 1990 Census, are permitted for their storm water discharge under Phase I. This includes 60 permittees in Georgia, with about 45 located in the greater Atlanta metro area.

Phase I MS4 permits require the prohibition of non-storm water discharges (i.e., illicit discharges) into the storm sewer systems and controls to reduce the discharge of pollutants to the maximum extent practicable, including the use of management practices, control techniques and systems, as well as design and engineering methods (Federal Register, 1990). A site-specific Storm Water Management Plan (SWMP) outlining appropriate controls is required by and referenced in the permit. There are two Phase I MS4s in the Oconee River Basin (Table 5).

Table 5. Phase I Permitted MS4s in the Oconee River Basin

Name	Permit No.	Watershed
Dacula	GAS000139	Oconee, Ocmulgee
Gwinnett County	GAS000118	Oconee, Ocmulgee, Chattahoochee

Source: Nonpoint Source Permitting Program, GA DNR, 2006

As of March 10, 2003, small MS4s serving urbanized areas are required to obtain a storm water permit under the Phase II storm water regulations. An urbanized area is defined as an entity with a residential population of at least 50,000 people and an overall population density of at least 1,000 people per square mile. Thirty counties and 56 communities are permitted under the Phase II regulations in Georgia. There are twelve counties or communities located in the Oconee River Basin that are covered by the Phase II General Storm Water Permit (Table 6). Those watersheds that occur within Phase I or Phase II MS4 areas as are listed in Table 7. The table provides the total area of each of these watersheds, and the percentage of the watershed that is an MS4 area.

3.1.3 Confined Animal Feeding Operations

Confined livestock and confined animal feeding operations (CAFOs) are characterized by high animal densities. This results in large quantities of fecal material being contained in a limited area. Processed agricultural manure from confined hog, dairy cattle, and select poultry operations is generally collected in lagoons. It is then applied to pastureland and cropland as a

Table 6. Phase II Permitted MS4s in the Oconee River Basin

Name	Watershed
Athens-Clarke County	Oconee, Savannah
Auburn	Oconee
Barrow County	Oconee
Bogart	Oconee
Flowery Branch	Oconee, Chattahoochee
Gainesville	Oconee, Chattahoochee
Hall County	Oconee, Chattahoochee
Oakwood	Oconee, Chattahoochee
Oconee County	Oconee
Watkinsville	Oconee
Winterville	Oconee, Savannah

Source: Nonpoint Source Permitting Program, GA DNR, 2006

Table 7. Percentage of Watersheds Occurring in MS4 Areas

Name	Total Area (acres)	% in MS4 area
Allen Creek Monroe Drive to 1 mile d/s of Ga Hwy 11	13,929	22.0
Allen Creek 1 mile d/s Ga Hwy 11 to Middle Oconee R	16,624	18.4
Apalachee River Headwaters to Apalachee River	4,799	100.0
Apalachee River Williamson Cr to Marburg Cr	44,404	39.3
Apalachee River Marburg Cr to Lake Oconee	162,526	10.7
Brooklyn Creek	1,443	100.0
Calls Creek	5,953	69.5
Carr Creek	2,115	100.0
Carver Creek	909	100.0
Cedar Creek Headwaters to Winder Reservoir (Barrow Co.)	5,402	0.8
Cedar Creek Headwaters to Oconee River, Athens	2,913	100.0
Clovehurst Branch	269	100.0
E.T. Creek	287	95.9
East Fork Trail Creek	3,786	100.0
Hunnicutt Creek (aka Mitchell Bridge Branch)	1,356	100.0
Kingswood Branch	426	100.0
Little Mulberry River	19,510	62.1
Middle Oconee River Dosters Cr to Mulberry River	94,526	16.3
Middle Oconee River Mulberry River to Big Bear Cr	230,147	18.4
Middle Oconee River Big Bear Cr to McNutt Cr	258,706	23.7
Middle Oconee River McNutt Cr to North Oconee River	305,853	26.1
Mulberry River Mulberry Cr to Little Mulberry River	42,782	32.9
Mulberry River Little Mulberry River to Middle Oconee	57,588	21.1
North Bypass Branch	57	100.0
North Oconee River Jackson County to Sandy Cr	110,421	4.3
North Oconee River Sandy Cr to Trail Cr	154,300	8.4
North Oconee River Trail Cr to Oconee River	170,253	17.0
North Walnut Creek Gainesville U/S Hall County Camp	567	2.5
North Walnut Creek Gainesville D/S Hall County Camp	1,367	39.3
Oconee River (N & Mid Oconee River) to Barnett Shoals	535,180	21.7
Oconee River Barnett Shoals to Lake Oconee	670,477	19.9
Tanyard Creek (Cloverhurst Branch)	439	100.0
Trail Creek	8,130	100.0
Tributary to North Walnut Creek	238	51.1
Walnut Creek	100,370	12.5
West Fork Trail Creek	3,091	99.2
Wheeler Creek	2,687	76.6

fertilizer during the growing season, at rates that often vary monthly.

In 1990, the State of Georgia began registering CAFOs. Many of the CAFOs were issued land application or NPDES permits for treatment of wastewaters generated from their operations. The type of permit issued depends on the operation size (i.e., number of animal units). Table 8 presents the swine and non-swine (primarily dairies) CAFOs located in the Oconee River Basin that are registered or have land application permits.

3.2 Nonpoint Source Assessment

In general, nonpoint sources cannot be identified as entering a waterbody through a discrete conveyance at a single location. Typical nonpoint sources of fecal coliform bacteria include:

- Wildlife
- Agricultural Livestock
  - Animal grazing
  - Animal access to streams
  - Application of manure to pastureland and cropland
- Urban Development
  - Leaking sanitary sewer lines
  - Leaking septic systems
  - Land Application Systems
  - Landfills

In urban areas, a large portion of storm water runoff may be collected to storm sewer systems and discharged through distinct outlet structures. For large urban areas, these storm sewer discharge points may be regulated as described in Section 3.1.2.

3.2.1 Wildlife

The importance of wildlife as a source of fecal coliform bacteria in streams varies considerably, depending on the animal species present in the subwatersheds. Based on information provided by the Wildlife Resources Division (WRD) of GA DNR, the animals that spend a large portion of their time in or around aquatic habitats are the most important wildlife sources of fecal coliform. Waterfowl, most notably ducks and geese, are considered to potentially be the greatest contributors of fecal coliform. This is because they are typically found on the water surface, often in large numbers, and deposit their feces directly into the water. Other potentially important animals regularly found around aquatic environments include racoons, beavers, muskrats, and to a lesser extent, river otters and minks. Population estimates of these animal species in Georgia are currently not available.

White-tailed deer have a significant presence throughout the Oconee River Basin. The average deer population for years 1995 through 2004 for counties in the Oconee River Basin are presented In Table 9. Fecal coliform bacteria contributions from deer to water bodies are generally considered less significant than that of waterfowl, racoons, and beavers. This is because a greater portion of their time is spent in terrestrial habitats. This also holds true for other terrestrial mammals such as squirrels and rabbits, and terrestrial birds (GA WRD, 2002). However, feces deposited on the land surface can result in the introduction of fecal coliform to streams during runoff events. It should be noted that between storm events, considerable decomposition of the fecal matter might occur, resulting in a decrease in the associated fecal coliform numbers. This is especially true in the warm, humid environments typical of the southeast.

Table 8. Registered CAFOs in the Oconee River Basin

Name	County	Animal Type	Total No. of Animals	Permit No.
Agri. Fresh Dairy	Laurens	Dairy		
Aubrey Moon Dairy	Morgan	Dairy	250	GAU700000
B & B Dairy, Inc.	Morgan	Dairy	230	GAU700000
Bells Dairy	Greene	Dairy	200	GAU700000
Big Sandy Creek Dairy	Morgan	Dairy	120	GAU700000
Bill Dodson Dairy, Inc	Putnam	Dairy	275	GAU700000
Boozer Farm	Walton	Poultry	94080	GAG930000
Bryans Dairy	Morgan	Dairy	-	GAU700000
Crystal Farms, Inc.	Hall	Poultry	585961	GAG930000
D & D Dairy	Greene	Dairy	230	GAU700000
Double S Dairy	Greene	Dairy	200	GAU700000
Douglas Chambers Dairy	Bibb	Dairy	-	GAU700000
Drayben Dairy	Greene	Dairy	-	GAU700000
Eatonton Dairy Farm LL	Putnam	Dairy	740	GAG930000
Gilbert & Sons Dairy	Morgan	Dairy	275	GAU700000
Godfrey Dairy	Morgan	Dairy	750	GAG930000
Green Glades Farm Inc.	Putnam	Dairy	-	GAU700000
Griffeth Farm	Barrow	Poultry	28000	GAU700000
Irvin Farm	Jackson	Poultry	226000	GAG930000
Joe Waller Dairy	Morgan	Dairy	280	GAU700000
Key's Dairy	Putnam	Dairy	250	GAU700000
Little's Dairy	Putnam	Dairy	400	GAU700000
R. A. Moore Dairy Inc.	Greene	Dairy	300	GAU700000
Richard/Charles Stewart Dairy	Greene	Dairy	300	GAU700000
Shady Oaks Dairy	Greene	Dairy	300	GAU700000
Strange Brothers Dairy	Morgan	Dairy	350	GAU700000
Sunrise Dairy	Putnam	Dairy	-	GAU700000
T & W Farms, Inc. #1	Putnam	Dairy	500	GAU700000
T & W Farms, Inc. #2	Jasper	Dairy	400	GAU700000
Taylor Farms	Montgomery	Swine	5000	GA0038156
Turk Dairy	Putnam	Dairy	-	GAU700000
University of GA Swine Center	Clarke	Swine	670	GAU700000
Williams Dairy	Morgan	Dairy	550	GAU700000

Sources: Permitting Compliance and Enforcement Program, GA EPD, 2004
GA Dept. of Agriculture, 2006

Table 9. Deer Census Data In The Oconee River Basin

County	1995-2004 Average Population (Number/Sq Mi)
Baldwin	50
Barrow	35
Bleckley	35
Clarke	50
Dodge	35
Greene	50
Gwinnett	35
Hall	35
Hancock	50
Jackson	50
Jasper	50
Johnson	40
Jones	50
Laurens	35
Madison	50
Montgomery	35
Morgan	50
Newton	50
Oconee	50
Oglethorpe	50
Putnam	50
Treutlen	35
Twiggs	40
Walton	35
Washington	40
Wheeler	35
Wilkinson	40

Source: Wildlife Resources Division, GA DNR, 2004

3.2.2 Agricultural Livestock

Agricultural livestock are a potential source of fecal coliform to streams in the Oconee River Basin. The animals grazing on pastureland deposit their feces onto land surfaces, where it can be transported during storm events to nearby streams. Animal access to pastureland varies monthly, resulting in varying fecal coliform loading rates throughout the year. Beef cattle spend all of their time in pastures, while dairy cattle and hogs are periodically confined. In addition, agricultural livestock will often have direct access to streams that pass through their pastures, and can thus impact water quality in a more direct manner (USDA, 2002).

Table 10 provides the estimated number of beef cattle, dairy cattle, goats, horse, swine, sheep, and chickens by category reported by county. These data were provided by the Natural Resources Conservation Service (NRCS).

Table 10. Estimated Agricultural Livestock Populations in the Oconee River Basin

County	Livestock								
	Beef Cattle	Dairy Cattle	Swine	Sheep	Horses	Goats	Chickens-Layers	Chickens-Broilers Sold	Chickens-Breeders
Baldwin	8,750	150	850	290	-	-	650,000	-	8,750
Barrow	7,400	-	600	165	-	-	2,557,500	64,000	7,400
Bleckley	6,050	-	1,000	350	1,000	-	-	-	6,050
Clarke	4,000	200	500	900	500	100	240,000	-	4,000
Dodge	12,250	-	750	250	400	-	-	-	12,250
Greene	7,400	7,400	7,400	7,400	7,400	7,400	7,400	7,400	7,400
Gwinnett	3,500	-	525	800	-	-	390,000	-	3,500
Hall	16,100	1,100	1,800	3,350	-	75	19,036,000	380,000	16,100
Hancock	6,500	-	400	800	-	-	-	-	6,500
Jackson	30,300	-	1,500	1,275	50	100	13,592,000	1,800,000	30,300
Jasper	10,750	2,500	1,000	2,000	-	50	380,000	1,050,000	10,750
Johnson	8,100	-	3,200	300	200	50	-	-	8,100
Jones	6,767	900	140	305	-	40	512,000	-	6,767
Laurens	16,000	493	5,000	1,000	1,500	300	-	-	16,000
Madison	17,985	500	1,250	645	480	400	14,836,000	592,000	17,985
Montgomery	4,150	-	725	725	10,575	-	-	108,000	4,150
Morgan	18,800	6,200	1,000	2,200	100	-	3,760,400	452,000	18,800
Newton	16,900	-	600	1,740	390	100	120,000	-	16,900
Oconee	10,755	325	750	950	10	200	6,485,600	-	10,755
Oglethorpe	16,100	1,000	700	1,200	15,300	250	8,544,000	100,000	16,100
Putnam	34,000	8,500	300	2,200	120	50	-	1,800,000	34,000
Treutlen	3,650	-	275	415	30	-	-	-	3,650
Twiggs	3,200	-	700	30	60	-	-	-	3,200
Walton	6,750	-	500	1,500	-	-	1,536,000	148,000	6,750
Washington	6,400	750	2,500	490	-	-	-	-	6,400
Wheeler	7,425	-	915	380	205	-	-	-	7,425
Wilkinson	1,650	-	1,000	250	250	-	175,000	-	1,650

Source: NRCS, 2005

3.2.3 Urban Development

Fecal coliform from urban areas are attributable to multiple sources, including: domestic animals, leaks and overflows from sanitary sewer systems, illicit discharges, leaking septic systems, runoff from improper disposal of waste materials, and leachate from both operational and closed landfills.

Urban runoff can contain high concentrations of fecal coliform from domestic animals and urban wildlife. Fecal coliform bacteria enter streams by direct washoff from the land surface, or the runoff may be diverted to a storm water collection system and discharged through a discrete outlet structure. For large, medium, and small urban areas (populations greater than 50,000), the storm water outlets are regulated under MS4 permits (see Section 3.1.2). For smaller urban areas, the storm water discharge outlets currently remain unregulated.

In addition to urban animal sources of fecal coliform, there may be illicit connections to the storm sewer system. As part of the MS4 permitting program, municipalities are required to conduct dry-weather monitoring to identify and then eliminate these illicit discharges. Fecal coliform bacteria may also enter streams from leaky sewer pipes, or during storm events when combined sewer overflows discharge.

3.2.3.1 Leaking Septic Systems

A portion of the fecal coliform in the Oconee River Basin may be attributed to failure of septic systems and illicit discharges of raw sewage. Table 11 presents the number of septic systems in each county of the Oconee River Basin existing in 1990, based on U.S. 1990 Census Data, and the number existing in 2004, based on the Georgia Department of Human Resources, Division of Public Health data. In addition, an estimate of the number of septic systems installed and repaired during the fourteen year period from 1990 to 2004 is given.

These data show that a substantial increase in the number of septic systems has occurred in several counties. Often, this is a reflection of population increases outpacing the expansion of sewage collection systems during this period. Hence, a large number of septic systems are installed to contain and treat the sanitary waste. It is estimated that there are approximately 2.37 people per household on septic systems (EPA, personal communication).

3.2.3.2 Land Application Systems

Many smaller communities use land application systems (LAS) for treatment of their sanitary wastewaters. These facilities are required through LAS permits to treat all their wastewater by land application and are to be properly operated as non-discharging systems that contribute no runoff to nearby surface waters. However, runoff during storm events may carry surface residual containing fecal coliform bacteria to nearby surface waters. Some of these facilities may also exceed the ground percolation rate when applying the wastewater, resulting in surface runoff from the field. If not properly bermed, this runoff, which probably contains fecal coliform bacteria, may discharge to nearby surface waters. There are 28 permitted LAS systems located in the Oconee River Basin (Table 12).

Table 11. Number of Septic Systems in the Oconee River Basin

County	Existing Septic Systems (1990)	Existing Septic Systems (2004)	No. of Septic Systems Installed (1990 to 2004)	No. of Septic Systems Repaired (1990 to 2004)
Baldwin	5,753	9,149	3,396	276
Barrow	7,903	19,403	11,500	1,000
Bleckley	2,358	3,834	1,476	415
Clarke	7,183	9,006	1,823	97
Dodge	4,517	6,536	2,019	315
Greene	2,759	5,959	3,200	500
Gwinnett	56,752	80,778	24,026	6,595
Hall	25,664	50,547	24,883	3,504
Hancock	2,488	3,918	1,430	61
Jackson	8,505	16,972	8,467	837
Jasper	2,571	4,509	1,938	189
Johnson	2,344	3,972	1,628	189
Jones	5,791	8,830	3,039	142
Laurens	8,322	16,709	8,387	866
Madison	7,647	11,852	4,205	301
Montgomery	1,629	2,888	1,259	180
Morgan	3,076	6,269	3,193	350
Newton	9,491	24,491	15,000	781
Oconee	5,591	9,632	4,041	408
Oglethorpe	3,448	5,602	2,154	135
Putnam	4,974	8,170	3,196	289
Treutlen	1,286	2,195	909	140
Twiggs	2,946	4,025	1,079	93
Walton	7,931	21,408	13,477	1,261
Washington	4,065	5,869	1,804	164
Wheeler	1,389	2,098	709	98
Wilkinson	1,944	2,814	870	167

Source: 1990 Census Data, and the Georgia Dept. of Human Resources, Div. of Public Health, 2006

Table 12. Permitted Land Application Systems in the Oconee River Basin

LAS Name	County	Permit No.	Type	Flow (MGD)
Barrow Co Board Of Commissioners	Barrow	GA02-271	Municipal	0.45
Barrow County - Barber Creek	Barrow	GA02-018	Municipal	0.15
Bio Grow Division	Clarke	GA02-156	Industrial	-
Braselton	Jackson	GA02-175	Municipal	0.34
Carey Station Urban Reuse Facility	Greene	GA03-883	Private	0.5
Crystal Farms Inc.	Hall	GA01-527	Industrial	0.015
E.I. Dupont De Nemours	Clarke	GA01-405	Industrial	0.003
East Dublin LAS	Laurens	GA02-270	Municipal	0.312
Family Life Enrichment Center	Oconee	GA03-928	Private	0.012
Gold Kist Inc.	Jackson	GA01-310	Industrial	0.009
Great Waters	Putnam	GA02-072	Industrial	0.07
Griffin Industries Inc.	Laurens	GA01-491	Industrial	0.01
Harrison Poultry	Barrow	GA01-532	Industrial	1.3
Hyline International Inc.	Newton	GA01-461	Industrial	0.002
Jefferson Central City	Jackson	GA02-006	Municipal	0.38
Jefferson North LAS	Jackson	GA02-230	Municipal	0.287
Jeffersonville Las	Twiggs	GA02-050	Municipal	0.7
Linger Longer Development Co.	Greene	GA03-897	Private	0.075
Madison Lakes LLC	Morgan	GA03-965	Private	0.1
Mott's Valley Fresh Inc.	Jackson	GA01-477	Industrial	0.08
Oconee Co -Rocky Branch LAS	Oconee	GA02-176	Municipal	0.2
Oconee Crossing Urban Reuse	Putnam	GA03-632	Private	0.5
Rhodia	Barrow	GA03-674	Industrial	-
Sonstegard Foods	Hall	GA01-420	Industrial	-
Stepan Company	Barrow	GA02-264	Industrial	-
Wayne Poultry Company	Jackson	GA01-546	Industrial	0.85
Winder LAS	Barrow	GA02-014	Municipal	1.65
Winder Marburg Cr Reuse	Barrow	GA02-158	Municipal	0.9

Source: Permitting Compliance and Enforcement Program, GA EPD, Atlanta, Georgia, 2006

3.2.3.3 Landfills

Leachate from landfills may contain fecal coliform bacteria that may at some point discharge into surface waters. Sanitary (or municipal) landfills are the most likely to serve as a source of fecal coliform bacteria. These types of landfills receive household wastes, animal manure, offal, hatchery and poultry processing plant wastes, dead animals, and other types of wastes. Older sanitary landfills were not lined and most have been closed. Those that remain active and have not been lined operate as construction/demolition landfills. Currently active sanitary landfills are lined and have leachate collection systems. All landfills, excluding inert landfills, are now required to install environmental monitoring systems for groundwater and methane sampling. There are 104 known landfills in the Oconee River Basin (Table 13). Of these, 18 are active landfills and 86 are inactive or closed. As shown in Table 13, many of the older, inactive landfills were never permitted.

Table 13. Landfills in the Oconee River Basin

Name	County	Permit No.	Type	Status
Ailey	Montgomery		NA	Inactive
Athens	Clarke		NA	Inactive
Athens-Winterville	Clarke	029-002D(SL)	Sanitary Landfill	
Auburn	Barrow		NA	Inactive
Baldwin Co. - Union Hill Ch Rd, Ph 3	Baldwin	005-017D(SL)	Municipal Solid Waste Landfill	Operating
Baldwin Co. - Union Hill Ch. Rd.	Baldwin	005-003D(SL)	NA	Inactive
Baldwin Co. Dump (Old Site)	Baldwin		NA	Inactive
Baldwin Co.-Union Hill Ch Rd Ph 2 (SL)	Baldwin	005-016D(SL)	Sanitary Landfill	Closed
Barrow Co. - Finch Rd.	Barrow	007-014D(SL)	NA	Inactive
Barrow Co. - Hwy. 29e	Barrow		NA	Inactive
Barrow Co. - Jones Rd.	Barrow	007-011D(SL)	NA	Inactive
Barrow Co.-Finch Rd Ph 2+3 (SL)	Barrow	007-016D(SL)	Sanitary Landfill	Closed
Bethlehem	Barrow		NA	Inactive
Blakely - Mathis Landfill	Barrow	007-013D(L)	NA	Inactive
Bostwick	Morgan		NA	Inactive
Braselton	Jackson		NA	Inactive
Burnett Lake Laura Road	Baldwin	005-001D(L)	Dry Trash Landfill	
Central State Hospital - Freeman Bldg (L)	Baldwin	005-015D(L)	Construction & Demolition Landfill	Operating
Central State Hospital (SL)	Baldwin	005-004D(SL)	Sanitary Landfill	Closed
Chester	Dodge		NA	Inactive
City Of Dacula	Gwinnett	067-005D(L)	Dry Trash Landfill	
City Of Milledgeville	Baldwin	005-002D(SL)	Sanitary Landfill	
Clarke (Airport Rd.)	Clarke		NA	Inactive
Clarke Co. - Athens Dunlap Rd (SL) Ph 1	Clarke	029-004D(SL)	Sanitary Landfill	Closed
Clarke Co. - Athens Dunlap Rd Ph 2,3,& 4	Clarke	029-012D(SL)	Municipal Solid Waste Landfill	Operating
Coggins-Trade St (L)	Clarke	029-009D(L)	Dry Trash Landfill	Closed
D & C Refuse-Woodmine (SL)	Baldwin	005-005D(SL)	Sanitary Landfill	Closed
Dixie Recycling Sys, Inc.	Hancock	070-003D(SL)	NA	Inactive
Dublin - Oconee River	Laurens		NA	Inactive
East Dublin - Buckeye Road (B.B. Tanner)	Laurens		NA	Inactive
East Dublin-Nathaniel Dr Rows 1&2 (SL)	Laurens	087-009D(SL)	Sanitary Landfill	Closed
Eatonton	Putnam		NA	Inactive
Engelhard-Gordon #2 (LI)	Wilkinson	158-014D(LI)	Industrial Landfill	Operating
Engelhard-McIntyre #2 (LI)	Wilkinson	158-013D(LI)	Industrial Landfill	Operating
Englehard Minerals	Wilkinson	158-01096D(L)(I)	NA	Inactive
Ernest Blakely Landfill	Barrow	007-009D(L)	NA	Inactive
Ga Kaolin-Deepstep (Am.Ind.) Ph #1 (LI)	Washington	150-007D(LI)	Industrial Landfill	Operating
Georgia - Pacific Co.	Jasper		NA	Inactive
Glenwood	Wheeler		NA	Inactive
Gordon	Twiggs		NA	Inactive
Greene Co. - Union Point	Greene	066-002D(SL)	NA	Inactive

Name	County	Permit No.	Type	Status
Greene Co-Us 278 W #2 Ph 1 (SL)	Greene	066-007D(SL)	Sanitary Landfill	Closed
Greene Co-Us 278 W #2 Ph 2 (SL)	Greene	066-008D(SL)	Sanitary Landfill	Closed
Greensboro	Greene		NA	Inactive
Hall Co.- Allen Creek Composting Facility	Hall	069-019P(CO)	Composting Facility	
Hall Co.-Candler Rd (Sr 60)	Hall	069-015D(MSWL)	Municipal Solid Waste Landfill	Operating
Hall Co.-Allen Creek Ph A (SL)	Hall	069-008D(SL)	Sanitary Landfill	In-Closure
Holly Hill Landfill	Barrow		NA	Inactive
Jackson Co.-Sr 82 Prison Farm Ph 2 (SL)	Jackson	078-009D(SL)	Sanitary Landfill	Closed
Jasper Co.-Sr 212 Monticello (SL)	Jasper	079-004D(SL)	Construction & Demolition Landfill	In-Closure
Jeffersonville	Twiggs		NA	Inactive
Laurens - Bethsaida	Laurens		NA	Inactive
Laurens - Rentz	Laurens		NA	Inactive
Laurens Co.-Bethsaida Church Rd (SL)	Laurens	087-008D(SL)	Sanitary Landfill	Closed
Laurens Co.-Old Macon Road MSWL	Laurens	087-015D(SL)	Municipal Solid Waste Landfill	Operating
Lower Apalachee Rd.	Morgan	104-002D(SL)	Sanitary Landfill	
M & M Clays-McIntyre/Wriley Rd (LI)	Wilkinson	158-007D(LI)	Industrial Landfill	Operating
Madison - Morgan Co.	Morgan		NA	Inactive
Manning Gin Rd.	Barrow		NA	Inactive
Mansfield	Newton		NA	Inactive
Milledgeville - English Stouffer	Baldwin	005-012D(SL)	Sanitary Landfill	
Montgomery Co-Us 221 Ailey Ph 1 (SL)	Montgomery	103-001D(SL)	Sanitary Landfill	Closed
Monticello (Landfill)	Jasper		NA	Inactive
Monticello (Sanitary Landfill)	Jasper		NA	Inactive
Morgan Co.-Us 441 N (Co Wk Cmp) Ph 2	Morgan	104-007D(SL)	Sanitary Landfill	Closed
Morgan Co-Us 441 N (Co Wk Cp) Ph 1	Morgan	104-006D(SL)	Sanitary Landfill	Closed
Mt. Vernon	Montgomery		NA	Inactive
Nord Kaolin-Allfarm Rd (LI)	Twiggs	143-007D(LI)	Industrial Landfill	Operating
Oconee	Washington		NA	Inactive
Oconee Co.-Mayne Mill Rd Frmgtn (SL)	Oconee	108-002D(SL)	Sanitary Landfill	Closed
Oconee Co.-Us 441/Cr 109 (SL)	Oconee	108-007D(SL)	Construction & Demolition Landfill	Closed
Pendergrass	Jackson		NA	Inactive
Pierce Road	Barrow		NA	Inactive
Putnam Co-Cr 29 (L) & (SL)	Putnam	117-007D(SL)	Unlined Sanitary Landfill	In-Closure
Putnam Co-Martin Mill Rd Ph 1 (SL)	Putnam	117-004D(SL)	Sanitary Landfill	Closed
Reliable Tire Service, Monroe Dr.	Hall	069-014D(C&D)	Construction & Demolition Landfill	Operating
Republic Waste - Oak Grove MSWL Sr324	Barrow	007-020D(SL)	Municipal Solid Waste Landfill	Operating
Rutledge - Hard Labor Cr.	Morgan		NA	Inactive
Sandersville (Beck Blvd.)	Washington		NA	Inactive
Sandersville (Deep Step Rd.)	Washington		NA	Inactive
Se Paper Mfg-Shad Crk Rd Indl Ph #1 (LI)	Laurens	087-007D(LI)	Industrial Landfill	Operating
Social Circle	Walton		NA	Inactive
Soperton	Treutlen		NA	Inactive
Sparta-Fairmont/Stockade Rds (SL)	Hancock	070-002D(SL)	Sanitary Landfill	Closed

Name	County	Permit No.	Type	Status
Speedway Sr 324 Site 1	Barrow	007-018D(SL)	Sanitary Landfill	
Sr 68 - Sandersville	Washington	150-001D(SL)	Sanitary Landfill	
Statham	Barrow		NA	Inactive
Thiele/Anglo/Burgess-Kaolin Rd (LI)	Washington	150-008D(LI)	Industrial Landfill	Operating
Toomsboro	Wilkinson		NA	Inactive
Treutlen - Wheeler Co.	Wheeler	153-003D(SL)	NA	Inactive
Treutlen & Wheeler Cos-Sr 46 Ph 2&3	Wheeler	153-005D(SL)	Sanitary Landfill	Closed
Twiggs Co-Old McCallum Pond Rd Ph 1&2	Twiggs	143-005D(SL)	Sanitary Landfill	Closed
Twiggs Co-Us 80 (SL)	Twiggs	143-008D(SL)	Municipal Solid Waste Landfill	Operating
Unimin Corporation McIntyre Plant	Wilkinson	158-008D(LI)	Industrial Landfill	Operating
US 129 Landfill	Hall	069-007D(SL)	Sanitary Landfill	
US 78 Construction & Demolition Landfill	Walton	147-012D(C&D)	Construction & Demolition Landfill	Operating
Walton Co		147-013D(C&D)	Construction & Demolition Landfill	
Washington C0-Kaolin Rd S #2 (SL)	Washington	150-009D(SL)	Sanitary Landfill	Closed
Washington Co-Kaolin Rd S #3 (SL)	Washington	150-010D(MSWL)	Municipal Solid Waste Landfill	Operating
Washington Co-Kaolin Rd S Ph 1 (SL)	Washington	150-006D(SL)	Sanitary Landfill	Closed
White Plains	Greene		NA	Inactive
Wilkinson Co-Sr 57 Pblc Wrks Camp (SL)	Wilkinson	158-010D(SL)	Sanitary Landfill	Closed
Winder	Barrow		NA	Inactive
Winder Barrow Ref. Co.	Barrow	007-007D(L)	NA	Inactive

Source: Land Protection Branch, GA DNR, 2005

4.0 ANALYTICAL APPROACH

The process of developing fecal coliform TMDLs for the Oconee River Basin listed segments includes the determination of the following:

- The current critical fecal coliform load to the stream under existing conditions;
- The TMDL for similar conditions under which the current load was determined; and
- The percent reduction in the current critical fecal coliform load necessary to achieve the TMDL.

The calculation of the fecal coliform load at any point in a stream requires the fecal coliform concentration and stream flow. The Loading Curve Approach was used to determine the current fecal coliform load and the TMDL. For the listed segments, fecal coliform sampling data were sufficient to calculate at least one 30-day geometric mean to compare with the regulatory criteria (see Appendix A).

4.1 Loading Curve Approach

For those segments in which sufficient water quality data were collected to calculate at least one 30-day geometric mean that was above the regulatory standard, the loading curve approach was used. This method involves comparing the current critical load to summer and winter seasonal TMDL curves.

As mentioned in Section 2.0, the USGS monitored many of the listed segments and collected stream flow information concurrently with water quality samples. Stream depths were measured and used to determine stream flows, based on rating curves developed by the USGS for each sampling location.

In cases where no stream flow measurements were available, flow on the day the fecal coliform samples were collected was estimated using data from a nearby gaged stream. The nearby stream had relatively similar watershed characteristics, including landuse, slope, and drainage area. The stream flows were estimated by multiplying the gaged flow by the ratio of the listed stream drainage area to the gaged stream drainage area. Table 14 lists those segments for which no flow data were available and indicates the gaged station that was used to estimate the flow.

The current critical loads were determined using fecal coliform data collected within a 30-day period to calculate the geometric means, and multiplying these values by the arithmetic means of the flows measured at the time the water quality samples were collected. Georgia's instream fecal coliform standards are based on a geometric mean of samples collected over a 30-day period, with samples collected at least 24 hours apart. To reflect this in the load calculation, the fecal coliform loads are expressed as 30-day accumulated loads with units of counts per 30 days. This is described by the equation below:

$$L_{critical} = C_{geomean} \times Q_{mean}$$

Where:

$L_{critical}$ = current critical fecal coliform load
$C_{geomean}$ = fecal coliform concentration as a 30-day geometric mean
Q_{mean} = stream flow as an arithmetic mean

Table 14. Stream Segments with Estimated Flows and Corresponding USGS Flow Gages

Monitoring Station	USGS Station Name	Station No.
Apalachee River - Headwaters to Apalachee Road	Apalachee River Near Bostwick	02219000
Apalachee River - Williamson Creek to Marburg Creek	Apalachee River Near Bostwick	02219000
Apalachee River - Marburg Creek to Lake Oconee	Apalachee River Near Bostwick	02219000
Big Sandy Creek - Little Sandy Creek (near Madison) to Hard Labor Creek	Apalachee River Near Bostwick	02219000
Bluff Creek - D/S Wiggins Road to Oconee River	Murder Creek below Eatonton	02221525
Brooklyn Creek - Headwaters to Middle Oconee River Athens	Apalachee River Near Bostwick	02219000
Carver Creek - Tributary to Trail Creek, Athens	Apalachee River Near Bostwick	02219000
Cedar Creek - King Branch to Glady Creek	Apalachee River Near Bostwick	02219000
Cedar Creek - Glady Creek to Big Cedar Creek	Apalachee River Near Bostwick	02219000
Cedar Creek - Headwaters to Oconee River, Athens	Apalachee River Near Bostwick	02219000
Cedar Creek - Headwaters to Winder Reservoir	Apalachee River Near Bostwick	02219000
Chandler Creek Headwaters to North Oconee River	Apalachee River Near Bostwick	02219000
Cloverhurst Branch - Athens	Apalachee River Near Bostwick	02219000
East Fork Trail Creek - Headwaters to West Fork Trail Creek	Apalachee River Near Bostwick	02219000
Fishing Creek - McWhorter Creek to Lake Oconee	Apalachee River Near Bostwick	02219000
Hunnicutt Creek - Headwaters to Middle Oconee River, Athens	Apalachee River Near Bostwick	02219000
Kingswood Branch - Tributary to McNutt Creek, Athens	Apalachee River Near Bostwick	02219000
Little River - Gap Creek to Big Indian Creek	Apalachee River Near Bostwick	02219000
Little River - Social Circle to Nelson Creek	Apalachee River Near Bostwick	02219000
Little Sugar Creek - Headwaters to Lake Oconee	Murder Creek below Eatonton	02221525
Murder Creek - Wolf Creek to Lake Sinclair	Murder Creek below Eatonton	02221525
North Bypass Branch - Tributary to Middle Oconee River, Athens	Apalachee River Near Bostwick	02219000
North Walnut Creek - Gainesville (U/S Hall County Camp)	Apalachee River Near Bostwick	02219000
North Walnut Creek - Gainesville (D/S Hall County Camp)	Apalachee River Near Bostwick	02219000
Sugar Creek - South Sugar Creek to Lake Oconee	Murder Creek below Eatonton	02221525
Tanyard Creek - U/S North Oconee River, Athens	Apalachee River Near Bostwick	02219000
Tributary to Little River - Eatonton to Little River	Murder Creek below Eatonton	02221525
Tributary to North Walnut Creek - Gainesville	Apalachee River Near Bostwick	02219000
West Fork Trail Creek - Athens	Apalachee River Near Bostwick	02219000
Wheeler Creek - Headwaters to Duncan Creek	Apalachee River Near Bostwick	02219000

The current estimated critical load is dependent on the fecal coliform concentrations and stream flows measured during the sampling events. The number of events sampled is usually 16 per year. Thus, these loads do not represent the full range of flow conditions or loading rates that can occur. Therefore, it must be kept in mind that the current critical loads used only represent the worst-case scenario that occurred among the time periods sampled.

The maximum fecal coliform load at which the instream fecal coliform criteria will be met can be determined using a variation of the equation above. By setting C equal to the seasonal, instream fecal coliform standards, the load will equal the TMDL. However, the TMDL is dependent on stream flow. Figures in Appendix A graphically illustrate that the TMDL is a continuum for the range of flows (Q) that can occur in the stream over time. There are two TMDL curves shown in these figures. One represents the summer TMDL for the period May through October when the 30-day geometric mean standard is 200 counts/100 mL. The second curve represents the winter TMDL for the period November through April when the 30-day geometric mean standard is 1,000 counts/100 mL. The equations for these two TMDL curves are:

$$TMDL_{summer} = 200 \text{ counts (as a 30-day geometric mean)/100 mL} \times Q$$

$$TMDL_{winter} = 1{,}000 \text{ counts (as a 30-day geometric mean)/100 mL} \times Q$$

The graphs show the relationship between the current critical load ($L_{critical}$) and the TMDL. The TMDL for a given stream segment is the load for the mean flow corresponding to the current critical load. This is the point where the current load exceeds the TMDL curve by the greatest amount. This critical TMDL can be represented by the following equation:

$$TMDL_{critical} = C_{standard} \times Q_{mean}$$

Where:

$TMDL_{critical}$ = critical fecal coliform TMDL load

$C_{standard}$ = seasonal fecal coliform standard (as a 30-day geometric mean)
summer - 200 counts/100 mL
winter - 1,000 counts/ 100 mL

Q_{mean} = stream flow as an arithmetic mean (same as used for $L_{critical}$)

A 30-day geometric mean load that plots above the respective seasonal TMDL curve represents an exceedance of the instream fecal coliform standard. The difference between the current critical load and the TMDL curve represents the load reduction required for the stream segment to meet the appropriate instream fecal coliform standard. There is also a single sample maximum criterion (4,000 counts per 100 milliliters) for the months of November through April. If a single sample exceeds the maximum criterion, and the seasonal geometric mean criteria is also exceeded, then the TMDL is based on the criteria exceedance requiring the largest load reduction. The load reduction can be expressed as follows:

$$\text{Load Reduction} = \frac{L_{critical} - TMDL_{critical}}{L_{critical}} \times 100$$

5.0 TOTAL MAXIMUM DAILY LOADS

A Total Maximum Daily Load (TMDL) is the amount of a pollutant that can be assimilated by the receiving waterbody without exceeding the applicable water quality standard; in this case, the seasonal fecal coliform standards. A TMDL is the sum of the individual waste load allocations (WLAs) from point sources and load allocations (LAs) for nonpoint sources, as well as natural background (40 CFR 130.2) for a given waterbody. The TMDL must also include a margin of safety (MOS), either implicitly or explicitly, that accounts for the uncertainty in the relationship between pollutant loads and the water quality response of the receiving water body. TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measures. For fecal coliform bacteria, the TMDLs are expressed as counts per 30 days as a geometric mean.

A TMDL is expressed as follows:

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

The TMDL calculates the WLAs and LAs with margins of safety to meet the stream's water quality standards. The allocations are based on estimates that use the best available data and provide the basis to establish or modify existing controls so that water quality standards can be achieved. In developing a TMDL, it is important to consider whether adequate data are available to identify the sources, fate, and transport of the pollutant to be controlled.

TMDLs may be developed using a phased approach. Under a phased approach, the TMDL includes: 1) WLAs that confirm existing limits and controls or lead to new limits, and 2) LAs that confirm existing controls or include implementing new controls (USEPA, 1991). A phased TMDL requires additional data be collected to determine if load reductions required by the TMDL are leading to the attainment of water quality standards.

The TMDL Implementation Plan establishes a schedule or timetable for the installation and evaluation of point and nonpoint source control measures, data collection, assessment of water quality standard attainment, and if needed, additional modeling. Future monitoring of the listed segment water quality will then be used to evaluate this phase of the TMDL, and if necessary, to reallocate the loads.

The fecal coliform loads calculated for each listed stream segment include the sum of the total loads from all point and nonpoint sources for the segment. The load contributions to the listed segment from unlisted upstream segments are represented in the background loads, unless the unlisted segment contains point sources that had permit violations for fecal coliform. In these cases, the upstream point sources are included in the wasteload allocations for the listed segment. In situations where two or more adjacent segments are listed, the fecal coliform loads to each segment are individually evaluated on a localized watershed basis. Point source loads originating in upstream segments are included in the background loads of the downstream segment. The following sections describe the various fecal coliform TMDL components.

5.1 Waste Load Allocations

The waste load allocation is the portion of the receiving water's loading capacity that is allocated to existing or future point sources. WLAs are provided to the point sources from municipal and industrial wastewater treatment systems with NPDES effluent limits. There are 15 active NPDES permitted facilities with fecal coliform permit limits in the Oconee River Basin watershed

that discharge into listed segments or have permit violations upstream of a listed segment. The maximum allocated fecal coliform loads for these municipal wastewater treatment facilities are given in Table 15. These WLA loads were calculated from the permitted or design flows and permitted fecal coliform concentrations. If the permit had no fecal coliform limit, a concentration of 200 counts/100 mL was used. These were expressed as accumulated loads over a 30-day period, and presented in units of counts per 30 days. If a facility expands its capacity and the permitted flow increases, the wasteload allocation for the facility would increase in proportion to the flow.

Table 15. WLAs for the Oconee River Basin

Facility Name	Permit No.	Receiving Stream	Listed Stream Segment	WLA (counts/30 days)
Athens North Oconee	GA0021725	North Oconee River	Trail Creek to Oconee River	2.44 E+12
Athens/Clarke County Cedar Cr	GA0034584	Oconee River	Confluence of North and Middle Oconee Rivers	4.55 E+11
Dublin WPCP	GA0025569	Oconee River	Long Branch to Turkey Creek	9.10 E+11
Dudley WPCP	GA0023957	Turkey Creek	Horse Branch to Rocky Creek	2.62 E+10
Eatonton East WPCP	GA0032271	Rooty Creek Tributary	Rd. S 926 Eatonton to Little Creek	6.26 E+10
Eatonton West WPCP	GA0032263	Unnamed tributary to Little River	Little River – Glady Creek to Lake Sinclair	8.87 E+10
Gordon WPCP	GA0020397	Little Commissioner Cr	Little Commissioner Cr – Ga Hwy 18 to Commissioner Cr	1.71 E+11
Greensboro South	GA0021351	Town Creek	Hwy 15 to Richland Creek	2.27 E+11
Hoschton WPCP	GA0035980	Mulberry River tributary	Mulberry River – Little Mulberry River to Middle Oconee	2.28 E+10
Jeffersonville WPCP	GA0020940	Turkey Creek	Turkey Creek – Horse Branch to Rocky Creek	5.69 E+10
Monticello Pearson Cr	GA0020141	Pearson Creek	Murder Creek – Wolf Creek to Lake Sinclair	3.87 E+10
Monticello White Oak	GA0020150	White Oak Creek	Murder Creek – Wolf Creek to Lake Sinclair	2.62 E+10
Oconee County-Calls Creek	GA0050211	Calls Creek	Lumpkin Branch to Middle Oconee River	9.10 E+10
Social Circle	GA0026107	Little River tributary	Little River – Social Circle to Nelson Cr	1.02 E+11
Winder Marburg Cr	GA0023191	Marburg Creek	Masseys Lake to Apalachee River	1.37 E+10

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

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

The waste load allocations from storm water discharges associated with MS4s (WLAsw) are estimated based on the percentage of urban area in each watershed covered by the MS4 storm water permit. At this time, the portion of each watershed that goes directly to a permitted storm sewer and that which goes through non-permitted point sources, or is sheet flow or agricultural runoff, has not been clearly defined. Thus, it is assumed that approximately 70 percent of storm water runoff from the regulated urban area is collected by the municipal separate storm sewer systems.

CAFOs are located within the Oconee River Basin (see Section 3.1.3). These facilities are either included under an LAS General Permit or an NPDES General Permit. A small number have an individual NPDES permit. However, presently no CAFOs discharge wastewater, and therefore, they were not provided a WLA.

This TMDL will use a phased approach. Future phases of TMDL development will attempt to further define the sources of pollutants and the portion that enters the permitted storm sewer systems. As more information is collected and these TMDLs are implemented, it will become clearer as to which BMPs are needed and how the water quality standards can be achieved.

5.2 Load Allocations

The load allocation is the portion of the receiving water's loading capacity that is attributed to existing or future nonpoint sources or to natural background sources. Nonpoint sources are identified in 40 CFR 130.6 as follows:

- Residual waste;
- Land disposal;
- Agricultural and silvicultural;
- Mines;
- Construction;
- Saltwater intrusion; and
- Urban storm water (non-permitted).

The LA is calculated as the remaining portion of the TMDL load available, after allocating the WLA and the MOS, using the following equation:

$$\Sigma LA = TMDL - (\Sigma WLA + \Sigma WLAsw + \Sigma MOS)$$

As described above, there are two types of load allocations: loads to the stream independent of precipitation, including sources such as failing septic systems, leachate from landfills, animals in the stream, and leaking sewer system collection lines, or background loads; and loads associated with fecal coliform accumulation on land surfaces that is washed off during storm events, including runoff from saturated LAS fields. At this time, it is not possible to partition the various sources of load allocations. Table 16 presents the total load allocation expressed as counts per 30 days, or as winter instantaneous maximum counts for the 303(d) listed streams

located in the Oconee River Basin for the current critical condition. In the future, after additional data has been collected, it may be possible to partition the load allocation by source.

5.3 Seasonal Variation

The Georgia fecal coliform criteria are seasonal. One set of criteria applies to the summer season, while a different set applies to the winter season. To account for seasonal variations, the critical loads for each listed segment were determined from sampling data obtained during both summer and winter seasons, when possible. However, in some cases, the available data was limited to a single season for the calculation of the critical load. The TMDL and percent reduction given in 16 for each listed segment was based on the season in which the critical load occurred. The TMDLs for each season, for any given flow, are presented as equations in Section 5.5.

Analyses of the available fecal coliform data and corresponding flows were performed to determine if the fecal coliform violations occurred during wet weather (high flow) or dry weather (low flow) conditions. The flow data from each sampling site were normalized by dividing the measured flow by the product of the average annual runoff (cfs/sq mile), published in Open-File Report 82-577, and the appropriate drainage area (Carter, 1982). Plots of the normalized flows (Q/Q_o) versus fecal coliform are shown in Appendix B. The plots do not show a consistent relationship between fecal coliform concentrations and flow. The summer and winter plots show that the fecal coliform violations occur during both high (wet weather) and low (dry weather) flow conditions.

5.4 Margin of Safety

The MOS is a required component of TMDL development. There are two basic methods for incorporating the MOS: 1) implicitly incorporate the MOS using conservative modeling assumptions to develop allocations; or 2) explicitly specify a portion of the TMDL as the MOS and use the remainder for allocations. For this TMDL, an explicit MOS of 10 percent of the TMDL was used. The MOS values are presented in Table 16.

5.5 Total Fecal Coliform Load

The fecal coliform TMDL for the listed stream segment is dependent on the time of year, the stream flow, and the applicable state water quality standard.

The total maximum daily seasonal fecal coliform loads for Georgia are given below:

$$TMDL_{summer} = 200 \text{ counts (as a 30-day geometric mean)/100 mL} \times Q$$

$$TMDL_{winter} = 1{,}000 \text{ counts (as a 30-day geometric mean)/100 mL} \times Q$$

$$TMDL_{winter} = 4{,}000 \text{ counts (instantaneous) /100 mL} \times Q$$

For purposes of determining necessary load reductions required to meet the instream water quality criteria, the current critical TMDL was determined. This load is the product of the applicable seasonal fecal coliform standard and the mean flow used to calculate the current critical load. It represents the sum of the allocated loads from point and nonpoint sources located within the immediate drainage area of the listed segment, the NPDES-permitted point discharges with recorded fecal coliform violations from the nearest upstream subwatersheds,

and a margin of safety (MOS). For these calculations, the fecal load contributed by each facility to the WLA was not the maximum presented in Table 15, but rather was the product of the fecal coliform permitted limit and the average monthly discharge at the time of the critical load. The current critical loads and corresponding TMDLs, WLAs (WLA and WLA_{sw}), LAs, MOSs, and percent load reductions for the Oconee River Basin stream segments are presented in Table 16.

The relationships of the current critical loads to the TMDLs are shown graphically in Appendix A. The vertical distance between the two values represents the load reductions necessary to achieve the TMDLs. If no TMDL or Critical Load is given on the graphs in Appendix A, the TMDL given in Table 16 is based on the instantaneous maximum standard. As a consequence of the localized nature of the load evaluations, the calculated fecal coliform load reductions pertain to point and nonpoint sources occurring within the immediate drainage area of the listed segment. These current critical values represent a worst-case scenario for the limited set of data. Thus, the load reductions required are conservative estimates, and should be sufficient to prevent exceedances of the instream fecal coliform standard for a wide range of conditions.

Evaluation of the relationship between instream water quality and the potential sources of pollutant loading is an important component of TMDL development, and is the basis for later implementation of corrective measures and BMPs. For the current TMDLs, the association between fecal coliform loads and the potential sources occurring within the subwatersheds of each segment was examined on a qualitative basis.

Table 16. Fecal Coliform Loads and Required Fecal Coliform Load Reductions

Stream Segment	Current Load (counts/ 30 days)	TMDL Components					Percent Reduction
		WLA (counts/ 30 days)[1]	WLAsw (counts/ 30 days)	LA (counts/ 30 days)	MOS (counts/ 30 days)	TMDL (counts/ 30 days)	
Allen Creek - Monroe Driver to 1 mile d/s GA. Hwy 11	8.19E+13		1.30E+12	6.30E+12	8.44E+11	8.44E+12	57
Allen Creek - 1 mile d/s GA Hwy 11 to Middle Oconee River	1.47E+13		4.01E+11	2.46E+12	3.18E+11	3.18E+12	78
Apalachee River - Headwaters to Apalachee Road	1.42E+12		5.89E+11	1.68E+11	8.41E+10	8.41E+11	41
Apalachee River - Williamson Creek to Marburg Creek	3.59E+13		1.88E+12	4.33E+12	6.90E+11	6.90E+12	81
Apalachee River - Marburg Creek to Lake Oconee	3.71E+14		8.82E+12	9.42E+13	1.14E+13	1.14E+14	69
Beaverdam Creek	2.82E+14			6.34E+13	7.05E+12	7.05E+13	75
Big Cedar Creek	3.52E+13			5.66E+12	6.29E+11	6.29E+12	82
Big Indian Creek	5.28E+14			7.93E+13	8.81E+12	8.81E+13	83
Big Sandy Creek - Headwaters to Little Sandy Creek	1.15E+13			2.86E+12	3.18E+11	3.18E+12	72
Big Sandy Creek - Little Sandy Creek (near Madison) to Hard Labor Creek	1.54E+14			9.02E+12	1.00E+12	1.00E+13	93
Big Sandy Creek - Porter Creek to Oconee River	8.55E+13			3.08E+13	3.42E+12	3.42E+13	60
Bluff Creek	2.99E+13			1.02E+13	1.13E+12	1.13E+13	62
Brooklyn Creek	2.14E+12			1.74E+11	4.97E+10	2.49E+11	88
Buffalo Creek	5.10E+13			2.51E+13	2.79E+12	2.79E+13	45
Calls Creek	1.06E+14	7.03E+10	2.30E+13	1.92E+13	4.70E+12	4.70E+13	56
Carver Creek	4.03E+12		3.13E+11	8.95E+10	4.48E+10	4.48E+11	89
Carr Creek	1.54E+11		6.32E+10	1.81E+10	9.03E+09	9.03E+10	41
Cedar Creek - King Branch to Glady Creek	1.47E+12			9.48E+11	1.05E+11	1.05E+12	28
Cedar Creek - Glady Creek to Big Cedar Creek	1.53E+12			9.87E+11	1.10E+11	1.10E+12	28
Cedar Creek - Headwaters to Oconee River, Athens	5.29E+12		2.82E+11	8.05E+10	4.02E+10	4.02E+11	92

Stream Segment	Current Load (counts/ 30 days)	TMDL Components					Percent Reduction
		WLA (counts/ 30 days)[1]	WLAsw (counts/ 30 days)	LA (counts/ 30 days)	MOS (counts/ 30 days)	TMDL (counts/ 30 days)	
Cedar Creek - Headwaters to Winder Reservoir	9.57E+13		5.88E+09	7.50E+11	8.39E+10	8.39E+11	95
Chandler Creek	1.76E+13			2.07E+12	2.30E+11	2.30E+12	87
Cloverhurst Branch	2.16E+12		1.12E+12	3.19E+11	1.60E+11	1.60E+12	26
E. T. Creek	1.52E+11		4.66E+10	1.58E+10	6.93E+09	6.93E+10	55
East Fork Trail Creek	3.17E+11		8.73E+10	2.49E+10	1.25E+10	1.25E+11	61
Fishing Creek	1.92E+13			3.94E+12	4.37E+11	4.37E+12	77
Hunnicutt Creek (aka Mitchell Bridge Branch)	6.10E+11		1.16E+11	3.31E+10	1.65E+10	1.65E+11	73
Kingswood Branch	7.85E+10		9.88E+09	2.82E+09	1.41E+09	1.41E+10	82
Little Commissioner Creek	6.61E+12	8.85E+10		4.37E+12	4.95E+11	4.95E+12	25
Little Mulberry Creek	9.14E+12		9.77E+11	1.05E+12	2.25E+11	2.25E+12	75
Little River - Shoal Creek to Gap Creek	5.40E+12			3.57E+12	3.96E+11	3.96E+12	27
Little River - Gap Creek to Big Indian Creek	5.83E+11			3.74E+11	4.15E+10	4.15E+11	29
Little River - Glady Creek to Lake Sinclair	2.74E+13	2.73E+10		1.17E+13	1.30E+12	1.30E+13	52
Little River - Social Circle to Nelson Creek	1.17E+12	1.03E+11		6.38E+11	8.23E+10	8.23E+11	30
Little Sugar Creek	4.41E+12			1.37E+12	1.52E+11	1.52E+12	65
Marburg Creek	3.33E+12	7.44E+10		2.30E+12	2.64E+11	2.64E+12	21
Middle Oconee River - Dosters Creek to Mulberry River	9.49E+13		2.51E+12	1.77E+13	2.24E+12	2.24E+13	76
Middle Oconee River - Mulberry River to Big Bear Creek	4.89E+13		2.92E+12	1.80E+13	2.32E+12	2.32E+13	53
Middle Oconee River - Big Bear Creek to McNutt Creek	1.34E+14		5.81E+12	2.53E+13	3.46E+12	3.46E+13	74
Middle Oconee River - McNutt Creek to North Oconee River	7.18E+13		1.05E+13	4.12E+13	5.74E+12	5.74E+13	20
Mulberry River - Mulberry Creek to Little Mulberry River	3.27E+13		1.88E+12	5.43E+12	8.12E+11	8.12E+12	75
Mulberry River - Little Mulberry River to Middle Oconee	3.41E+13	1.19E+10	1.36E+12	6.98E+12	9.29E+11	9.29E+12	73

Stream Segment	Current Load (counts/ 30 days)	TMDL Components					Percent Reduction
		WLA (counts/ 30 days)[1]	WLAsw (counts/ 30 days)	LA (counts/ 30 days)	MOS (counts/ 30 days)	TMDL (counts/ 30 days)	
Murder Creek	4.82E+12	2.28E+10		2.25E+12	2.53E+11	2.53E+12	48
North Bypass Branch	8.75E+09		2.97E+09	8.48E+08	4.24E+08	4.24E+09	52
North Oconee River - Buffington Mill Creek to Chandler Creek	1.73E+14			9.60E+12	1.07E+12	1.07E+13	94
North Oconee River - Chandler Creek to Bordens Creek	3.51E+13			6.51E+12	7.23E+11	7.23E+12	79
North Oconee River - Bordens Creek to Curry Creek	1.17E+13			7.63E+12	8.48E+11	8.48E+12	27
North Oconee River - Jackson County to Sandy Creek	9.36E+13		7.09E+11	2.21E+13	2.53E+12	2.53E+13	73
North Oconee River - Sandy Creek to Trail Creek, Athens	4.38E+13		7.09E+11	2.21E+13	2.57E+12	2.57E+13	41
North Oconee River - Trail Creek to Oconee River	2.30E+15	1.59E+12	1.44E+12	2.17E+13	1.70E+14	1.70E+15	76
North Walnut Creek - Gainesville U/s Hall County Camp	4.89E+11		3.73E+12	2.29E+13	1.28E+10	1.28E+11	74
North Walnut Creek - Gainesville D/s Hall County Camp	1.45E+13		1.79E+09	1.13E+11	6.89E+11	6.89E+12	52
Oconee River - Confluence of North & Middle Oconee Rivers	3.05E+14	3.00E+11	1.81E+13	8.73E+13	1.17E+13	1.17E+14	61
Oconee River - Barnett Shoals to Lake Oconee	2.70E+14		1.29E+13	7.03E+13	9.24E+12	9.24E+13	66
Oconee River - Long Branch to Turkey Creek	2.80E+15	4.35E+11		1.22E+15	1.35E+14	1.35E+15	52
Pond Fork - Headwaters to East Pond Fork	5.58E+12			8.81E+11	9.79E+10	9.79E+11	82
Pond Fork - East Pond Fork to Middle Oconee River	9.30E+12			2.69E+12	2.98E+11	2.98E+12	68
Richland Creek - U/s Greensboro to Interstate 20	3.63E+11			2.60E+11	2.88E+10	2.88E+11	20
Richland Creek - Interstate 20 to Beaverdam Creek	5.09E+13			2.95E+12	3.28E+11	3.28E+12	94
Rooty Creek	2.33E+13	5.96E+10		6.54E+11	7.93E+10	7.93E+11	97
Sugar Creek	6.05E+12			1.62E+12	1.80E+11	1.80E+12	70
Tanyard Creek	9.39E+11		3.77E+10	1.08E+10	5.38E+09	5.38E+10	94
Town Creek - Penfield to Lake Oconee	1.48E+12			7.13E+11	7.93E+10	7.93E+11	46
Town Creek - Hwy. 15 to Richland Creek, Greensboro	8.72E+11	6.01E+10		2.57E+11	3.52E+10	3.52E+11	60

Stream Segment	Current Load (counts/ 30 days)	TMDL Components					Percent Reduction
		WLA (counts/ 30 days)[1]	WLAsw (counts/ 30 days)	LA (counts/ 30 days)	MOS (counts/ 30 days)	TMDL (counts/ 30 days)	
Trail Creek	2.35E+14		4.11E+13	1.17E+13	5.87E+12	5.87E+13	75
Tributary to Little River	4.29E+11			2.43E+10	2.70E+09	2.70E+10	94
Tributary to North Walnut Creek	2.48E+12		4.25E+11	6.47E+11	1.19E+11	1.19E+12	52
Turkey Creek - Horse Branch to Rocky Creek	7.87E+11	6.05E+10		5.57E+11	6.86E+10	6.86E+11	13
Turkey Creek - Rocky Creek to Oconee River	4.27E+12			3.69E+12	4.10E+11	4.10E+12	4
Walnut Creek	5.30E+12		1.22E+11	1.08E+12	1.34E+11	1.34E+12	75
West Fork Trail Creek	8.77E+11		3.65E+11	1.09E+11	5.27E+10	5.27E+11	40
Wheeler Creek	1.16E+12		2.54E+11	1.70E+11	4.71E+10	4.71E+11	59

Notes: [1] The assigned fecal coliform load from each NPDES permitted facility for WLA was determined as the product of the fecal coliform permit limit and the facility average monthly discharge at the time of the critical load.

6.0 RECOMMENDATIONS

The TMDL process consists of an evaluation of the 303(d) listed stream segments' subwatersheds to identify, as best as possible, the sources of the fecal coliform loads causing the stream to exceed instream standards. The TMDL analysis was performed using the best available data to specify WLAs and LAs that will meet fecal coliform water quality criteria so as to support the use classification specified for each listed segment.

This TMDL represents part of a long-term process to reduce fecal coliform loading to meet water quality standards in the Oconee River Basin. Implementation strategies will be reviewed and the TMDLs will be refined as necessary in the next phase (next five-year cycle). The phased approach will support progress toward water quality standards attainment in the future. In accordance with USEPA TMDL guidance, these TMDLs may be revised based on the results of future monitoring and source characterization data efforts. The following recommendations emphasize further source identification and involve the collection of data to support the current allocations and subsequent source reductions.

6.1 Monitoring

Water quality monitoring is conducted at a number of locations across the state each year. The GA EPD has adopted a basin approach to water quality management that divides Georgia's major river basins into five groups. This approach provides for additional sampling work to be focused on one of the five basin groups each year and offers a five-year planning and assessment cycle. The Ocmulgee, Oconee, and Altamaha River Basins were the subjects of focused monitoring in 2004 and will again receive focused monitoring in 2009.

The TMDL Implementation Plan will outline an appropriate water quality monitoring program for the listed streams in the Oconee River Basin. The monitoring program will be developed to help identify the various fecal coliform sources. The monitoring program may be used to verify the 303(d) stream segment listings. This will be especially valuable for those segments where no data, old data, or spill data resulted in the listing.

6.2 Fecal Coliform Management Practices

Based on the findings of the source assessment, NPDES point source fecal coliform loads from wastewater treatment facilities do not significantly contribute to the impairment of the listed stream segments. This is because most facilities are required to treat to levels corresponding to instream water quality criteria. Fecal coliform loads from NPDES permitted MS4 areas may be significant, but these sources cannot be easily segregated from other storm water runoff. Other sources of fecal coliform in urban areas include wastes that are attributable to domestic animals, leaks and overflows from sanitary sewer systems, illicit discharges of sanitary waste, leaking septic systems, runoff from improper disposal of waste materials, and leachate from both operational and closed landfills. In agricultural areas, potential sources of fecal coliform may include CAFOs, animals grazing in pastures, dry manure storage facilities and lagoons, chicken litter storage areas, and direct access of livestock to streams. Wildlife, especially waterfowl can be a significant source of fecal coliform bacteria.

Management practices are recommended to reduce fecal coliform source loads to the listed 303(d) stream segments, with the result of achieving the instream fecal coliform standard criteria. These recommended management practices include:

- Compliance with NPDES permit limits and requirements;
- Adoption of NRCS Conservation Practices; and
- Application of Best Management Practices (BMPs) appropriate to agricultural or urban land uses, where applicable.

6.2.1 Point Source Approaches

Point sources are defined as discharges of treated wastewater or storm water into rivers and streams at discrete locations. The NPDES permit program provides a basis for municipal, industrial and storm water permits, monitoring and compliance with limitations, and appropriate enforcement actions for violations.

In accordance with GA EPD rules and regulations, all discharges from point source facilities are required to be in compliance with the conditions of their NPDES permit at all times. In the future, all municipal and industrial wastewater treatment facilities with the potential for the occurrence of fecal coliform in their discharge will be given end-of-pipe limits equivalent to the water quality standard of 200 counts/100 mL. An exception is constructed wetland systems, which have a natural level of fecal coliform input from animals attracted to the artificial wetlands. In addition, the permits will include routine monitoring and reporting requirements.

6.2.2 Nonpoint Source Approaches

The GA EPD is responsible for administering and enforcing laws to protect the waters of the State. The GA EPD is the lead agency for implementing the State's Nonpoint Source Management Program. Regulatory responsibilities that have a bearing on nonpoint source pollution include establishing water quality standards and use classifications, assessing and reporting water quality conditions, and regulating land use activities that may affect water quality. Georgia is working with local governments, agricultural and forestry agencies such as the Natural Resources Conservation Service, the Georgia Soil and Water Conservation Commission, and the Georgia Forestry Commission, to foster the implementation of BMPs to address nonpoint source pollution. In addition, public education efforts are being targeted to individual stakeholders to provide information regarding the use of BMPs to protect water quality. The following sections describe, in more detail, recommendations to reduce nonpoint source loads of fecal coliform bacteria in Georgia's surface waters.

6.2.2.1 Agricultural Sources

The GA EPD should coordinate with other agencies that are responsible for agricultural activities in the state to address issues concerning fecal coliform loading from agricultural lands. It is recommended that information (e.g., livestock populations by subwatershed, animal access to streams, manure storage and application practices, etc.) be periodically reviewed so that watershed evaluations can be updated to reflect current conditions. It is also recommended that BMPs be utilized to reduce the amount of fecal coliform bacteria transported to surface waters from agricultural sources to the maximum extent practicable.

The following three organizations have primary responsibility for working with farmers to promote soil and water conservation, and to protect water quality:

- University of Georgia (UGA) - Cooperative Extension Service;
- Georgia Soil and Water Conservation Commission (GSWCC); and
- Natural Resources Conservation Service (NRCS).

UGA has faculty, County Cooperative Extension Agents, and technical specialists who provide services in several key areas relating to agricultural impacts on water quality.

The GA EPD designated the GSWCC as the lead agency for agricultural Nonpoint Source Management in the State. The GSWCC develops nonpoint source management programs and conducts educational activities to promote conservation and protection of land and water devoted to agricultural uses.

The NRCS works with federal, state, and local governments to provide financial and technical assistance to farmers. The NRCS develops standards and specifications for BMPs that are to be used to improve, protect, and/or maintain our state's natural resources. In addition, every five years, the NRCS conducts the National Resources Inventory (NRI). The NRI is a statistically based sample of land use and natural resource conditions and trends that covers non-federal land in the United States.

The NRCS is also providing technical assistance to the GSWCC and the GA EPD with the Georgia River Basin Planning Program. Planning activities associated with this program will describe conditions of the agricultural natural resource base once every five years. It is recommended that the GSWCC and the NRCS continue to encourage BMP implementation, education efforts, and river basin surveys with regard to river basin planning.

6.2.2.2 Urban Sources

Both point and nonpoint sources of fecal coliform bacteria can be significant in the Oconee River Basin urban areas. Urban sources of fecal coliform can best be addressed using a strategy that involves public participation and intergovernmental coordination to reduce the discharge of pollutants to the maximum extent practicable. Management practices, control techniques, public education, and other appropriate methods and provisions may be employed. In addition to water quality monitoring programs, discussed in Section 6.1, the following activities and programs conducted by cities, counties, and state agencies are recommended:

- Uphold requirements that all new and replacement sanitary sewage systems be designed to minimize discharges into storm sewer systems;

- Further develop and streamline mechanisms for reporting and correcting illicit connections, breaks, surcharges, and general sanitary sewer system problems;

- Sustained compliance with storm water NPDES permit requirements; and

- Continue efforts to increase public awareness and education towards the impact of human activities in urban settings on water quality, ranging from the consequences of industrial and municipal discharges to the activities of individuals in residential neighborhoods.

6.3 Reasonable Assurance

Permitted discharges will be regulated through the NPDES permitting process described in this report. Georgia is working with both federal and state agencies, such as the NRCS and the GSWCC, and with local governments, to foster the implementation of BMPs to address nonpoint sources. In addition, public education efforts will be targeted at individual stakeholders to provide information regarding the use of BMPs to protect water quality.

6.4 Public Participation

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

7.0 INITIAL TMDL IMPLEMENTATION PLAN

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

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

1. EPA has identified a number of management strategies for the control of nonpoint sources of pollutants, representing some best management practices. The "Management Measure Selector Table" shown below identifies these management strategies by source category and pollutant. Nonpoint sources are the primary cause of excessive pollutant loading in most cases. Any wasteload allocations for wastewater treatment plant facilities will be implemented in the form of water-quality based effluent limitations in NPDES permits. Any wasteload allocations for regulated storm water will be implemented in the form of best management practices in the NPDES permits. NPDES permit discharges are a secondary source of excessive pollutant loading, where they are a factor, in most cases.

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

3. As part of the Initial TMDL Implementation Plan, the GA EPD brochure entitled *"Watershed Wisdom -- Georgia's TMDL Program*" will be distributed by GA EPD to the GA EPD Contractor for use with appropriate stakeholders for this TMDL. Also, a copy of the video of that same title will be provided to the GA EPD

Contractor for its use in making presentations to appropriate stakeholders on TMDL implementation plan development.

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

5. The deadline for development of a Revised TMDL Implementation Plan is the end of September 2009.

6. The GA EPD Contractor helping to develop the Revised TMDL Implementation Plan, in coordination with GA EPD, will work on the following tasks involved in converting the Initial TMDL Implementation Plan to a Revised TMDL Implementation Plan:

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

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

8. The Revised TMDL Implementation Plan will supersede this Initial TMDL Implementation Plan once GA EPD approves the Revised TMDL Implementation Plan.

Management Measure Selector Table

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

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

REFERENCES

Carter, R.F., 1982. *Storage Requirements for Georgia Streams*, USGS, Water Resources Investigations, Open File Report 82-557.

Federal Register, 1990. *Federal Register, Part II: Environmental Protection Agency*, Vol. 55, No. 222, November 16, 1990.

GAEPD, 2000 – 2001. *Water Quality in Georgia*, 2000 – 2001, Georgia Department of Natural Resources, Environmental Protection Division.

GA EPD, 2001. *Oconee River Basin Management Plan 2001,* State of Georgia, Department of Natural Resources, Environmental Protection Division, Water Protection Branch.

GA EPD, 2000. *Combined Databases Of Landfills In Georgia; Historic And Current Through 1999,* State of Georgia, Department of Natural Resources, Environmental Protection Division, Geologic Survey Branch.

GA EPD, 2005. *State of Georgia Rules and Regulations for Water Quality Control, Chapter 391-3-6, Revised November 2005,* State of Georgia, Department of Natural Resources, Environmental Protection Division, Water Protection Branch.

GA WRD, 2005. Personal Communications with Mr. Kent Kammermeyer, Region II Office, Wildlife Resources Division, Georgia Department of Natural Resources, Thomson, GA, October 2005.

USDA, 2006. Personal Communications with Mr. Jimmy Bramblett, Water Resources Specialist, U.S. Department of Agriculture, NRCS, 355 East Hancock Ave., Athens, GA, February 2006.

USEPA, 1991. *Guidance for Water Quality Based Decisions: The TMDL Process*, EPA 440/4-91-001, U.S. Environmental Protection Agency, Assessment and Watershed Protection Division, Washington, D.C.

Appendix A

30-day Geometric Mean Fecal Coliform Monitoring Data

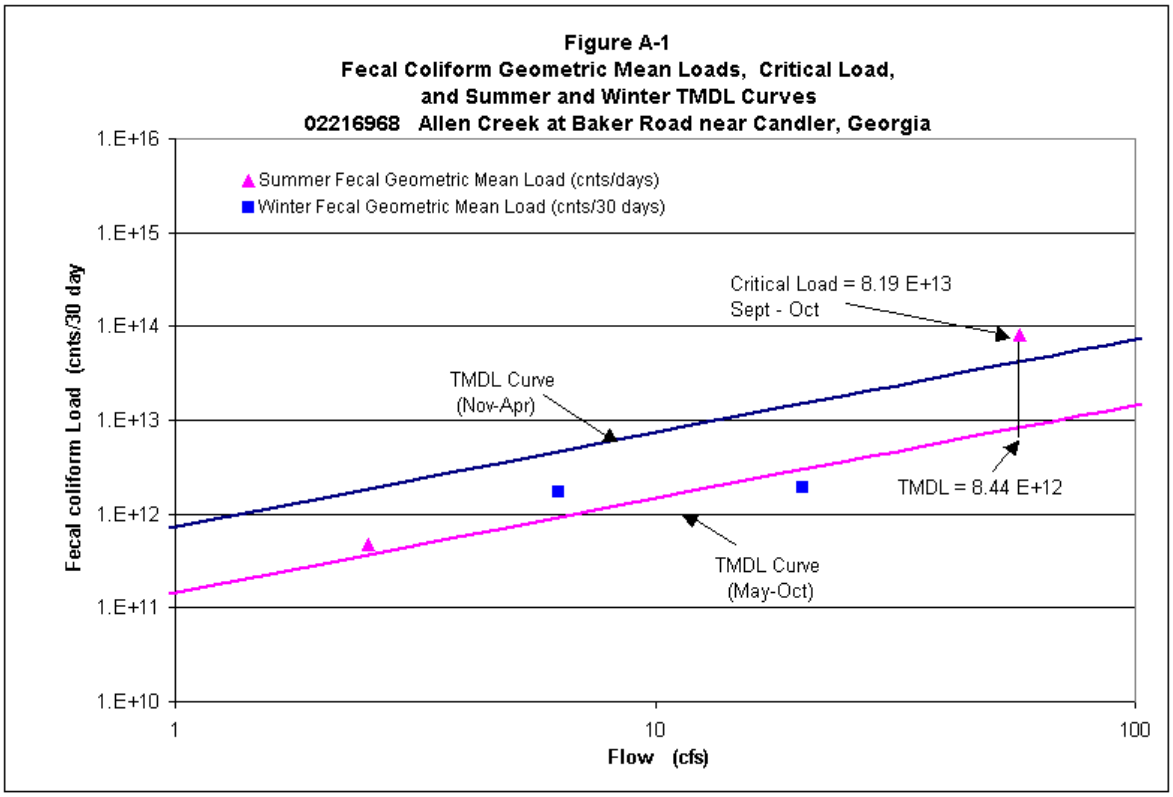


Table A-1. Data for Figure A-1

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
1-Apr-99	5400	57.0				
22-Apr-99	20	2.0				
27-Apr-99	20	2.0	129	20.3	1.93E+12	1.49E+13
18-May-99	70	2.0				
27-May-99	70	2.0				
17-Jun-99	3300	3.6	253	2.5	4.70E+11	3.72E+11
22-Sep-99	2400	2.0				
27-Sep-99	1300	206.0				
5-Oct-99	1300	2.0				
13-Oct-99	3500	20.0	1941	57.5	8.19E+13	8.44E+12
23-Nov-99	140	2.0				
1-Dec-99	130	2.0				
14-Dec-99	9200	20.0				
16-Dec-99	490	5.5				
20-Dec-99	80	2.0	366	6.3	1.69E+12	4.62E+12

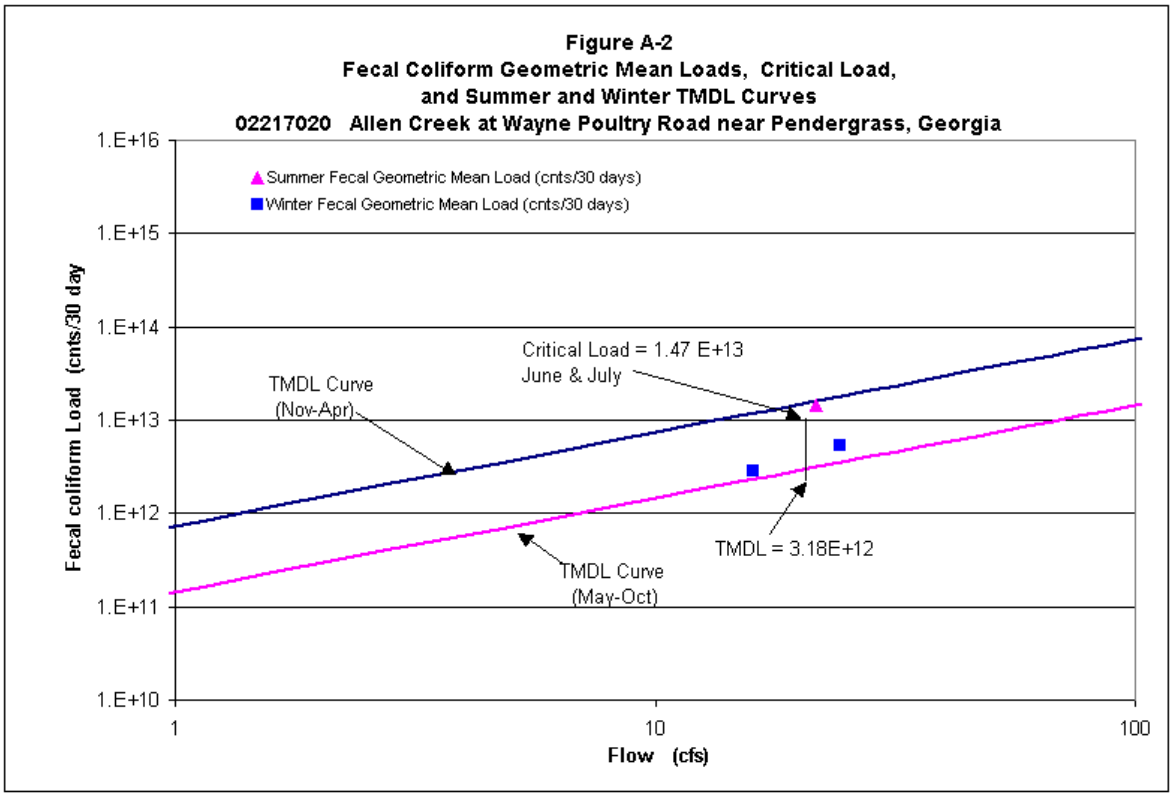


Table A-2. Data for Figure A-2

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
3-Feb-04	2400	27.0				
10-Feb-04	110	21.0				
17-Feb-04	130	27.0				
25-Feb-04	230	22.0	298	24.3	5.31E+12	1.78E+13
8-Mar-04	330	17.0				
16-Mar-04	170	16.0				
23-Mar-04	300	16.0				
5-Apr-04	210	15.0	244	16.0	2.86E+12	1.17E+13
22-Jun-04	1100	13.0				
28-Jun-04	2400	35.0				
13-Jul-04	300	17.0	925	21.7	1.47E+13	3.18E+12

Figure A-3
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
Apalachee River Headwaters to Apalachee Road (Gwinnett Co)Georgia

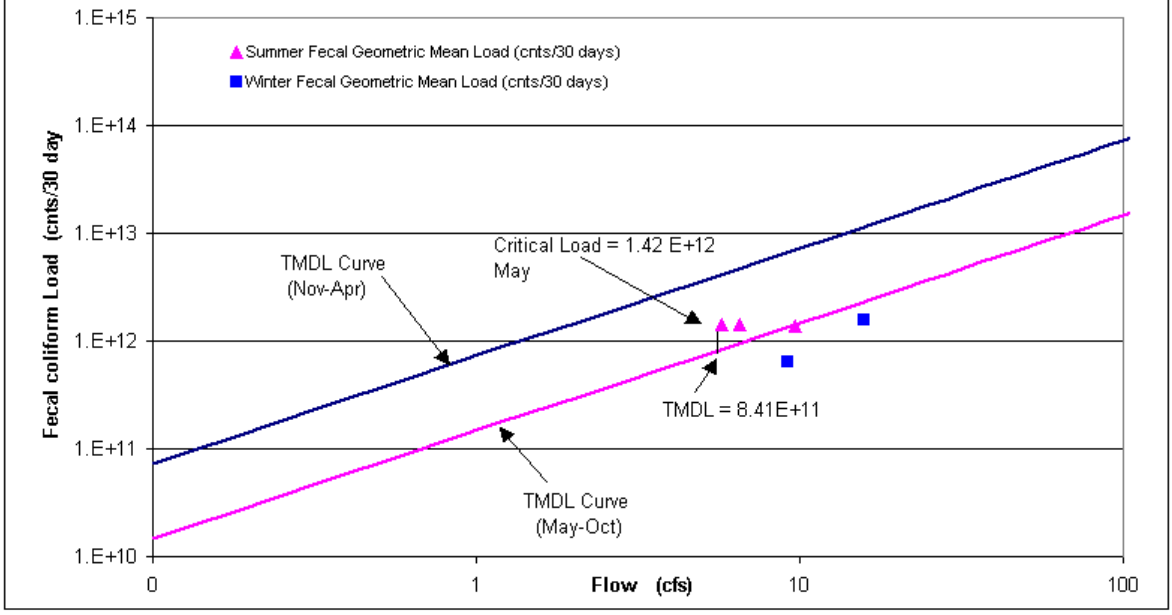


Table A-3. Data for Figure A-3

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
4-May-04	520	6				
11-May-04	400	4				
18-May-04	405	7				
25-May-04	152	5	336	5.7	1.42E+12	8.41E+11
5-Oct-04	2120	8				
12-Oct-04	173	6				
19-Oct-04	132	6				
26-Oct-04	164	6	299	6.5	1.43E+12	9.60E+11
4-Jan-05	47	10				
11-Jan-05	280	8				
18-Jan-05	105	9				
25-Jan-05	60	10	95	9.2	6.45E+11	6.76E+12
5-Apr-05	357	20				
12-Apr-05	100	17				
19-Apr-05	80	13				
28-Apr-05	113	13	134	15.8	1.56E+12	1.16E+13
10-May-15	115	8				
17-May-05	160	12				
24-May-05	225	8				
31-May-05	340	10	194	9.7	1.38E+12	1.42E+12

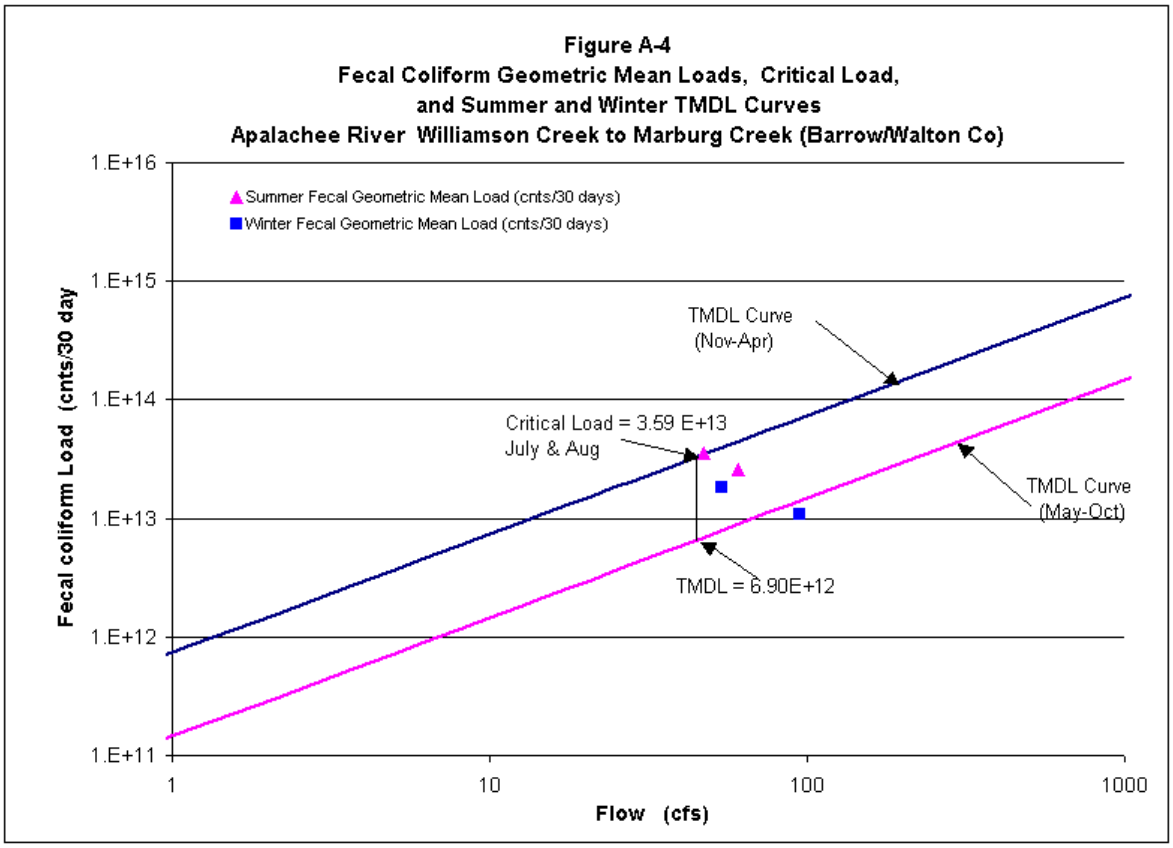


Table A-4. Data for Figure A-4

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
13-Jan-04	130	66.2				
20-Jan-04	270	61.1				
28-Jan-04	80	162.8				
2-Feb-04	216	87.5	157	94.4	1.09E+13	6.93E+13
13-Apr-04	1678	67.0				
19-Apr-04	309	52.8				
21-Apr-04	278	48.9				
28-Apr-04	309	46.9	459	53.9	1.82E+13	3.96E+13
20-Jul-04	340	41.8				
26-Jul-04	5000	54.8				
28-Jul-04	3000	54.8				
3-Aug-04	230	36.7	1041	47.0	3.59E+13	6.90E+12
18-Oct-04	220	49.7				
20-Oct-04	5000	82.4				
25-Oct-04	130	57.6				
27-Oct-04	800	54.4	582	61.0	2.60E+13	8.96E+12

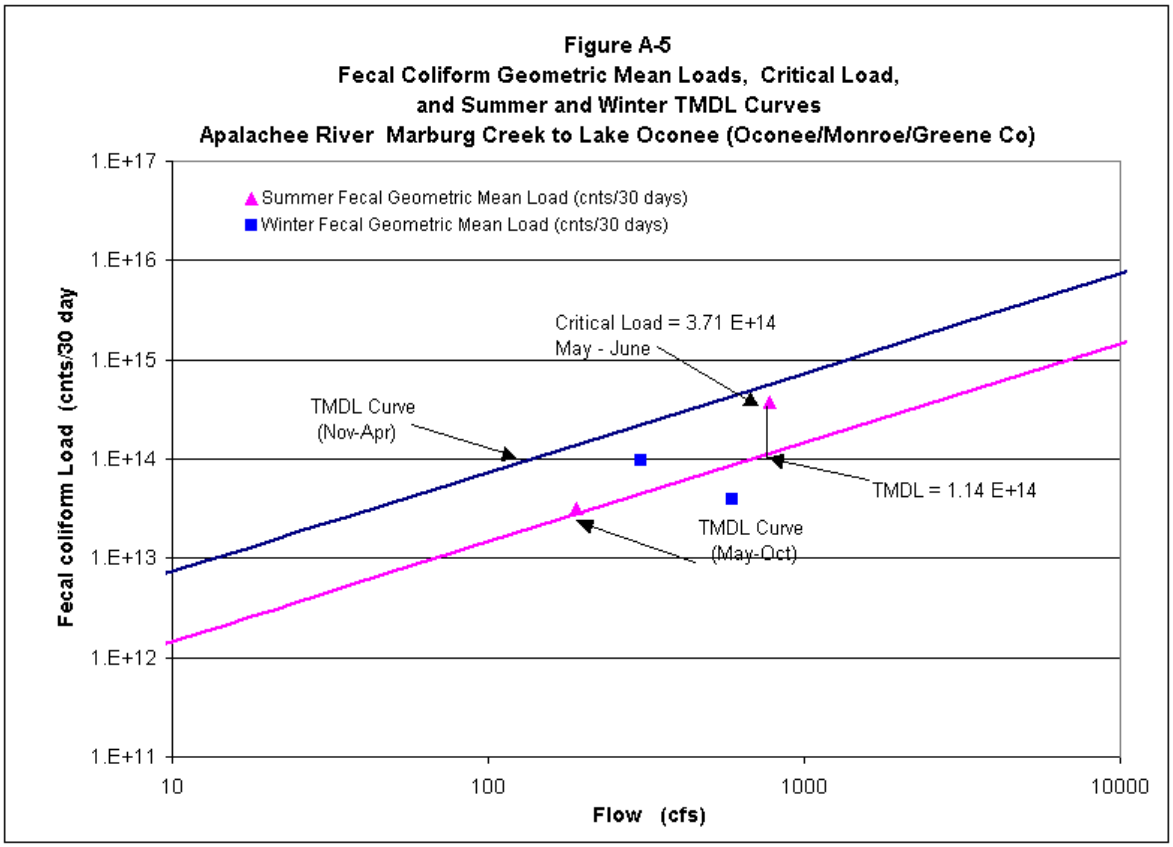


Table A-5. Data for Figure A-5

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
18-Feb-03	300	961				
25-Feb-03	90	551				
4-Mar-03	130	355				
11-Mar-03	20	502	92	592.3	3.98E+13	4.35E+14
22-May-03	16000	2063				
29-May-03	130	381				
4-Jun-03	500	333				
12-Jun-03	170	342	648	779.9	3.71E+14	1.14E+14
20-Aug-03	140	225				
27-Aug-03	130	195				
4-Sep-03	300	182				
9-Sep-03	500	157	229	189.7	3.18E+13	2.79E+13
5-Nov-03	110	190				
19-Nov-03	11000	581				
1-Dec-03	500	212				
3-Dec-03	60	238	436	305.5	9.79E+13	2.24E+14

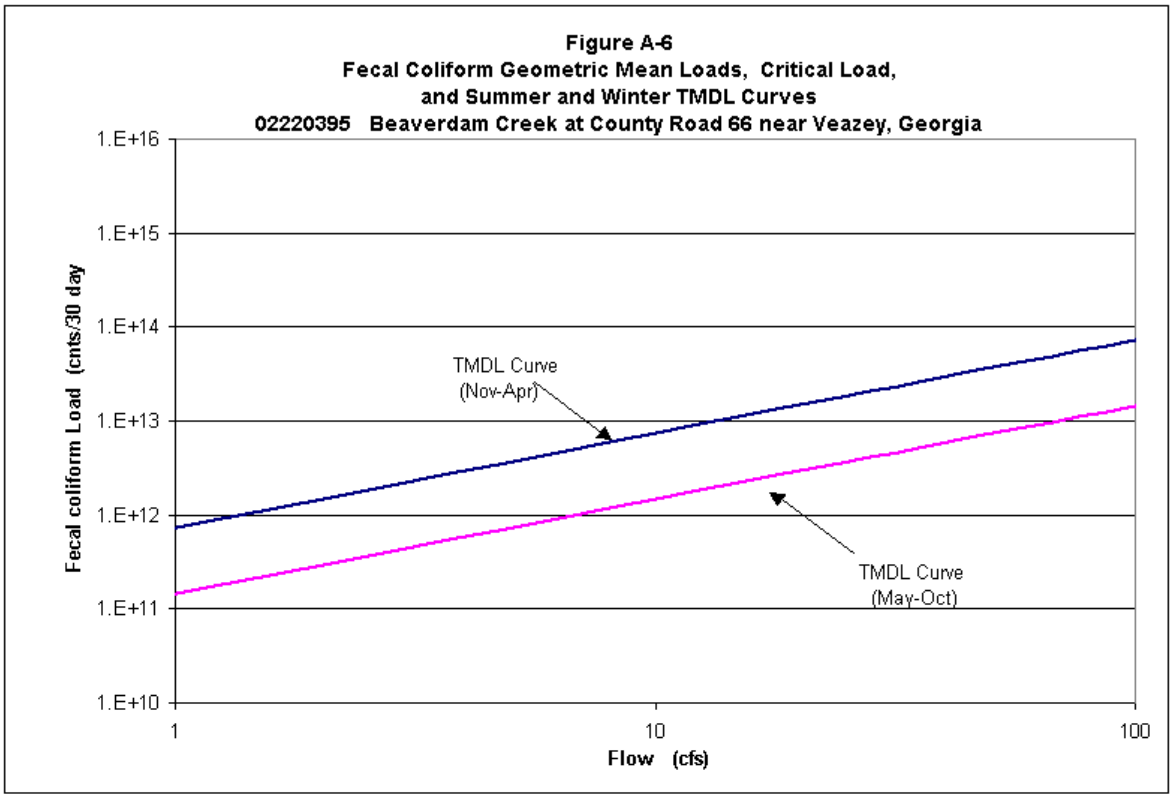


Table A-6. Data for Figure A-6

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
13-Apr-04	**16000**	**24.0**				
15-Apr-04	230	24.0				
27-Apr-04	800	17.0				
29-Apr-04	130	6.0	786.5	17.8	1.02E+13	1.30E+13
4-May-04	800	24.0				
11-May-04	500	7.4				
18-May-04	500	4.8				
25-May-04	270	3.1	482.1	9.8	3.48E+12	1.44E+12
3-Aug-04	170	2.5				
10-Aug-04	130	0.0				
17-Aug-04	170	3.1				
24-Aug-04	40	2.0	110.7	1.9	1.54E+11	2.79E+11
9-Nov-04	500	11.0				
16-Nov-04	1300	9.1				
30-Nov-04	500	11.0				
7-Dec-04	170	20.0	484.8	12.8	4.55E+12	9.38E+12

Figure A-7
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
Big Cedar Creek Hog Creek to Lake Sinclair

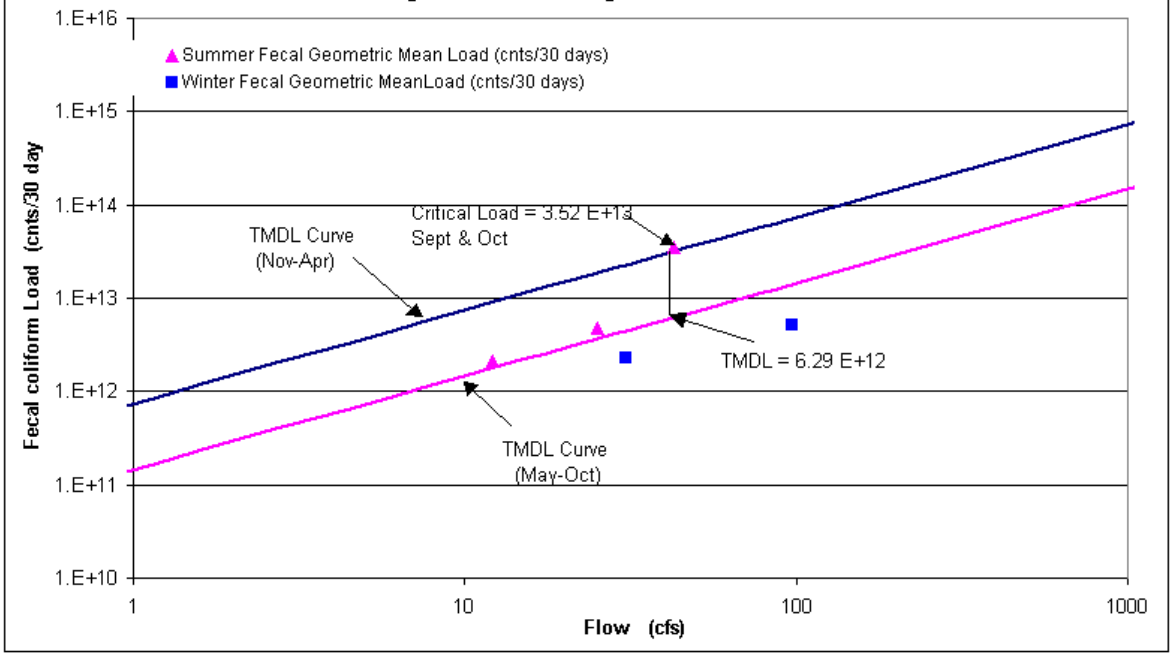


Table A-7. Data for Figure A-7

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
11-Sep-01	170	29				
19-Sep-01	300	16				
25-Sep-01	110	40				
3-Oct-01	800	16	259	25.2	4.78E+12	3.69E+12
5-Dec-01	80	25				
12-Dec-01	300	42				
17-Dec-01	110	30				
2-Jan-02	40	26	101	30.6	2.28E+12	2.25E+13
7-Mar-02	40	129				
12-Mar-02	110	86				
18-Mar-02	80	86				
25-Mar-02	70	90	70	97.7	5.05E+12	7.17E+13
6-Jun-02	300	15				
12-Jun-02	220	11				
24-Jun-02	170	8				
1-Jul-02	300	14	241	12.1	2.14E+12	1.78E+12
23-Sep-02	500	18				
30-Sep-02	800	23				
7-Oct-02	3000	14				
17-Oct-02	1300	116	1118	42.9	3.52E+13	6.29E+12

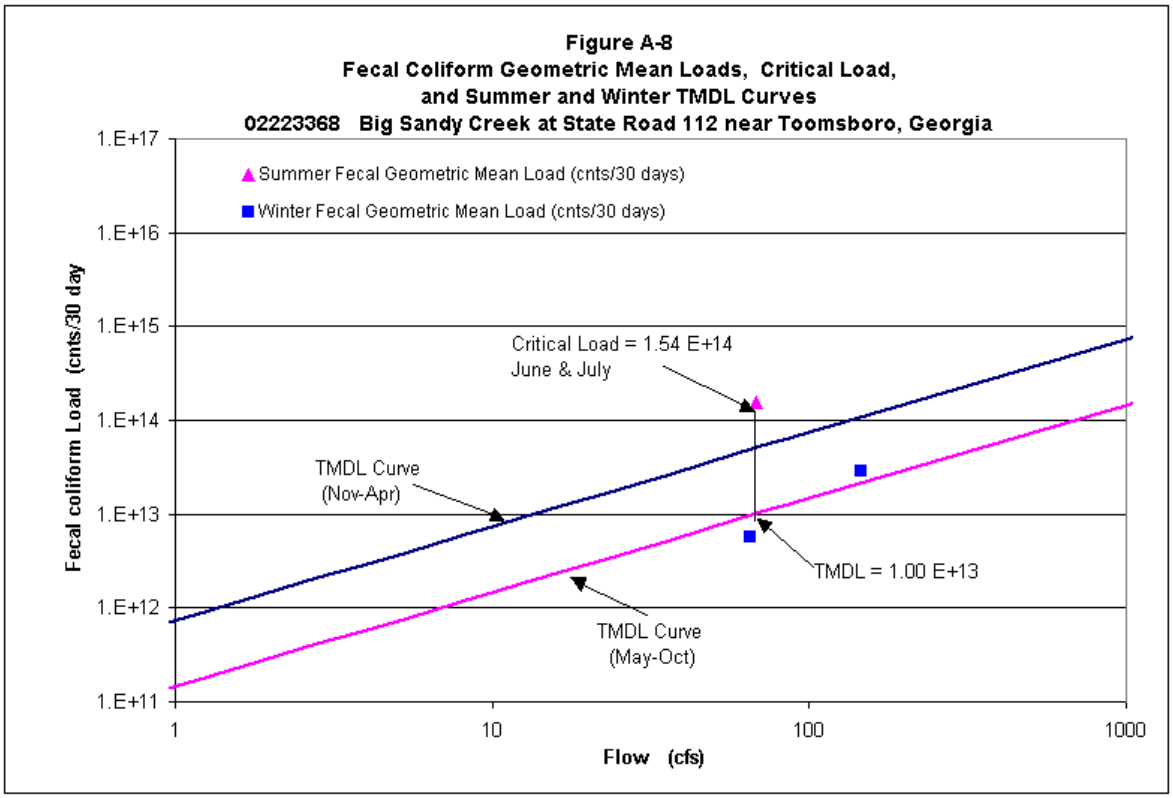


Table A-8. Data for Figure A-8

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
5-Feb-04	700	92.9				
12-Feb-04	1100	238.9				
18-Feb-04	80	148.2				
24-Feb-04	80	105.0	265	146.3	2.84E+13	1.07E+14
10-Mar-04	80	81.1				
17-Mar-04	80	68.2				
24-Mar-04	170	50.0				
7-Apr-04	170	62.6	117	65.5	5.61E+12	4.81E+13
24-Jun-04	2400	47.4				
29-Jun-04	5000	120.9				
15-Jul-04	2400	36.4	3065	68.2	1.54E+14	1.00E+13

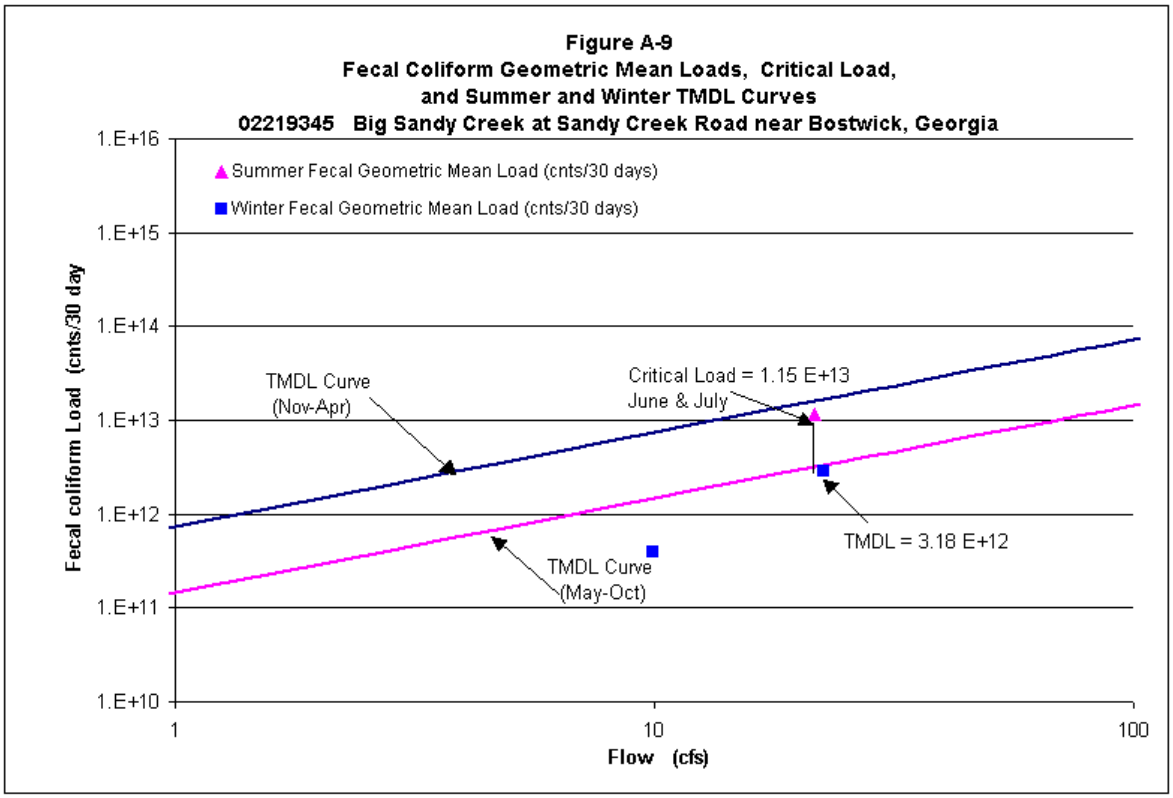


Table A-9. Data for Figure A-9

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
5-Feb-04	90	11.0				
12-Feb-04	2400	43.0				
18-Feb-04	80	22.0				
24-Feb-04	50	14.0	171	22.5	2.83E+12	1.65E+13
10-Mar-04	140	8.4				
17-Mar-04	80	11.0				
24-Mar-04	40	12.0				
7-Apr-04	20	8.4	55	10.0	4.00E+11	7.30E+12
24-Jun-04	170	20.0				
29-Jun-04	800	28.0				
15-Jul-04	2800	17.0	725	21.7	1.15E+13	3.18E+12

Figure A-10
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
02223368 Big Sandy Creek at State Road 112 near Toomsboro, Georgia

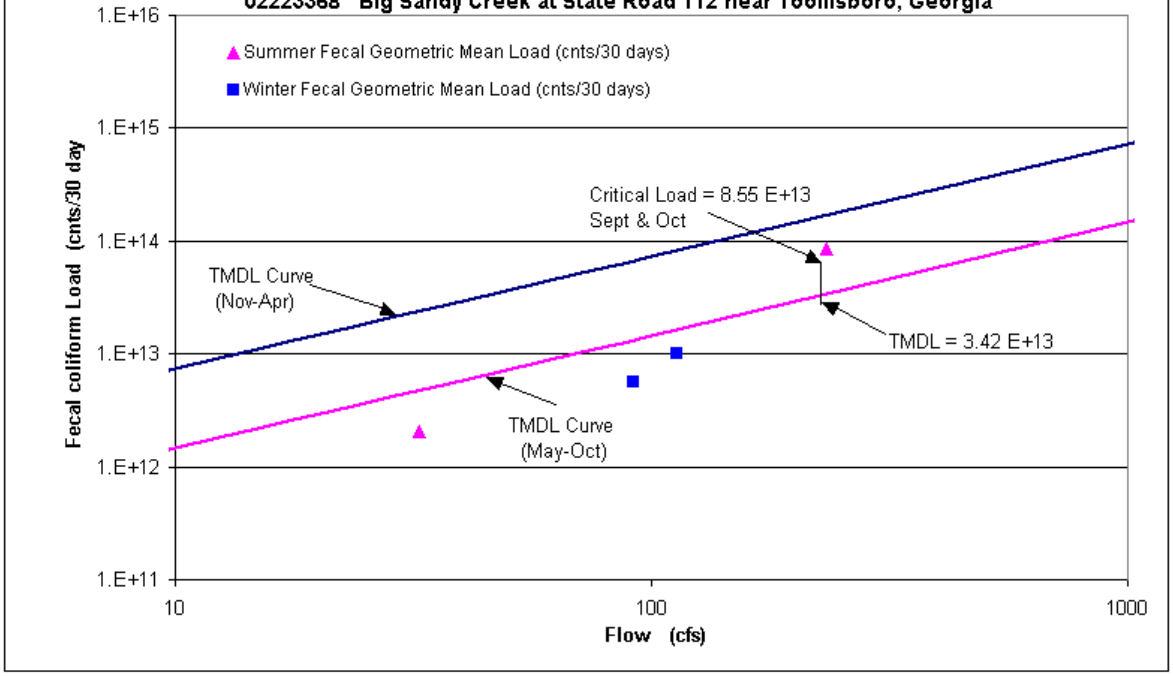


Table A-10. Data for Figure A-10

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
1-Apr-04	130	121.0				
6-Apr-04	40	80.0				
15-Apr-04	110	98.0				
29-Apr-04	90	67.0	85	91.5	5.69E+12	6.72E+13
22-Jul-04	130	53.0				
29-Jul-04	70	17.0				
11-Aug-04	80	15.0				
18-Aug-04	80	45.0	87	32.5	2.08E+12	4.77E+12
28-Sep-04	9000	400.0				
6-Oct-04	210	278.0				
13-Oct-04	110	132.0				
27-Oct-04	300	122.0	500	233.0	8.55E+13	3.42E+13
9-Nov-04	140	98.0				
16-Nov-04	110	118.0				
22-Nov-04	130	101.0				
6-Dec-04	110	134.0	122	112.8	1.01E+13	8.28E+13

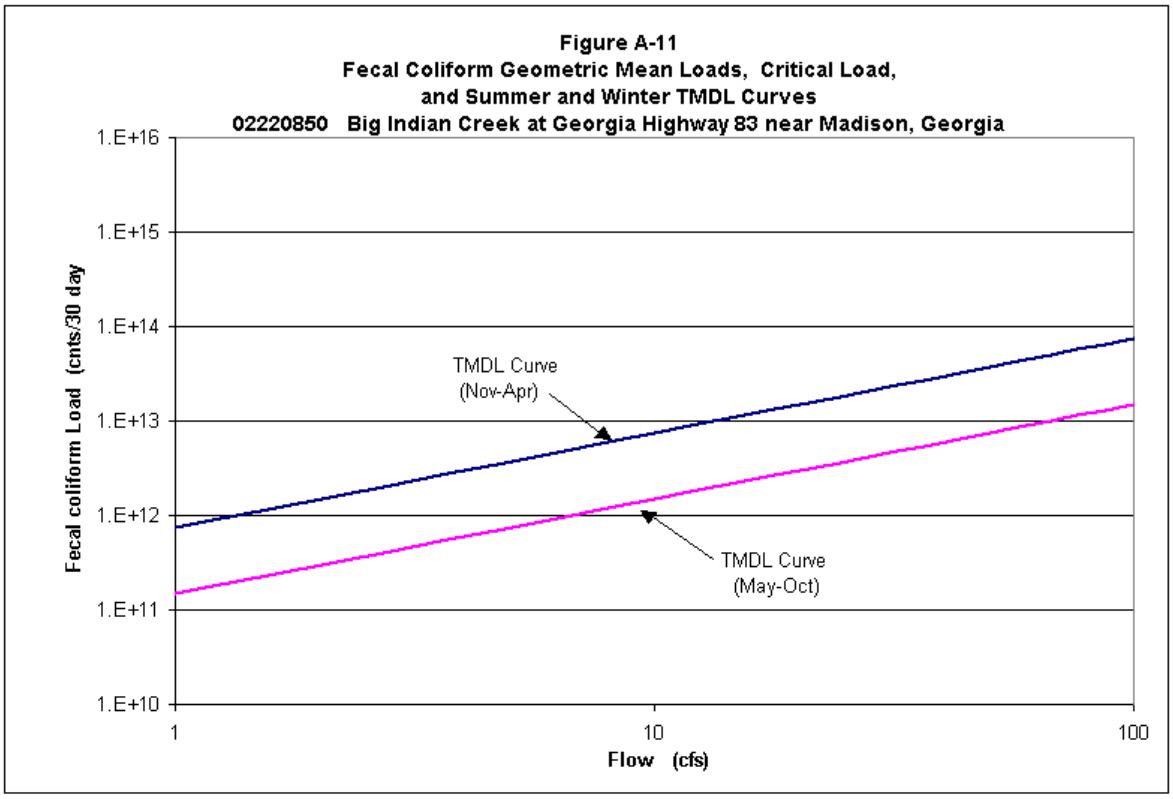


Table A-11. Data for Figure A-11

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
5-Jan-99	9200	16.0				
19-Jan-99	20	11.0				
25-Jan-99	**24000**	**30.0**				
2-Feb-99	2200	235.0	1765.5	73.0	9.46E+13	5.36E+13
26-May-99	80	4.2				
9-Jun-99	220	3.0				
15-Jun-99	330	5.0				
21-Jun-99	40	4.4	123.5	4.2	3.76E+11	6.09E+11
28-Jul-99	130	2.6				
11-Aug-99	490	2.3				
18-Aug-99	40	2.8				
25-Aug-99	330	19.0	170.3	6.7	8.34E+11	9.80E+11
29-Nov-99	20	6.8				
13-Dec-99	20	3.6				
15-Dec-99	230	12.0				
20-Dec-99	80	8.2	52.1	7.7	2.92E+11	5.62E+12

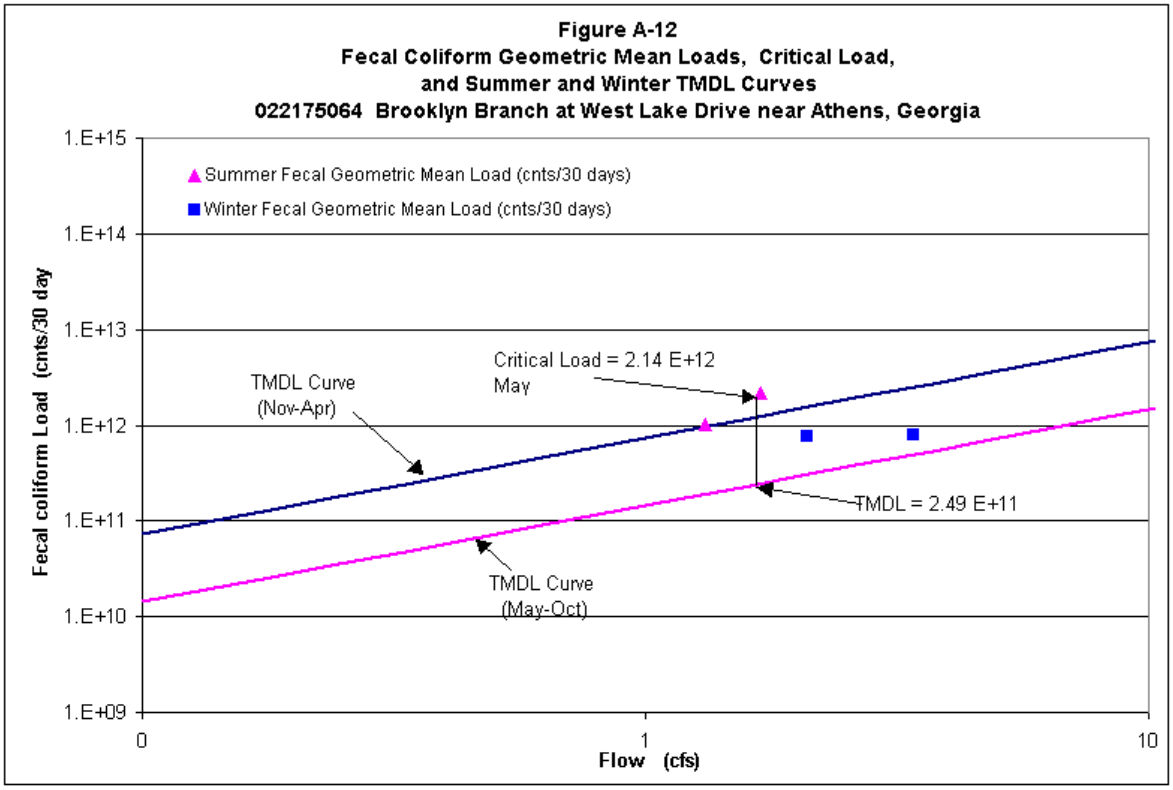


Table A-12. Data for Figure A-12

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
11-Mar-04	500	2.4				
18-Mar-04	500	2.3				
25-Mar-04	500	2.0				
8-Apr-04	500	1.6	500	2.1	7.71E+11	1.54E+12
5-May-04	800	1.7				
10-May-04	5000	1.3				
17-May-04	1700	2.0				
24-May-04	1300	1.7	1724	1.7	2.14E+12	2.49E+11
2-Aug-04	3000	1.7				
9-Aug-04	500	1.1				
16-Aug-04	1700	1.6				
26-Aug-04	500	0.8	1063	1.3	1.02E+12	1.93E+11
8-Nov-04	90	2.5				
15-Nov-04	270	2.6				
29-Nov-04	170	4.6				
6-Dec-04	2400	3.9	316	3.4	7.88E+11	2.50E+12

Figure A-13
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
02223065 Bluff Creek at Georgia Highway 272 near Oconee, Georgia

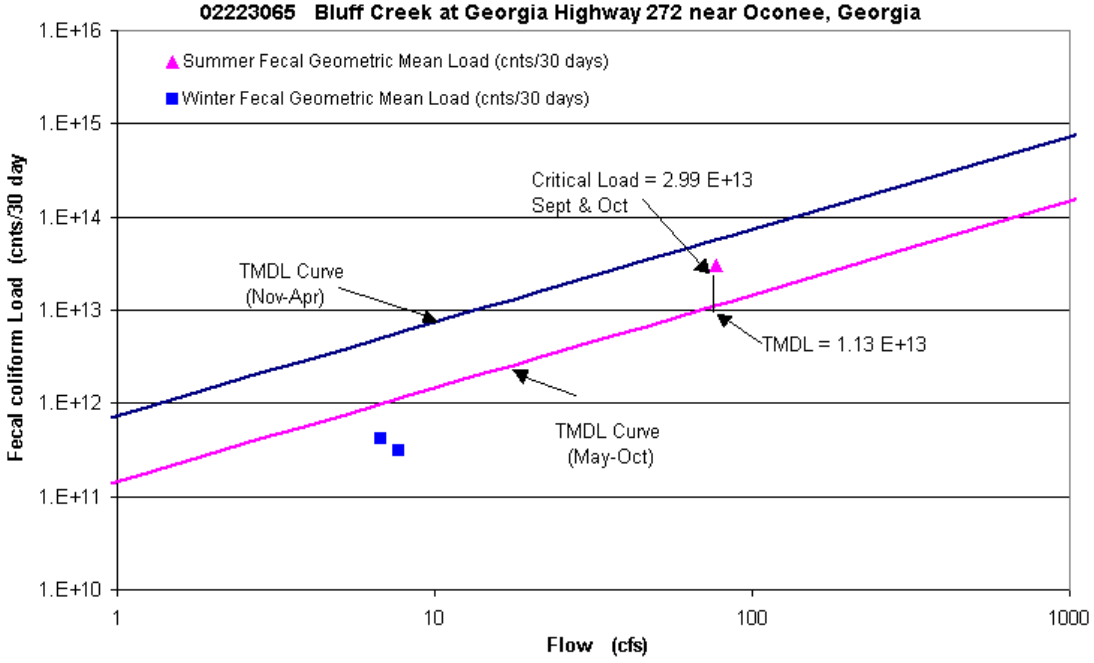


Table A-13. Data for Figure A-13

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
1-Apr-04	800	9				
6-Apr-04	80	7				
15-Apr-04	20	7				
29-Apr-04	40	5	85	6.8	4.20E+11	4.97E+12
28-Sep-04	1400	218				
6-Oct-04	210	7				
13-Oct-04	500	6	528	77.2	2.99E+13	1.13E+13
9-Nov-04	300	6				
16-Nov-04	80	8				
22-Nov-04	20	7				
6-Dec-04	20	10	56	7.7	3.16E+11	5.67E+12

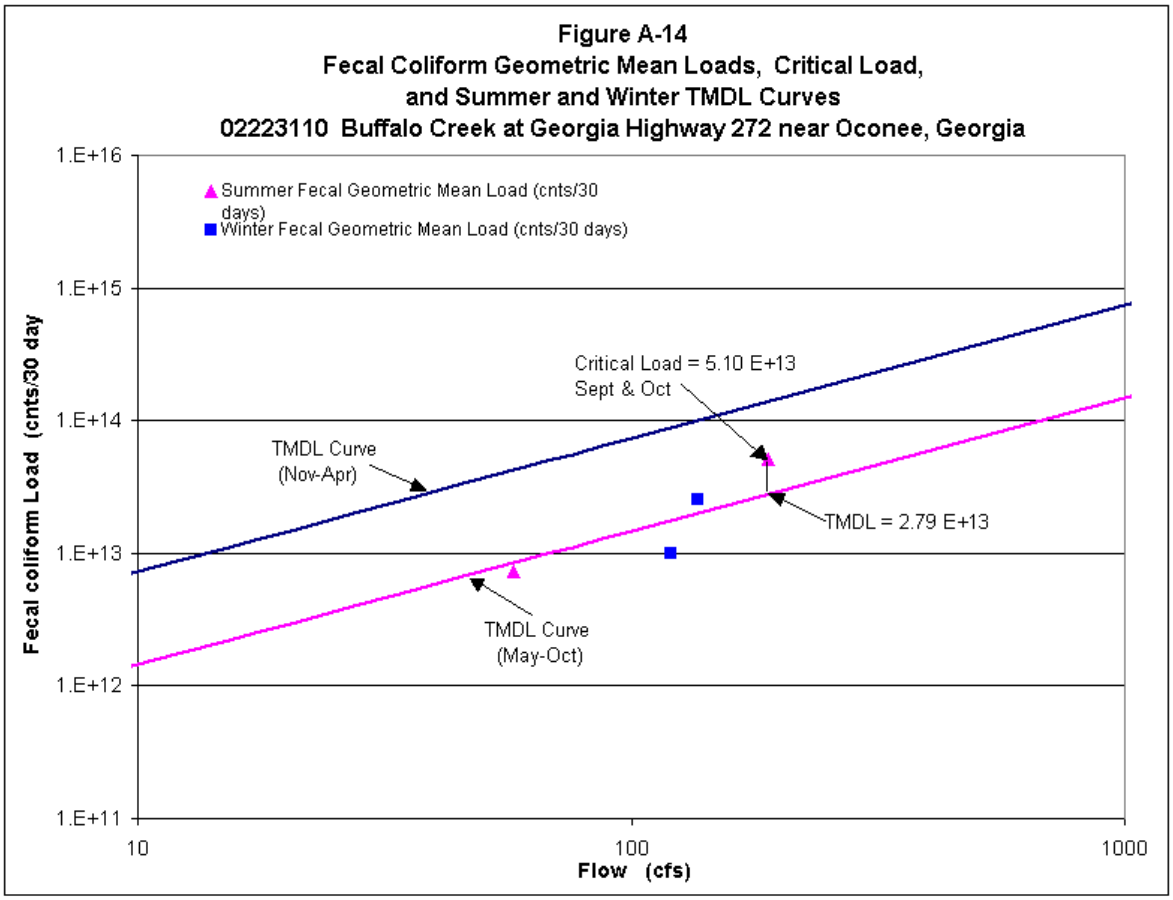


Table A-14. Data for Figure A-14

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
1-Apr-04	130	149.0				
6-Apr-04	140	126.0				
15-Apr-04	80	119.0				
29-Apr-04	110	88.0	112	120.5	9.95E+12	8.84E+13
22-Jul-04	70	54.0				
29-Jul-04	20	54.0				
11-Aug-04	800	54.0				
18-Aug-04	800	69.0	173	57.8	7.33E+12	8.48E+12
28-Sep-04	3000	346.0				
6-Oct-04	260	172.0				
13-Oct-04	210	119.0				
27-Oct-04	110	122.0	366	189.8	5.10E+13	2.79E+13
9-Nov-04	300	112.0				
16-Nov-04	500	150.0				
22-Nov-04	210	102.0				
6-Dec-04	130	183.0	253	136.8	2.54E+13	1.00E+14

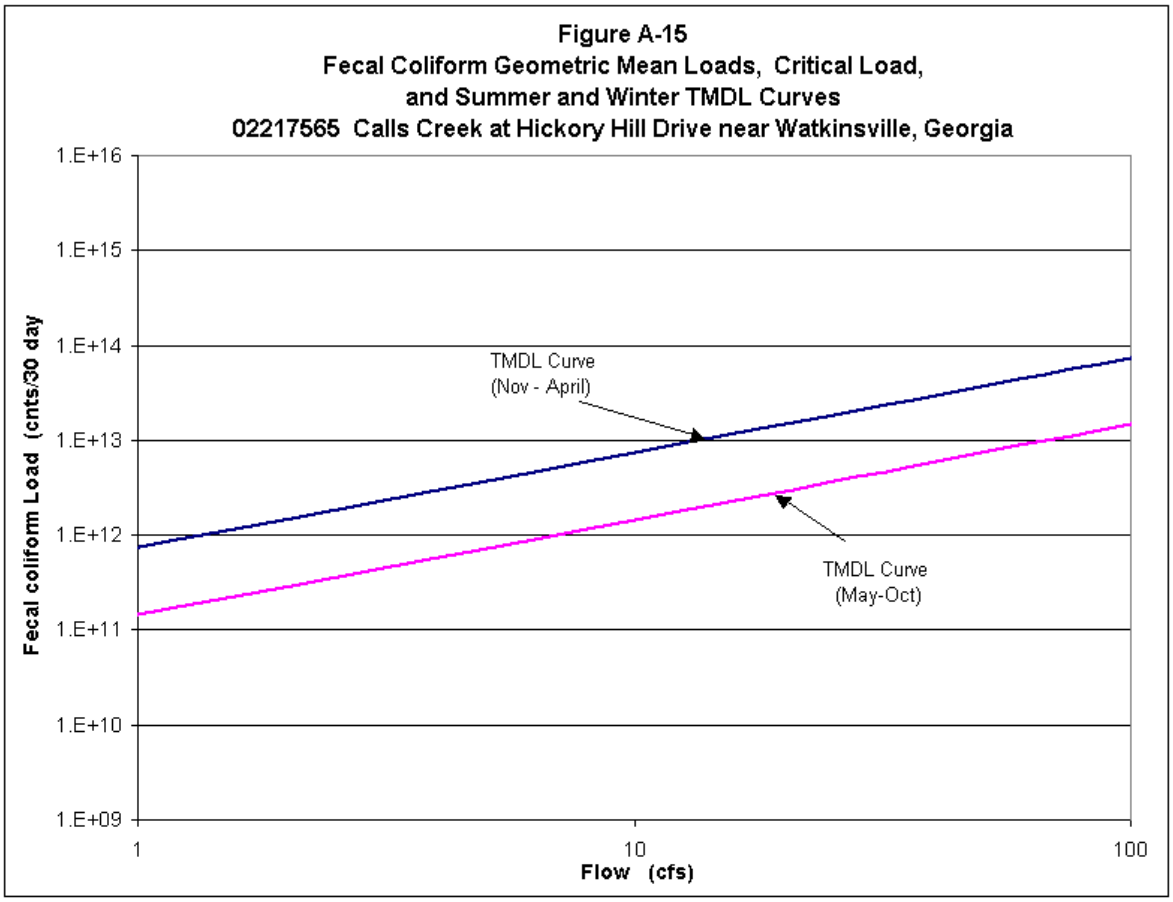


Table A-15. Data for Figure A-15

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
5-Feb-04	130	7.7				
12-Feb-04	**9000**	**16.0**				
18-Feb-04	110	16.0				
24-Feb-04	1700	13.0	683.9	13.2	6.61E+12	9.67E+12
9-Mar-04	700	11.0				
15-Mar-04	170	11.0				
25-Mar-04	800	11.0				
6-Apr-04	130	9.7	333.5	10.7	2.61E+12	7.84E+12
24-Jun-04	700	7.7				
30-Jun-04	300	10.0				
15-Jul-04	300	3.8	397.9	7.2	2.09E+12	1.05E+12

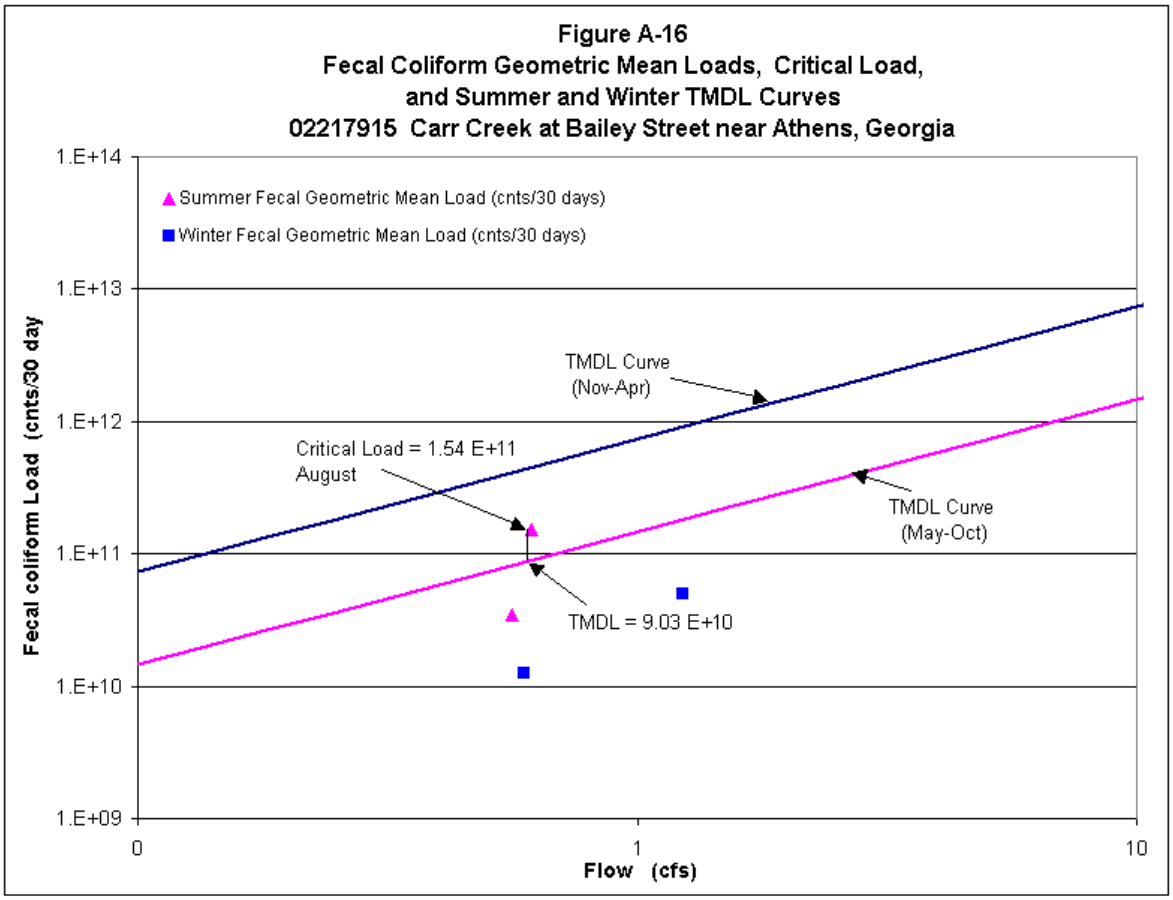


Table A-16. Data for Figure A-16

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
11-Mar-04	20	0.5				
18-Mar-04	90	0.7				
23-Mar-04	20	0.8				
8-Apr-04	20	0.5	29	0.6	1.27E+10	4.35E+11
5-May-04	80	1.1				
10-May-04	20	0.4				
18-May-04	230	0.4				
24-May-04	130	0.4	83	0.6	3.43E+10	8.26E+10
2-Aug-04	16000	1.8				
10-Aug-04	140	0.0				
16-Aug-04	20	0.3				
25-Aug-04	300	0.3	340	0.6	1.54E+11	9.03E+10
8-Nov-04	130	0.5				
15-Nov-04	90	0.9				
29-Nov-04	20	1.8				
6-Dec-04	40	1.8	55	1.2	5.02E+10	9.08E+11

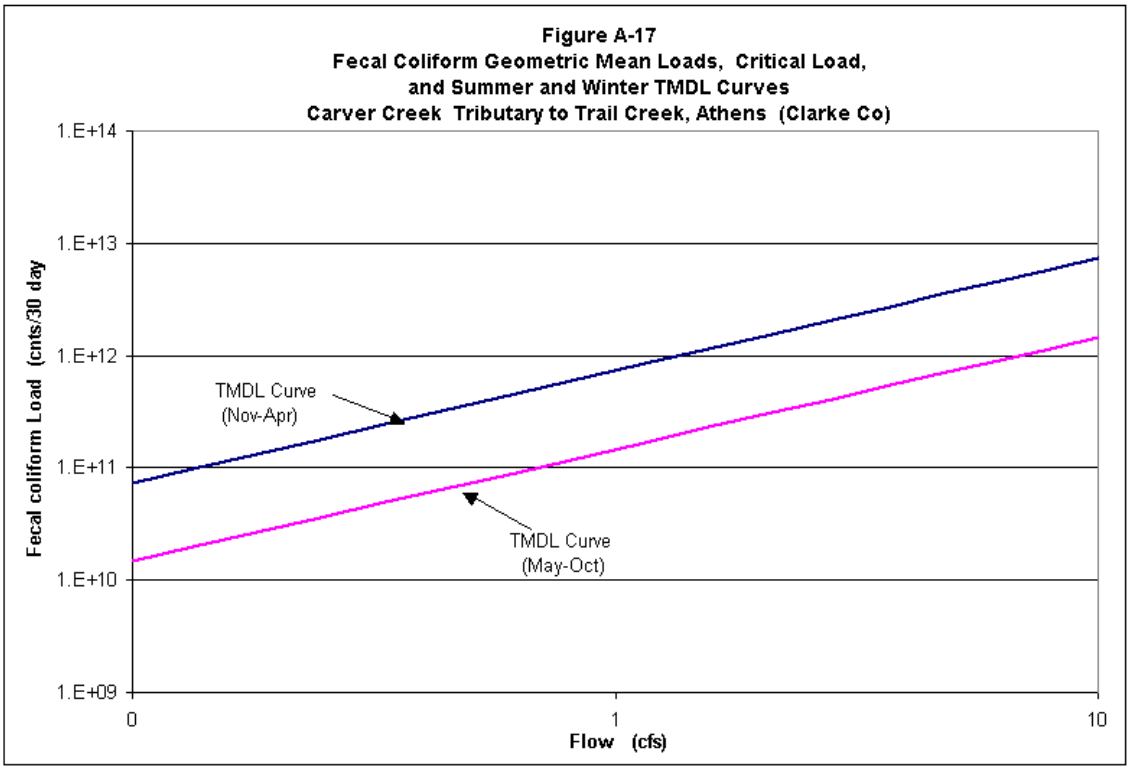


Table A-17. Data for Figure A-17

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
5-Aug-94	175	2.3				
12-Sep-94	120	1.5				
4-Oct-94	720	3.4				
14-Mar-95	10	3.3				
4-Apr-95	200	2.1				
1-May-95	600	1.5				
5-Jun-95	**3600**	**1.5**				
10-Jul-95	229	1.0				

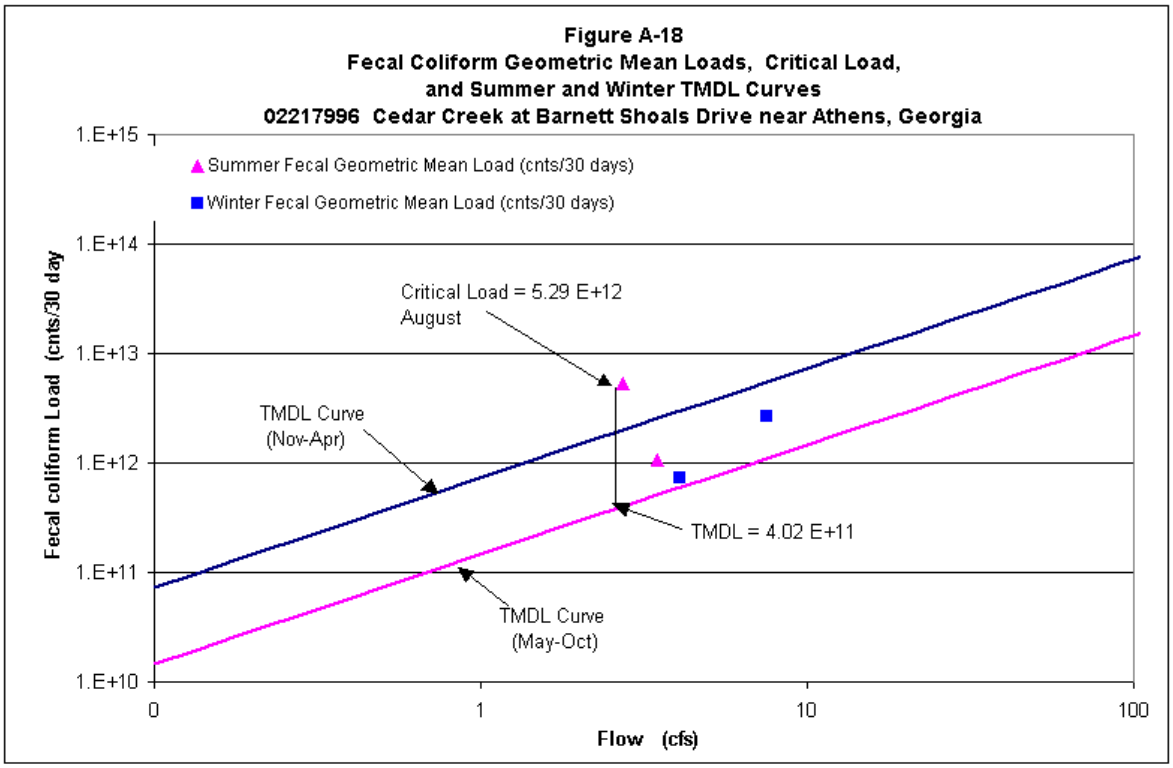


Table A-18. Data for Figure A-18

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
11-Mar-04	110	4.9				
18-Mar-04	800	4.7				
24-Mar-04	130	3.4				
8-Apr-04	300	3.3	242	4.1	7.27E+11	3.00E+12
4-May-04	500	3.9				
11-May-04	500	2.6				
18-May-04	230	4.5				
25-May-04	500	2.9	412	3.5	1.05E+12	5.10E+11
2-Aug-04	16000	3.4				
9-Aug-04	16000	2.2				
16-Aug-04	170	3.3				
25-Aug-04	1100	2.0	2630	2.7	5.29E+12	4.02E+11
15-Nov-04	230	5.3				
29-Nov-04	230	9.4				
6-Dec-04	2200	7.9	488	7.5	2.69E+12	5.52E+12

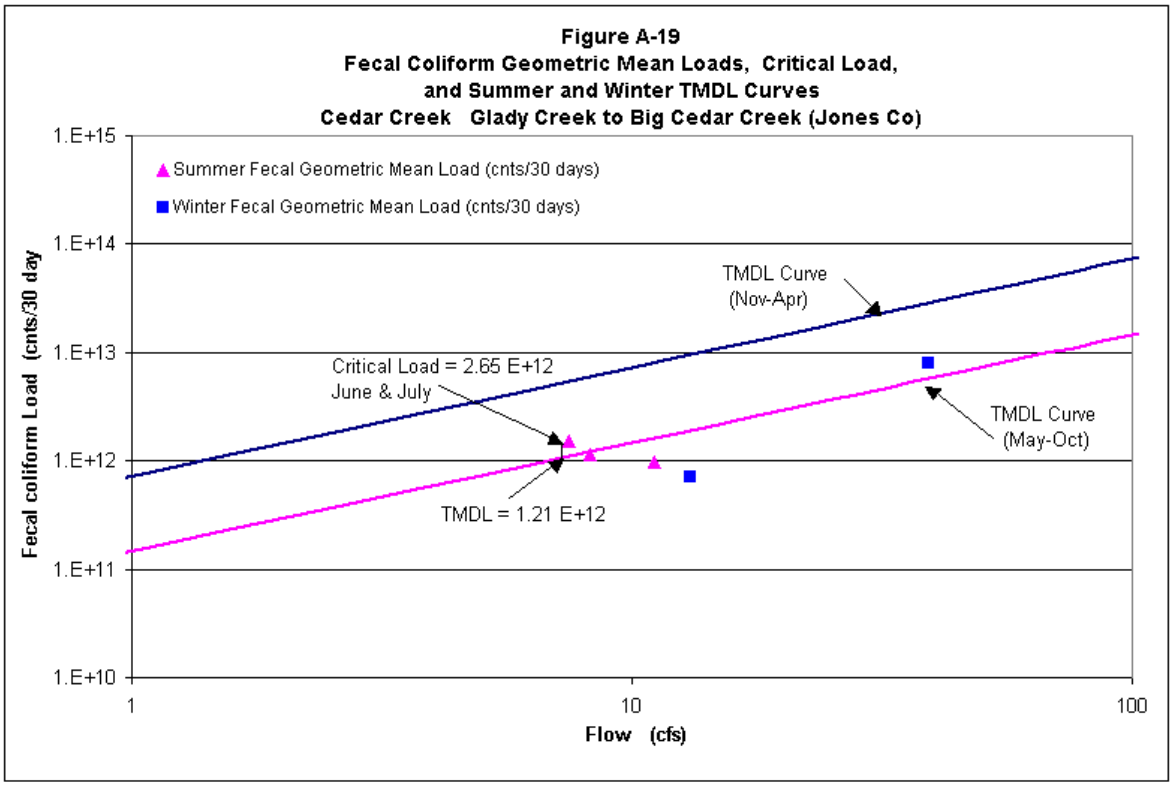


Table A-19. Data for Figure A-19

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
11-Sep-01	130	13.9				
19-Sep-01	230	7.3				
25-Sep-01	170	16.0				
3-Oct-01	40	7.3	119	11.1	9.74E+11	1.63E+12
5-Dec-01	170	10.8				
12-Dec-01	110	17.7				
17-Dec-01	80	12.5				
2-Jan-02	20	11.5	74	13.1	7.12E+11	9.63E+12
7-Mar-02	300	49.7				
12-Mar-02	500	35.4				
18-Mar-02	130	34.0				
25-Mar-02	300	37.9	277	39.3	7.97E+12	2.88E+13
6-Jun-02	80	8.7				
12-Jun-02	300	5.9				
24-Jun-02	500	5.6				
1-Jul-02	500	9.7	278	7.5	1.53E+12	1.10E+12
23-Sep-02	80	3.8				
30-Sep-02	130	5.2				
7-Oct-02	500	2.7				
17-Oct-02	230	21.2	186	8.2	1.12E+12	1.21E+12

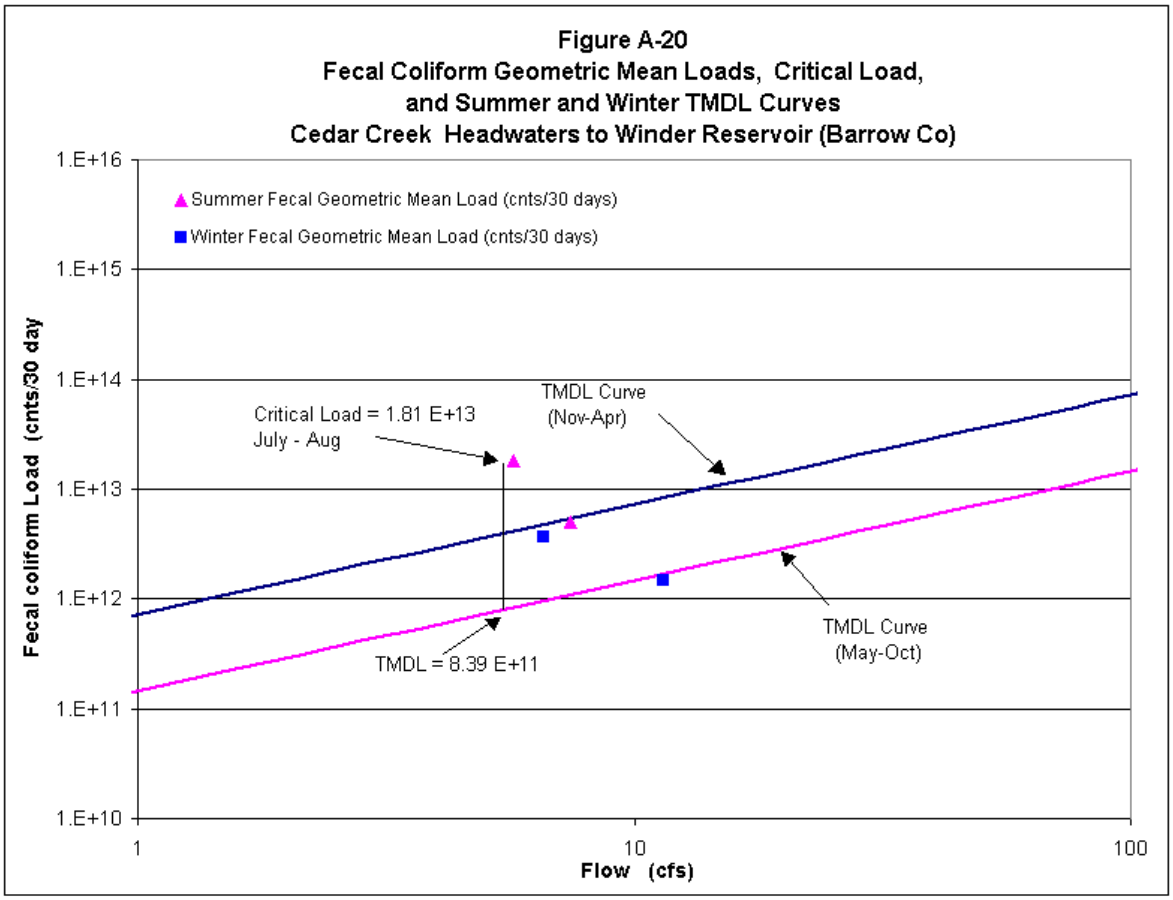


Table A-20. Data for Figure A-20

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
13-Jan-04	170	8.1				
20-Jan-04	110	7.4				
28-Jan-04	230	19.8				
2-Feb-04	220	10.6	175	11.5	1.48E+12	8.43E+12
13-Apr-04	16000	8.2				
19-Apr-04	500	6.4				
21-Apr-04	140	5.9				
28-Apr-04	300	5.7	761	6.6	3.66E+12	4.81E+12
20-Jul-04	3000	5.1				
26-Jul-04	9000	6.7				
28-Jul-04	16000	6.7				
3-Aug-04	800	4.5	4312	5.7	1.81E+13	8.39E+11
18-Oct-04	340	6.0				
20-Oct-04	1700	10.0				
25-Oct-04	500	7.0				
27-Oct-04	2400	6.6	913	7.4	4.97E+12	1.09E+12

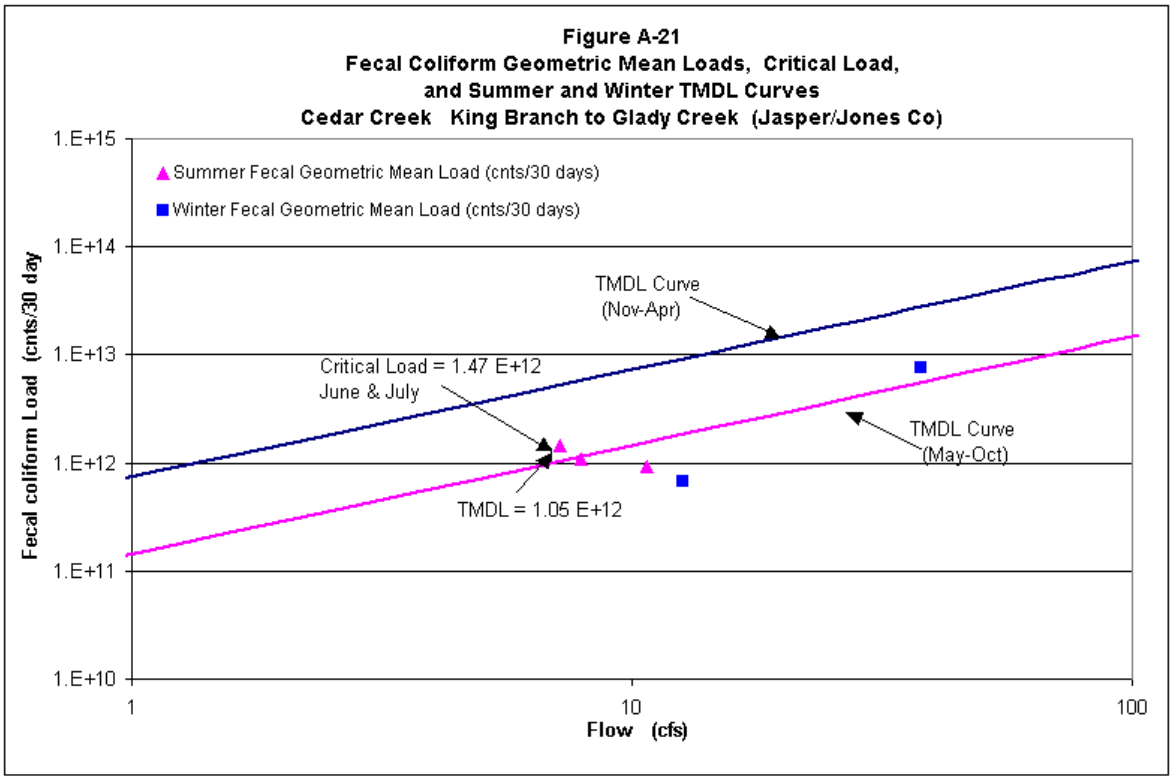


Table A-21. Data for Figure A-21

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
11-Sep-01	130	13.4				
19-Sep-01	230	7.0				
25-Sep-01	170	15.4				
3-Oct-01	40	7.0	119	10.7	9.36E+11	1.57E+12
5-Dec-01	170	10.3				
12-Dec-01	110	17.0				
17-Dec-01	80	12.0				
2-Jan-02	20	11.0	74	12.6	6.84E+11	9.25E+12
7-Mar-02	300	47.7				
12-Mar-02	500	34.0				
18-Mar-02	130	32.7				
25-Mar-02	300	36.4	277	37.7	7.66E+12	2.77E+13
6-Jun-02	80	8.3				
12-Jun-02	300	5.7				
24-Jun-02	500	5.3				
1-Jul-02	500	9.3	278	7.2	1.47E+12	1.05E+12
23-Sep-02	80	3.7				
30-Sep-02	130	5.0				
7-Oct-02	500	2.6				
17-Oct-02	230	20.4	186	7.9	1.08E+12	1.16E+12

Figure A-22
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
02217598 Chandler Creek at Deadwyler Road near Maysville, Georgia

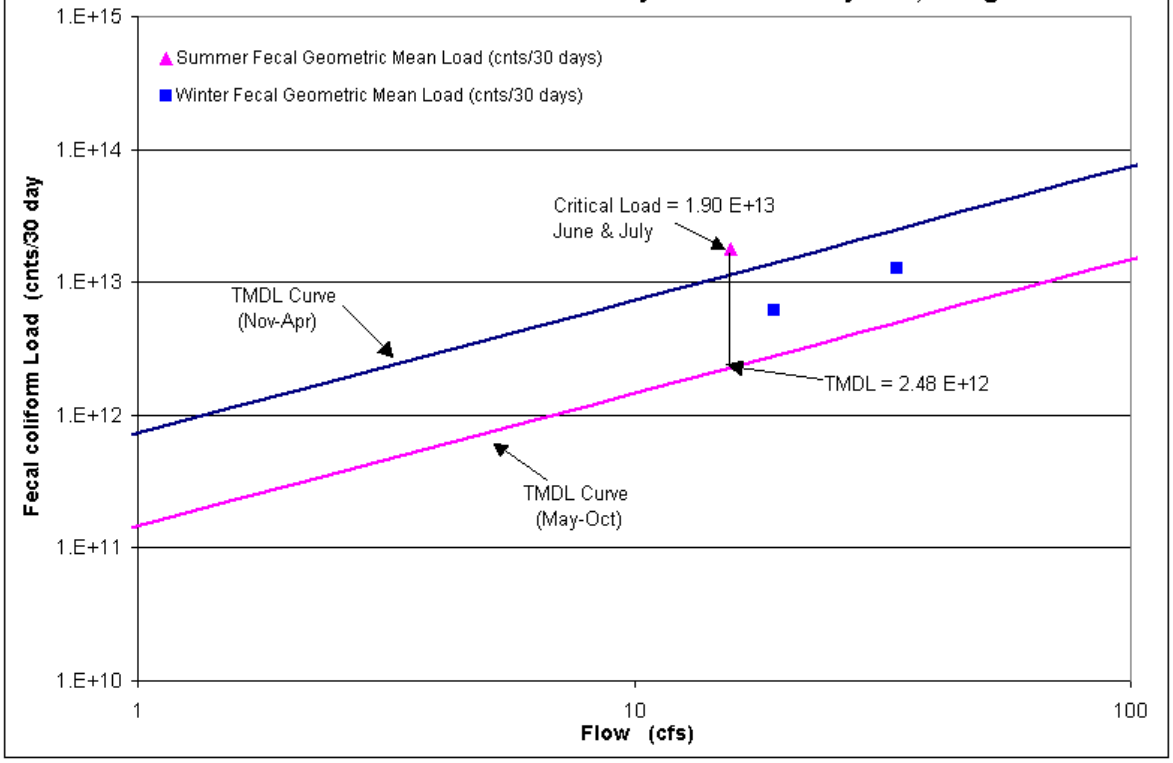


Table A-22. Data for Figure A-22

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
4-Feb-04	1100	28.0				
11-Feb-04	500	30.0				
17-Feb-04	110	50.1				
25-Feb-04	1100	27.4	508	33.9	1.26E+13	2.49E+13
10-Mar-04	490	22.0				
17-Mar-04	5000	18.5				
22-Mar-04	220	18.9				
7-Apr-04	70	17.0	441	19.1	6.17E+12	1.40E+13
23-Jun-04	2400	11.1				
28-Jun-04	3000	27.3				
14-Jul-04	500	8.5	1533	15.6	1.76E+13	2.30E+12

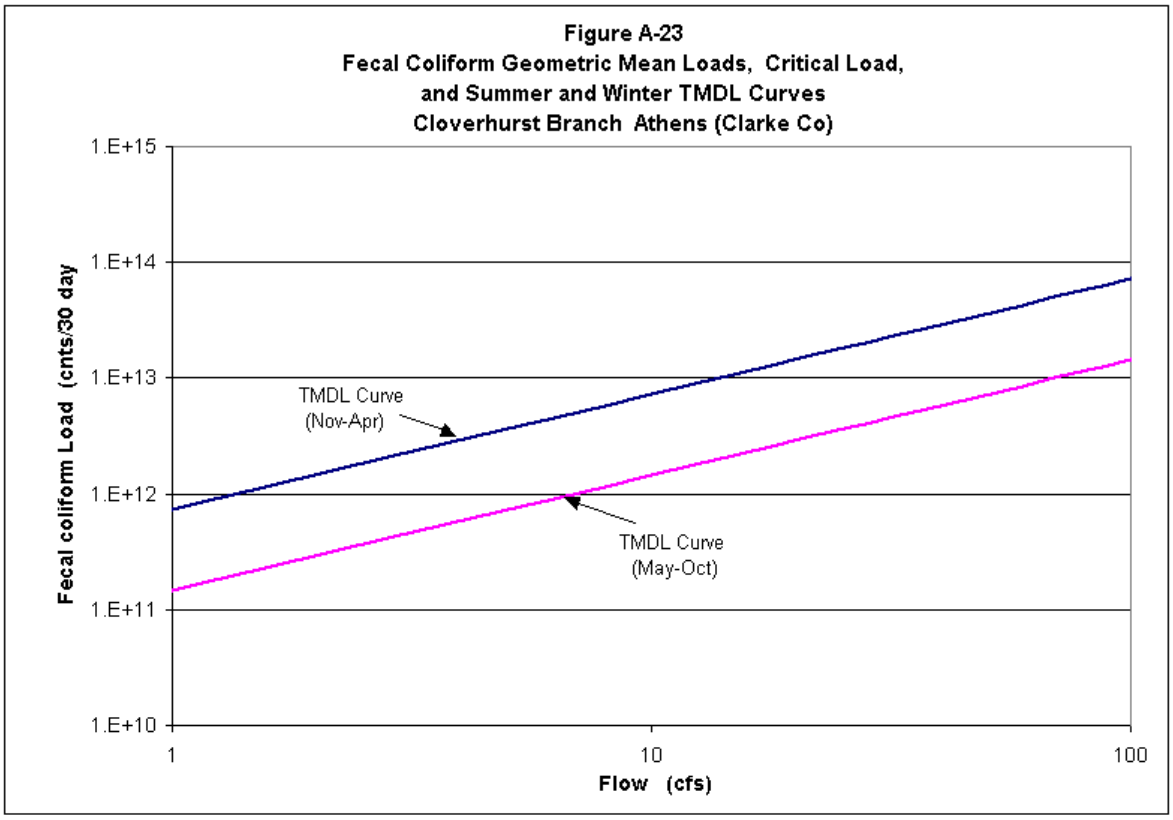


Table A-43. Data for Figure A-23

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
22-Feb-94	3000	0.5				
23-Feb-94	3900	0.5				
24-Feb-94	1400	0.7				
25-Feb-94	650	0.6				
26-Feb-94	440	0.5				
27-Feb-94	420	0.4	640.4	0.6	2.62E+11	4.09E+11
8-Aug-94	725	0.5				
28-Sep-94	360	0.5				
24-Oct-94	300	0.7				
14-Nov-94	946	0.5				
20-Mar-95	40	0.8				
10-Apr-95	**5400**	**0.5**				
16-May-95	2300	0.4				
13-Jun-95	990	0.6				
17-Jul-95	750	0.2				

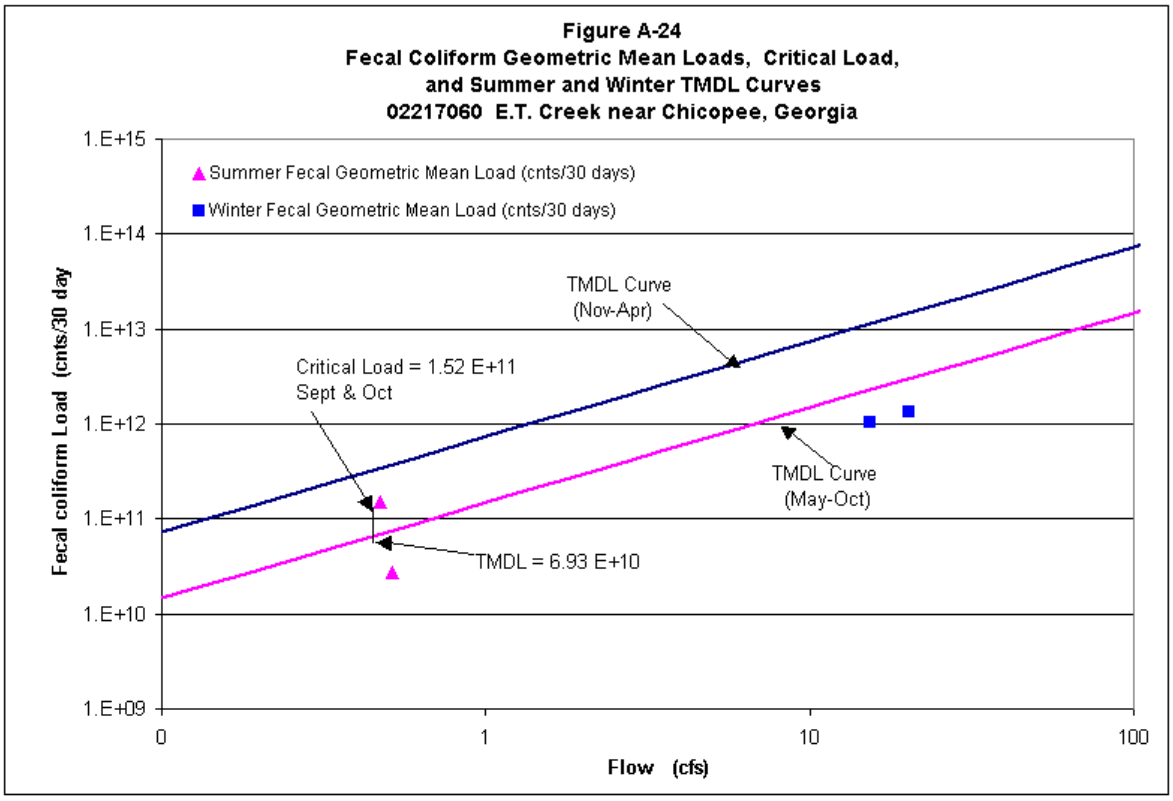


Table A-24. Data for Figure A-24

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
1-Apr-99	130	0.5				
5-Apr-99	80	60.0				
22-Apr-99	20	0.6				
27-Apr-99	330	0.6	91	15.4	1.03E+12	1.13E+13
25-May-99	50	0.3				
27-May-99	20	0.6				
8-Jun-99	80	0.6				
17-Jun-99	330	0.6	72	0.5	2.71E+10	7.55E+10
22-Sep-99	330	0.6				
27-Sep-99	700	0.1				
5-Oct-99	330	0.6				
13-Oct-99	490	0.6	440	0.5	1.52E+11	6.93E+10
1-Dec-99	330	0.6				
14-Dec-99	130	80.0				
16-Dec-99	80	0.4				
20-Dec-99	20	0.3	91	20.3	1.36E+12	1.49E+13

Figure A-25
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
02217866 East Fork Trail Creek Tributary (Carver Branch) at Olympic Drive near Athens

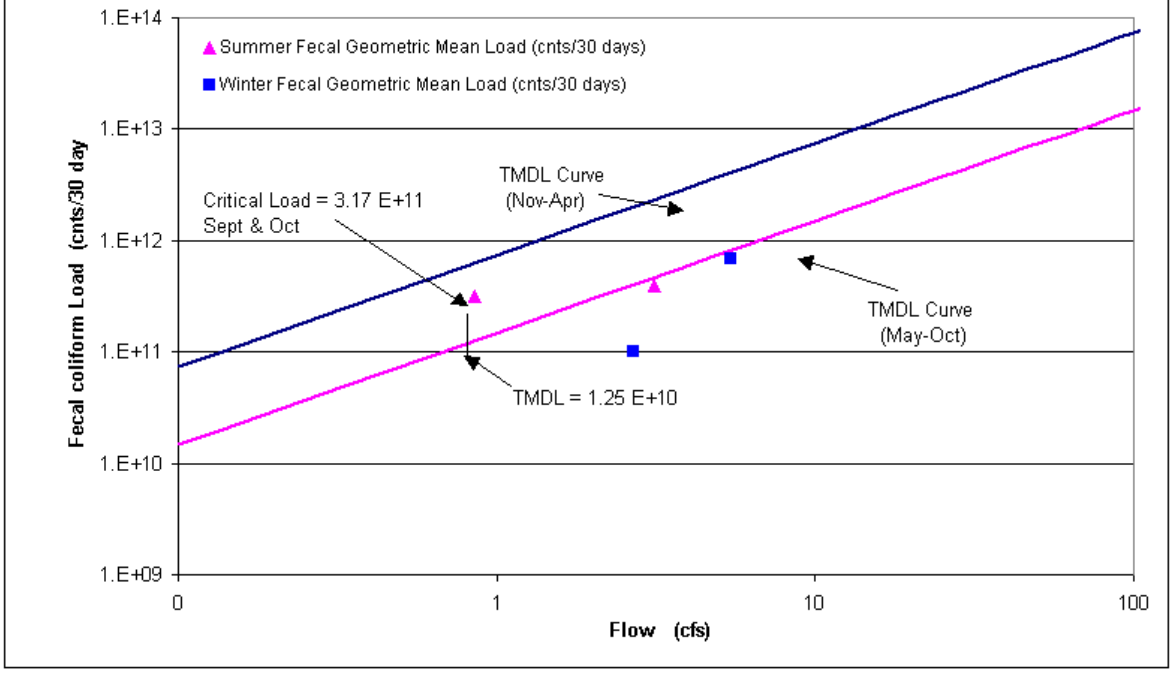


Table A-25. Data for Figure A-25

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
15-Mar-99	210	8.6				
18-Mar-99	80	5.1				
30-Mar-99	630	4.0				
31-Mar-99	80	4.0	171	5.4	6.79E+11	3.98E+12
3-May-99	490	2.9				
6-May-99	790	3.8				
19-May-99	20	3.2				
26-May-99	110	2.7	171	3.1	3.94E+11	4.62E+11
7-Sep-99	130	0.6				
8-Sep-99	140	0.6				
21-Sep-99	230	0.8				
4-Oct-99	16000	1.4	509	0.8	3.17E+11	1.25E+11
1-Nov-99	20	1.6				
9-Nov-99	50	2.1				
22-Nov-99	330	2.4				
29-Nov-99	20	4.7	51	2.7	9.98E+10	1.97E+12

Figure A-26
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
02218327 Fishing Creek at Macedonia Road near Penfield, Georgia

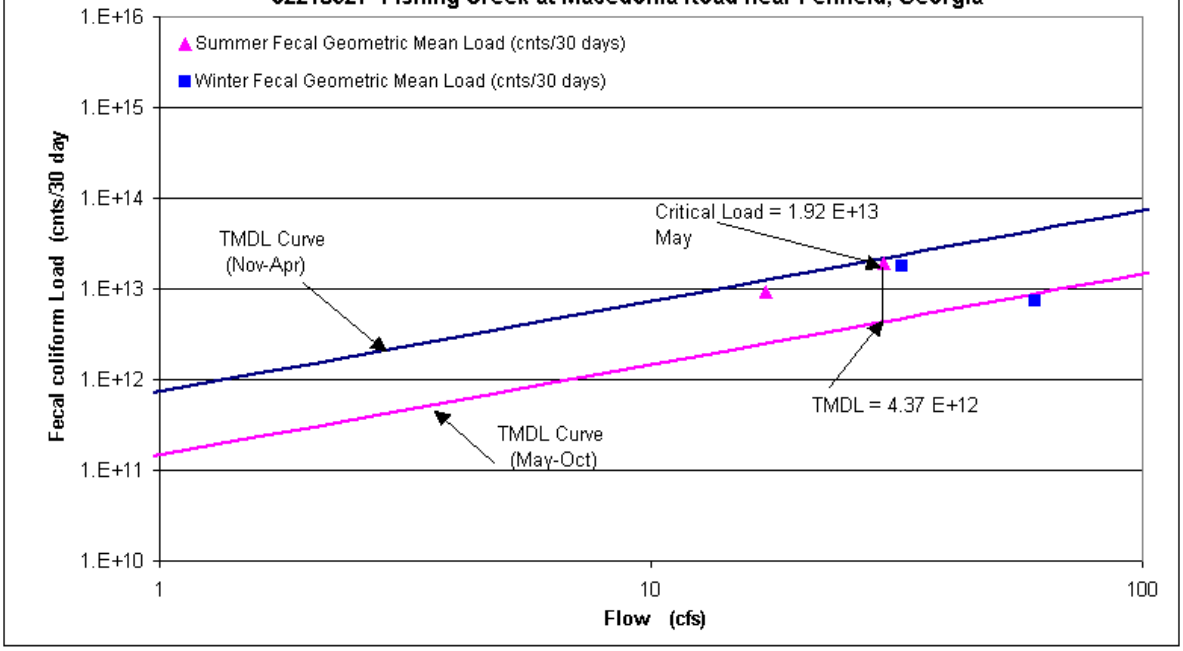


Table A-43. Data for Figure A-26

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
13-Apr-04	2200	38				
15-Apr-04	500	40				
27-Apr-04	170	27				
29-Apr-04	1700	24	751	32.4	1.79E+13	2.38E+13
4-May-04	300	33				
11-May-04	500	23				
18-May-04	800	39				
25-May-04	5000	25	880	29.8	1.92E+13	4.37E+12
3-Aug-04	500	21				
10-Aug-04	220	9				
17-Aug-04	1700	21				
25-Aug-04	1700	17	751	17.1	9.43E+12	2.51E+12
9-Nov-04	40	39				
16-Nov-04	80	46				
30-Nov-04	80	67				
7-Dec-04	3000	90	166	60.5	7.40E+12	4.44E+13

Figure A-27
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
02217496 Hunnicut Creek at Westchester Drive near Athens, Georgia

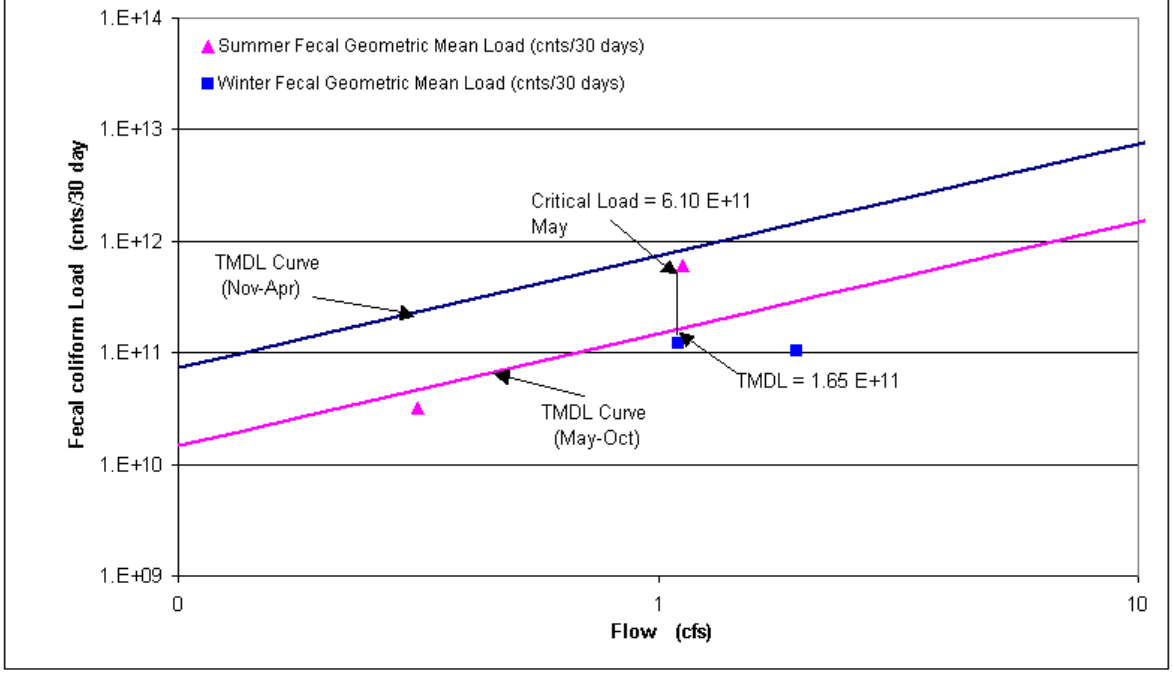


Table A-27. Data for Figure A-27

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
15-Mar-99	20	3.1				
18-Mar-99	50	1.8				
30-Mar-99	20	1.4				
31-Mar-99	1400	1.4	73	1.9	1.04E+11	1.43E+12
3-May-99	140	1.0				
6-May-99	24000	1.3				
19-May-99	1100	1.1				
26-May-99	80	1.0	737	1.1	6.10E+11	1.65E+11
7-Sep-99	170	0.2				
8-Sep-99	130	0.2				
21-Sep-99	330	0.3				
1-Nov-99	50	0.6	138	0.3	3.21E+10	2.32E+11
9-Nov-99	170	0.7				
22-Nov-99	330	0.8				
29-Nov-99	20	1.7				
6-Dec-99	460	1.1	151	1.1	1.22E+11	8.11E+11

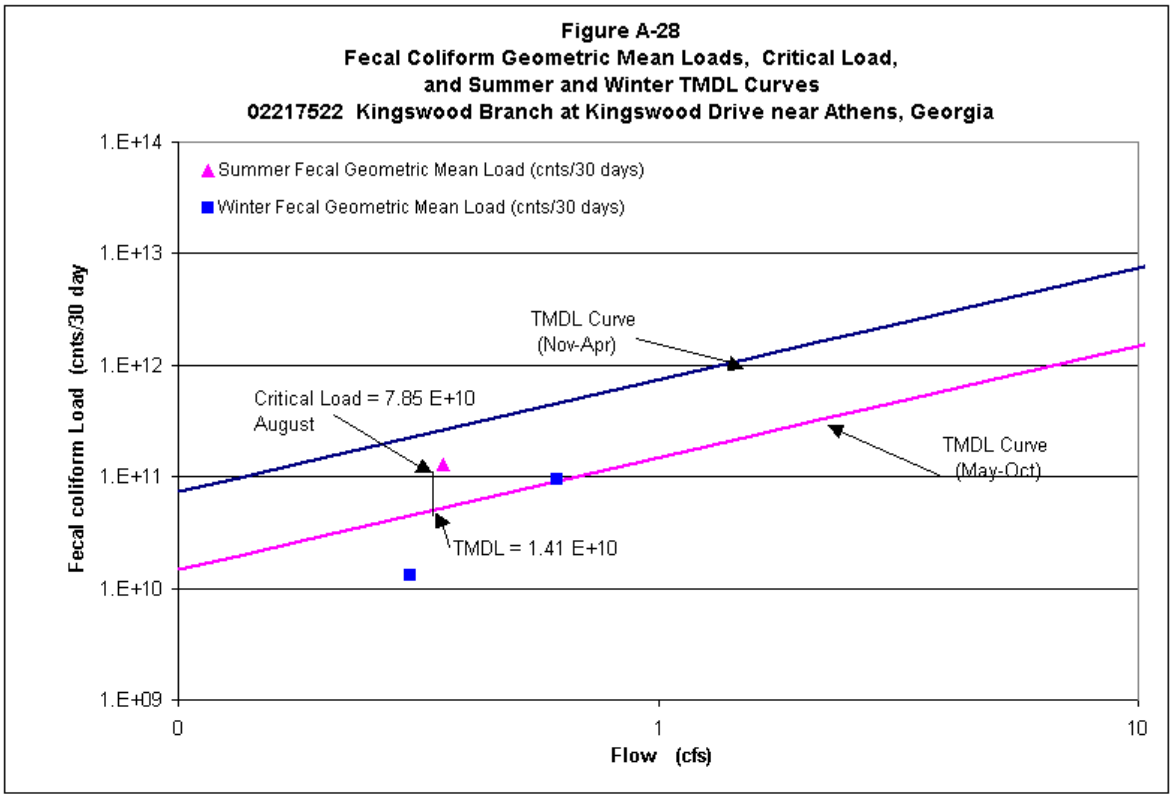


Table A-28. Data for Figure A-28

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
15-Mar-99	230	1.0				
18-Mar-99	130	0.6				
30-Mar-99	130	0.4				
31-Mar-99	490	0.5	209	0.6	9.41E+10	4.51E+11
3-May-99	80	0.3				
6-May-99	5400	0.4				
19-May-99	790	0.4				
26-May-99	170	0.3	491	0.4	1.28E+11	5.23E+10
7-Sep-99	130	0.1				
8-Sep-99	700	0.1				
21-Sep-99	700	0.1				
4-Oct-99	24000	0.2	1112	0.1	7.85E+10	1.41E+10
1-Nov-99	130	0.2				
9-Nov-99	50	0.2				
22-Nov-99	90	0.3				
29-Nov-99	20	0.5	58	0.3	1.30E+10	2.23E+11

Figure A-29
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
02223180 Little Commissioner Creek at Claymont Road near McIntyre, Georgia

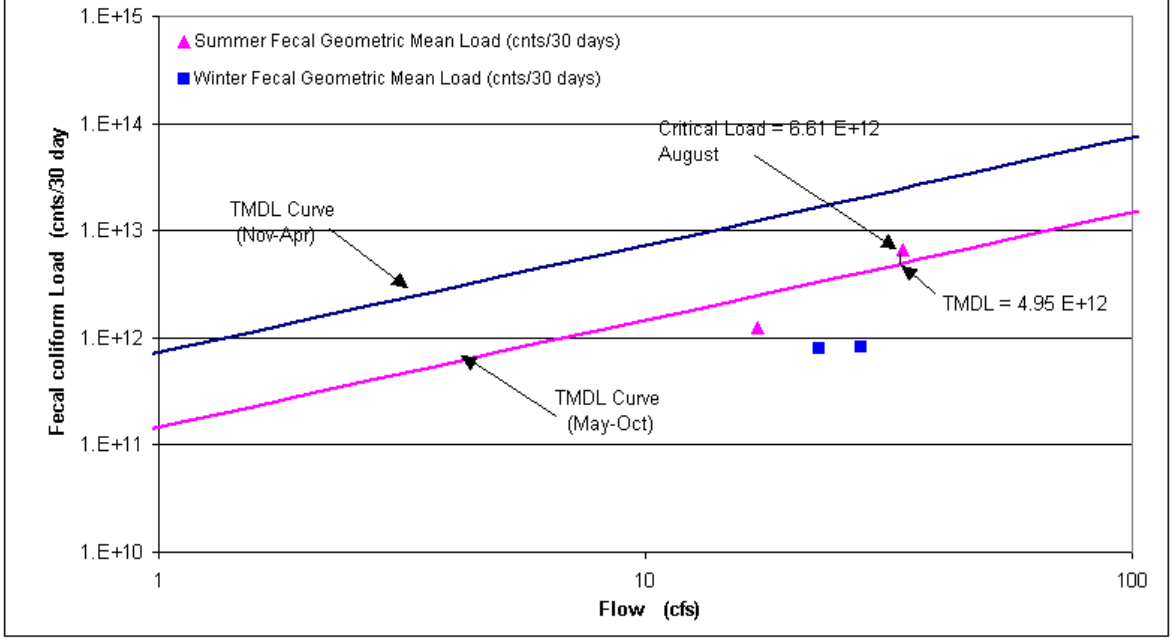


Table A-29. Data for Figure A-29

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
1-Apr-04	80	28.0				
6-Apr-04	40	21.0				
15-Apr-04	20	25.0				
29-Apr-04	80	17.0	48	22.8	7.94E+11	1.67E+13
22-Jul-04	80	17.0				
29-Jul-04	80	17.0				
11-Aug-04	800	17.0				
18-Aug-04	20	17.0	101	17.0	1.26E+12	2.50E+12
28-Sep-04	5000	38.0				
6-Oct-04	230	38.0				
13-Oct-04	40	30.0				
27-Oct-04	110	29.0	267	33.8	6.61E+12	4.95E+12
9-Nov-04	40	27.0				
16-Nov-04	80	29.0				
22-Nov-04	40	27.0				
6-Dec-04	20	28.0	40	27.8	8.15E+11	2.04E+13

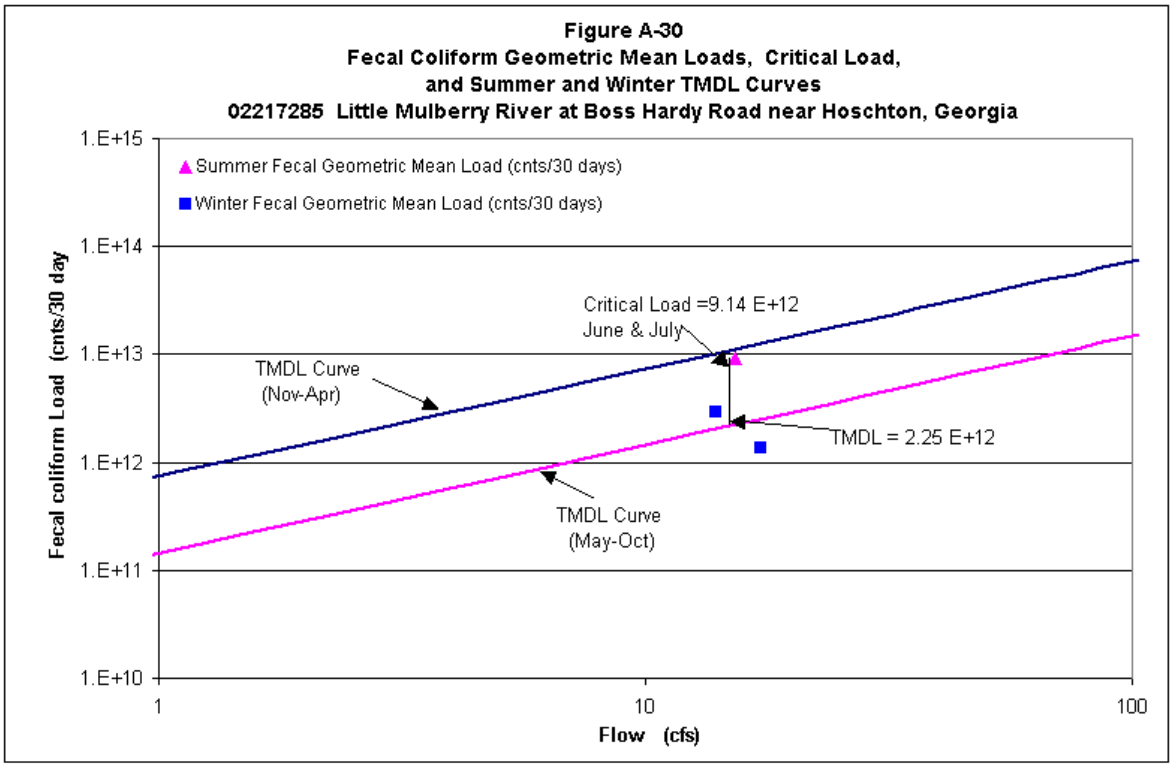


Table A-30. Data for Figure A-30

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
3-Feb-04	490	19.0				
10-Feb-04	40	16.0				
17-Feb-04	80	20.0				
25-Feb-04	80	14.0	106	17.3	1.34E+12	1.27E+13
8-Mar-04	700	15.0				
16-Mar-04	300	14.0				
22-Mar-04	130	14.0				
5-Apr-04	230	13.0	281	14.0	2.89E+12	1.03E+13
22-Jun-04	630	15.0				
28-Jun-04	1700	20.0				
13-Jul-04	500	11.0	812	15.3	9.14E+12	2.25E+12

Figure A-31
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
02220900 Little River at State Road 16 near Eatonton, Georgia

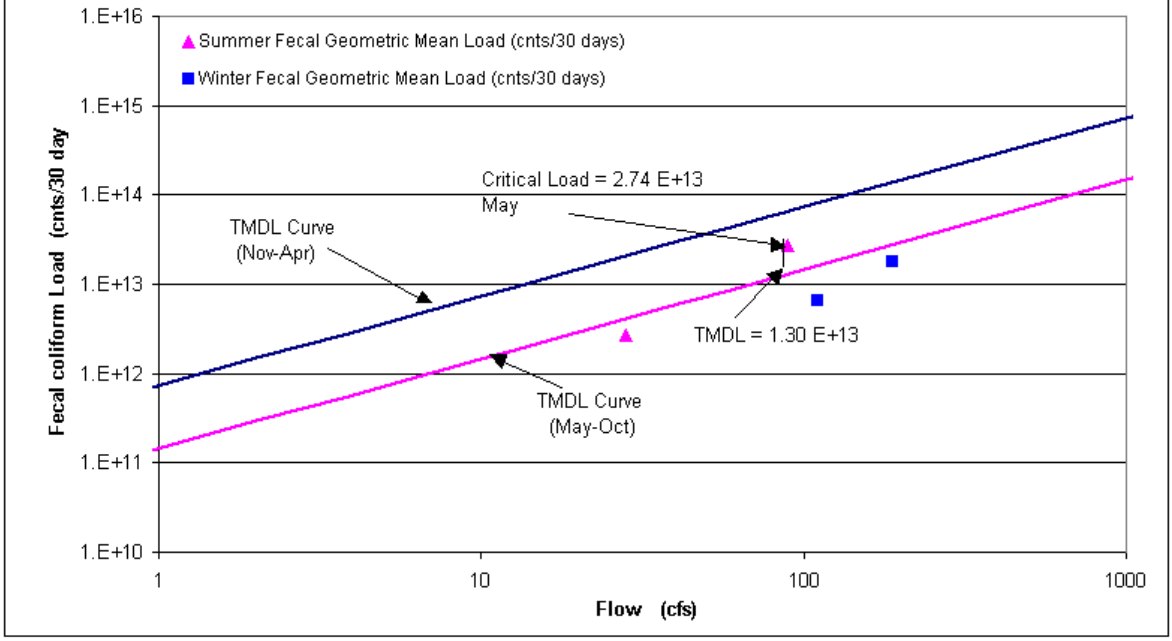


Table A-31. Data for Figure A-31

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
12-Apr-04	40	112.0				
14-Apr-04	130	152.0				
26-Apr-04	110	81.0				
28-Apr-04	70	97.0	80	110.5	6.45E+12	8.11E+13
3-May-04	9000	183.0				
12-May-04	170	67.0				
19-May-04	120	59.0				
26-May-04	170	46.0	420	88.8	2.74E+13	1.30E+13
5-Aug-04	300	24.0				
11-Aug-04	110	19.0				
17-Aug-04	40	40.0				
24-Aug-04	230	30.0	132	28.3	2.74E+12	4.15E+12
17-Nov-04	80	172.0				
23-Nov-04	220	172.0				
1-Dec-04	140	218.0				
8-Dec-04	115	196.0	130	189.5	1.80E+13	1.39E+14

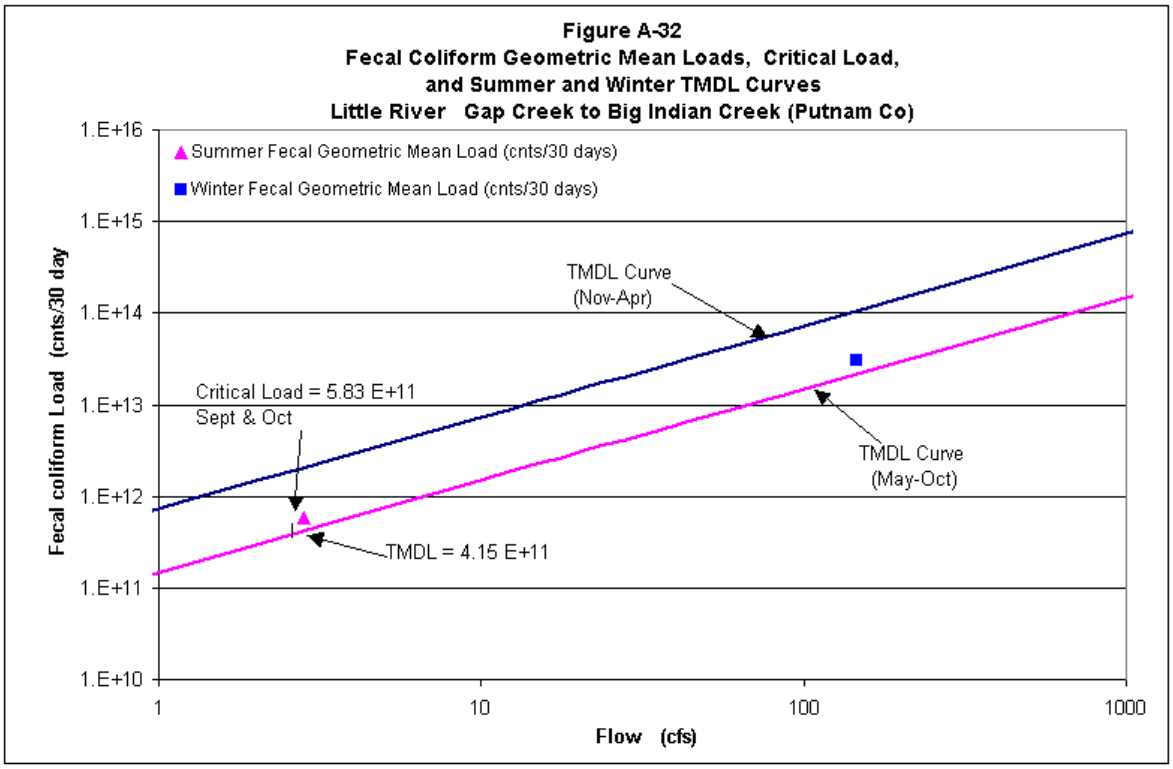


Table A-32. Data for Figure A-32

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
22-Aug-02	230	2.2				
29-Aug-02	300	1.7				
3-Sep-02	300	4.0				
4-Sep-02	300	3.5	281	2.8	5.83E+11	4.15E+11
14-Nov-02	1300	428.3				
25-Nov-02	130	57.4				
3-Dec-02	220	41.7				
11-Dec-02	170	56.3	282	145.9	3.02E+13	1.07E+14

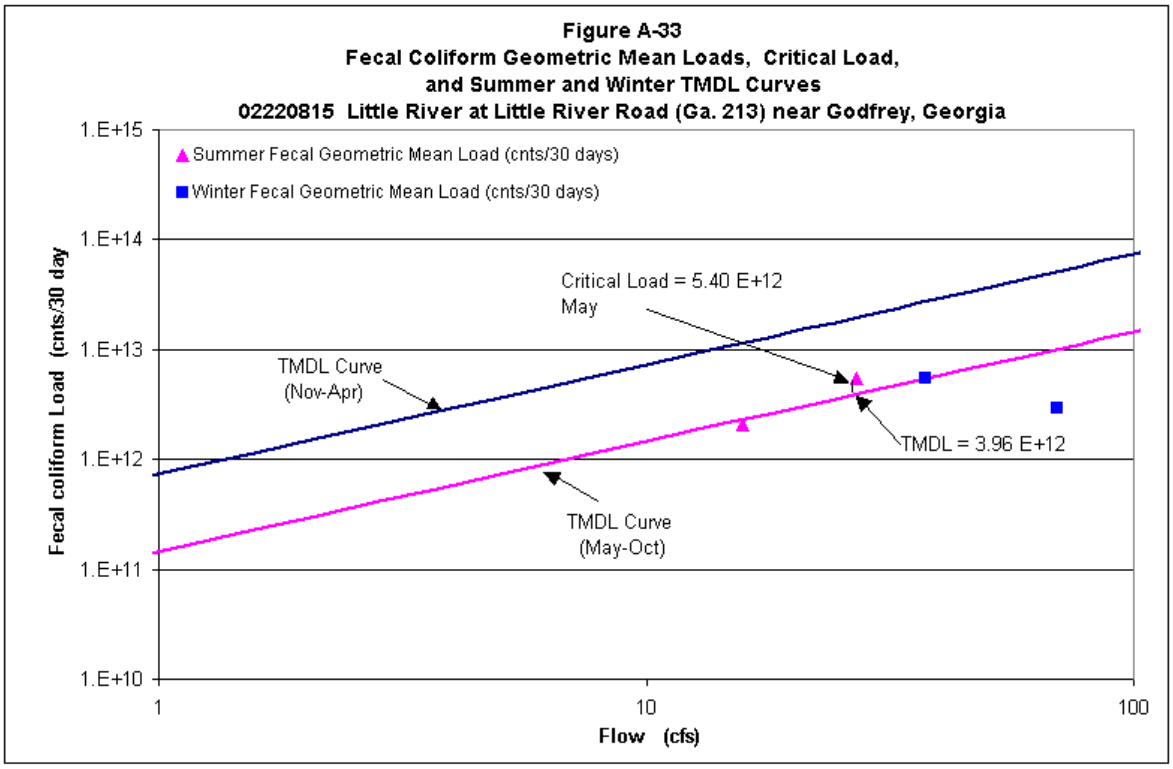


Table A-33. Data for Figure A-33

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
12-Apr-04	130	39.0				
14-Apr-04	300	47.0				
27-Apr-04	300	37.0				
29-Apr-04	140	27.0	201	37.5	5.54E+12	2.75E+13
3-May-04	230	45.0				
12-May-04	230	24.0				
18-May-04	130	21.0				
25-May-04	800	18.0	272	27.0	5.40E+12	3.96E+12
3-Aug-04	110	16.0				
10-Aug-04	130	12.0				
17-Aug-04	800	18.0				
24-Aug-04	90	17.0	179	15.8	2.07E+12	2.31E+12
9-Nov-04	20	56.0				
16-Nov-04	80	67.0				
30-Nov-04	80	75.0				
7-Dec-04	80	80.0	57	69.5	2.89E+12	5.10E+13

Figure A-34
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
Little River Social Circle to Nelson Creek

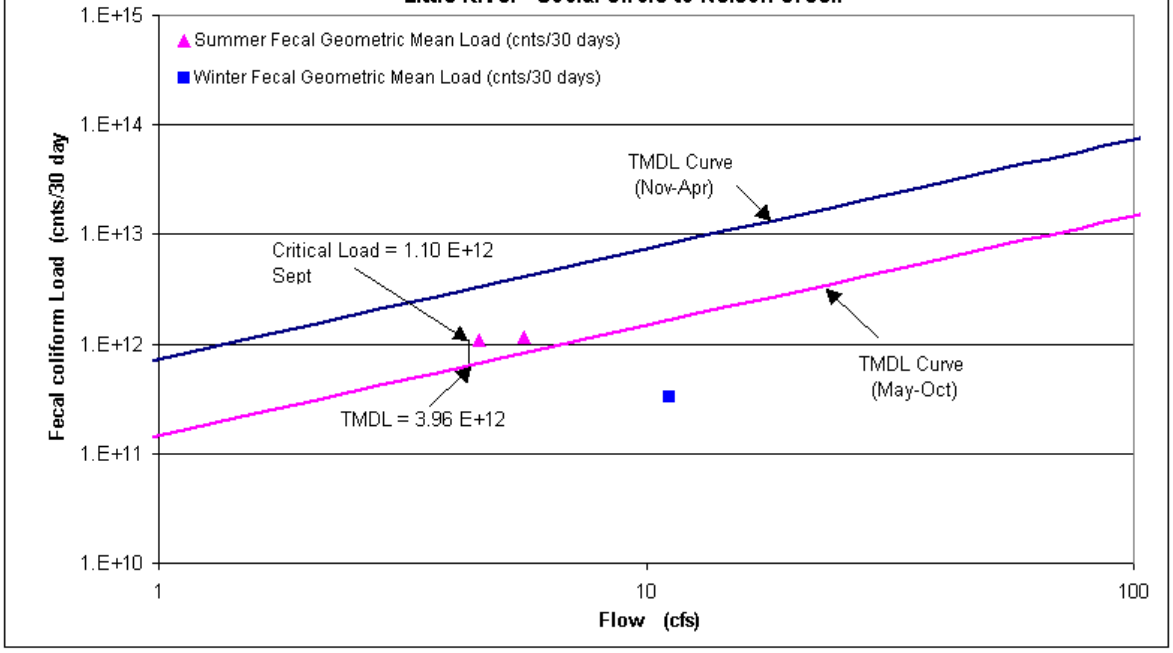


Table A-34. Data for Figure A-34

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
18-Feb-04	80	16.0				
25-Feb-04	20	10.9				
3-Mar-04	80	9.0				
10-Mar-04	20	8.7	40	11.2	3.28E+11	8.19E+12
19-May-04	360	5.3				
26-May-04	335	4.2				
7-Jun-04	180	4.2				
14-Jun-04	300	8.7	284	5.6	1.17E+12	8.23E+11
18-Aug-04	265	3.6				
25-Aug-04	565	3.1				
1-Sep-04	300	4.7				
13-Sep-04	265	6.7	330	4.5	1.10E+12	6.66E+11

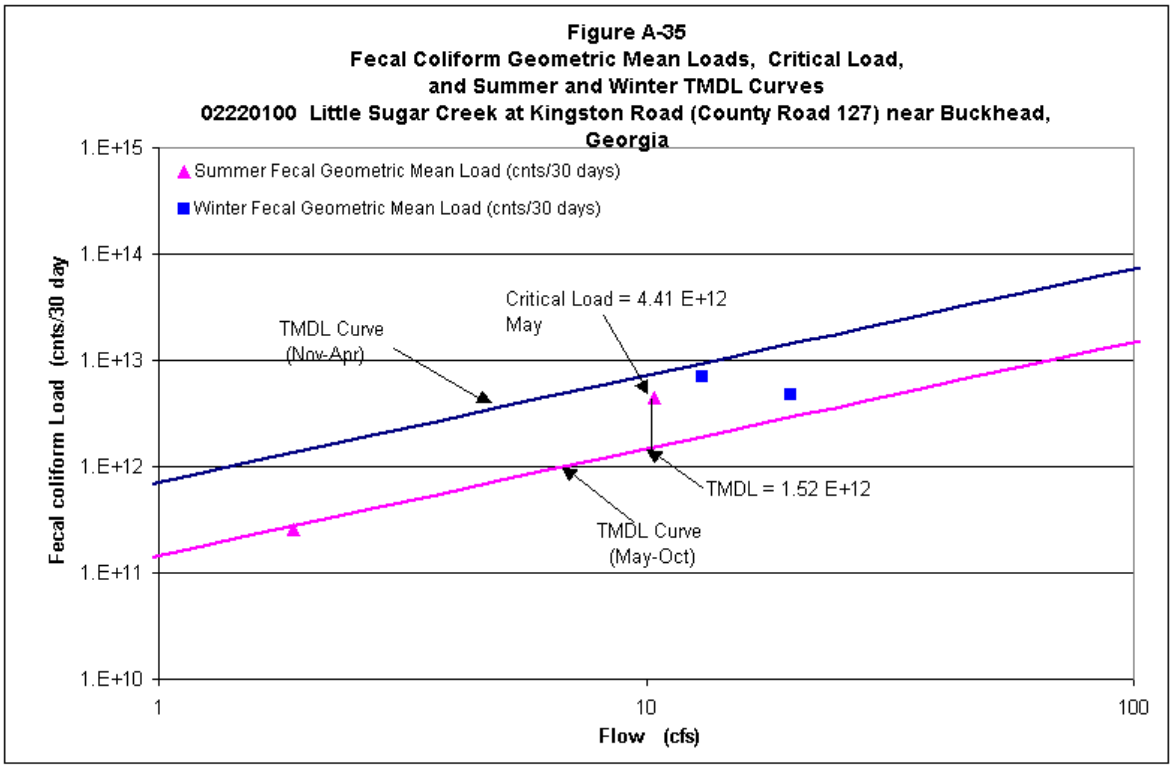


Table A-35. Data for Figure A-35

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
13-Apr-04	9000	15.9				
15-Apr-04	220	14.7				
27-Apr-04	500	11.9				
29-Apr-04	300	9.5	738	13.0	7.05E+12	9.55E+12
3-May-04	1300	20.5				
12-May-04	1700	8.4				
18-May-04	300	7.2				
25-May-04	170	5.4	579	10.4	4.41E+12	1.52E+12
3-Aug-04	130	1.6				
10-Aug-04	130	1.2				
17-Aug-04	300	2.5				
24-Aug-04	220	2.3	183	1.9	2.54E+11	2.78E+11
9-Nov-04	230	12.3				
16-Nov-04	1300	16.5				
30-Nov-04	170	28.6				
7-Dec-04	230	21.7	329	19.7	4.77E+12	1.45E+13

Figure A-36
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
02220923 Little River Tributary 2 CR 212 (Glenwood Springs Rd) near Eatonton, Georgia

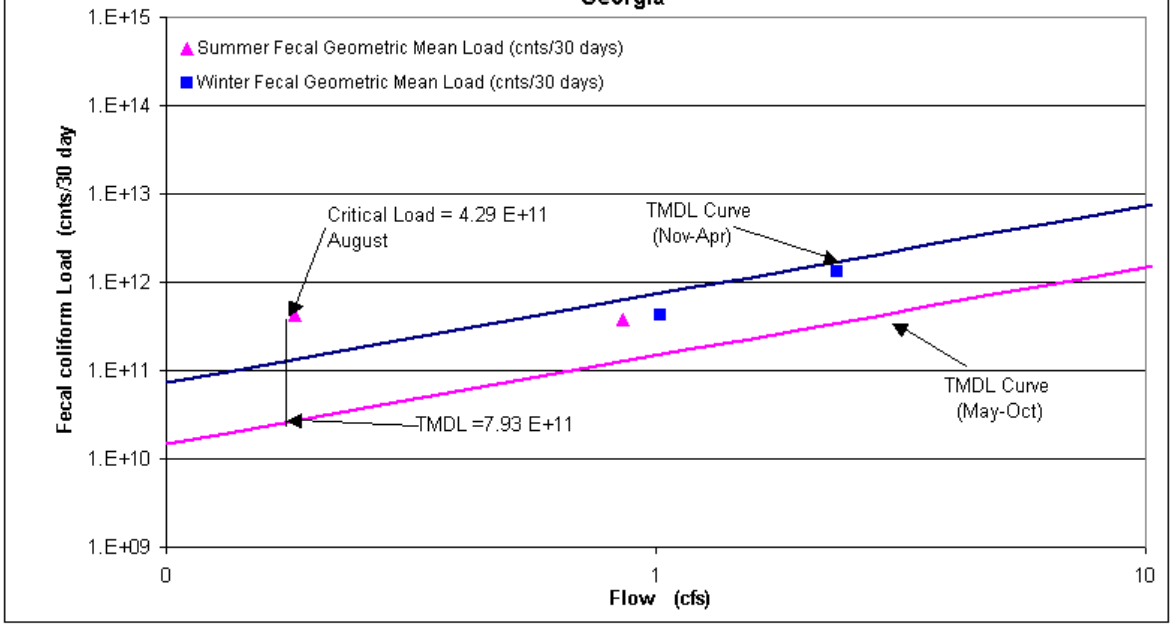


Table A-36. Data for Figure A-36

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
12-Apr-04	220	1.1				
14-Apr-04	500	1.4				
26-Apr-04	300	0.8				
28-Apr-04	3000	0.9	561	1.0	4.21E+11	7.50E+11
3-May-04	2400	1.6				
12-May-04	230	0.7				
19-May-04	500	0.7				
26-May-04	500	0.4	609	0.9	3.82E+11	1.25E+11
5-Aug-04	16000	0.1				
11-Aug-04	500	0.1				
18-Aug-04	800	0.3				
24-Aug-04	16000	0.2	3181	0.2	4.29E+11	2.70E+10
17-Nov-04	1300	1.3				
23-Nov-04	800	4.3				
1-Dec-04	1300	2.2				
8-Dec-04	230	1.6	747	2.4	1.29E+12	1.73E+12

Figure A-37
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
02218805 Marburg Creek at Manning Gin Road near Bethlehem, Georgia

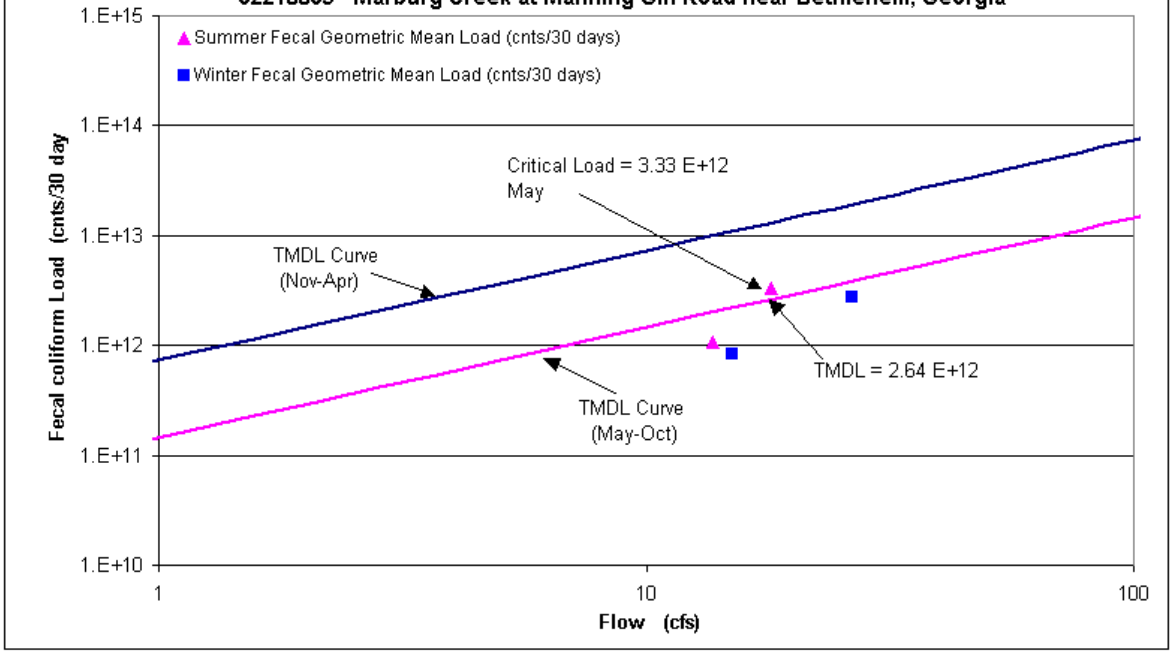


Table A-37. Data for Figure A-37

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
11-Mar-04	40	16.0				
18-Mar-04	130	15.0				
24-Mar-04	80	16.0				
8-Apr-04	80	13.0	76	15.0	8.36E+11	1.10E+13
5-May-04	70	16.0				
10-May-04	500	14.0				
17-May-04	500	25.0				
24-May-04	230	17.0	252	18.0	3.33E+12	2.64E+12
2-Aug-04	130	15.0				
9-Aug-04	80	10.0				
16-Aug-04	40	16.0				
26-Aug-04	300		106	13.7	1.06E+12	2.01E+12
8-Nov-04	80	17.0				
15-Nov-04	70	16.0				
29-Nov-04	140	32.0				
6-Dec-04	500	41.0	141	26.5	2.74E+12	1.95E+13

Figure A-38
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
02217515 Middle Oconee River at U.S. Highway 441 near Athens, Georgia

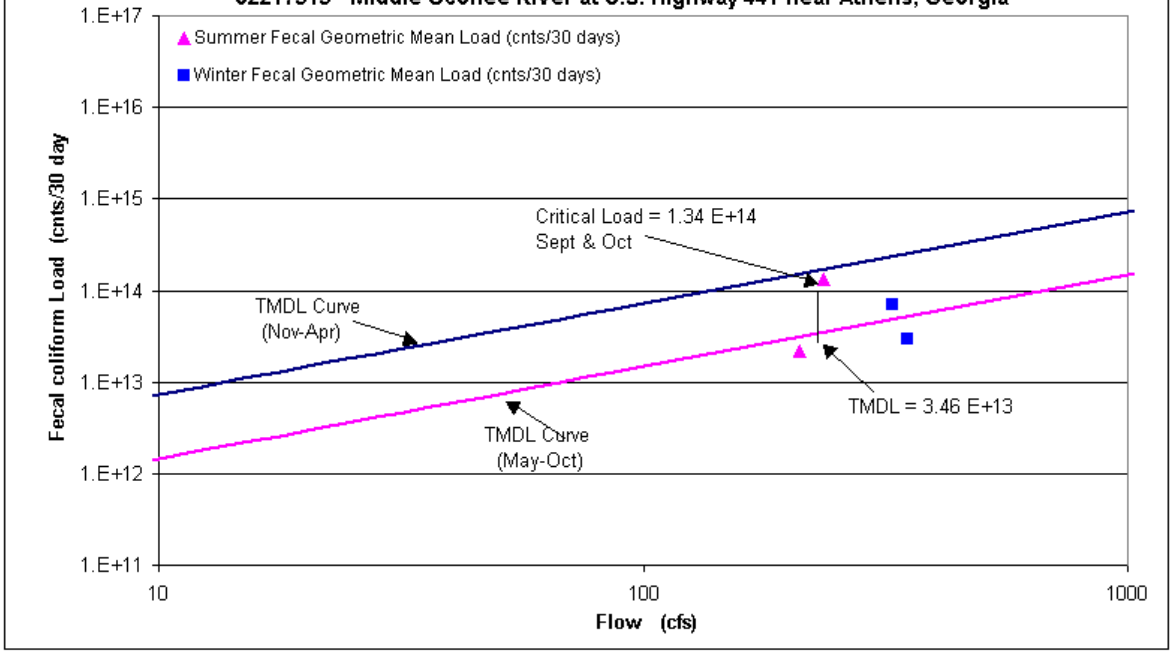


Table A-38. Data for Figure A-38

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
1-Apr-99	330	592.0				
5-Apr-99	220	347.0				
22-Apr-99	50	249.0				
27-Apr-99	50	217.0	116	351.3	2.99E+13	2.58E+14
18-May-99	80	201.0				
25-May-99	460	198.0				
27-May-99	80	155.0				
17-Jun-99	130	290.0	140	211.0	2.17E+13	3.10E+13
22-Sep-99	330	78.0				
27-Sep-99	360	60.0				
5-Oct-99	9200	514.0				
13-Oct-99	330	290.0	775	235.5	1.34E+14	3.46E+13
1-Dec-99	330	249.0				
14-Dec-99	790	509.0				
16-Dec-99	260	324.0				
20-Dec-99	110	228.0	294	327.5	7.06E+13	2.40E+14

Figure A-39
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
02217251 Middle Oconee River at Etheridge Road near Arcade, Georgia

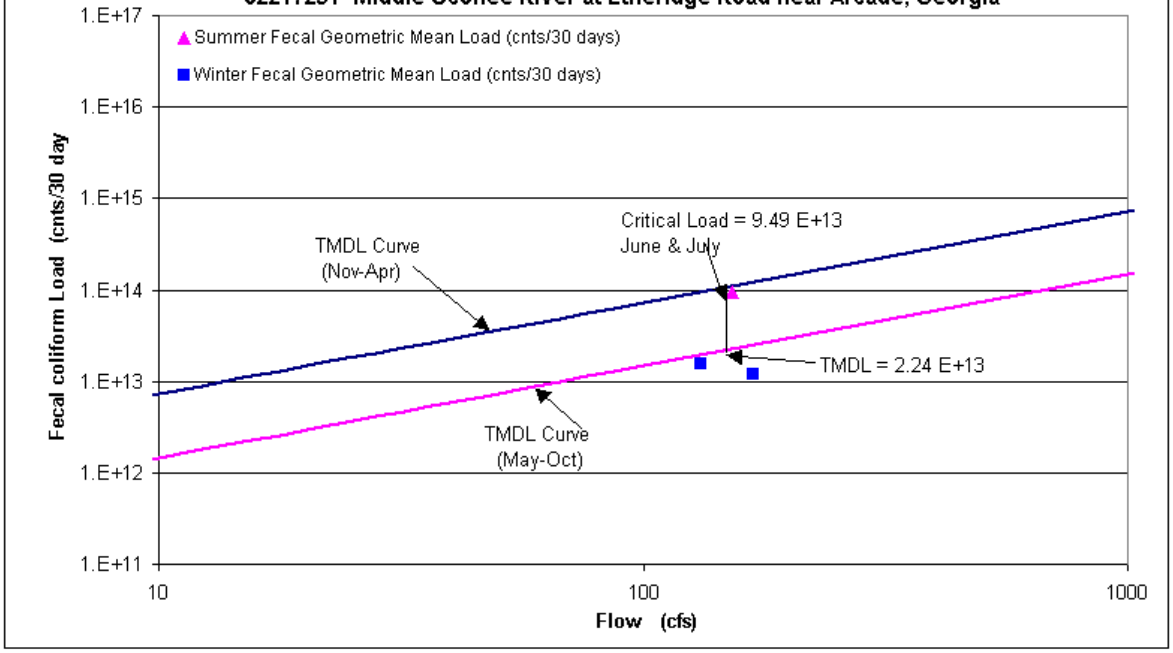


Table A-39. Data for Figure A-39

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
4-Feb-04	230	168.0				
11-Feb-04	40	171.0				
17-Feb-04	80	184.0				
25-Feb-04	110	154.0	95	169.3	1.18E+13	1.24E+14
10-Mar-04	230	142.0				
17-Mar-04	300	139.0				
23-Mar-04	70	127.0				
7-Apr-04	140	118.0	161	131.5	1.56E+13	9.65E+13
23-Jun-04	2400	184.0				
29-Jun-04	1100	184.0				
14-Jul-04	230	90.0	847	152.7	9.49E+13	2.24E+13

Figure A-40
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
02217475 Middle Oconee River at Georgia Highway 82 near Arcade, Georgia

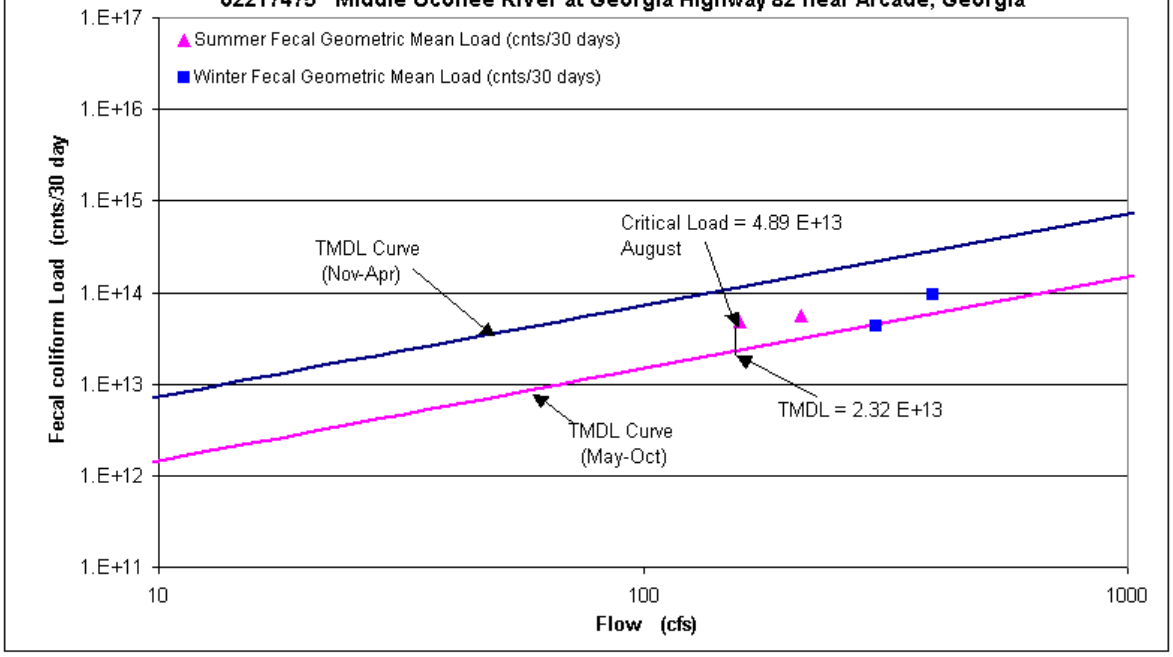


Table A-40. Data for Figure A-40

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
11-Mar-04	500	343.0				
18-Mar-04	170	314.0				
23-Mar-04	140	295.0				
8-Apr-04	110	259.0	190	302.8	4.23E+13	2.22E+14
5-May-04	170	248.0				
10-May-04	500	191.0				
17-May-04	800	220.0				
24-May-04	230	190.0	354	212.3	5.51E+13	3.12E+13
2-Aug-04	700	185.0				
9-Aug-04	300	109.0				
16-Aug-04	300	202.0				
26-Aug-04	500	136.0	421	158.0	4.89E+13	2.32E+13
8-Nov-04	170	269.0				
15-Nov-04	70	279.0				
29-Nov-04	300	475.0				
6-Dec-04	3000	567.0	322	397.5	9.39E+13	2.92E+14

Figure A-41
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
02217569 Middle Oconee River at Whitehall Road at Athens, Georgia

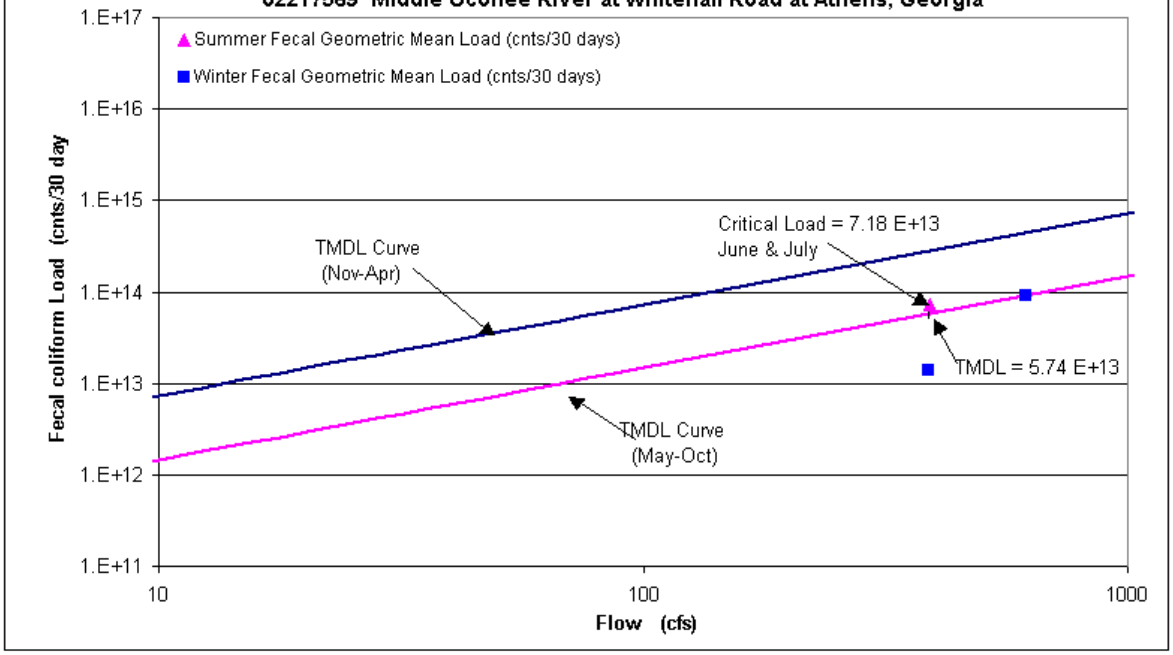


Table A-41. Data for Figure A-41

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
5-Feb-04	230	527.0				
12-Feb-04	2400	800.0				
18-Feb-04	40	660.0				
24-Feb-04	80	471.0	205	614.5	9.25E+13	4.51E+14
9-Mar-04	330	467.0				
15-Mar-04	40	420.0				
25-Mar-04	20	369.0				
6-Apr-04	20	291.0	48	386.8	1.36E+13	2.84E+14
24-Jun-04	1300	546.0				
30-Jun-04	300	472.0				
15-Jul-04	40	156.0	250	391.3	7.18E+13	5.74E+13

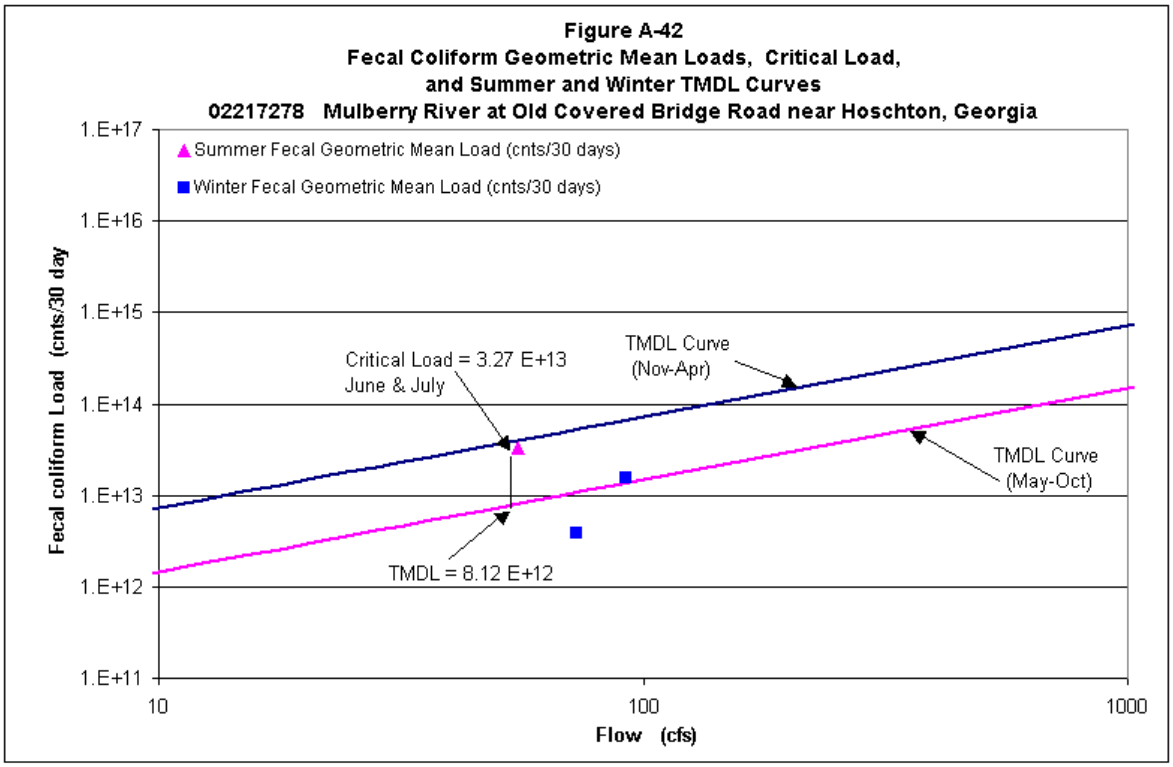


Table A-42. Data for Figure A-42

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
3-Feb-04	1300	92.0				
10-Feb-04	90	92.0				
17-Feb-04	130	92.0				
25-Feb-04	170	92.0	225	92.0	1.52E+13	6.75E+13
8-Mar-04	50	92.0				
16-Mar-04	110	86.0				
22-Mar-04	40	62.0				
5-Apr-04	130	52.0	73	73.0	3.92E+12	5.36E+13
22-Jun-04	310	35.0				
28-Jun-04	2400	92.0				
13-Jul-04	700	39.0	805	55.3	3.27E+13	8.12E+12

Figure A-43
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
02217380 Mulberry River at Georgia Highway 11 near Winder, Georgia

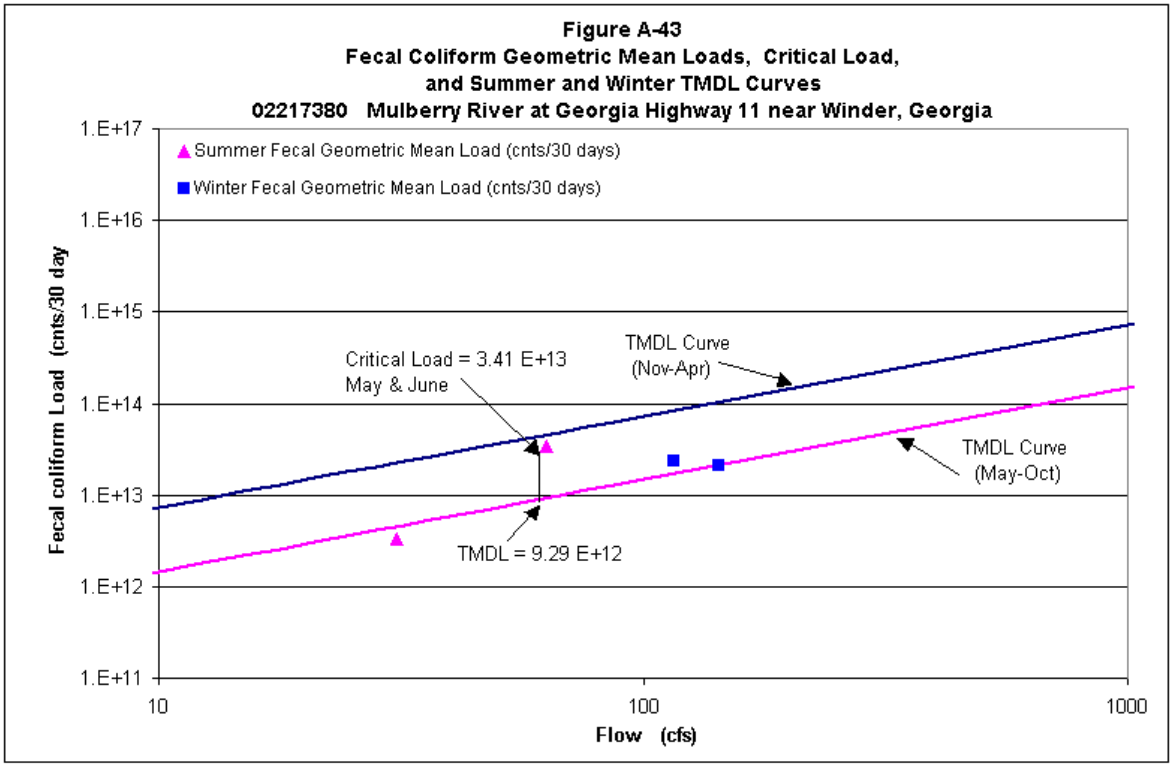


Table A-43. Data for Figure A-43

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
15-Feb-99	170	138.0				
21-Feb-99	330	172.0				
28-Feb-99	80	142.0				
3-Mar-99	330	121.0	196	143.3	2.06E+13	1.05E+14
27-May-99	1300	45.0				
10-Jun-99	170	30.0				
17-Jun-99	4900	148.0				
22-Jun-99	270	30.0	735	63.3	3.41E+13	9.29E+12
29-Jul-99	20	30.0				
12-Aug-99	130	30.0				
19-Aug-99	790	30.0				
26-Aug-99	230	34.0	147	31.0	3.35E+12	4.55E+12
30-Nov-99	110	64.0				
14-Dec-99	490	236.0				
16-Dec-99	220	102.0				
21-Dec-99	490	62.0	276	116.0	2.35E+13	8.51E+13

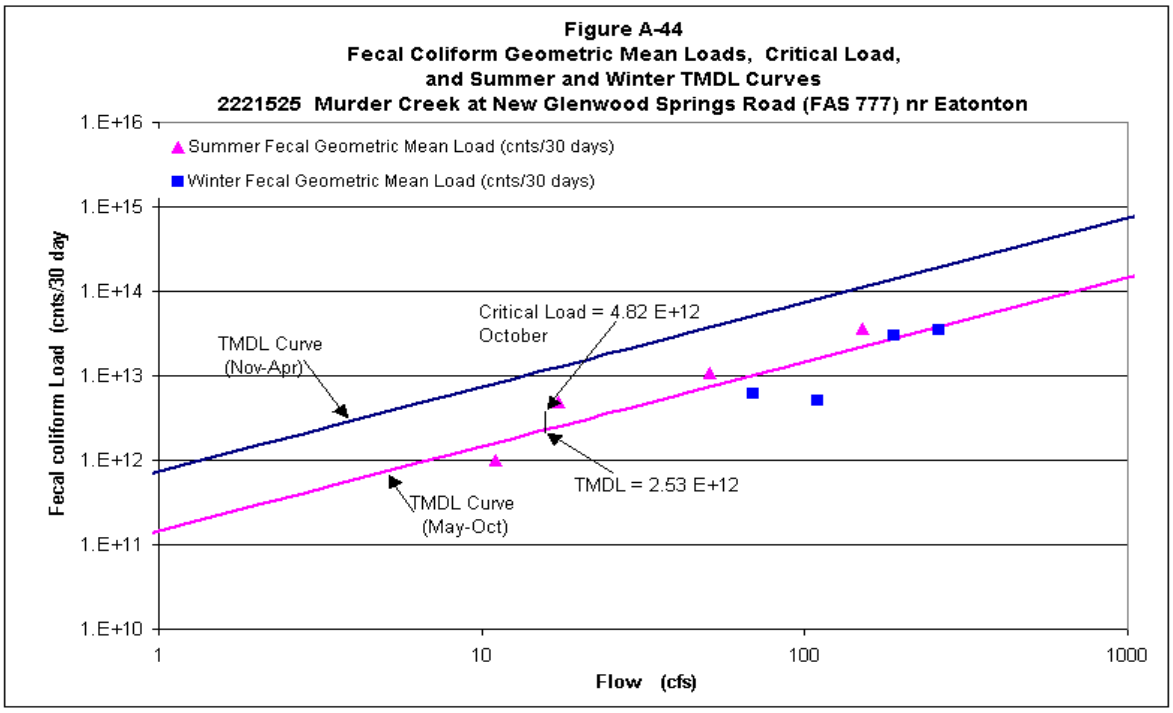


Table A-44. Data for Figure A-44

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
8-Jan-02	330	59.5				
15-Jan-02	20	56.2				
22-Jan-02	230	87.6				
29-Jan-02	130	74.6	119	69.5	6.04E+12	5.10E+13
1-Apr-02	1300	356.8				
8-Apr-02	20	109.2				
15-Apr-02	500	208.7				
22-Apr-02	155	85.4	212	190.0	2.95E+13	1.39E+14
15-Jul-02	85	13.0				
23-Jul-02	170	8.3				
30-Jul-02	130	14.1				
1-Aug-02	130	8.9	125	11.1	1.01E+12	1.62E+12
1-Oct-02	1100	14.1				
8-Oct-02	60	8.3				
15-Oct-02	500	23.8				
22-Oct-02	640	22.7	381	17.2	4.82E+12	2.53E+12
13-Jan-03	170	76.8				
27-Jan-03	20	76.8				
3-Feb-03	40	120.0				
13-Feb-03	110	164.3	62	109.5	5.00E+12	8.03E+13
10-Apr-03	3250	564.3				
16-Apr-03	40	192.4				
22-Apr-03	80	153.5				
24-Apr-03	110	130.8	184	260.3	3.51E+13	1.91E+14
14-Jul-03	220	141.6				
21-Jul-03	130	109.2				
28-Jul-03	220	129.7				
4-Aug-03	1700	224.9	322	151.4	3.57E+13	2.22E+13
15-Oct-03	1700	53.0				
21-Oct-03	130	49.7				
27-Oct-03	130	45.4				
29-Oct-03	230	55.1	285	50.8	1.06E+13	7.46E+12

Figure A-45
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
North Bypass Branch Tributary to Middle Oconee River, Athens (Clarke Co)

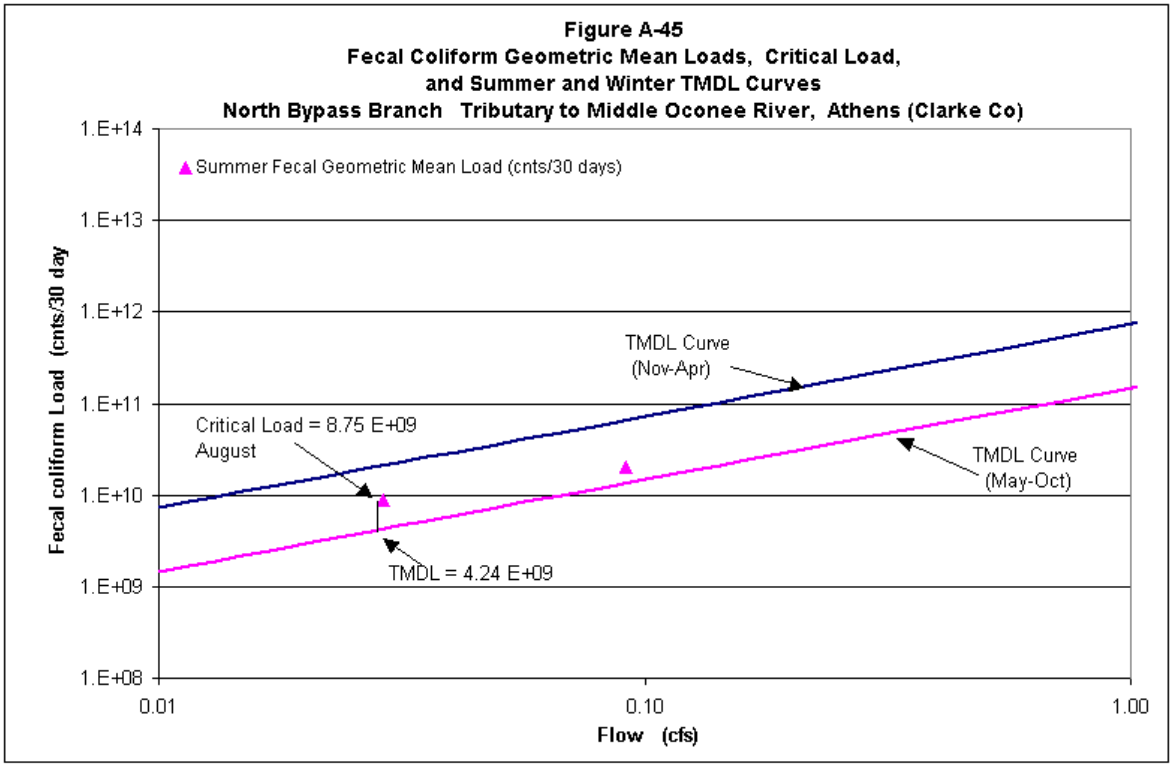


Table A-45. Data for Figure A-45

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
15-Aug-95	7500	0.03				
16-Aug-95	160	0.03				
17-Aug-95	268	0.03				
18-Aug-95	90	0.03	412	0.03	8.75E+09	4.24E+09
28-Sep-95	892	0.06				
29-Sep-95	260	0.06				
10-Oct-95	112	0.15	296	0.09	1.99E+10	1.34E+10

Figure A-46
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
02217740 North Oconee River - Athens Water Intake

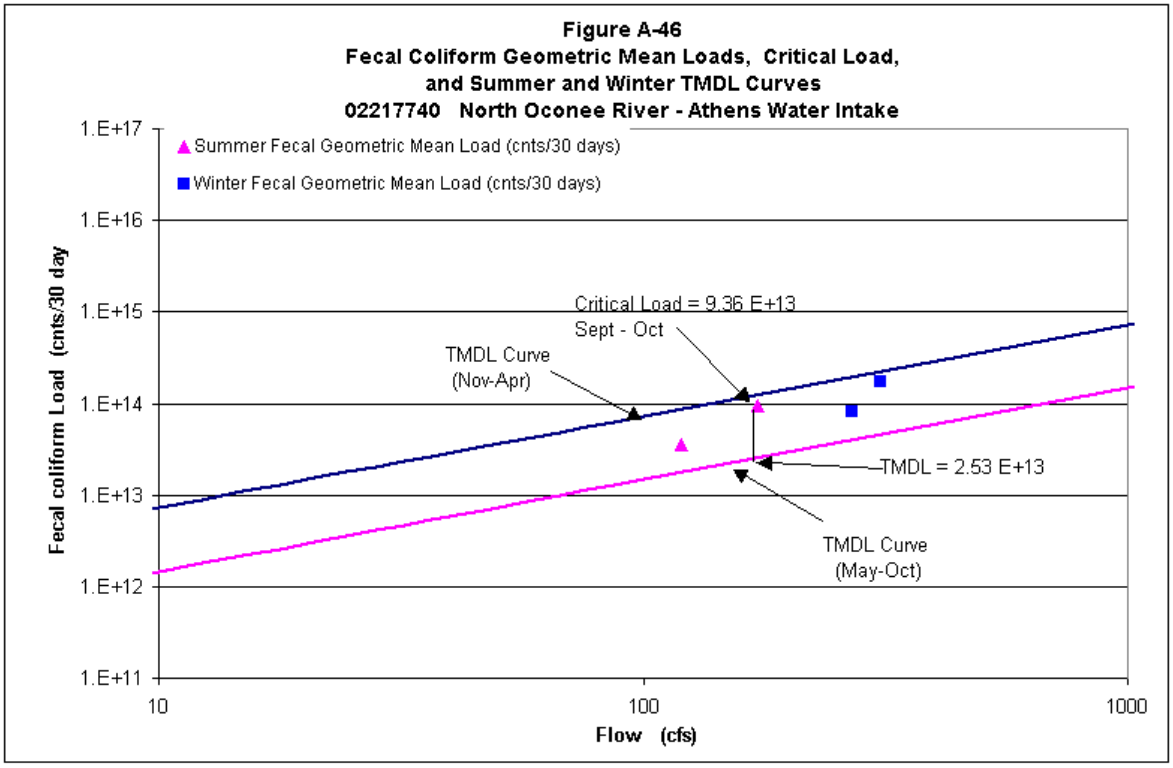


Table A-46. Data for Figure A-46

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
1-Apr-99	4100	400.0				
5-Apr-99	330	400.0				
22-Apr-99	130	140.0				
27-Apr-99	170	140.0	416	270.0	8.24E+13	1.98E+14
18-May-99	490	130.0				
25-May-99	330	90.0				
27-May-99	220	90.0				
15-Jun-99	790	170.0	409	120.0	3.61E+13	1.76E+13
22-Sep-99	790	48.0				
27-Sep-99	700	42.0				
5-Oct-99	1100	270.0				
13-Oct-99	490	330.0	739	172.5	9.36E+13	2.53E+13
1-Dec-99	330	160.0				
14-Dec-99	630	580.0				
16-Dec-99	4900	330.0				
20-Dec-99	330	170.0	761	310.0	1.73E+14	2.28E+14

Figure A-47
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
02217592 North Oconee River at Deadwyler Road near Maysville, Georgia

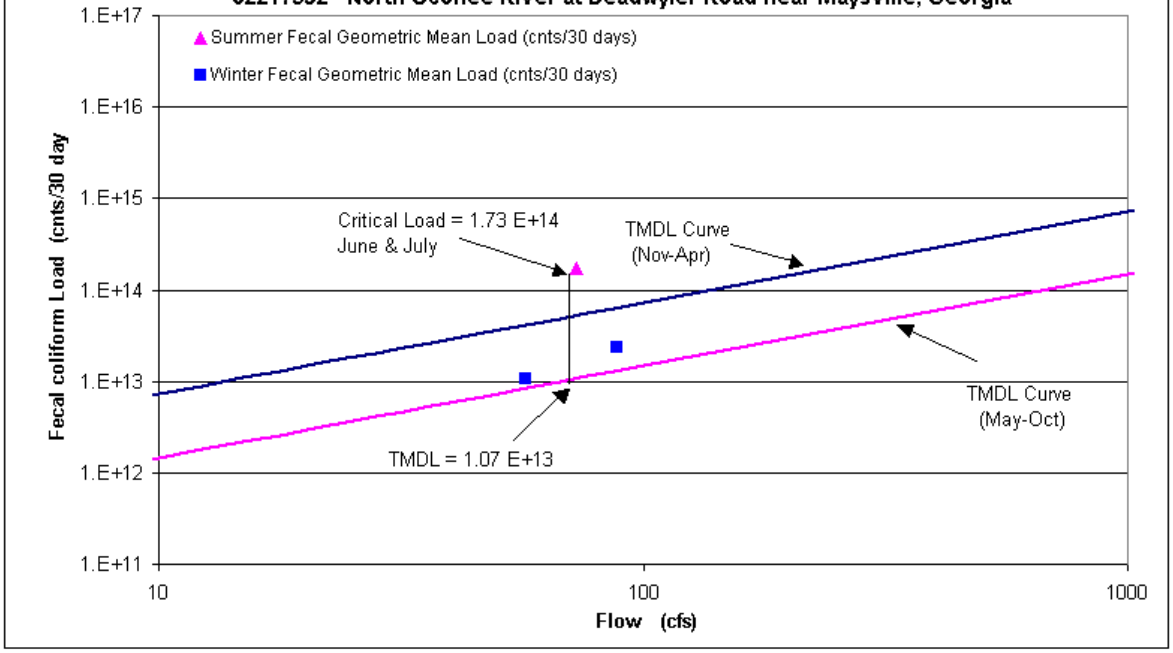


Table A-47. Data for Figure A-47

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
4-Feb-04	3500	86.0				
11-Feb-04	500	96.0				
17-Feb-04	80	96.0				
25-Feb-04	130	75.0	367	88.3	2.38E+13	6.48E+13
10-Mar-04	140	62.0				
17-Mar-04	800	58.0				
22-Mar-04	80	57.0				
7-Apr-04	490	52.0	257	57.3	1.08E+13	4.20E+13
23-Jun-04	9200	95.0				
28-Jun-04	16000	95.0				
14-Jul-04	230	28.0	3235	72.7	1.73E+14	1.07E+13

Figure A-48
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
02217610 North Oconee River at Georgia Highway 82 near Maysville, Georgia

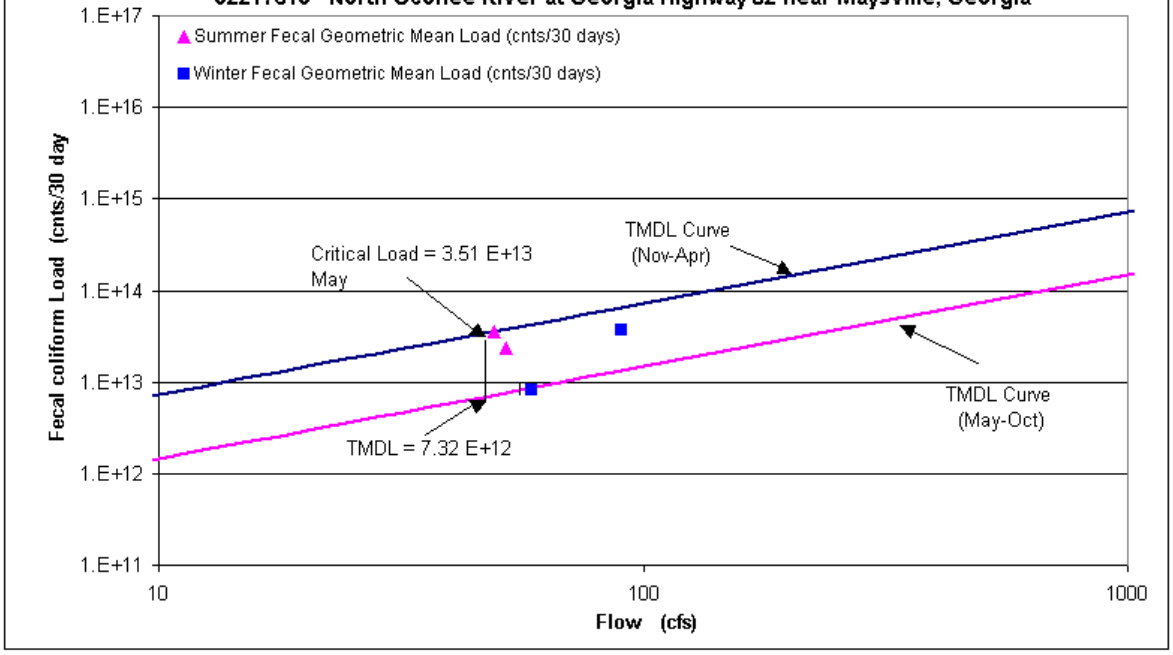


Table A-48. Data for Figure A-48

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
11-Mar-04	80	60.0				
18-Mar-04	500	59.0				
23-Mar-04	110	65.0				
8-Apr-04	300	52.0	191	59.0	8.25E+12	4.33E+13
5-May-04	500	54.0				
10-May-04	800	37.0				
17-May-04	1300	52.0				
24-May-04	1700	54.0	970	49.3	3.51E+13	7.23E+12
2-Aug-04	800	53.0				
9-Aug-04	130	35.0				
16-Aug-04	800	61.0				
26-Aug-04	1700	59.0	613	52.0	2.34E+13	7.63E+12
8-Nov-04	800	74.0				
15-Nov-04	300	71.0				
29-Nov-04	230	93.0				
6-Dec-04	1700	122.0	553	90.0	3.66E+13	6.61E+13

Figure A-49
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
02217646 North Oconee River at State Highway 335 Near Nicholson, Georgia

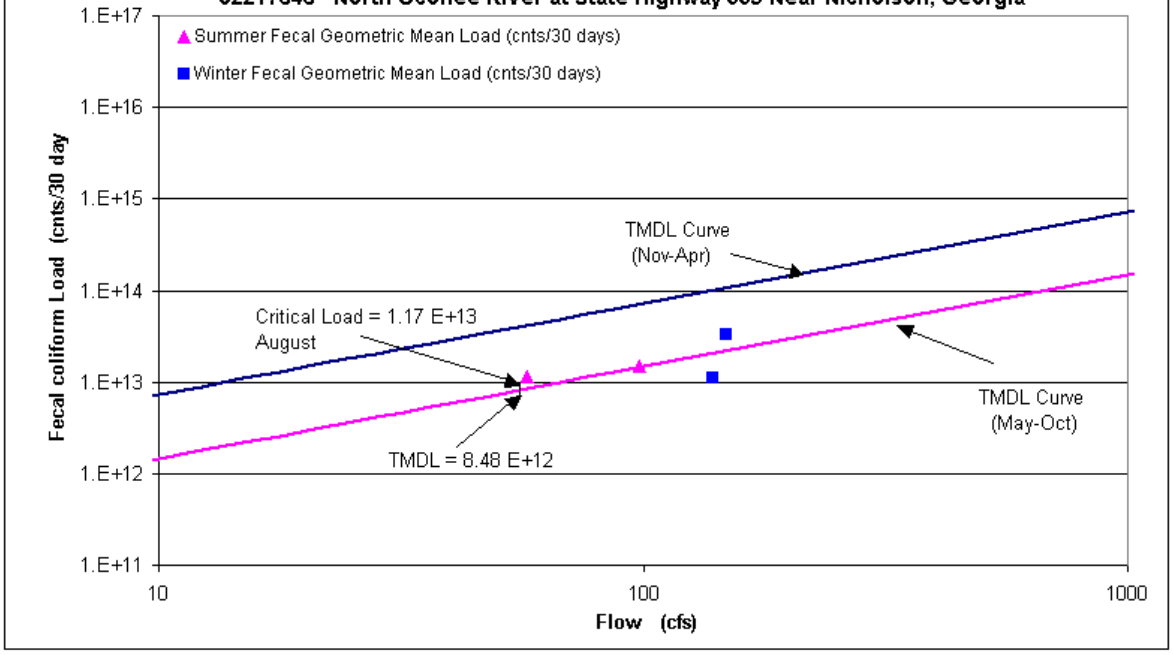


Table A-49. Data for Figure A-49

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
11-Mar-04	40	147.0				
18-Mar-04	300	136.0				
23-Mar-04	140	137.0				
8-Apr-04	80	136.0	108	139.0	1.10E+13	1.02E+14
5-May-04	220	112.0				
10-May-04	130	79.0				
17-May-04	300	99.0				
24-May-04	220	104.0	208	98.5	1.51E+13	1.45E+13
2-Aug-04	800	66.0				
9-Aug-04	80	33.0				
16-Aug-04	300	76.0				
26-Aug-04	300	56.0	275	57.8	1.17E+13	8.48E+12
8-Nov-04	130	125.0				
15-Nov-04	170	126.0				
29-Nov-04	130	170.0				
6-Dec-04	3000	173.0	305	148.5	3.32E+13	1.09E+14

Figure A-50
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
02217805 North Oconee River at East Broad Street at Athens, Georgia

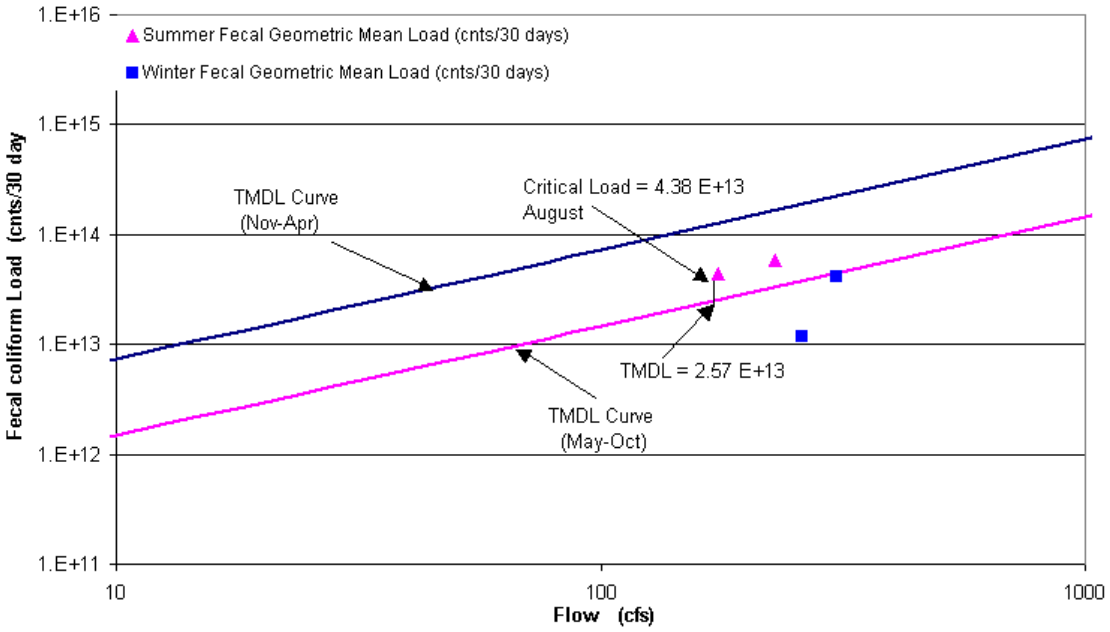


Table A-50. Data for Figure A-50

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
11-Mar-04	80	264.0				
18-Mar-04	40	263.0				
23-Mar-04	230	274.0				
8-Apr-04	20	240.0	62	260.3	1.18E+13	1.91E+14
4-May-04	700	273.0				
10-May-04	500	194.0				
17-May-04	300	229.0				
24-May-04	130	222.0	342	229.5	5.76E+13	3.37E+13
2-Aug-04	300	178.0				
10-Aug-04	300	138.0				
16-Aug-04	300	204.0				
25-Aug-04	500	181.0	341	175.3	4.38E+13	2.57E+13
9-Nov-04	70	245.0				
15-Nov-04	170	259.0				
29-Nov-04	300	355.0				
6-Dec-04	300	368.0	181	306.8	4.07E+13	2.25E+14

Figure A-51
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
02217950 North Oconee River at Whitehall Road near Whitehall, Georgia

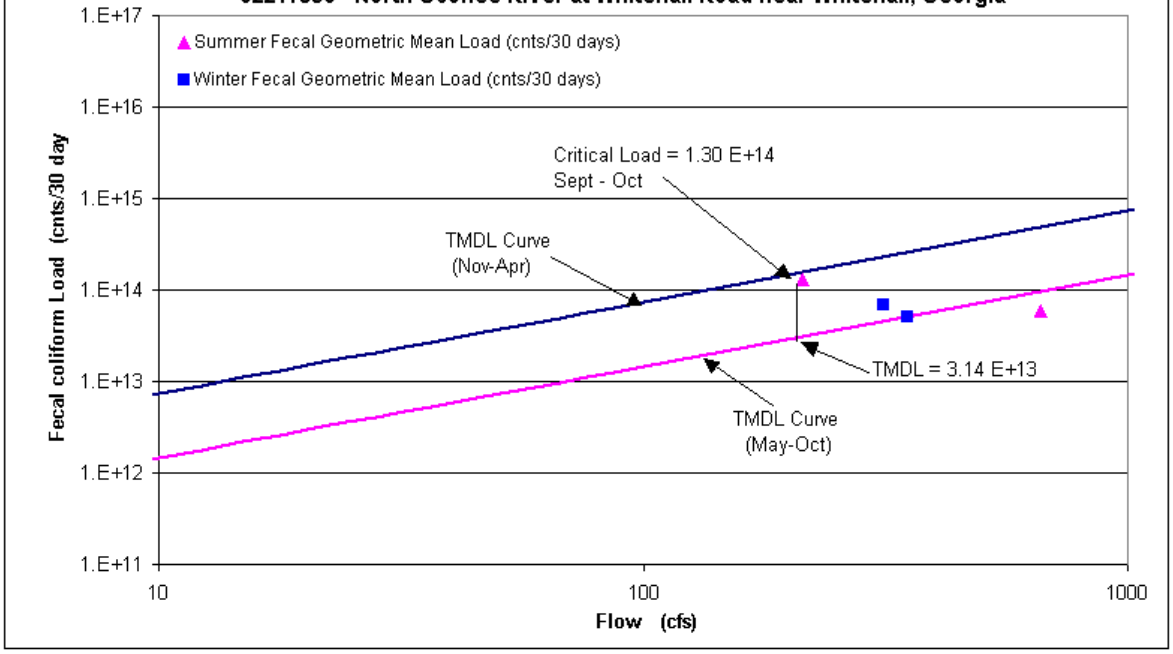


Table A-51. Data for Figure A-51

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
1-Apr-99	5400	580.0				
5-Apr-99	170	370.0				
22-Apr-99	20	225.0				
27-Apr-99	80	225.0	196	350.0	5.03E+13	2.57E+14
18-May-99	50	1500.0				
27-May-99	110	225.0				
17-Jun-99	340	260.0	123	661.7	5.98E+13	9.71E+13
22-Sep-99	170	100.0				
27-Sep-99	7000	95.0				
5-Oct-99	1700	290.0				
13-Oct-99	230	370.0	826	213.8	1.30E+14	3.14E+13
1-Dec-99	130	225.0				
14-Dec-99	2400	420.0				
16-Dec-99	330	380.0				
20-Dec-99	80	225.0	301	312.5	6.91E+13	2.29E+14

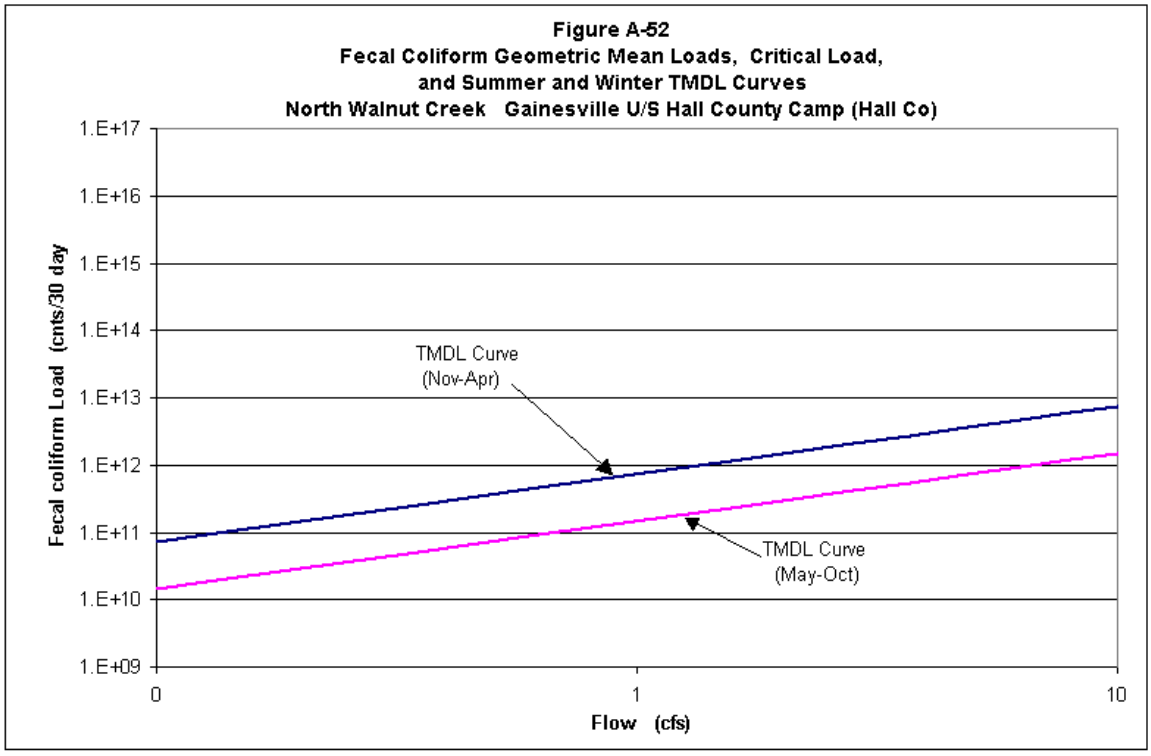


Table A-52. Data for Figure A-52

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
19-Jan-93	10	1.6				
4-Feb-93	18	1.4				
17-Mar-93	14	2.6				
13-Apr-93	12	2.2				
17-May-93	62	1.0				
22-Jun-93	94	0.6				
6-Jul-93	100	0.4				
17-Aug-93	**1533**	**0.4**				
15-Sep-93	6	0.2				
11-Oct-93	234	0.3				
2-Nov-93	58	0.8				
9-Dec-93	19	1.0				
8-Feb-94	2463	1.6				
13-Apr-94	1200	1.0				
15-Aug-94	470	1.0				
25-Aug-94	145	1.6				
17-Oct-94	84	2.5				
25-Jan-95	66	1.2				
17-Apr-95	96	1.1				
13-Jul-95	90	0.5				

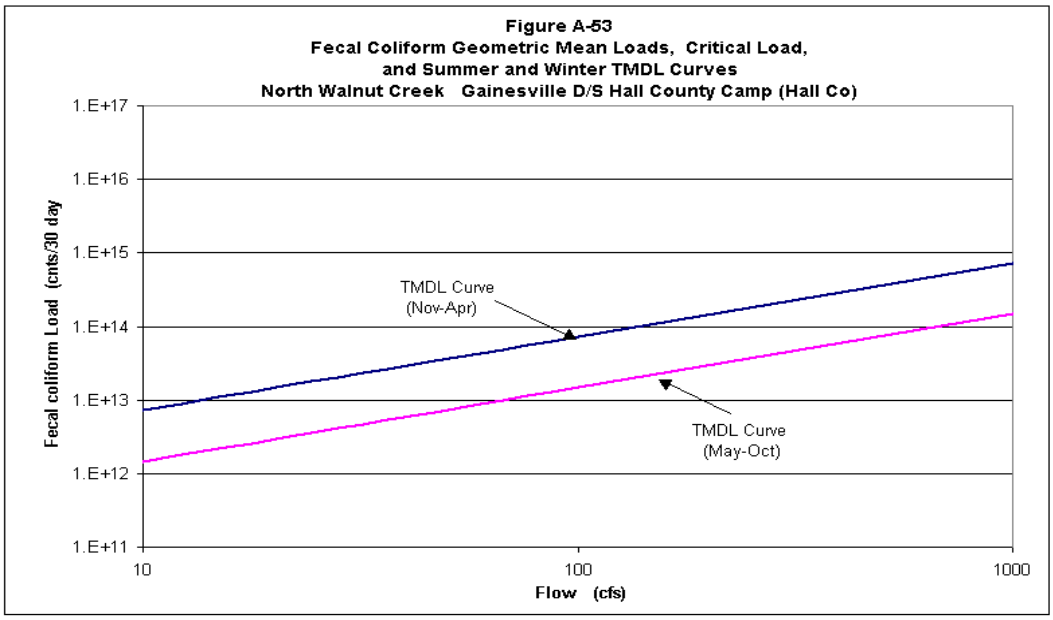


Table A-53. Data for Figure A-53

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
24-Jan-90	225	5.1				
20-Feb-90	250	31.9				
28-Mar-90	110	3.9				
18-Apr-90	131	2.7				
5-May-90	75	2.4				
11-Jun-90	331	1.2				
25-Jul-90	520	2.3				
22-Aug-90	2400	1.0				
19-Sep-90	270	1.3				
24-Oct-90	4800	2.3				
12-Dec-90	115	1.4				
19-Mar-91	85	2.6				
1-May-91	420	4.6				
28-Jun-91	600	4.2				
21-Aug-91	368000	2.7				
31-Oct-91	440	0.9				
27-Feb-92	103	7.5				
16-Apr-92	263	1.7				
16-Jun-92	2550	1.6				
6-Aug-92	878	0.6				
14-Oct-92	703	2.0				
8-Dec-92	17	3.4				
19-Jan-93	4	4.0				
4-Feb-93	430	3.3				
17-Mar-93	50	6.3				
13-Apr-93	22	5.3				
17-May-93	183	2.5				
22-Jun-93	54	1.5				
6-Jul-93	350	1.0				
17-Aug-93	400	1.0				
15-Sep-93	42	0.5				
11-Oct-93	177	0.8				
2-Nov-93	220	1.9				
9-Dec-93	95	2.3				
8-Feb-94	3200	3.9				
13-Apr-94	**8400**	**2.3**				
15-Aug-94	440	2.4				
25-Aug-94	130	3.9				
17-Oct-94	181	6.0				
25-Jan-95	346	2.9				
17-Apr-95	132	2.5				
13-Jul-95	807	1.1				
2-Nov-99	2600	0.7				

Figure A-54
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
02218000 Oconee River at Barnett Shoals Road near Athens, Georgia

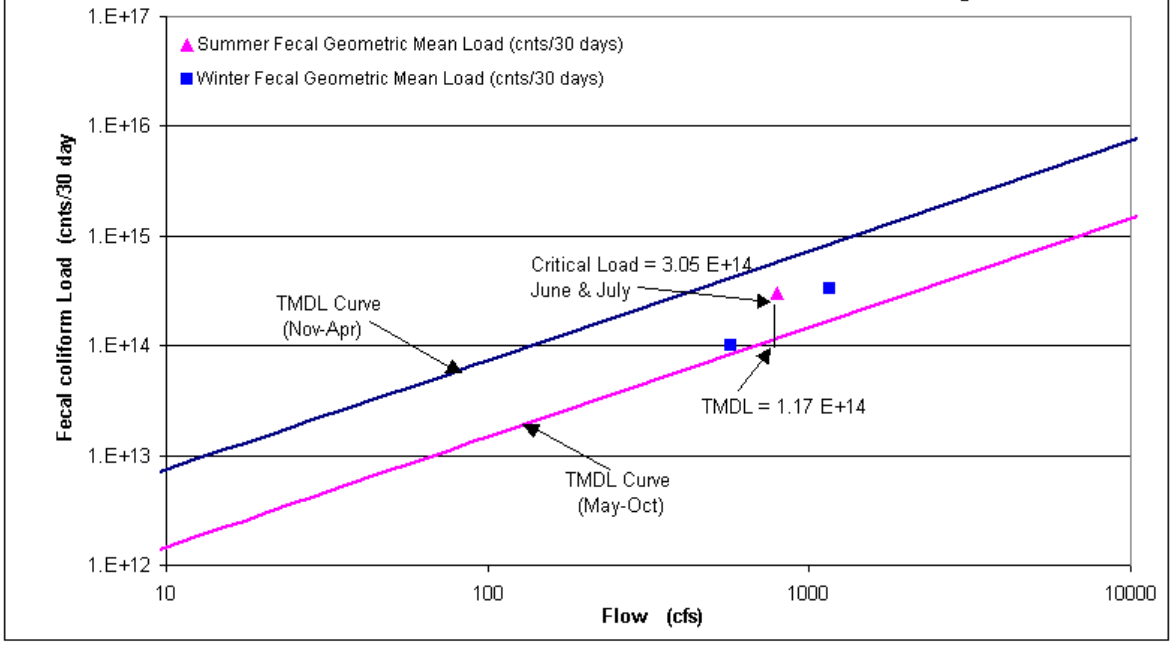


Table A-54. Data for Figure A-54

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
5-Feb-04	340	802.0				
12-Feb-04	1700	2000.0				
18-Feb-04	230	1170.0				
24-Feb-04	170	637.0	388	1152.3	3.28E+14	8.46E+14
9-Mar-04	330	653.0				
15-Mar-04	110	565.0				
24-Mar-04	800	497.0				
6-Apr-04	110	573.0	238	572.0	9.98E+13	4.20E+14
24-Jun-04	3500	902.0				
30-Jun-04	500	1050.0				
15-Jul-04	80	447.0	519	799.7	3.05E+14	1.17E+14

Figure A-55
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
02223600 Oconee River at Interstate Highway 16 near Dublin, Georgia

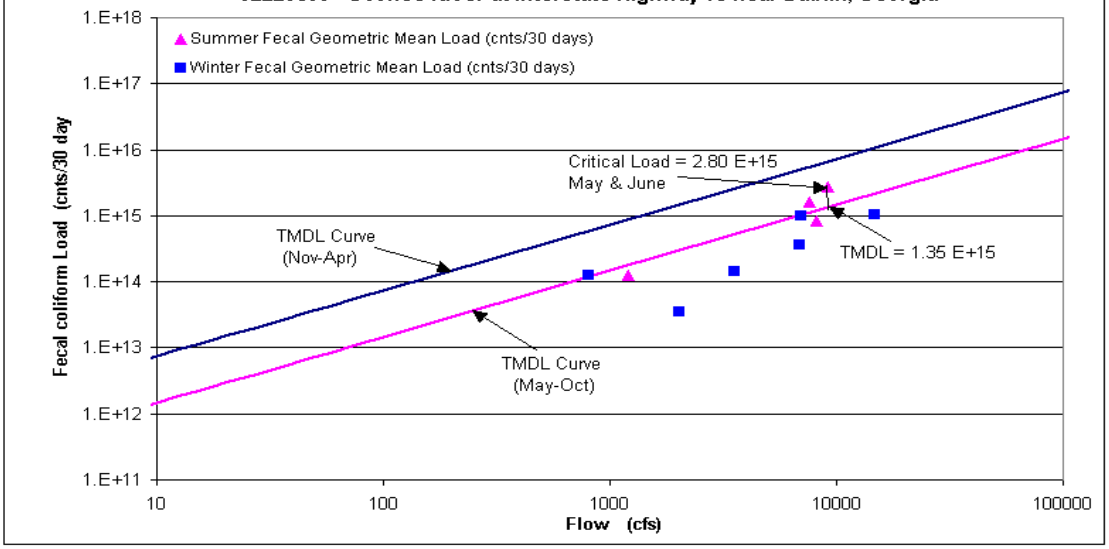


Table A-55. Data for Figure A-55

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
10-Feb-03	220	4800.0				
12-Feb-03	230	5620.0				
20-Feb-03	230	10600.0				
6-Mar-03	130	6970.0	197	6998	1.01E+15	5.14E+15
15-May-03	50	9380.0				
22-May-03	5400	12400.0				
5-Jun-03	490	2910.0				
12-Jun-03	220	12200.0	413	9223	2.80E+15	1.35E+15
10-Jul-03	170	15000.0				
24-Jul-03	790	6320.0				
31-Jul-03	110	3650.0				
7-Aug-03	460	5530.0	287	7625	1.61E+15	1.12E+15
20-Nov-03	330	682.8				
4-Dec-03	20	508.7				
11-Dec-03	230	833.0				
18-Dec-03	1300	1212.0	211	809	1.25E+14	5.94E+14
24-Feb-04	80	4050.0				
2-Mar-04	130	5380.0				
16-Mar-04	40	2600.0				
24-Mar-04	20	2210.0	54	3560	1.40E+14	2.61E+15
24-Mar-04	20	2210.0				
30-Mar-04	20	2060.0				
6-Apr-04	40	1940.0				
14-Apr-04	20	1930.0	24	2035	3.55E+13	1.49E+15
15-Jun-04	70	1200.0				
21-Jun-04	300	1260.0				
23-Jun-04	130	1150.0	140	1203	1.23E+14	1.77E+14
9-Feb-05	110	8730.0				
16-Feb-05	20	4640.0				
3-Mar-05	70	9660.0				
9-Mar-05	170	4460.0	72	6873	3.61E+14	5.04E+15
30-Mar-05	490	19400.0				
6-Apr-05	20	24700.0				
14-Apr-05	130	10300.0				
20-Apr-05	70	4770.0	97	14793	1.06E+15	1.09E+16
13-Jul-05	330	10200.0				
18-Jul-05	20	10300.0				
4-Aug-05	110	4200.0				
11-Aug-05	490	8150.0	137	8213	8.28E+14	1.21E+15

Figure A-56
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
Oconee River at Georgia Highway 15 near Penfield, Georgia

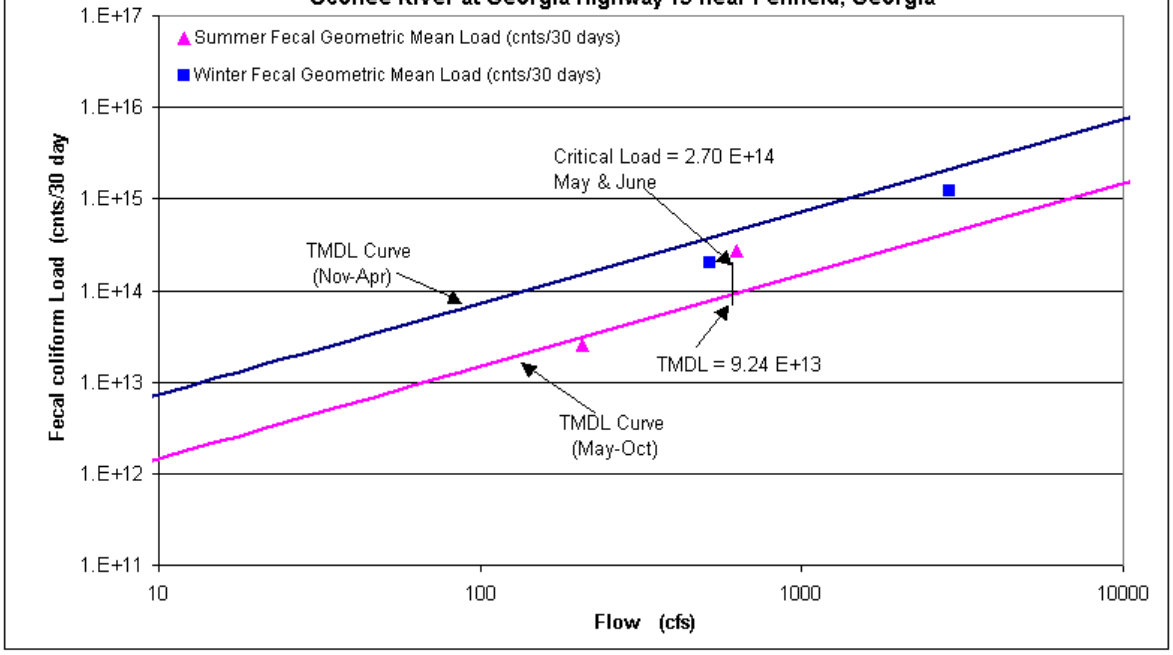


Table A-56. Data for Figure A-56

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
6-Jan-99	3100	948.0				
20-Jan-99	20	736.0				
26-Jan-99	490	1720.0				
3-Feb-99	3500	8160.0	571	2891.0	1.21E+15	2.12E+15
25-May-99	330	570.0				
8-Jun-99	220	379.0				
16-Jun-99	7000	1060.0				
22-Jun-99	230	510.0	585	629.8	2.70E+14	9.24E+13
27-Jul-99	130	376.0				
10-Aug-99	70	241.0				
17-Aug-99	170	67.0				
24-Aug-99	490	148.0	166	208.0	2.53E+13	3.05E+13
9-Nov-99	310	441.0				
16-Nov-99	310	401.0				
23-Nov-99	1700	466.0				
7-Dec-99	460	759.0	524	516.8	1.99E+14	3.79E+14

Figure A-57
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
Pond Fork at Greggs Road near Gainesville, Georgia

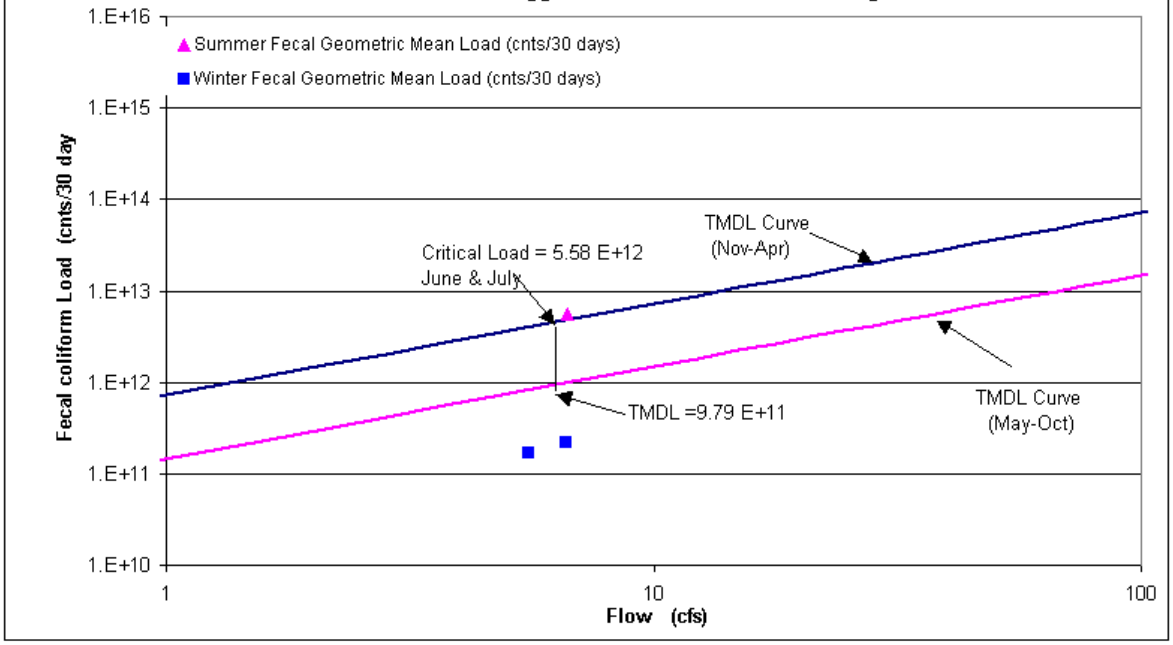


Table A-57. Data for Figure A-57

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
3-Feb-04	70	6.2				
10-Feb-04	20	6.2				
17-Feb-04	60	8.8				
25-Feb-04	50	5.2	45	6.6	2.19E+11	4.84E+12
8-Mar-04	70	4.3				
16-Mar-04	20	6.2				
22-Mar-04	20	7.4				
5-Apr-04	110	4.3	42	5.6	1.71E+11	4.07E+12
23-Jun-04	9200	8.8				
28-Jun-04	230	8.8				
13-Jul-04	700	2.4	1140	6.7	5.58E+12	9.79E+11

Figure A-58
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
02216940 Pond Fork at Wayne Poultry Road near Pendergrass, Georgia

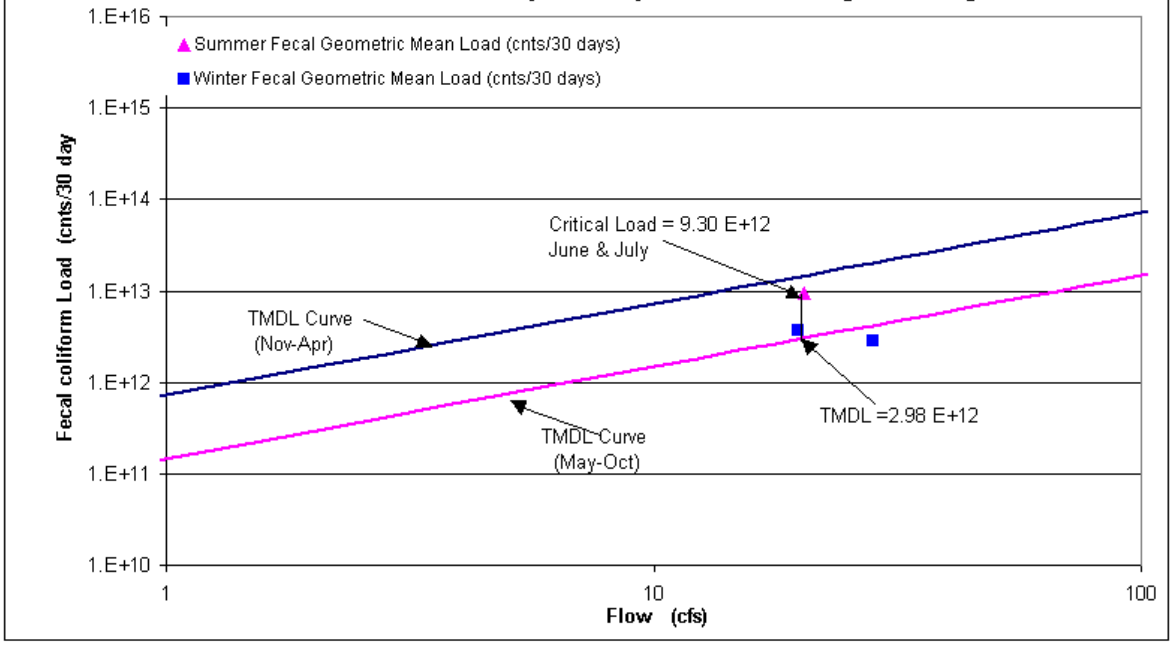


Table A-58. Data for Figure A-58

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
3-Feb-04	490	30.0				
10-Feb-04	110	27.0				
17-Feb-04	130	32.0				
25-Feb-04	50	24.0	137	28.3	2.84E+12	2.07E+13
8-Mar-04	170	21.0				
16-Mar-04	300	20.0				
23-Mar-04	170	20.0				
5-Apr-04	490	18.0	255	19.8	3.70E+12	1.45E+13
22-Jun-04	220	14.0				
28-Jun-04	5000	32.0				
13-Jul-04	220	15.0	623	20.3	9.30E+12	2.98E+12

Figure A-59
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
Richland Creek Interstate 20 to Beaverdam Creek (Greene Co)

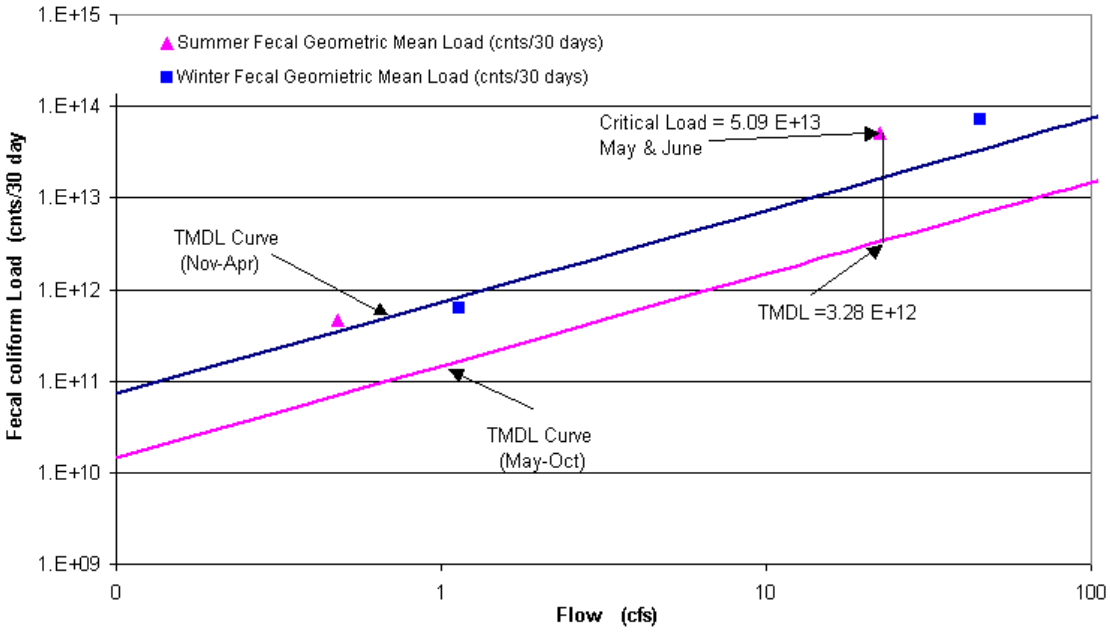


Table A-59. Data for Figure A-59

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
6-Jan-99	5400	6.9				
20-Jan-99	130	86.0				
26-Jan-99	5400	3.7				
3-Feb-99	5400	86.0	2127	45.7	7.13E+13	3.35E+13
25-May-99	2200	1.2				
14-Jun-99	5400	0.9				
16-Jun-99	17000	86.0				
22-Jun-99	460	1.3	3105	22.3	5.09E+13	3.28E+12
27-Jul-99	1300	0.8				
10-Aug-99	330	0.4				
17-Aug-99	5400	0.4				
24-Aug-99	1300	0.4	1317	0.5	4.67E+11	7.08E+10
9-Nov-99	490	0.9				
16-Nov-99	490	1.3				
23-Nov-99	1100	1.4				
7-Dec-99	1300	1.0	765	1.1	6.36E+11	8.31E+11

Figure A-60
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
02220310 Richland Creek at Ga. Hwy 15 near Greensboro, Georgia

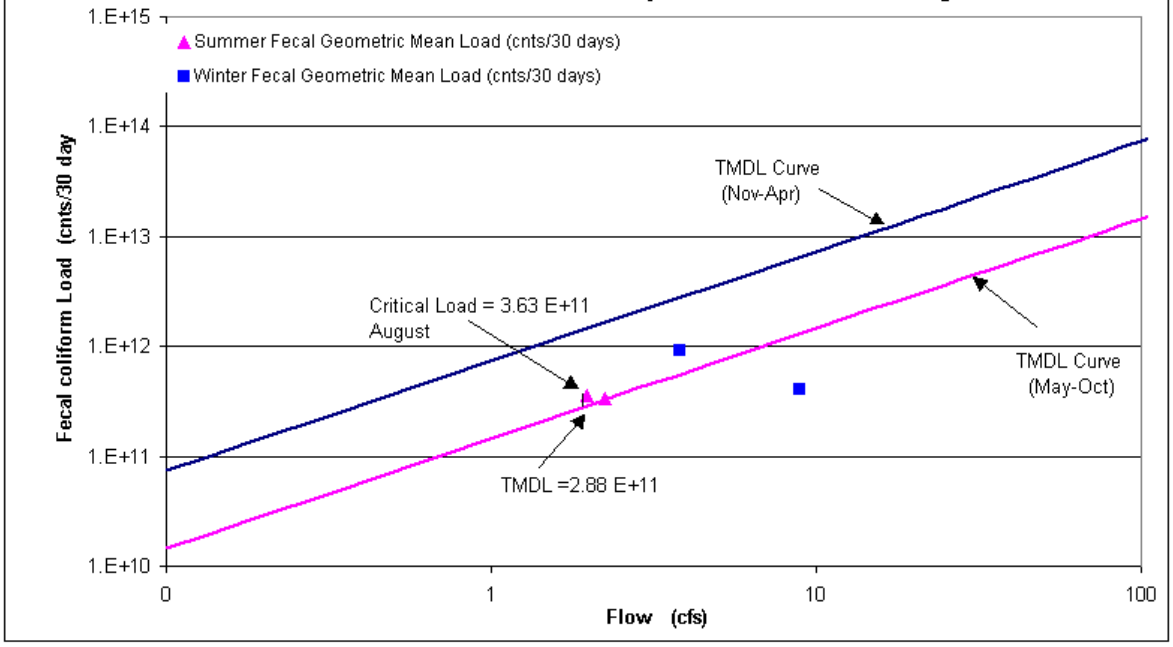


Table A-60. Data for Figure A-60

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
13-Apr-04	1300	7.8				
15-Apr-04	80	3.7				
27-Apr-04	800	2.0				
29-Apr-04	130	1.8	322	3.8	9.05E+11	2.81E+12
4-May-04	230	4.0				
11-May-04	170	3.1				
18-May-04	170	1.0				
25-May-04	260	0.8	204	2.2	3.34E+11	3.28E+11
3-Aug-04	80	0.4				
10-Aug-04	20	0.3				
17-Aug-04	500	0.5				
25-Aug-04	5000	6.7	251	2.0	3.63E+11	2.88E+11
9-Nov-04	80	8.9				
16-Nov-04	70	8.9				
30-Nov-04	40	8.9				
7-Dec-04	70	8.9	63	8.9	4.11E+11	6.53E+12

Figure A-61
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
02220735 Rooty Creek at Martin Luther King Jr. Drive (County Road 90) near Eatonton

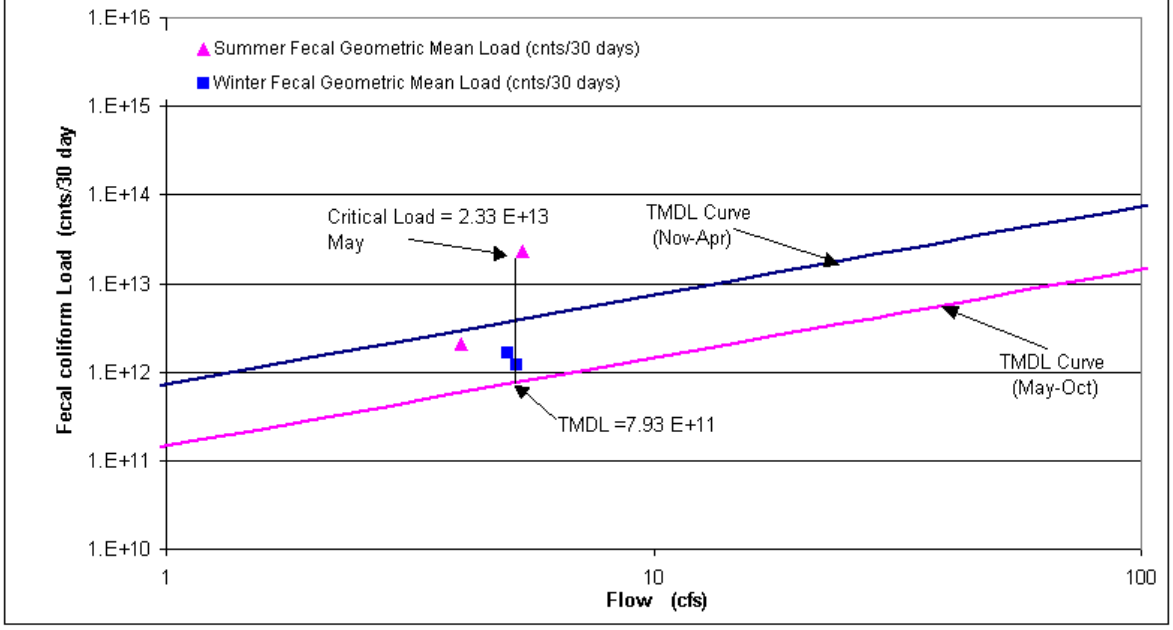


Table A-60. Data for Figure A-61

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
12-Apr-04	220	5.4				
14-Apr-04	300	5.4				
26-Apr-04	1700	5.1				
28-Apr-04	80	5.1	308	5.3	1.19E+12	3.85E+12
3-May-04	16000	5.4				
12-May-04	5000	5.4				
19-May-04	3000	5.4				
26-May-04	5000	5.4	5886	5.4	2.33E+13	7.93E+11
5-Aug-04	800	4.6				
11-Aug-04	300	1.0				
18-Aug-04	700	5.4				
24-Aug-04	1400	5.1	696	4.0	2.06E+12	5.91E+11
17-Nov-04	500	3.9				
23-Nov-04	500	5.4				
1-Dec-04	500	5.4				
8-Dec-04	300	5.4	440	5.0	1.62E+12	3.69E+12

Figure A-62
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
02220095 Sugar Creek at Mount Zion Road (County Road 134) near Buckhead, Georgia

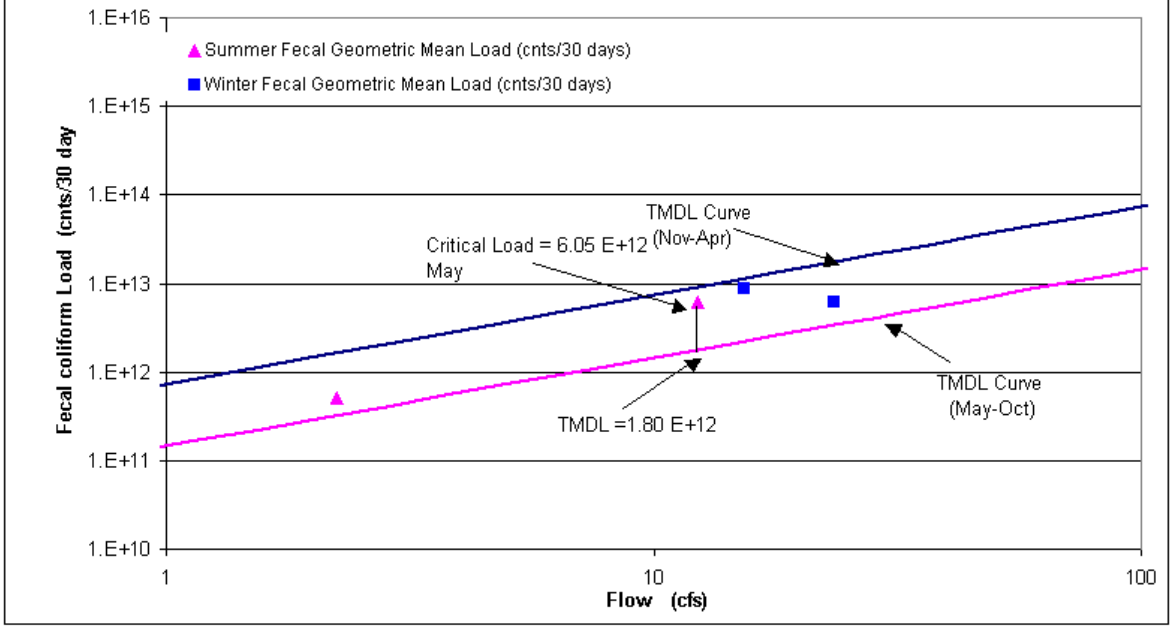


Table A-61. Data for Figure A-62

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
13-Apr-04	2200	18.9				
15-Apr-04	270	17.4				
27-Apr-04	700	14.1				
29-Apr-04	800	11.2	759	15.4	8.58E+12	1.13E+13
3-May-04	3000	24.3				
12-May-04	500	10.0				
18-May-04	500	8.5				
25-May-04	270	6.4	671	12.3	6.05E+12	1.80E+12
3-Aug-04	220	1.9				
10-Aug-04	170	1.4				
17-Aug-04	500	2.9				
24-Aug-04	500	2.7	311	2.2	5.12E+11	3.29E+11
9-Nov-04	300	14.5				
16-Nov-04	800	19.5				
30-Nov-04	1700	33.8				
7-Dec-04	40	25.7	357	23.4	6.13E+12	1.72E+13

Figure A-63
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
02217906 Tanyard Creek at East Campus Drive near Athens, Georgia

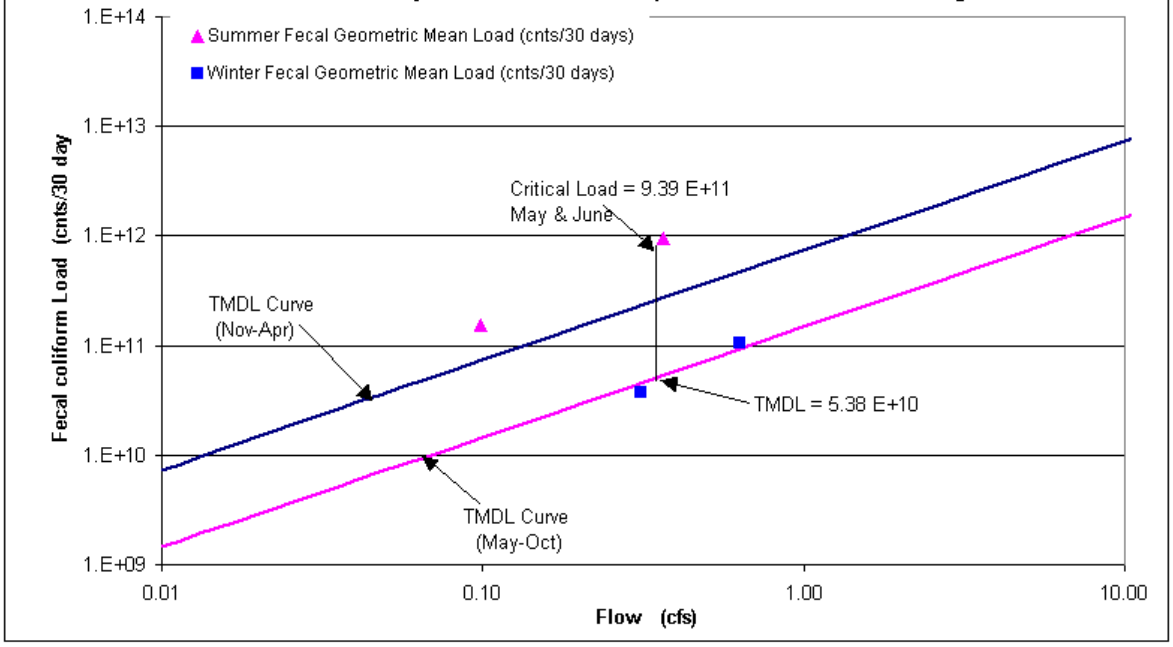


Table A-62. Data for Figure A-63

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
15-Mar-99	20	1.0				
18-Mar-99	230	0.6				
30-Mar-99	170	0.5				
31-Mar-99	3500	0.5	229	0.6	1.06E+11	4.64E+11
3-May-99	490	0.3				
6-May-99	24000	0.4				
19-May-99	16000	0.4				
26-May-99	790	0.3	3492	0.4	9.39E+11	5.38E+10
7-Sep-99	5400	0.1				
8-Sep-99	740	0.1				
21-Sep-99	1400	0.1				
4-Oct-99	3500	0.2	2104	0.1	1.53E+11	1.45E+10
1-Nov-99	330	0.2				
9-Nov-99	330	0.2				
22-Nov-99	330	0.3				
29-Nov-99	20	0.5	164	0.3	3.76E+10	2.29E+11

Figure A-64
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
02218460 Town Creek at Cold Springs Road near Greensboro, Georgia

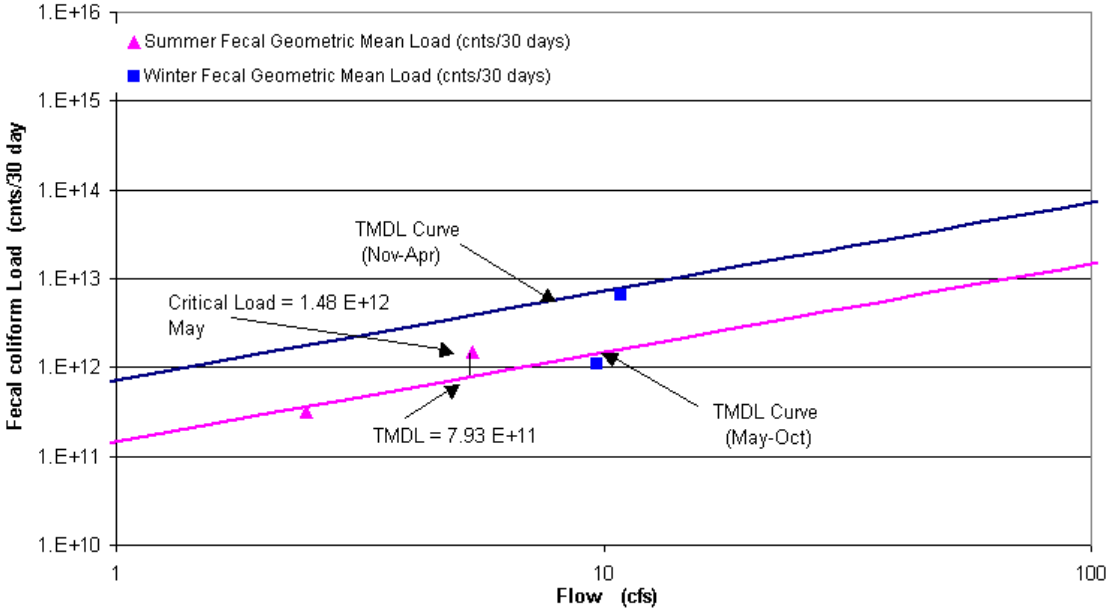


Table A-63. Data for Figure A-64

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
13-Apr-04	5000	13.0				
15-Apr-04	300	12.0				
27-Apr-04	1300	13.0				
29-Apr-04	230	5.5	818	10.9	6.53E+12	7.98E+12
4-May-04	300	10.0				
11-May-04	500	5.2				
18-May-04	260	3.4				
25-May-04	500	3.0	374	5.4	1.48E+12	7.93E+11
3-Aug-04	140	2.3				
10-Aug-04	230	1.7				
17-Aug-04	230	3.6				
25-Aug-04	130	2.2	176	2.5	3.17E+11	3.60E+11
9-Nov-04	40	5.8				
16-Nov-04	1100	6.9				
30-Nov-04	170	13.0				
7-Dec-04	80	13.0	156	9.7	1.11E+12	7.10E+12

Figure A-65
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
02220360 Town Creek at Ga. Hwy 44 near Greensboro, Georgia

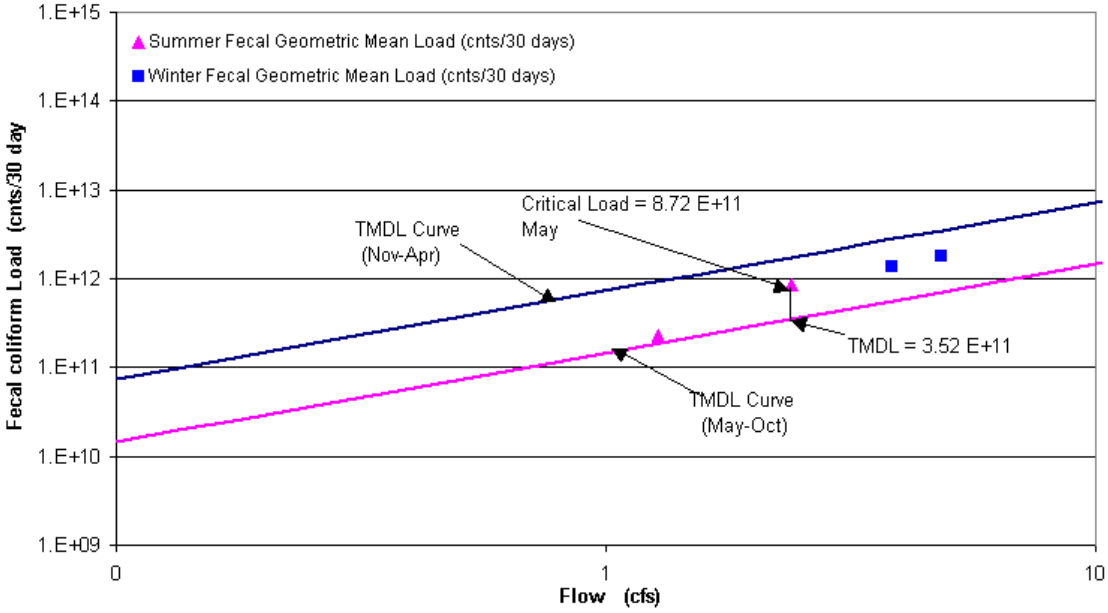


Table A-64. Data for Figure A-65

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
13-Apr-04	5000	4.9				
15-Apr-04	300	4.6				
27-Apr-04	230	1.0				
29-Apr-04	170	4.9	492	3.9	1.39E+12	2.83E+12
4-May-04	800	4.1				
11-May-04	500	2.7				
18-May-04	500	1.8				
25-May-04	300	1.0	495	2.4	8.72E+11	3.52E+11
3-Aug-04	300	1.4				
10-Aug-04	170	0.8				
17-Aug-04	500	1.6				
24-Aug-04	130	1.3	240	1.3	2.26E+11	1.88E+11
9-Nov-04	500	3.5				
16-Nov-04	2400	3.8				
30-Nov-04	500	6.0				
7-Dec-04	110	6.0	507	4.8	1.80E+12	3.54E+12

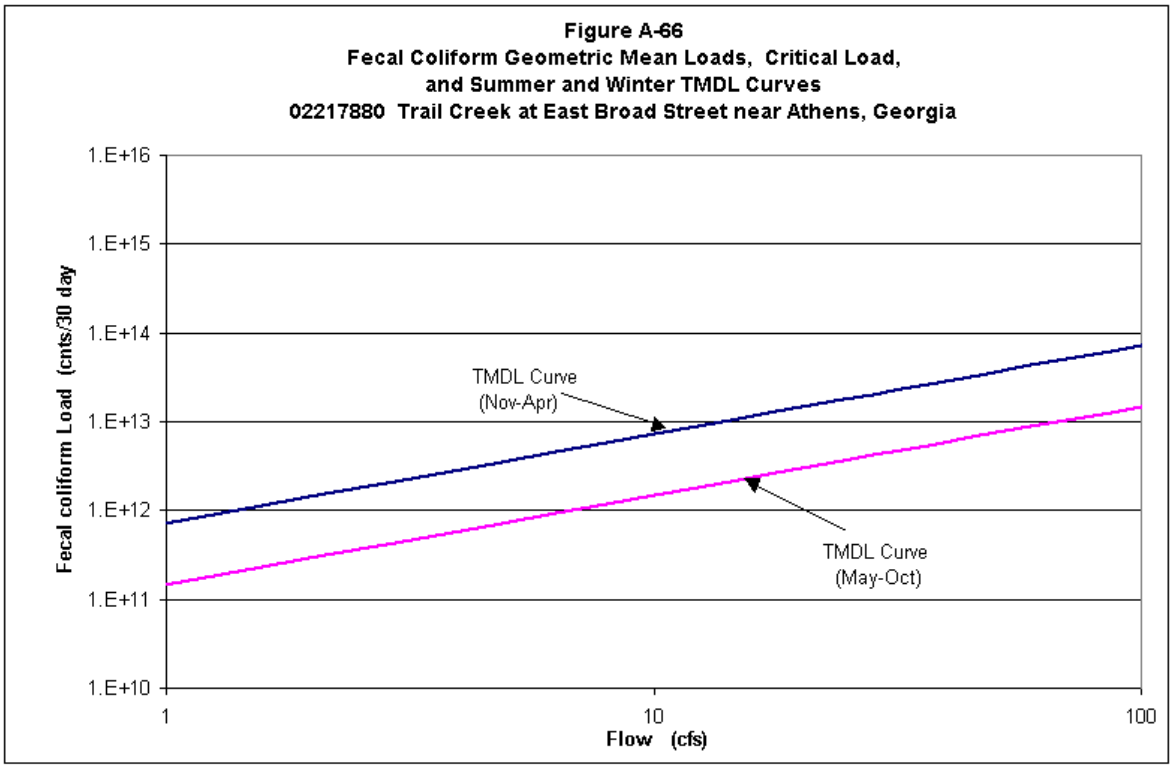


Table A-65. Data for Figure A-66

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
11-Mar-04	230	14.0				
18-Mar-04	130	7.0				
23-Mar-04	170	20.0				
8-Apr-04	**16000**	**20.0**	534.0	15.3	5.98E+12	1.12E+13
4-May-04	300	7.8				
10-May-04	500	3.0				
17-May-04	400	3.5				
24-May-04	170	3.0	317.8	4.3	1.01E+12	6.35E+11
2-Aug-04	230	3.0				
10-Aug-04	2400	3.0				
16-Aug-04	220	3.0				
25-Aug-04	300	7.0	436.9	4.0	1.28E+12	5.87E+11
9-Nov-04	20	4.6				
15-Nov-04	170	7.0				
29-Nov-04	1100	20.0				
6-Dec-04	300	20.0	183.0	12.9	1.73E+12	9.47E+12

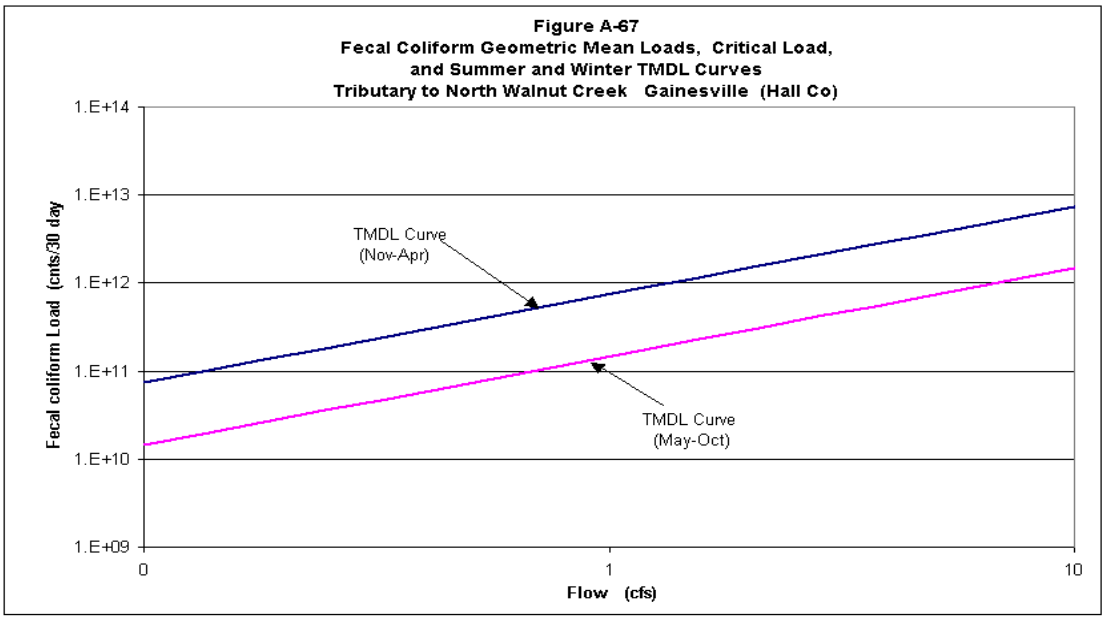


Table A-43. Data for Figure A-67

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
24-Jan-90	313	0.9				
20-Feb-90	336	5.5				
28-Mar-90	263	0.7				
18-Apr-90	243	0.5				
5-May-90	185	0.4				
11-Jun-90	330	0.2				
25-Jul-90	2000	0.4				
22-Aug-90	4400	0.2				
19-Sep-90	1000	0.2				
24-Oct-90	2500	0.4				
12-Dec-90	1381	0.2				
19-Mar-91	800	0.4				
1-May-91	2600	0.8				
28-Jun-91	3000	0.7				
21-Aug-91	348	0.5				
31-Oct-91	2200	0.2				
27-Feb-92	410	1.3				
16-Apr-92	1371	0.3				
16-Jun-92	21400	0.3				
6-Aug-92	4300	0.1				
14-Oct-92	5300	0.3				
8-Dec-92	153	0.6				
19-Jan-93	140	0.7				
4-Feb-93	4800	0.6				
17-Mar-93	445	1.1				
13-Apr-93	116	0.9				
17-May-93	360	0.4				
22-Jun-93	109	0.3				
6-Jul-93	2840	0.2				
17-Aug-93	426	0.2				
15-Sep-93	203	0.1				
11-Oct-93	450	0.1				
2-Nov-93	1060	0.3				
9-Dec-93	410	0.4				
8-Feb-94	2560	0.7				
13-Apr-94	**8320**	**0.4**				
15-Aug-94	680	0.4				
25-Aug-94	447	0.7				
17-Oct-94	660	1.0				
25-Jan-95	1760	0.5				
17-Apr-95	400	0.4				
13-Jul-95	520	0.2				
2-Nov-99	590	0.1				

Figure A-68
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
02224100 Turkey Creek at U.S. Highway 441 near Dublin, Georgia

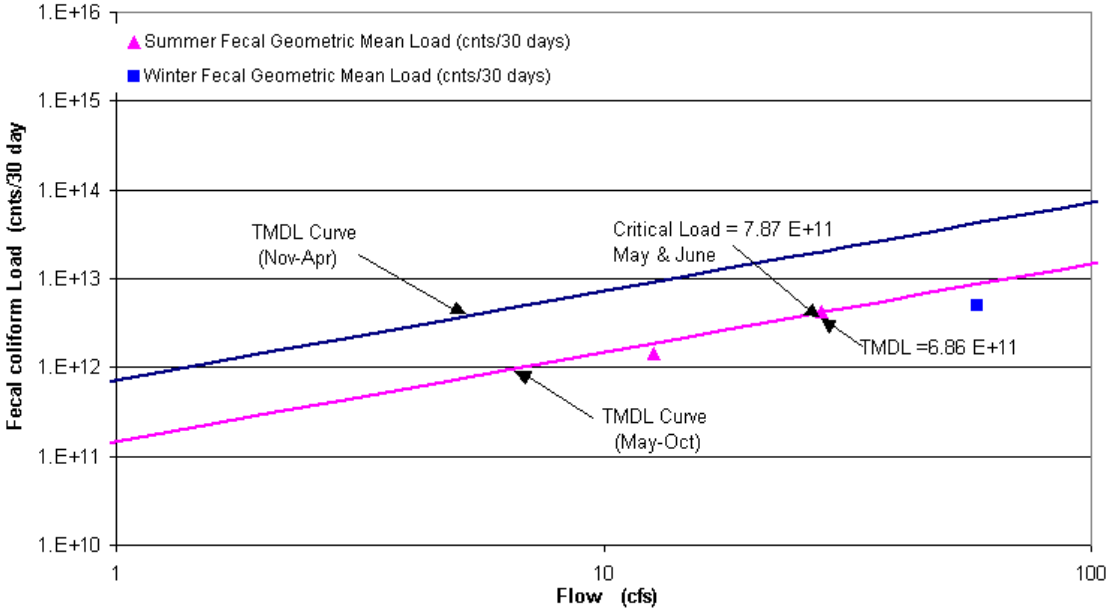


Table A-67. Data for Figure A-68

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
28-Jan-99	70	500.0				
11-Feb-99	330	492.0				
18-Feb-99	790	341.0				
25-Feb-99	50	270.0	174	400.8	5.11E+13	2.94E+14
13-May-99	790	63.0				
20-May-99	80	27.0				
3-Jun-99	130	13.0				
10-Jun-99	230	8.6	208	27.9	4.27E+12	4.10E+12
19-Aug-99	230	2.3				
26-Aug-99	170	40.0				
2-Sep-99	110	6.2				
16-Sep-99	140	2.3	157	12.7	1.46E+12	1.86E+12
18-Nov-99	230	37.0				
2-Dec-99	130	56.0				
9-Dec-99	80	55.0				
16-Dec-99	80	86.0	118	58.5	5.05E+12	4.29E+13

Figure A-69
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
02223940 Turkey Creek at Walke Dairy Road (County Road 338) near Dudley, Georgia

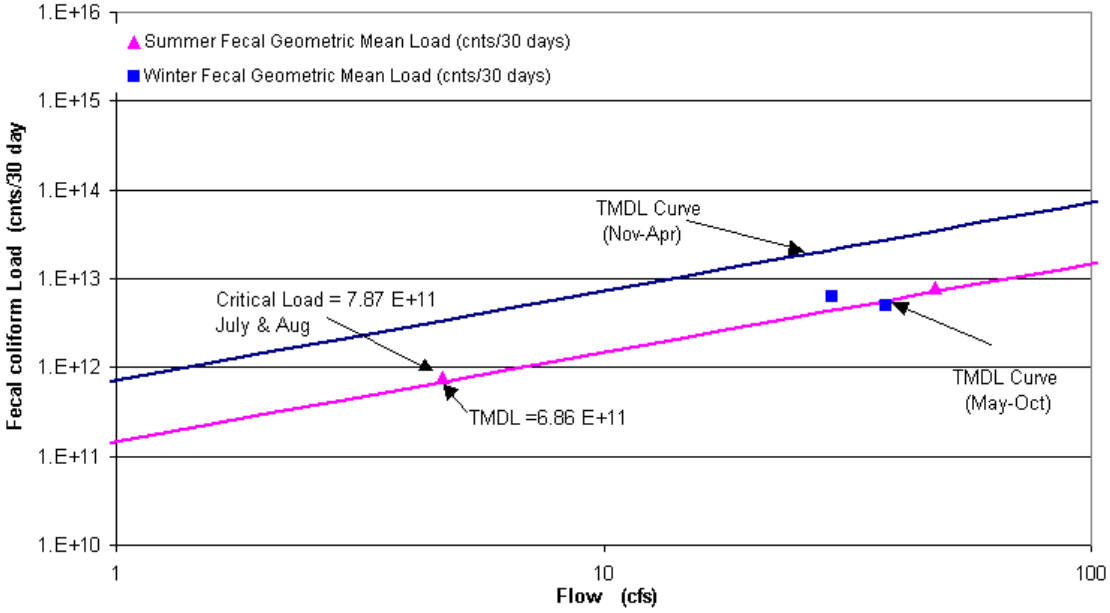


Table A-68. Data for Figure A-69

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
31-Mar-04	170	39.0				
8-Apr-04	500	24.0				
14-Apr-04	110	34.0				
28-Apr-04	800	21.0	294	29.5	6.37E+12	2.17E+13
21-Jul-04	210	5.5				
28-Jul-04	206	4.8				
10-Aug-04	80	3.1				
19-Aug-04	800	5.3	229	4.7	7.87E+11	6.86E+11
29-Sep-04	800	88.0				
7-Oct-04	80	41.0				
14-Oct-04	140	30.0				
26-Oct-04	300	32.0	228	47.8	7.98E+12	7.01E+12
4-Nov-04	230	23.0				
8-Nov-04	130	26.0				
17-Nov-04	300	24.0				
30-Nov-04	110	79.0	177	38.0	4.94E+12	2.79E+13

Figure A-70
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
02217100 Walnut Creek at Tanners Mill Road (SR211) near Talmo, Georgia

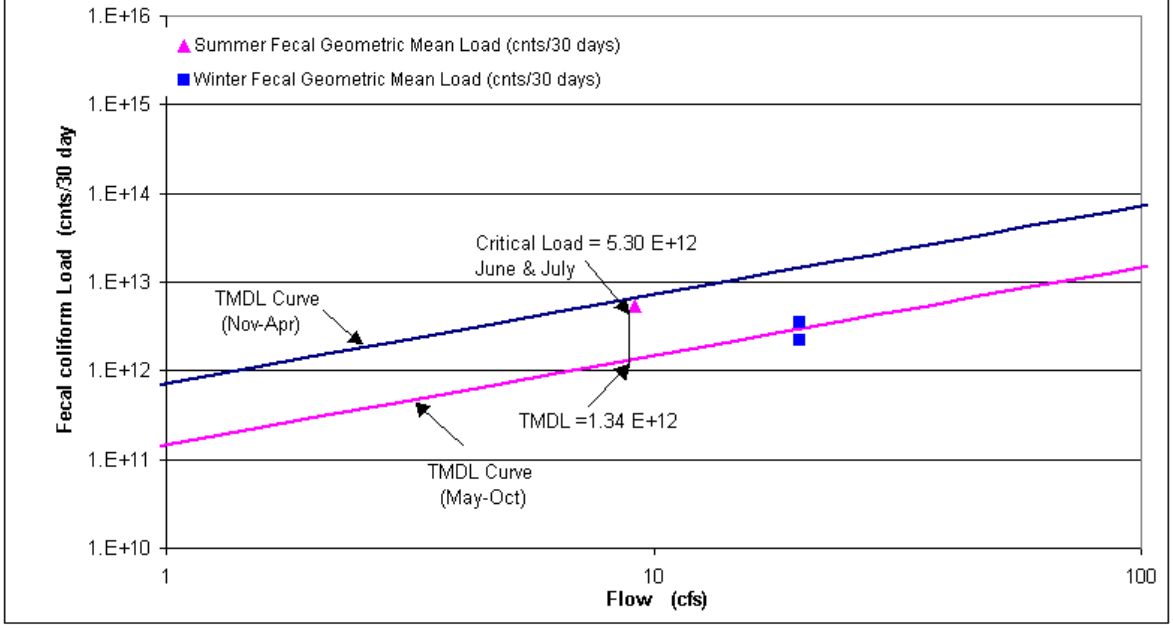


Table A-69. Data for Figure A-70

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
3-Feb-04	490	20.0				
10-Feb-04	40	20.0				
17-Feb-04	500	20.0				
25-Feb-04	330	20.0	238	20.0	3.50E+12	1.47E+13
8-Mar-04	430	20.0				
16-Mar-04	130	20.0				
22-Mar-04	40	20.0				
5-Apr-04	230	20.0	151	20.0	2.21E+12	1.47E+13
22-Jun-04	330	4.3				
28-Jun-04	3000	20.0				
13-Jul-04	500	3.1	791	9.1	5.30E+12	1.34E+12

Figure A-71
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
02217845 West Fork Trail Creek at U.S. 29 near Athens, Georgia

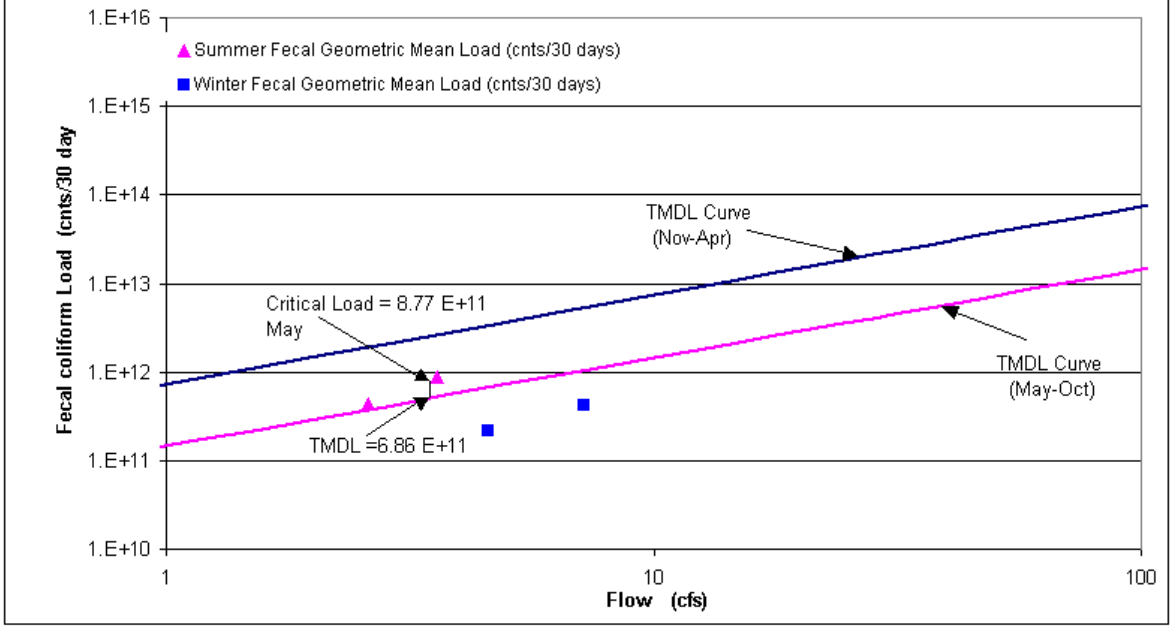


Table A-70. Data for Figure A-71

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
11-Mar-04	70	5.2				
18-Mar-04	80	5.0				
23-Mar-04	40	4.5				
8-Apr-04	80	3.5	65	4.6	2.18E+11	3.35E+12
4-May-04	110	4.1				
11-May-04	2800	2.8				
17-May-04	500	4.4				
25-May-04	80	3.0	333	3.6	8.77E+11	5.27E+11
2-Aug-04	300	3.6				
10-Aug-04	80	1.2				
16-Aug-04	110	3.5				
25-Aug-04	1100	2.1	232	2.6	4.43E+11	3.82E+11
9-Nov-04	220	4.8				
15-Nov-04	20	5.7				
29-Nov-04	40	9.9				
6-Dec-04	220	8.3	79	7.2	4.16E+11	5.27E+12

Figure A-72
Fecal Coliform Geometric Mean Loads, Critical Load, and Summer and Winter TMDL Curves
Wheeler Creek Headwaters to Duncan Creek (Gwinnett/Barrow Co)

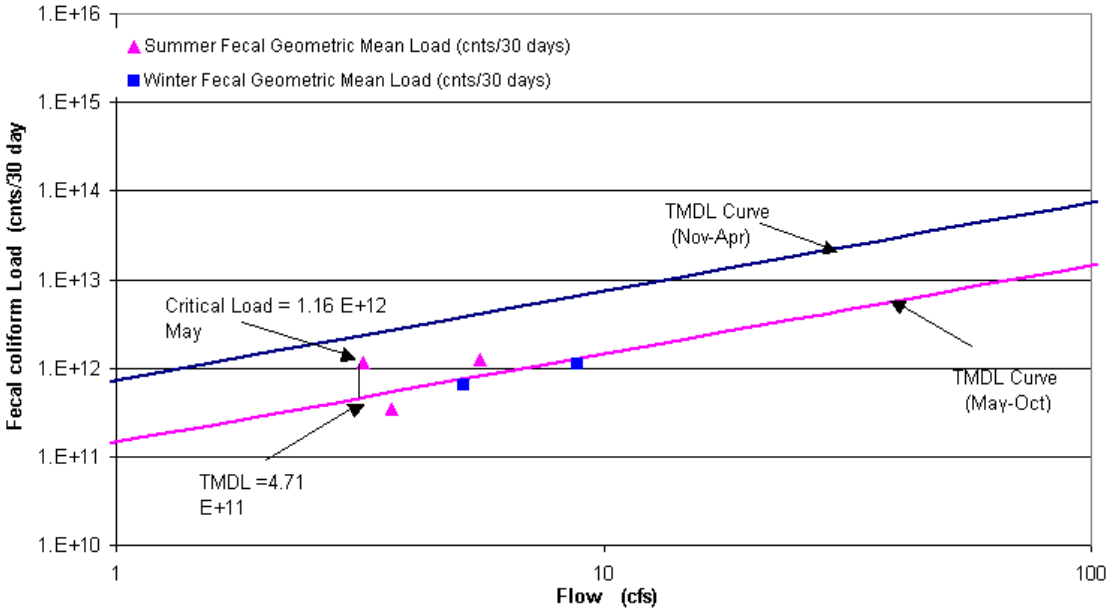
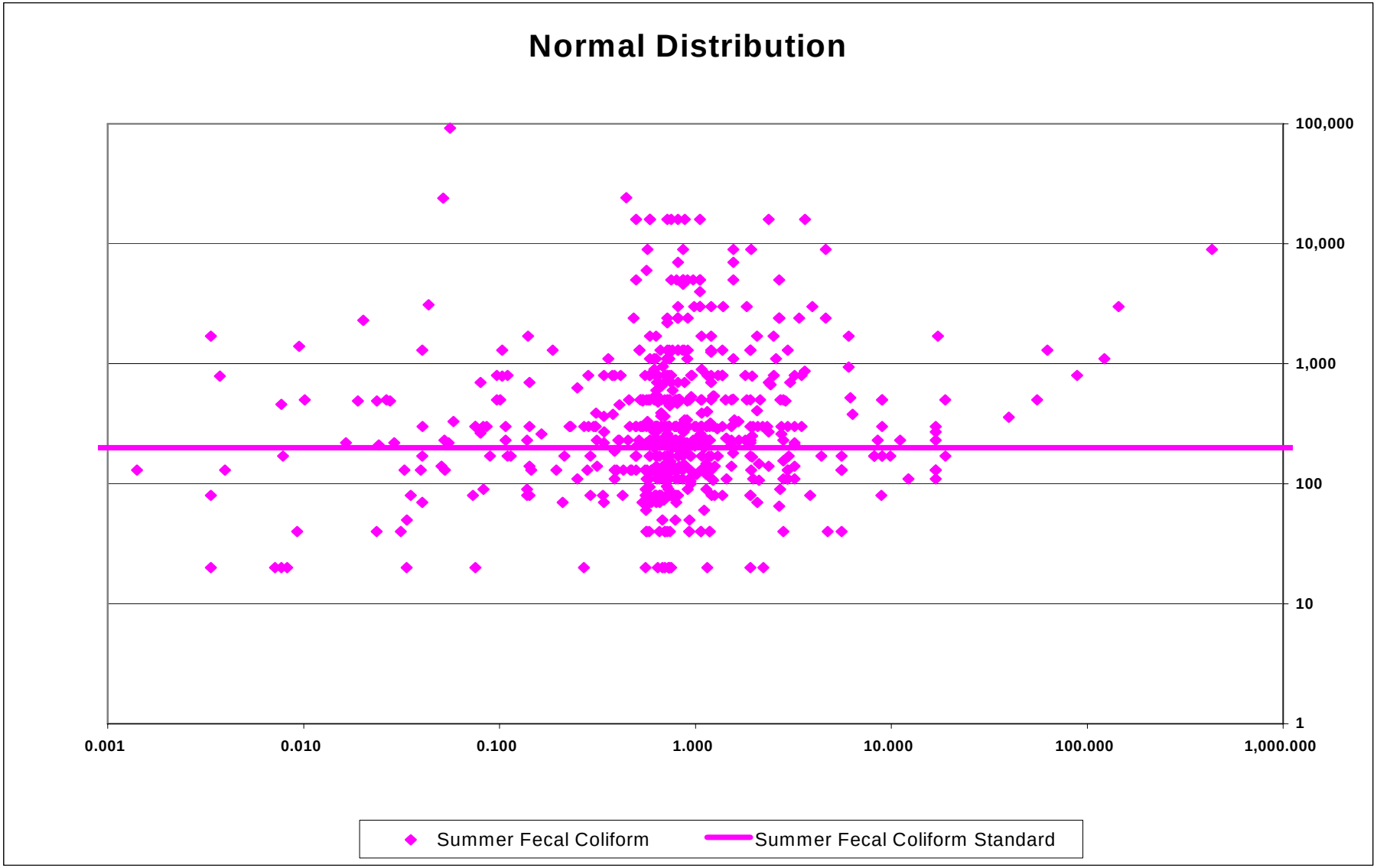


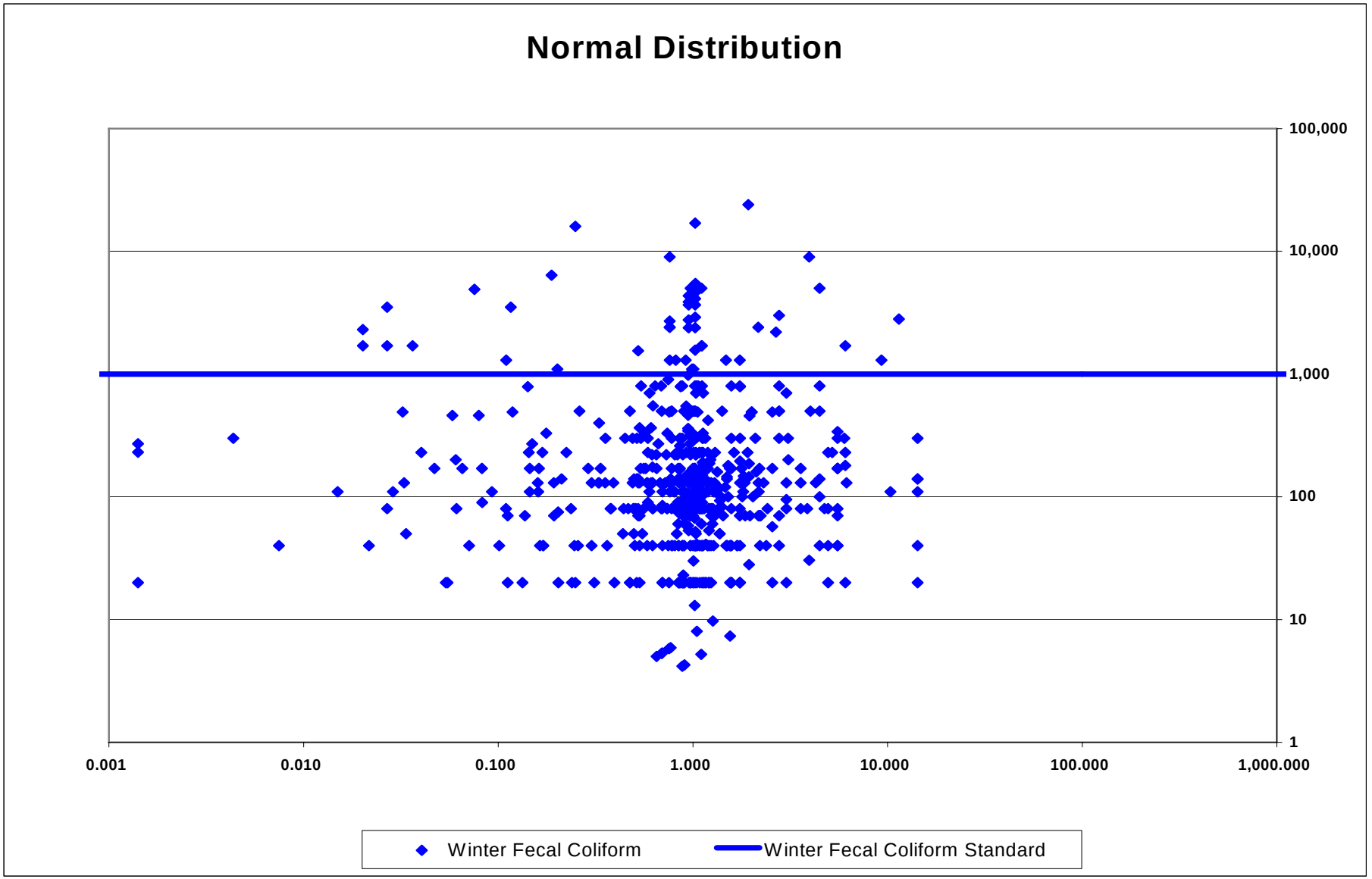
Table A-71. Data for Figure A-72

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
4-May-04	840	3.6				
11-May-04	167	2.4				
18-May-04	700	4.2				
25-May-04	593	2.6	491	3.2	1.16E+12	4.71E+11
12-Oct-04	267	4.4				
19-Oct-04	47	3.5				
26-Oct-04	127	3.4				
26-Oct-04	173	3.4	129	3.7	3.46E+11	5.38E+11
4-Jan-05	100	5.4				
11-Jan-05	360	4.4				
18-Jan-05	150	5.3				
25-Jan-05	155	5.5	170	5.2	6.44E+11	3.78E+12
5-Apr-05	257	11.0				
12-Apr-05	193	9.8				
19-Apr-05	160	7.2				
28-Apr-05	100	7.4	168	8.9	1.09E+12	6.50E+12
10-May-05	263	5.2				
17-May-05	440	6.9				
24-May-05	237	4.5				
31-May-05	290	5.7	299	5.6	1.23E+12	8.21E+11

Appendix B

Normalized Flows Versus Fecal Coliform Plots


Normal Distribution
100,000
10,000
1,000
100
10
1
0.001
0.010
0.100
1.000
10.000
100.000
1,000.000
Summer Fecal Coliform
Summer Fecal Coliform Standard


Normal Distribution
100,000
10,000
1,000
100
10
1
0.001
0.010
0.100
1.000
10.000
100.000
1,000.000
Winter Fecal Coliform
Winter Fecal Coliform Standard