TOTAL MAXIMUM DAILY LOADs (TMDLs)

For

Fecal Coliform

In

303(d) Listed Streams in The Oconee River Basin

Allen Creek - (Monroe Drive to 1 mile D/S GA. Hwy 11)
Little Commissioner Cr. - (Ga Hwy 18 to Commissioner Cr.)
North Walnut Creek - (Gainesville D/S Hall County Camp)
North Walnut Creek - (Gainesville U/S Hall County Camp)
Town Creek - (Peavy Branch to Oconee River)
Tributary 2 to Allen Creek - (Gainesville D/S Old Landfill)
Tributary 5 to Allen Creek - (Gainesville)
Tributary 7 to Allen Creek - (Gainesville W. of New Landfill)
Tributary 8 to Allen Creek - (Gainesville E. of New Landfill)
Tributary to N. Walnut Creek - (Gainesville)
Walnut Creek - (Caney Fork to Middle Oconee River)

Submitted to:

U.S. Environmental Protection Agency, Region 4

Prepared by:

Georgia Department of Natural Resources
Environmental Protection Division
Atlanta, Georgia

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LIST OF ABBREVIATIONS

BMP	Best Management Practices
CFS	Cubic Feet per Second
DEM	Digital Elevation Model
DMR	Discharge Monitoring Report
DNR	Department of Natural Resources
DWPC	Division of Water Pollution Control
EPA	Environmental Protection Agency
EPD	Environmental Protection Division (State of Georgia)
GIS	Geographic Information System
HSPF	Hydrological Simulation Program - FORTRAN
HUC	Hydrologic Unit Code
LA	Load Allocation
MGD	Million Gallons per Day
MOS	Margin of Safety
MPN	Most Probable Number
MRLC	Multi-Resolution Land Characteristic
NPDES	National Pollutant Discharge Elimination System
NPSM	Nonpoint Source Model
NRCS	Natural Resources Conservation Service
Rf3	Reach File 3*
RM	River Mile
STORET	STORage RETrieval database
TMDL	Total Maximum Daily Load
USGS	United States Geological Survey
WCS	Watershed Characterization System
WLA	Waste Load Allocation

*Reach File 3 = electronic file providing a detailed stream network from small to large streams and supports development of stream routing for modeling purposes.

SUMMARY
Proposed Total Maximum Daily Loads (TMDLs)
303(d) Listed Streams in Oconee River Basin - HUC 03070101 and HUC 03070102

State: Georgia

Counties: Hall, Gwinnett, Madison, Jackson, Barrow, Clarke, Walton, Oconee, Morgan, Newton, Greene, Oglethorpe, Jasper, Putnam, Hancock, Jones, Baldwin, Washington, Twiggs, Wilkinson, Johnson, Laurens, Treutlen, Dodge, Wheeler, Montgomery, and Bleckley

Major River Basin: Oconee River

Constituent(s) of Concern: Fecal Coliform Bacteria

Summary of 303(d) Listed Waterbody Information and Allocation by Stream Segment

Stream Name	Segment Description	Hydrologic Unit(s)	Use Classification	Segment Length (miles)	Drainage Area (miles^2)	WLA (#/30 days)	LA (#/30 days)	MOS	TMDL (#/30 days)	Percent Reduction
Allen Creek	Monroe Driver to 1 mile D/S GA Hwy 11	030701010103	Fishing	9	18.9	0	1.73×10^{12}	Implicit + 10% Explicit	1.73×10^{12}	79.8
Apalachee River	Marburg Creek to Lake Oconee	030701010805 030701010901 030701010905 030701010906	Fishing	35	*TBD	TBD	TBD	Implicit + 10% Explicit	TBD	TBD
Apalachee River	Williamson Creek to Marburg Creek	030701010802 030701010804	Fishing	7	TBD	TBD	TBD	Implicit + 10% Explicit	TBD	TBD
Beaverdam Creek	Oliver creek to Lake Oconee	030701011102 030701011103	Fishing	4	TBD	TBD	TBD	Implicit + 10% Explicit	TBD	TBD
Big Cedar Creek	Hog Creek to Lake Sinclair	030701011704	Fishing	11	TBD	TBD	TBD	Implicit + 10% Explicit	TBD	TBD
Big Indian Creek	I-20 to Little Indian Creek	030701011405 030701011406	Fishing	11	TBD	TBD	TBD	Implicit + 10% Explicit	TBD	TBD

Stream Name	Segment Description	Hydrologic Unit(s)	Use Classification	Segment Length (miles)	Drainage Area (miles^2)	WLA (#/30 days)	LA (#/30 days)	MOS	TMDL (#/30 days)	Percent Reduction
Big Sandy Creek	Porter Creek to Oconee River	030701020701 030701020705	Fishing	14	TBD	TBD	TBD	Implicit + 10% Explicit	TBD	TBD
Carr Creek	Headwaters to North Oconee River	030701010505	Fishing	2	TBD	TBD	TBD	Implicit + 10% Explicit	TBD	TBD
Cedar Creek	Headwaters to Oconee River	030701010601	Fishing	4	TBD	TBD	TBD	Implicit + 10% Explicit	TBD	TBD
Cedar Creek	Headwaters to Winder Reservoir	030701010204	Fishing	4	TBD	TBD	TBD	Implicit + 10% Explicit	TBD	TBD
East Fork Trail Creek	Headwaters to West Fork Trail Creek	030701010505	Fishing	3	TBD	TBD	TBD	Implicit + 10% Explicit	TBD	TBD
Little Commissioner Creek	Ga Hwy 18 to Commissioner Creek	030701020504	Fishing	9	49	$2.37x10^8$	$4.79x10^{10}$	Implicit + 10% Explicit	$4.81x10^{10}$	82.6
Little River	Glady Creek to Lake Sinclair	030701011501 030701011503	Fishing	8	TBD	TBD	TBD	Implicit + 10% Explicit	TBD	TBD
Little River	Shoal Creek to Gap Creek	030701011402 030701011404	Fishing	14	TBD	TBD	TBD	Implicit + 10% Explicit	TBD	TBD
Little River	Social Circle to Nelson Creek	030701011401	Fishing	3	TBD	TBD	TBD	Implicit + 10% Explicit	TBD	TBD
Little Sugar Creek	Headwaters to Lake Oconee	030701011003	Fishing	9	TBD	TBD	TBD	Implicit + 10% Explicit	TBD	TBD
Marburg Creek	Masseys Lake to Apalachee River	030701010803	Fishing	7	TBD	TBD	TBD	Implicit + 10% Explicit	TBD	TBD
Middle Oconee River	Big Bear Creek to McNutt Creek	030701010307	Fishing	12	TBD	TBD	TBD	Implicit + 10% Explicit	TBD	TBD
Middle Oconee River	Mulberry River to Big Bear Creek	030701010301	Fishing	11	TBD	TBD	TBD	Implicit + 10% Explicit	TBD	TBD
Mulberry River	Little Mulberry River to Middle Oconee	030701010204 030701010205	Fishing	18	TBD	TBD	TBD	Implicit + 10% Explicit	TBD	TBD

Stream Name	Segment Description	Hydrologic Unit(s)	Use Classification	Segment Length (miles)	Drainage Area (miles^2)	WLA (#/30 days)	LA (#/30 days)	MOS	TMDL (#/30 days)	Percent Reduction
North Oconee River	Bordens Creek to Curry Creek	030701010406	Fishing	8	TBD	TBD	TBD	Implicit + 10% Explicit	TBD	TBD
North Oconee River	Chandler Creek to Bordens Creek	030701010402 030701010404 030701010406	Fishing	12	TBD	TBD	TBD	Implicit + 10% Explicit	TBD	TBD
North Oconee River	Jackson County to Sandy Creek	030701010505	Fishing/ Drinking Water	5	TBD	TBD	TBD	Implicit + 10% Explicit	TBD	TBD
North Oconee River	Sandy Creek to Trail Creek	030701010501	Fishing/ Drinking Water	2	TBD	TBD	TBD	Implicit + 10% Explicit	TBD	TBD
North Oconee River	Trail Creek to Oconee River	030701010505	Fishing	8	TBD	TBD	TBD	Implicit + 10% Explicit	TBD	TBD
North Walnut Creek	Gainesville D/S Hall County Camp	030701010104	Fishing	1	2.4	$3.16x10^6$	$3.8x10^{10}$	Implicit + 10% Explicit	$3.8x10^{10}$	91.4
North Walnut Creek	Gainesville U/S Hall County Camp	030701010104	Fishing	2	1.1	0	$3.3x10^{10}$	Implicit + 10% Explicit	$3.3x10^{10}$	39.4
Oconee River	Barnett Shoals to Lake Oconee	030701010606 030701010701	Fishing	16	TBD	TBD	TBD	Implicit + 10% Explicit	TBD	TBD
Oconee River	Confluence of North & Middle Oconee Rivers	030701010601	Fishing	4	TBD	TBD	TBD	Implicit + 10% Explicit	TBD	TBD
Oconee River	Long Branch to Turkey Creek	030701020901	Fishing	9	TBD	TBD	TBD	Implicit + 10% Explicit	TBD	TBD
Richland Creek	Interstate 20 to Beaverdam Creek	030701011104	Fishing	8	TBD	TBD	TBD	Implicit + 10% Explicit	TBD	TBD
Rooty Creek	Rd. S926 Eatonton to Little Creek	030701011803	Fishing	9	TBD	TBD	TBD	Implicit + 10% Explicit	TBD	TBD
Tanyard Creek	U/S North Oconee River	030701010505	Fishing	1	TBD	TBD	TBD	Implicit + 10% Explicit	TBD	TBD

Stream Name	Segment Description	Hydrologic Unit(s)	Use Classification	Segment Length (miles)	Drainage Area (miles^2)	WLA (#/30 days)	LA (#/30 days)	MOS	TMDL (#/30 days)	Percent Reduction
Town Creek	Hwy. 15 to Richland Creek	030701011101	Fishing	4	TBD	TBD	TBD	Implicit + 10% Explicit	TBD	TBD
Town Creek	Peavy Branch to Oconee River	030701020204 030701020205	Fishing	16	60.5	0	2.85×10^{11}	Implicit + 10% Explicit	2.85×10^{11}	88.5
Tributary 2 to Allen Creek	Gainesville D/S Old Landfill	030701010103	Fishing	1	1.1	0	3.85×10^{10}	Implicit + 10% Explicit	3.85×10^{10}	47.1
Tributary 5 to Allen Creek	Gainesville	030701010103	Fishing	1	0.6	0	2.91×10^{10}	Implicit + 10% Explicit	2.91×10^{10}	84.6
Tributary 7 to Allen Creek	Gainesville West side of New Landfill	030701010103	Fishing	1	0.6	0	4.55×10^{10}	Implicit + 10% Explicit	4.55×10^{10}	85
Tributary 8 to Allen Creek	Gainesville East Side of New Landfill	030701010103	Fishing	1	1.1	0	6.29×10^{10}	Implicit + 10% Explicit	6.29×10^{10}	85.5
Tributary to North Walnut Creek	Gainesville	030701010104	Fishing	1	0.4	3.16×10^{6}	1.28×10^{10}	Implicit + 10% Explicit	1.28×10^{10}	90
Turkey Creek	Horse Branch to Rocky Creek	030701021103	Fishing	10	TBD	TBD	TBD	Implicit + 10% Explicit	TBD	TBD
Turkey Creek	Rocky Creek to Oconee River	030701021104 030701021105	Fishing	11	TBD	TBD	TBD	Implicit + 10% Explicit	TBD	TBD
Walnut Creek	Caney Fork to Middle Oconee River	030701010105	Fishing	14	55	3.16×10^{6}	3.85×10^{11}	Implicit + 10% Explicit	3.85×10^{11}	46.7

*To Be Determined by EPA.

Note: Current and future discharges shall be permitted at or below the water quality standard for fecal coliform bacteria of 200-counts/100 ml.

Applicable Water Quality Standard for Drinking Water and Fishing use classifications:

Section 391-3-6-.03 (6) of the *State of Georgia Rules and Regulations for Water Quality Control, Chapter 391-3-6 Revised, July, 2000:*
May through October - fecal coliform is 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 per 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.
November through April - fecal coliform is 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 geometric mean standard is the target value for the TMDLs

Little Commissioner Creek – (Ga HWY 18 to Commissioner Creek)

TMDL Development - Analysis/Modeling:

The Hydrologic Simulation Program Fortran (HSPF) watershed model was used to develop these TMDLs. An hourly time step was used to simulate hydrologic and water quality conditions with results expressed as daily averages. A simulation period of 10 years was used to assess the water quality standards for these TMDLs representing a range of hydrologic and meteorological conditions.

PROPOSED
FECAL COLIFORM TOTAL MAXIMUM DAILY LOADS (TMDLs)
for 303(d) listed stream segments in the
OCONEE RIVER BASIN

1.0 INTRODUCTION

Section 303(d) of the Clean Water Act requires each state to list those waters within its boundaries for which technology based effluent limitations are not stringent enough to protect any water quality standard applicable to such waters. The TMDL process establishes the allowable loadings of pollutants or other quantifiable parameters for a waterbody based on the relationship between pollution sources and in-stream water quality conditions. This allows water quality based controls to be developed and implemented in an effort to reduce pollution, and restore and maintain compliance with water quality standards.

2.0 WATERSHED DESCRIPTION

The Oconee River watershed (HUC 03070101 and HUC 03070102) is located in Central Georgia (Figure 1A) and falls within the Level III Piedmont and Southeastern Plains ecoregions. Figures 1B – 1D show the location of the watersheds containing all of the 303(d) listed segments for which a TMDL has been proposed in this report. 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. 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 as 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. City of Milledgeville is the major populated area in the Lower Oconee River watershed. Typical characteristics for these subecoregions are as follows:

- 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 contains approximately 8,167 miles of Rf3 level streams and drains a total area of approximately 5,326 square miles. Watershed land use distribution is based on the Multi-Resolution Land Characteristic (MRLC) databases derived from Landsat Thematic Mapper digital images from the period 1990-1994. Land use in the Oconee River Basin is summarized in Table 1. Figures 2A – 2C show MRLC land use for the watersheds containing all of the 303(d) listed segments for which a TMDL has been proposed in this report. Land use data in some portions of the Upper Oconee watersheds in proximity to the Athens area was modified using a process developed by Aqua Terra, Inc., consultants. This methodology reclassified MRLC land use data for some forested areas from "forested" to "built up" based on an analysis of the degree or level of development adjacent to that particular area. This approach was demonstrated to produce a more accurate land use analysis when compared to data available for a limited number of areas where land use data was available that had been collected and compiled using more detailed and accurate methods than were used in developing the MRLC data. This adjustment was justifiable only for rapidly developing areas around Athens where there was believed to be a large amount of (tree) canopied development occurring.

3.0 PROBLEM DEFINITION

EPA Region 4 approved Georgia's final 2000 303(d) list on August 28, 2000. This 303(d) list was then updated for the Altamaha, Ocmulgee, and Oconee River Basins and was finalized and approved by EPA Region 4 in June, 2001. The list identified the waterbodies for the Oconee River Basin shown in Table 2, as either not supporting or partially supporting designated use classifications, due to exceedence 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. The objective of this study is to develop fecal coliform TMDLs for 303(d) listed waterbodies in the Oconee River basin.

4.0 TARGET IDENTIFICATION

Each of the 303(d) listed waterbodies in the Oconee River Basin for which a fecal coliform TMDL is being developed has a designated use classification of either fishing or drinking water. The fecal coliform water quality criteria for protection of the drinking water and fishing use classifications is established by the *State of Georgia Rules and Regulations for Water Quality Control, Chapter 391-3-6 Revised, July, 2000*, and will be used as the target level for fecal coliform TMDL development for all listed segments in the Oconee River basin.

Section 391-3-6-.03 (6) of the *State of Georgia Rules and Regulations for Water Quality Control,* *Chapter 391-3-6 Revised, July, 2000,* states that during the months of May through October, when water contact recreation activities are expected to occur, fecal coliform is 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 is 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 geometric mean standard is the target for the TMDLs. An implicit and explicit MOS is applied to this standard during development of the TMDLs, as detailed in Section 8.3 of this report.

5.0 WATER QUALITY ASSESSMENT AND DEVIATION FROM TARGET

Compliance with the applicable fecal coliform water quality criteria was assessed for each of the current 303(d) listed streams, based on monitoring data collected from the monitoring stations listed in Table 3.

Water quality data collected during calendar year 1999 for the current 303(d) listed stream segments, which met the regulatory criteria for calculation of a valid geometric mean, are summarized in Table 4. A geometric mean in excess of 200 counts per 100 milliliters during the period May – October, or in excess of 1000 counts per 100 milliliters during the period November – April, provides a basis for adding a stream segment to the 303(d) listing. A single sample in excess of 4000 counts per 100 milliliters can also provide a basis for adding a stream segment to the 303(d) listing. Stream segments that do not have 1999 monitoring data exceeding the above geometric mean or single sample criteria, were placed on the 303(d) as a result of data collected prior to 1999. All water quality data collected during calendar year 1999 for the current 303(d) listed stream segments in the Oconee River basin, including data which did not meet the regulatory criteria for calculation of a valid geometric mean, are provided in Table A-1, in Appendix A of this report.

6.0 SOURCE ASSESSMENT

An important part of the TMDL analysis is the identification of source categories, source subcategories, or individual sources of fecal coliform bacteria in the watershed and the amount of loading contributed by each of these sources. Sources are broadly classified as either point or nonpoint sources.

A point source can be defined as a discernable, confined, and discrete conveyance from which pollutants are or may be discharged to surface waters. Point source discharges of industrial wastewater and treated sanitary wastewater must be authorized by National Pollutant Discharge Elimination System (NPDES) permits. NPDES permitted facilities discharging treated sanitary wastewater are considered primary point sources of fecal coliform bacteria.

Nonpoint sources of fecal coliform bacteria are diffuse sources that cannot be identified as entering a waterbody through a discrete conveyance at a single location. These sources generally, but not always, involve accumulation of fecal coliform bacteria on land surfaces and washoff as a result of storm events. Typical nonpoint sources of fecal coliform bacteria include:

- Wildlife
- Land application of agricultural manure
- Livestock grazing
- Leaking septic systems
- Urban development (including leaking sewer collection lines)
- Animals having access to streams

For nonpoint sources involving agricultural activities, the Natural Resources Conservation Service (NRCS) was consulted for information and parameters to be used to characterize agricultural activities represented in the water quality model.

6.1 Point Sources

There are a number of permitted point source discharges located in the drainage areas of the 303(d) listed stream segments. The average discharge flow and flow-weighted average fecal coliform loading for these facilities, as calculated from CY1999 Discharge Monitoring Report (DMR) data, are summarized in Table 5. Design flow and fecal coliform loading based on monthly fecal coliform permit limits, are also provided in Table 5. The locations of these point sources are presented in Appendix G.

A monthly average fecal coliform concentration of 200 counts per 100 milliliters was assumed for the purpose of calculating the flow-weighted average fecal coliform loading for facilities that did not have an existing fecal coliform permit limit, or for which no DMR data was available for the CY1999 period. Calibration of the water quality model was conducted using DMR data whenever available. In cases where no DMR data was available the fecal coliform loading rate was calculated using the design flow and assuming an average fecal coliform concentration equal to the lesser of 200 counts/ 100 ml and the existing fecal coliform permit limit.

6.2 Nonpoint Source Assessment

6.2.1 Wildlife

Wildlife deposit feces onto land surfaces where it can be transported during storm events to nearby streams. In the water quality model, the wildlife fecal coliform contribution is accounted for in the deer population. The deer population is estimated to be 30 to 45 animals per square mile in this area (Georgia WRD, 1999). The upper limit of 45 deer per square mile has been chosen to account for deer and all other wildlife present in the watershed. It is assumed that the wildlife population remains constant throughout the year, and that wildlife is uniformly distributed on all land classified in the MRLC database as forest, pasture, cropland, and wetlands.

6.2.2 Agricultural Animals

Agricultural animals are also a potential source of several types of fecal coliform loading to streams in the Oconee River basin.

As with wildlife, agricultural livestock grazing on pastureland or forestland deposit their feces onto land surfaces where it can be transported during storm events to nearby streams. Animal access to pasture land varies monthly, resulting in varying fecal coliform loading rates throughout the year. Beef cattle spend all of their time in pasture, while dairy cattle and hogs are confined periodically. All manure from beef cattle is therefore assumed applied to pastureland. The percentage of feces deposited during grazing time is used to estimate the fecal coliform loading rates from pastureland.

Confined livestock operations also generate manure, which can be applied to pastureland and cropland as a fertilizer. Processed agricultural manure from confined hog, dairy cattle, and some poultry operations is generally collected in lagoons and applied to land surfaces during the growing season, at rates which often vary on a monthly basis. It is a basic assumption that the manure is evenly distributed over the land surfaces to which it is applied. Assumptions regarding manure management practices for specific agricultural livestock operations are as follows:

- Poultry litter is normally piled for a period before it is used for manure application. Within the Oconee River basin it is estimated that approximately 100 percent of poultry litter is applied to pastureland, with only a negligible amount applied to cropland. It is assumed that the poultry litter is applied primarily during the period between March and October (inclusive), and that application rates vary monthly.

- Within the Oconee River basin it is estimated that approximately 100 percent of broiler litter is applied to pastureland, with only a negligible amount applied to cropland. It is assumed that the broiler litter is applied year-round, but at variable monthly rates.

- Hog farms in the Oconee River basin operate by confining the animals or allowing them to graze in small pastures or pens. It is assumed that all of the hog manure produced by either farming method is applied to available pastureland, with negligible amounts applied to cropland. Application rates of hog manure to pastureland vary monthly according to management practices. Applications are assumed to be made during the period between March and October (inclusive).

- On dairy farms, the cows are confined for a limited period each day during which time they are fed and milked. This is estimated to be four hours per day for each dairy cow. It is assumed that 100 percent of manure collected during confinement is applied to the available pastureland in the watershed. It is also assumed that the dairy cow manure is applied during the period between February and October (inclusive), as well as in November. Application rates vary monthly according to management practices.

- All manure from beef cattle is assumed applied to pastureland. The beef cow manure is assumed to be applied year-round, and at a constant monthly rate.

- Imported manure is used both on cropland and pastureland at proportions of 75 percent and 25 percent, respectively. It is assumed that the imported manure is applied during the period between February and October (inclusive), as well as in November. Application rates vary monthly.

Agricultural livestock and other unconfined animals (i.e., deer and other wildlife) also often have direct access to streams that pass through pastures, and as such can impact water quality. Feces deposited into these streams by grazing animals is included in the water quality model as a direct nonpoint source having constant flow and concentration. To calculate the amount of fecal coliform bacteria introduced into streams by cattle, it is assumed that only beef cow populations have access to the streams, and of those, approximately twelve percent will defecate in the stream (personal communication, EPA, Georgia Agribusiness Council, NRCS, University of Georgia, et. al.).

Livestock data for the listed streams in the Oconee River basin are shown in Table 6. This data is based on the 1997 Census of Agriculture and is reported by county. The county data are assigned to the watersheds based on the percentage of agricultural area in each subwatershed classified as pasture/hay. Cattle numbers reported in the census data also represent other breeds of cattle and calves in addition to dairy and beef.

6.2.3 Leaking Septic Systems

Some fecal coliform loading in the Oconee River basin may be attributed to failure of septic systems and illicit discharges of raw sewage. Estimates from county census data of people in each listed stream watershed utilizing septic systems are shown in Table 7. These estimates were updated based on a county-by-county survey conducted by EPD in April-May 2001. It is estimated that there are approximately 2.37 people per household on septic systems (EPA, personal communication). Based on the EPD survey, it is assumed that five percent of the septic systems in the watershed leak. Leaking septic systems are included in the water quality model as a direct nonpoint source having constant flow and concentration. The average fecal coliform concentration of the septic system wastewater reaching a stream was assumed to be 1×10^4 counts per 100 ml.

6.2.4 Urban Development

Fecal coliform loading from urban areas is potentially attributable to multiple sources including storm water runoff, leaks and overflows from sanitary sewer systems, illicit discharges of sanitary waste, runoff from improper disposal of waste materials, leaking septic systems, and domestic animals. Urban runoff and storm water processes are considered to be significant contributors to fecal coliform concentrations in some Oconee River subwatersheds. Major populated areas in the Oconee River watershed are Athens, Milledgeville, and Dublin.

To estimate the load of fecal coliform bacteria from leaking sewer collection lines, it was assumed that up to five percent of the permitted design flow of a municipal water pollution control plant (WPCP) was lost through leaks. The average fecal coliform bacteria concentration in the untreated wastewater was assumed to be 1×10^6 counts/100 ml (EPA, "Protocol for Developing Pathogen TMDLs", 2001).

7.0 ANALYTICAL APPROACH

Establishing the relationship between in-stream water quality and source loading is an important component of TMDL development. It allows the determination of the relative contribution of sources to total pollutant loading and the evaluation of potential changes to water quality resulting from implementation of various management options. This relationship can be developed using a variety of techniques ranging from qualitative assumptions based on scientific principles to numerical computer modeling. In this section, the numerical modeling techniques developed to simulate fecal coliform bacteria fate and transport in the watershed are discussed.

7.1 Model Selection

A dynamic computer model was selected for fecal coliform analysis in order to: a) simulate the time varying nature of fecal coliform deposition on land surfaces and transport to receiving waters; b) incorporate seasonal effects on the production and fate of fecal coliform bacteria; and c) identify the critical condition for the TMDL analysis. Several computer based tools were also utilized to generate input data for the model.

The Nonpoint Source Model (NPSM) is a watershed model capable of simulating nonpoint source runoff and associated pollutant loadings, account for point source discharges, and performing flow and water quality routing through stream reaches. NPSM is based on the Hydrologic Simulation Program - Fortran (HSPF). In these TMDLs, NPSM was used to simulate point source discharges, simulate the deposition and transport of fecal coliform bacteria from land surfaces, and compute the resulting water quality response.

In addition to NPSM, the Watershed Characterization System (WCS), a geographic information system (GIS) tool, was used to display, analyze, and compile available information to support water quality model simulations for the Oconee River basin. This information includes land use categories, point source dischargers, soil types and characteristics, population data (human and livestock), and stream characteristics. Results of the WCS characterization are input to a spreadsheet developed by Tetra Tech, Inc. to estimate NPSM input parameters associated with fecal coliform buildup (loading rates) and washoff from land surfaces. In addition, the spreadsheet can be used to estimate direct sources of fecal coliform loading to water bodies from leaking septic systems and animals having access to streams. Information from the WCS and spreadsheet tools were used as initial input for variables in the NPSM model.

7.2 Model Set Up

The Oconee River basin was delineated into 302 subwatersheds in order to characterize relative fecal coliform bacteria contributions from significant contributing drainage areas. Figures 3A – 3C show the watersheds containing all of the 303(d) listed segments for which a TMDL has been proposed in this report.

Boundaries were constructed so that subwatershed “pour points” coincided, when possible, with water quality monitoring stations or USGS flow gages. Watershed delineation was based on the Reach File 3 (Rf3) stream coverage and Digital Elevation Model (DEM) data. This discretization allows management and load reduction alternatives to be varied by subwatershed. The structure of the watershed models for the subject stream segments of this report are presented in Appendix G.

An important factor influencing model results is the precipitation data contained in the meteorological data file used in the simulation. The pattern and intensity of rainfall affects the build-up and wash-off of fecal coliform bacteria from the land into the streams, as well as the dilution potential of the stream. Precipitation data from the EarthInfo CD set were used for simulations in all subwatersheds. Details regarding the methods and data sets are presented in Appendix B.

7.3 Model Calibration

Calibration of the watershed model included both hydrology and water quality components. The hydrology calibration was performed first and involved adjustment of the model parameters used to represent the hydrologic cycle until acceptable agreement was achieved between simulated flows and historic stream flow data from a USGS stream gaging station in the watershed for the same period of time.

Model parameters adjusted include: evapotranspiration, infiltration, upper and lower zone storage, groundwater storage, recession, losses to the deep groundwater system, and interflow discharge. Details of hydrologic calibrations are presented in Appendix B. Hydrology calibrations are presented in Appendix C, along with USGS gages used for the flow calibrations. Calibrated models were then subjected to model validation to ensure that generated model streamflows for each of the impaired segments were acceptable. Model generated hydrographs for each of the impaired streams are presented in Appendix D.

The model was also calibrated for water quality. Appropriate model parameters were adjusted to obtain acceptable agreement between simulated instream fecal coliform concentrations and observed data collected at the sampling stations indicated in Table 3. No geometric mean values were available from USGS water quality monitoring stations for the following listed segments:

North Walnut Creek - (Gainesville D/S Hall County Camp)
North Walnut Creek - (Gainesville U/S Hall County Camp)
Tributary 2 to Allen Creek - (Gainesville D/S Old Landfill)
Tributary 5 to Allen Creek - (Gainesville)
Tributary 7 to Allen Creek - (Gainesville W. of New Landfill)
Tributary 8 to Allen Creek - (Gainesville E. of New Landfill)
Tributary to N. Walnut Creek - (Gainesville)

Water quality calibrations were performed for these segments utilizing monthly monitoring data provided by the city of Gainesville. Although this data provided the means for a satisfactory calibration, the quantity and frequency of the data prevented the calculation of valid geometric means for the purpose of determining compliance with the water quality standard for fecal coliform bacteria.

Details of water quality calibrations are presented in Appendix B. Water quality calibrations are presented in Appendix E.

8.0 DEVELOPMENT OF TOTAL MAXIMUM DAILY LOAD

The TMDL process quantifies the amount of a pollutant that can be assimilated in a waterbody, identifies sources of the pollutant, and recommends regulatory or other actions to be taken to achieve compliance with applicable water quality standards based on the relationship between pollution sources and in-stream water quality conditions. A TMDL can be expressed as the sum of all point source loads (Waste Load Allocations), nonpoint source loads (Load Allocations), and an appropriate margin of safety (MOS) which takes into account any uncertainty concerning the relationship between effluent limitations and water quality:

$$TMDL = \Sigma \text{ WLAs} + \Sigma \text{ LAs} + MOS$$

The objective of a TMDL is to allocate loads among known pollutant sources throughout a watershed so that appropriate control measures can be implemented and water quality standards achieved. 40 CFR §130.2 (i) states that TMDLs can be expressed in terms of mass per time (e.g. pounds per day), toxicity, or other appropriate measure. For fecal coliform bacteria, the TMDLs are expressed as counts per 30 days.

8.1 Critical Conditions

The critical condition for nonpoint source fecal coliform loading is an extended dry period followed by a rainfall runoff event. During the dry weather period, fecal coliform bacteria builds up on the land surface, and is washed off by rainfall. The critical condition for point source loading occurs during periods of low stream flow when dilution is minimized. Both conditions are simulated in the water quality model.A definitive time period was used to simulate a continuous 30-day geometric mean concentration to compare to the target. This time period contained a range of hydrological conditions that included both low and high stream flows from which critical conditions were identified and used to derive the TMDL values.

The simulated 30-day geometric mean concentrations for existing conditions are presented in Appendix F. From these figures, critical conditions can be determined. The 30-day critical period in the model is the period preceding the largest simulated violation of the geometric mean standard (EPA, 1991). During periods where the model predicted extremely low stream flows, the model often became unstable and exhibited extreme positive or negative spikes. These portions of the simulation were excluded from consideration of the critical period. Meeting water quality standards during this period ensures that water quality standards can be achieved throughout the reviewed time period. For the listed segments in the Oconee River basin, the critical period used in development of the TMDLs is given in Table 8.

8.2 Existing Conditions

The existing fecal coliform load for each of the 303(d) listed waterbodies in the Oconee River basin was determined in the following manner:

- The calibrated model, corresponding to the portion of the Oconee River basin that is upstream of the pour point of the listed waterbody segment was run for a time period that included the critical condition. This critical time period is provided for each listed segment in Table 8.

- The existing fecal coliform load for each listed segment is represented as the sum of fecal coliform load from NPDES permitted discharges, the discharge loads of direct nonpoint sources (e.g. animal access to streams, illicit discharges of fecal coliform bacteria, failing septic systems, or leaking sewer collection lines), and the fecal coliform load indirectly going to surface waters from all land uses (e.g. surface runoff), cumulated over the 30 day critical period. The existing loading rates given in Table 8 considers a die-off and absorption by soil for fecal coliform applied to land (during accumulation and before transported to the stream), but does not consider fecal coliform decay (die-off) during transport to the stream. The existing in-stream fecal coliform concentration given in Table 8 includes in-stream decay of the fecal coliform.

Model results indicate that nonpoint sources related to agricultural and urban land uses have the greatest impact on the fecal coliform bacteria loading in the Oconee River basin. Direct inputs of fecal coliform bacteria from “other sources” (i.e., animal access to streams, illicit discharges of fecal coliform bacteria, failing septic systems, and leaking sewer collection lines) are also shown to increase bacteria loading in the watershed. Reductions in these loading rates reduce the in-stream fecal coliform bacteria levels. Non-point source loading rates and the in-stream geometric mean concentration representing existing conditions during the critical period are shown in Table 8.

In general, point source loads from NPDES facilities do not significantly contribute to the impairment of the listed stream segments since discharges from these facilities are required to be treated to levels corresponding to instream water quality criteria. Table 5 provides point source loads from NPDES facilities for existing conditions based on DMRs, and loads for TMDL conditions based on permitted facility flows and limits. As shown in this table, most facilities for which data is available have existing (i.e. based on DMR reporting) loads that are significantly lower than the maximum load at the permit limits.

8.3 Margin of Safety

There are two methods for incorporating an MOS in the analysis: a) implicitly incorporate the MOS using conservative model assumptions to develop allocations; or b) explicitly specify a portion of the TMDL as the MOS and use the remainder for allocations. In these TMDLs, an implicit MOS was incorporated through the use of conservative modeling assumptions and a continuous simulation that incorporates a range of meteorological events. Conservative modeling assumptions used include: septic systems discharging directly into the streams; development of the TMDL using loads based on the design flow and fecal coliform permit limits of NPDES facilities; and all land uses connected directly to streams. An explicit MOS of 10% was also included in the TMDLs by requiring the simulated geometric mean concentration to be 180 counts / 100 ml, rather than the standard of 200 counts / 100 ml.

8.4 Determination of TMDL, WLA, and LA

The TMDL is the total amount of pollutant that can be assimilated by a water body while maintaining water quality standards. Fecal coliform bacteria TMDLs are expressed as counts per 30-day period since this is how the water quality standard is expressed. The TMDL, therefore, represents the maximum fecal coliform bacteria load that can be assimilated by a stream during the critical 30-day period while maintaining the fecal coliform bacteria water quality standard of 200 counts / 100 ml. As previously stated, the TMDL is calculated using the equation:

$$\text{TMDL} = \Sigma\ \text{WLAs} + \Sigma\ \text{LAs} + \text{MOS}$$

With MOS = 20 counts / 100 ml (i.e. a 10% explicit MOS), the TMDL, ∑WLA, and ∑LA were determined according to the following procedure:

- The calibrated model, corresponding to the portion of the watershed that is upstream of the pour point of the listed waterbody segment was run for a time period that included the critical condition as specified in Table 8.

- Existing NPDES permitted facilities and any known future facility discharges were assumed to discharge at design flows and the fecal coliform permit limit of 200 counts/100 ml.

- Fecal coliform land loading variables and the magnitude of loading from sources modeled as “other direct sources” were adjusted within reasonable range of known values until the resulting fecal coliform concentration at the pour point of the listed water body segment was less than or equal to 180 counts/100ml. (i.e. the water quality standard of 200 counts/100ml minus 20 counts/100ml [i.e. a 10% explicit MOS]).

- The ∑WLA is the load associated with the daily discharge loads of all modeled NPDES permitted facilities summed over the 30-day critical period. The discharge load for each facility represents the design flow at a fecal coliform concentration of 200 counts/100 ml (permitted limit).

- The ∑LA is the daily fecal coliform load indirectly going to surface waters from all modeled land use areas as a result of buildup/washoff processes plus the daily discharge load sources modeled as “other direct sources” and the result summed over the 30-day critical period.

- The TMDL for the 30 day critical period is ∑WLAs plus ∑LAs.

The TMDLs, WLAs, and LAs for the listed water bodies are summarized in Table 9.

8.4.1 Waste Load Allocations

There are 54 NPDES permitted facilities that discharge fecal coliform bacteria in the Oconee River basin. Future facility permits will require end-of-pipe limits equivalent to the water quality standard of 200 counts/100 ml or less.

8.4.2 Load Allocations

There are two modes of transport for nonpoint source fecal coliform bacteria loading in the model. First, loading from failing septic systems, animals in the stream, and leaking sewer system collection lines are modeled as "other direct sources" to the stream and are independent of precipitation. The second mode involves loading resulting from fecal coliform accumulation on land surfaces and wash-off during storm events. Fecal coliform applied to land is subject to a die-off rate and an absorption rate before it is transported to the stream.

Model results were analyzed to determine which sources of fecal coliform have the greatest impact on the fecal coliform bacteria loadings in the Oconee River basin. The results of this analysis are indicated in Table 10, for each of the 303(d) listed segments for which a TMDL was developed. Wasteload and Load allocation scenarios that would meet in-stream water quality standards for each of the 303(d) listed streams analyzed in the Oconee River basin are provided in Table 10. Possible load reduction scenarios that would meet in-stream water quality standards for each of the 303(d) listed streams analyzed in the Oconee River basin is provided in Table 11.

Best management practices (BMPs) that could be used to implement this TMDL include controlling pollution from agriculture and urban runoff, identification and elimination of illicit discharges and other unknown "direct sources" of fecal coliform bacteria to the streams, and repair of leaking sewer collection lines and failing septic systems. Loading from agricultural sources may be minimized by adoption of NRCS resource management practices. NRCS practices include measures such as covering manure stacks exposed to the environment; reducing animal access to streams; and applying manure to croplands (if applicable) at agronomic rates. Measures which can reduce urban contributions include: repair and renovation of leaking sewer collection systems; reduction of sewer overflows and surcharges by use of separate conduit systems for domestic wastewater and stormwater; encouragement of households and businesses to connect to public sewer systems and reduce the population using septic systems.

Additional monitoring and characterization of the watershed should be conducted to verify the various other direct sources of fecal coliform bacteria in the watershed.

8.4.3 Seasonal Variation

Seasonal variation was incorporated in the continuous simulation water quality model by using varying monthly loading rates and daily meteorological data.

9.0 RECOMMENDATIONS

The TMDL analysis was performed using the best data available to specify WLAs and LAs that will meet the water quality criteria for fecal coliform in the Oconee River basin so as to support the use classification specified for each of the listed segments in Table 2. The following recommendations and strategies are targeted toward source identification, collection of data to support additional modeling and evaluation, and subsequent reduction in sources that are causing impairment of water quality.

9.1 Point Source Facilities

All discharges from point source facilities are required to be in compliance with the conditions of their NPDES permit at all times. All permitted facilities with the potential to discharge fecal coliform which do not currently have a fecal coliform limit will be given a fecal coliform limit of not more than 200 counts / 100 ml during the permit reissuance process.

9.2 Urban Sources of Fecal Coliform Loading

Urban sources of fecal coliform can best be addressed using a stategy which involves public participation and intergovernmental coordination to reduce the discharge of pollutants to the maximum extent practicable using management practices, control techniques, public education, and other appropriate methods and provisions. The following activities and programs conducted by cities, counties, and state agencies are recommended:

- Monitoring programs to identify the types and extent of fecal coliform water quality problems, relative degradation or improvement over time, areas of concern, and source identification;
- Requirements that all new and replacement sanitary sewage systems are designed to minimize discharges from the system into storm sewer systems;
- Mechanisms for reporting and correcting illicit connections, breaks, surcharges, and general sanitary sewer system problems;
- Sustained compliance with NPDES permit discharge requirements.

9.3 Agricultural Sources of Fecal Coliform Loading

The Georgia Environmental Protection Division (EPD) should coordinate with the Georgia Soil and Water Conservation Commission, and the Natural Resources Conservation Service (NRCS) to address issues concerning fecal coliform loading from agricultural lands in the Oconee River basin. It is recommended that information (such as livestock populations by subwatershed, animal access to streams, manure application practices, etc.) be evaluated periodically so that watershed models can be updated to reflect current conditions. It is further 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.

9.4 Stream Monitoring

Further monitoring of the fecal coliform concentrations at current and additional water quality monitoring stations in the watershed is needed to characterize sources of fecal coliform bacteria and document future reduction of loading. Georgia's watershed management approach specifies a five-year cycle for planning and assessment. Watersheds will be examined (or re-examined) as appropriate, on a rotating basis.

9.5 Future Efforts

This TMDL represents the first phase 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 results of future monitoring and source characterization data efforts.

10.0 Public Participation

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

11.0 Initial TMDL Implementation Plan

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

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

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

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

3. As part of the Initial TMDL Implementation Plan the EPD brochure entitled "Watershed Wisdom -- Georgia's TMDL Program" will be distributed by EPD to the EPD Contractor for

use with appropriate stakeholders for this TMDL, and a copy of the video of that same title will be provided to the EPD Contractor for its use in making presentations to appropriate stakeholders, on TMDL Implementation plan development.

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

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

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

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

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

Management Measure Selector Table

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

Land Use	**Management Measures**	Fecal Coliform	Dissolved Oxygen	pH	Sediment	Temperature	*Toxicity*	*Mercury*	Metals (copper, lead, zinc, cadmium)	PCBs, toxaphene
	9. Forest Chemical Management		_			_				
	10. Wetlands Forest Management	_	_	_		_		_		
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		_							

Land Use	**Management Measures**	Fecal Coliform	Dissolved Oxygen	pH	Sediment	Temperature	*Toxicity*	*Mercury*	Metals (copper, lead, zinc, cadmium)	PCBs, toxaphene
	Control for Roads, Highways and Bridges									
	4. Operation and Maintenance-Roads, Highways and Bridges	–	–			–			–	

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FIGURES

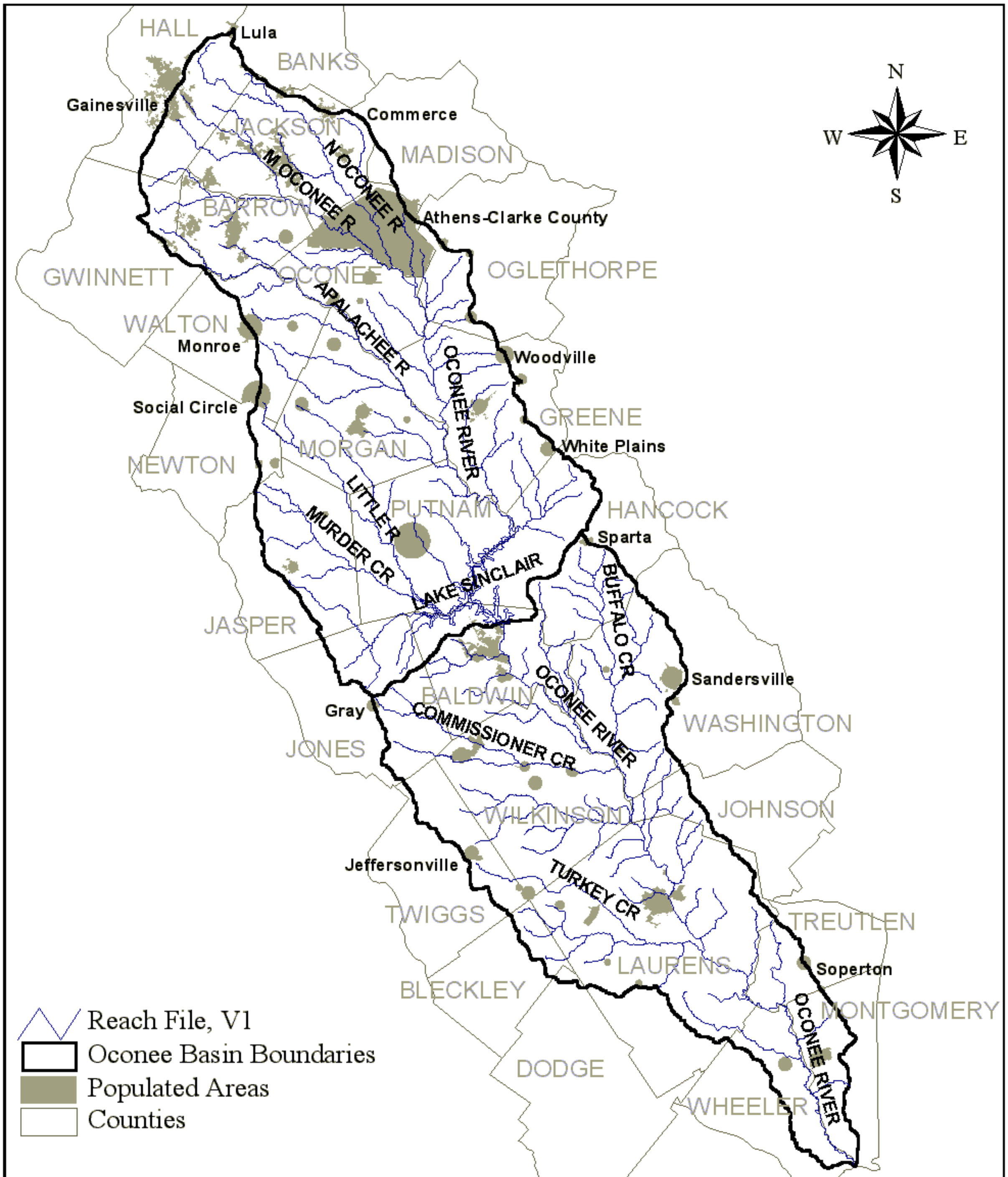


Figure 1A - Oconee River Basin

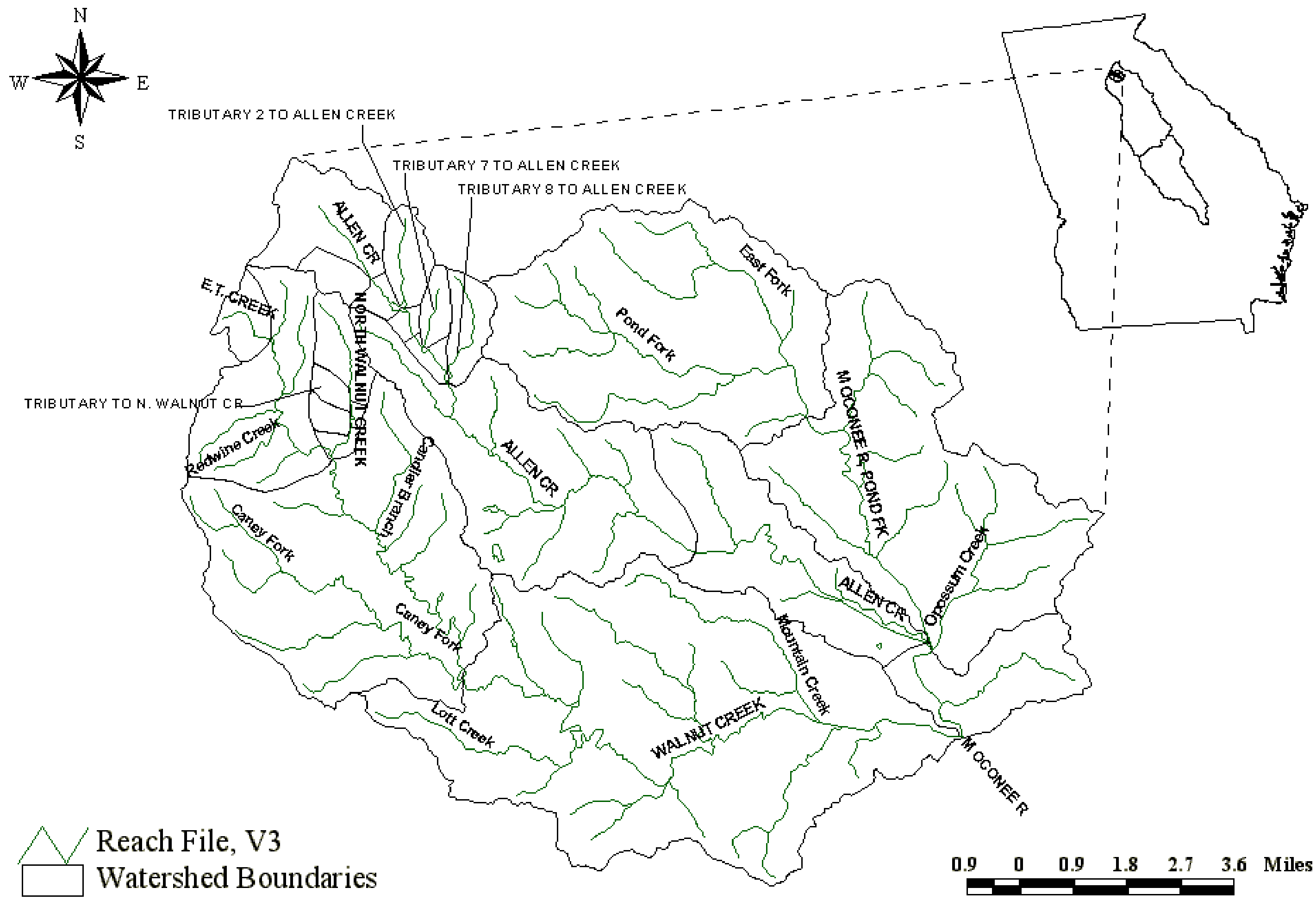


Figure 1B - Location of Pond Fork Creek, Allen Creek, & Walnut Creek Watersheds Upper Oconee River Basin (Projects UPOCN01 - UPOCN02).

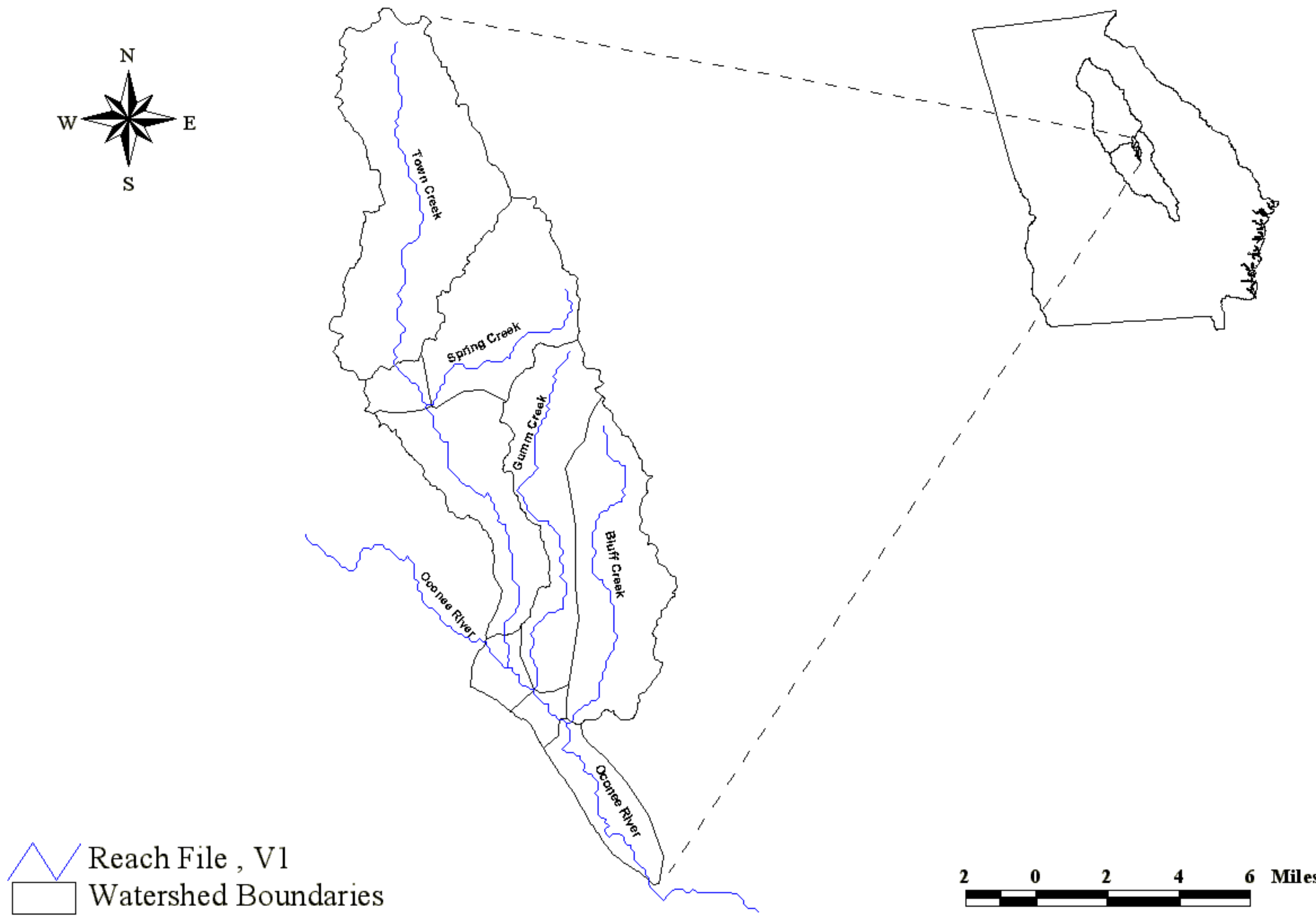


Figure 1C - Location of Bluff Creek, Gumm Creek, and Town Creek Watersheds Lower Oconee River Basin (Project LROCN02)

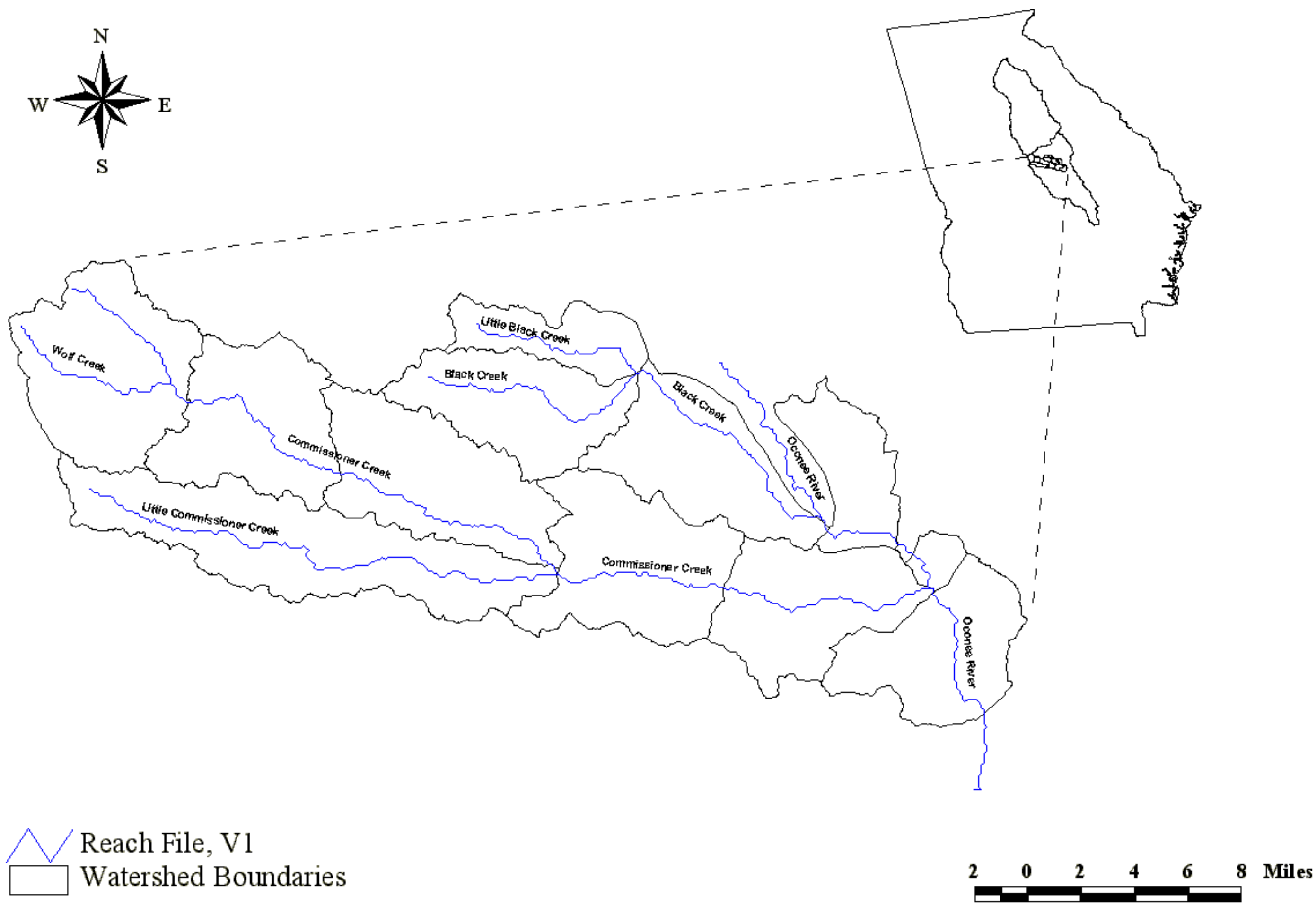


Figure 1D - Location of Black Creek and Little Commissioner Creek Watersheds
Lower Oconee River Basin (Project LROCN05)

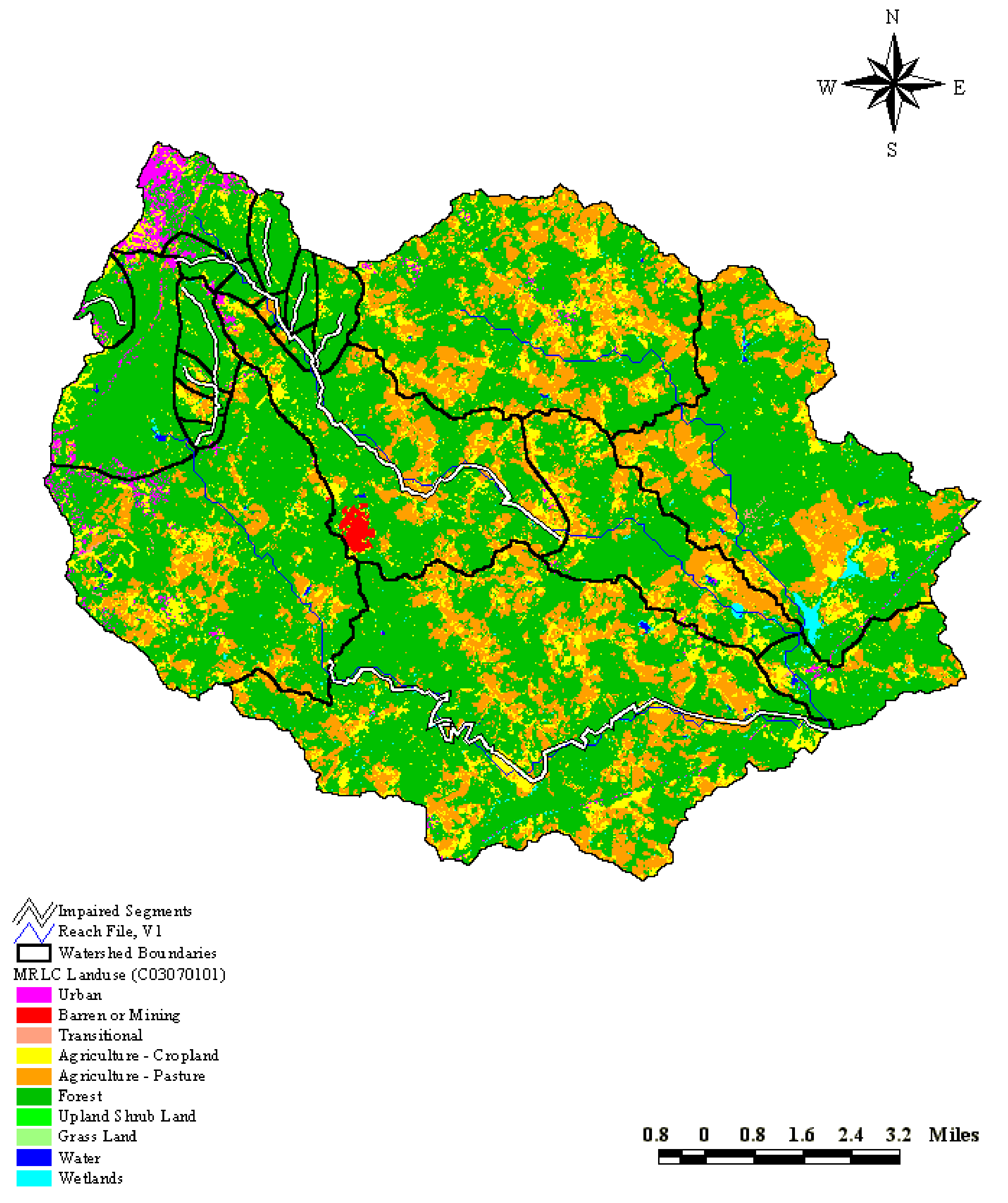


Figure 2A - Land Use Distribution.
Pond Fork Creek, Allen Creek, & Walnut Creek Watersheds
Upper Oconee River Basin (Projects UPOCN01 - UPOCN02)

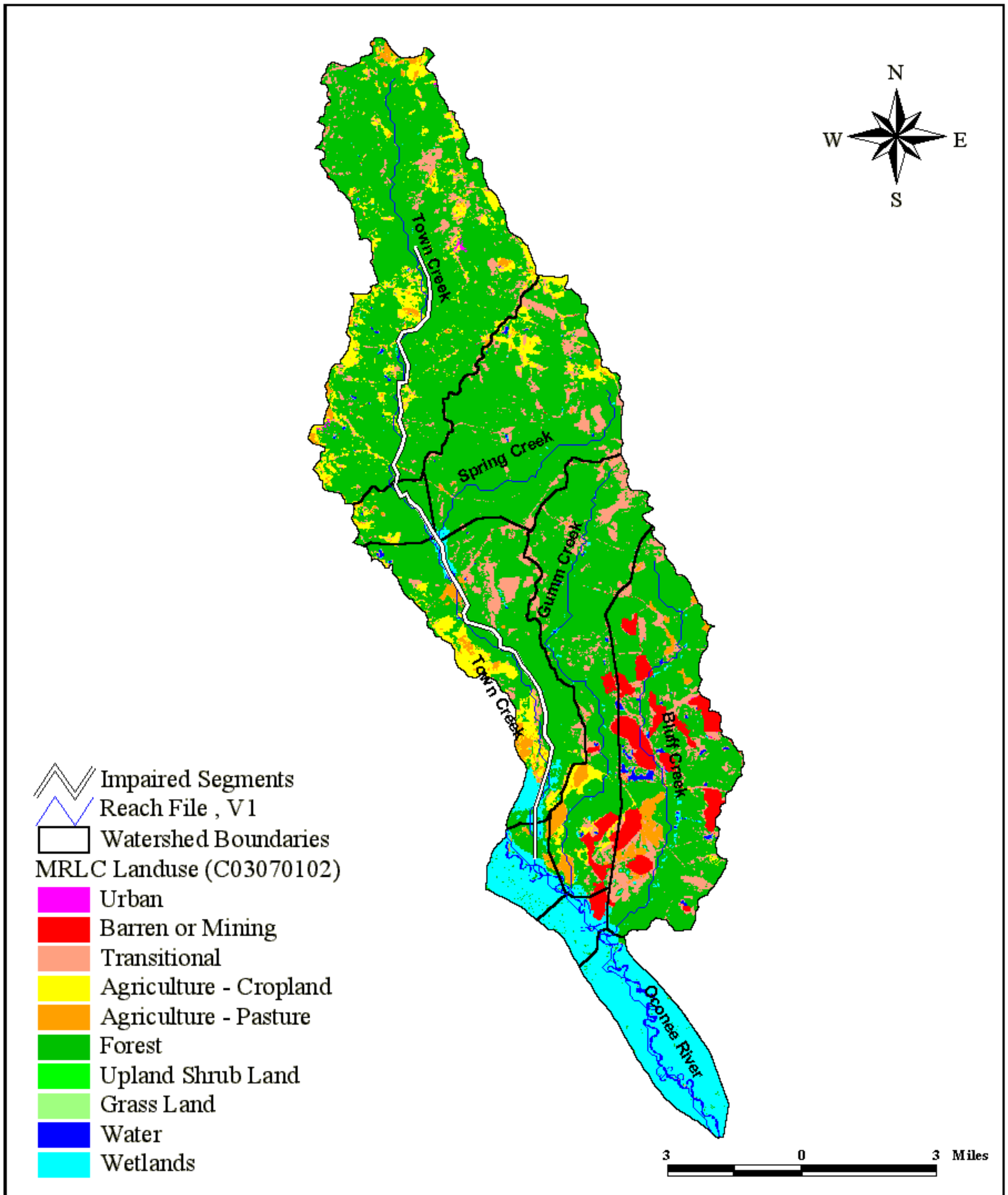


Figure 2B - Land Use Distribution
Bluff Creek, Gumm Creek, and Town Creek Watersheds
Lower Oconee River Basin (Project LROCN02)

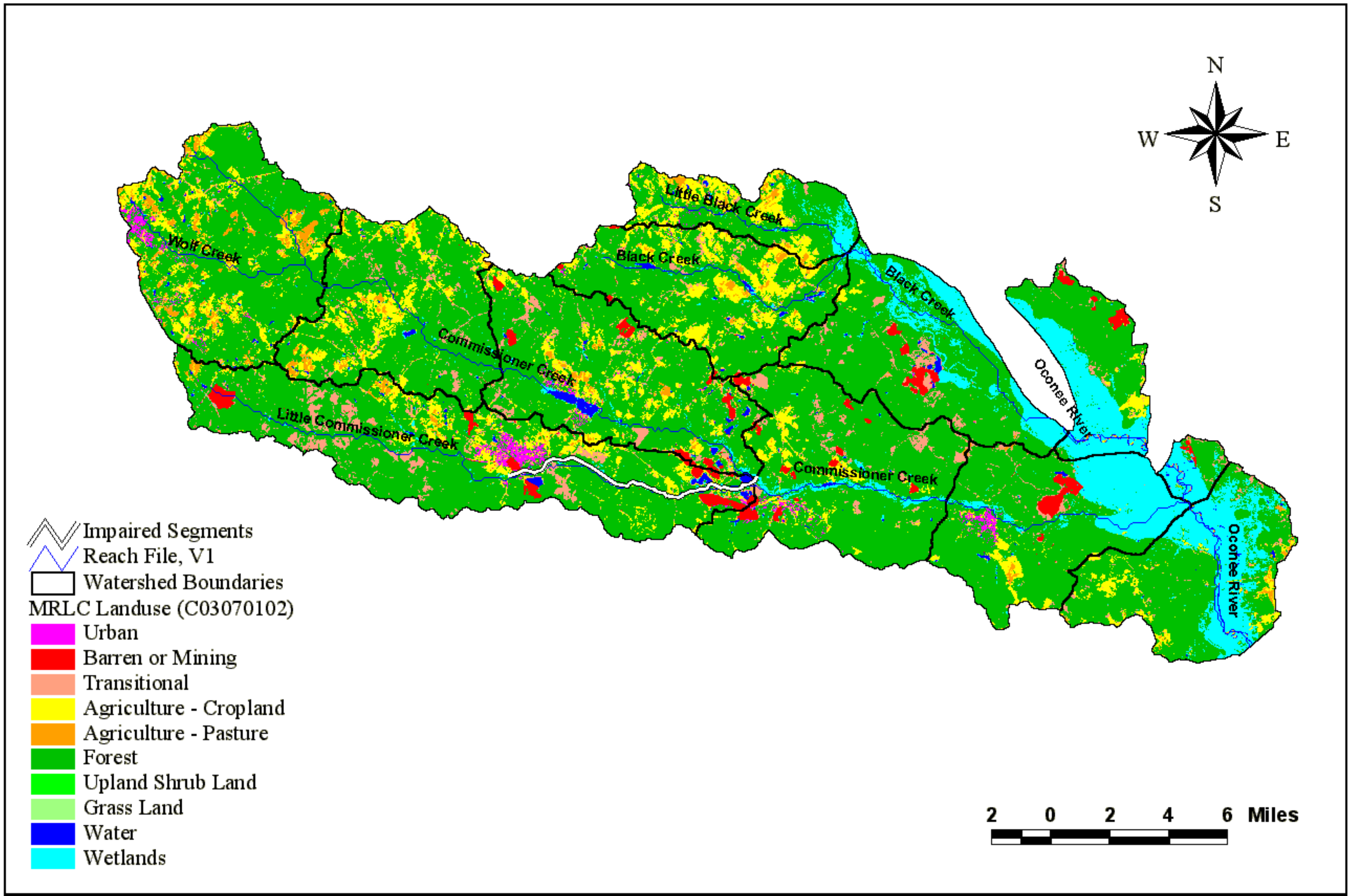


Figure 2C - Land Use Distribution
Black Creek and Little Commissioner Creek Watersheds
Lower Oconee River Basin (LROCN05)

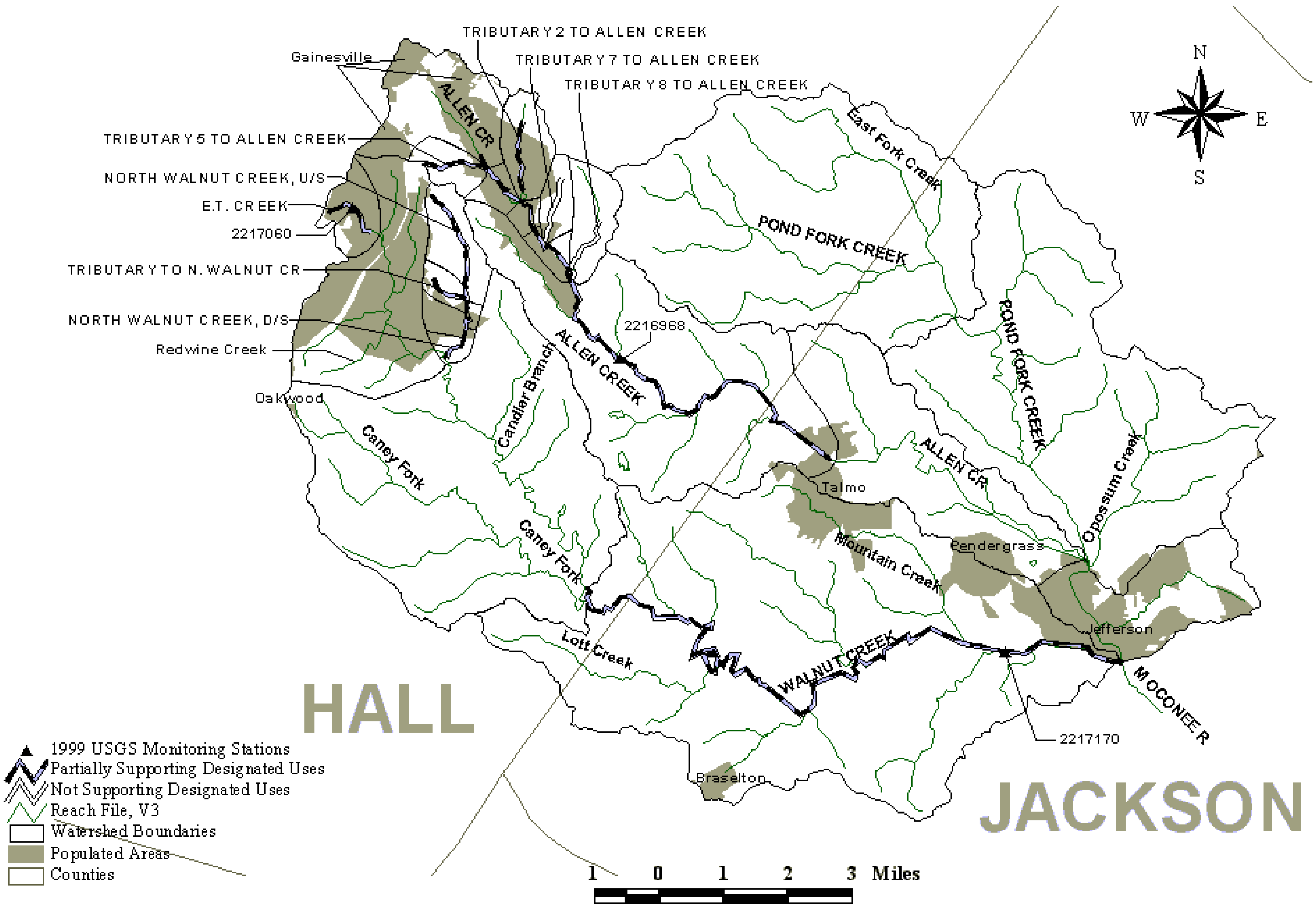


Figure 3A - Pond Fork Creek, Allen Creek, & Walnut Creek Watersheds
Upper Oconee River Basin (Projects UPOCN01 - UPOCN02)

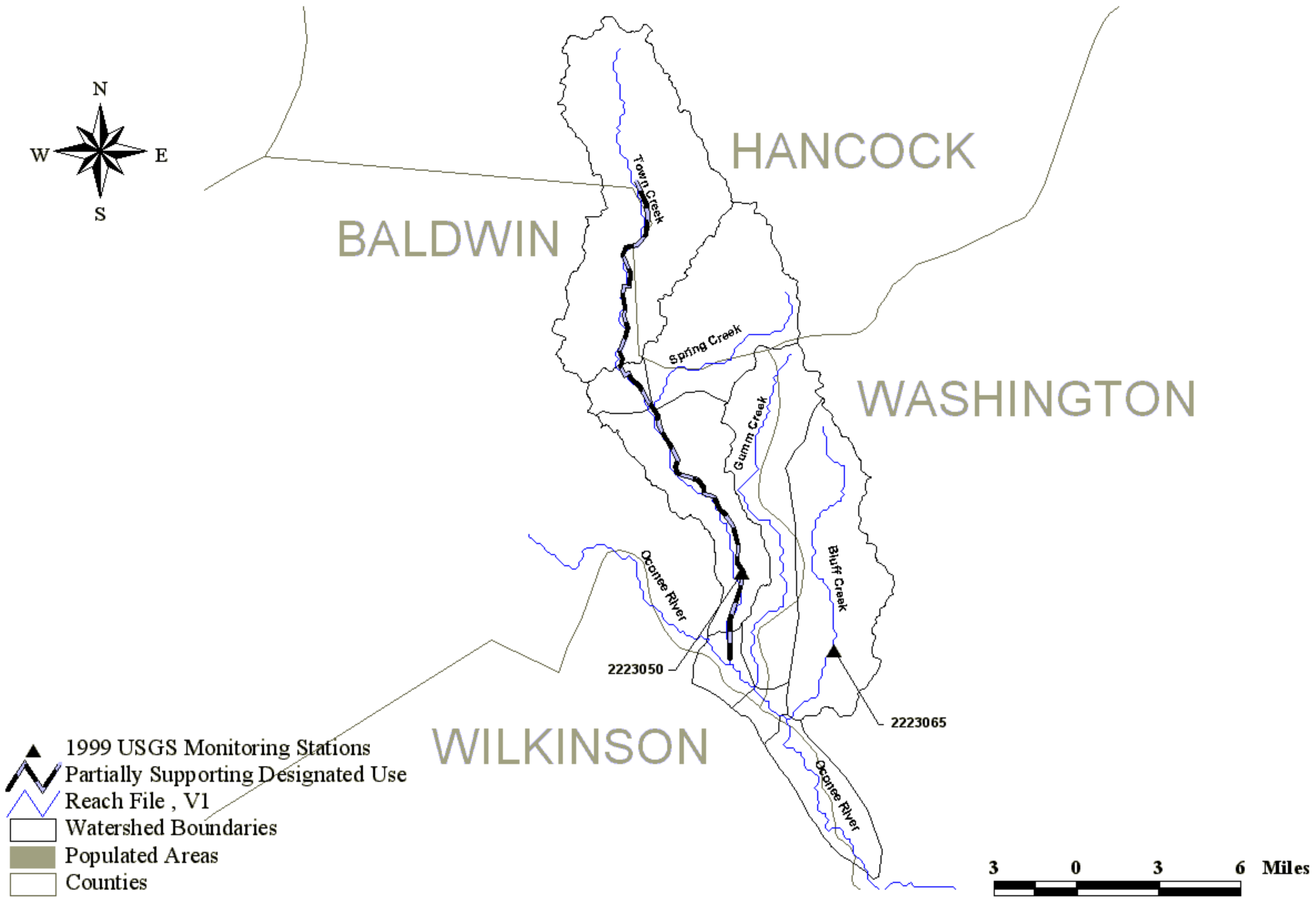


Figure 3B - Bluff Creek, Gumm Creek, and Town Creek Watersheds
Lower Oconee River Basin (Project LROCN02)

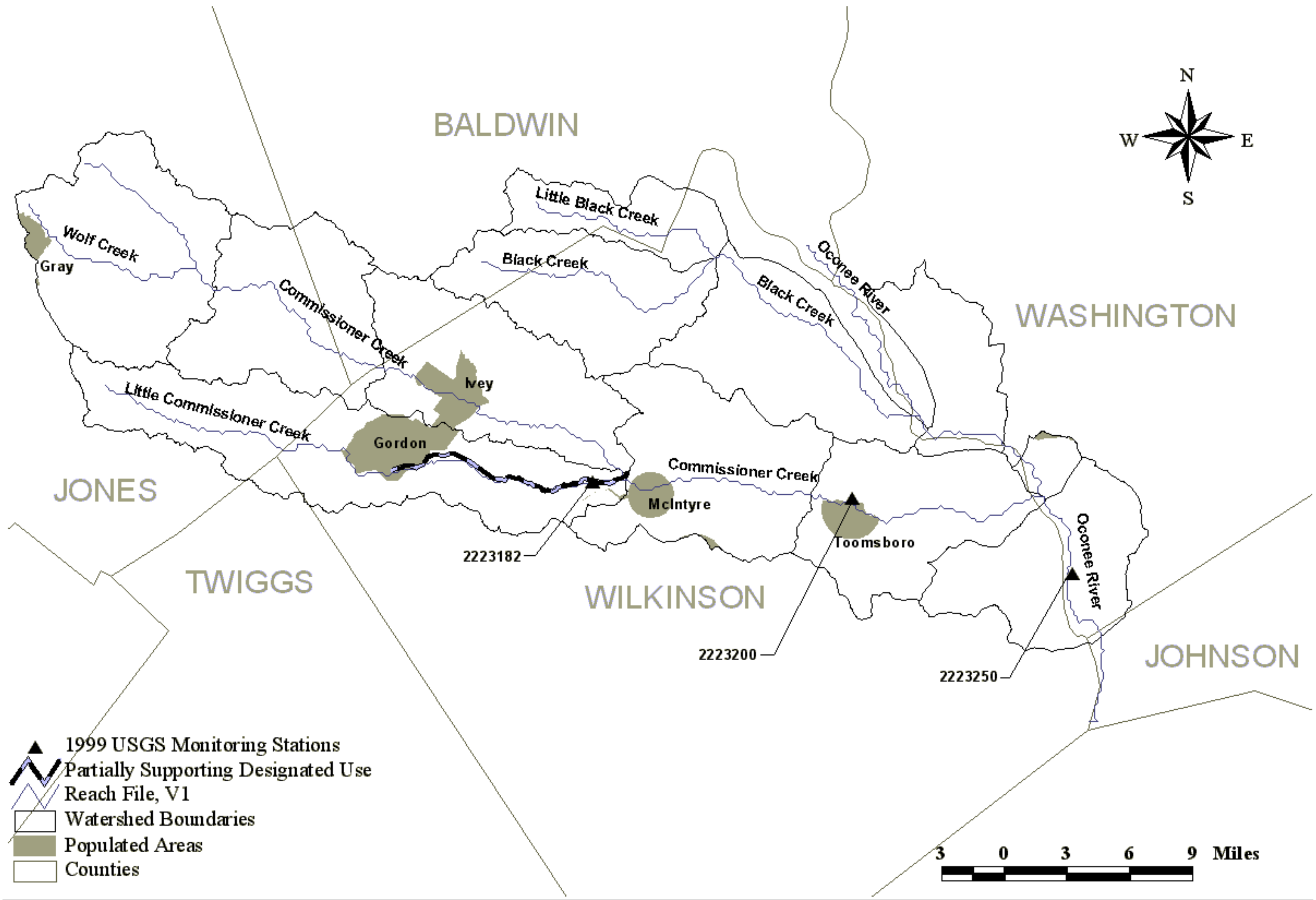


Figure 3C - Black Creek and Little Commissioner Creek Watersheds Lower Oconee River Basin (Project LROCN05)

TABLES

Table 1 Land Use Distribution for Oconee River Watershed

Stream/Segment	Land Use Categories - in units of acres (percent)																
	Bare Rock/Sand/Clay	Deciduous Forest	Emergent Herbaceous Wetlands	Evergreen Forest	High Intensity Commercial/Industrial/Transportation	Low Intensity Commercial/Industrial/Transportation	High Intensity Residential	Low Intensity Residential	Mixed Forest	Open Water	Other Grasses Urban/Recreational	Pasture/Hay	Quarries/Strip Mines/Gravel Pits	Row Crops	Transitional	Woody Wetlands	Unclassified
Allen Creek (Monroe Driver to 1 mile d/s ga. Hwy 11)	5 (0.0)	6125 (50.8)	2 (0.0)	744 (6.2)	431 (3.6)	0 (0.0)	68 (0.6)	80 (0.7)	1273 (10.6)	11 (0.1)	205 (1.7)	1781 (14.8)	186 (1.5)	1126 (9.3)	11 (0.1)	18 (0.1)	0 (0.0)
Apalachee River (Marburg Creek to Lake Oconee)	72 (0.0)	57039 (32.3)	61 (0.0)	31478 (17.8)	866 (0.5)	0 (0.0)	160 (0.1)	1048 (0.6)	24779 (14.0)	913 (0.5)	981 (0.6)	37949 (21.5)	6 (0.0)	14575 (8.2)	2646 (1.5)	4272 (2.4)	0 (0.0)
Apalachee River (Williamson Creek to Marburg Creek)	0 (0.0)	17756 (40.0)	14 (0.0)	5597 (12.6)	213 (0.5)	0 (0.0)	22 (0.0)	262 (0.6)	6519 (14.7)	85 (0.2)	138 (0.3)	10234 (23.1)	0 (0.0)	1667 (3.8)	265 (0.6)	1630 (3.7)	0 (0.0)
Beaverdam Creek (Oliver creek to Lake Oconee)	16 (0.1)	5408 (29.0)	2 (0.0)	6755 (36.2)	210 (1.1)	0 (0.0)	1 (0.0)	112 (0.6)	2253 (12.1)	133 (0.7)	85 (0.5)	1366 (7.3)	112 (0.6)	1664 (8.9)	469 (2.5)	79 (0.4)	0 (0.0)
Big Cedar Creek (Hog Creek to Lake Sinclair)	48 (0.1)	35501 (40.0)	29 (0.0)	32079 (36.2)	33 (0.0)	0 (0.0)	6 (0.0)	139 (0.2)	10185 (11.5)	505 (0.6)	46 (0.1)	3433 (3.9)	121 (0.1)	3082 (3.5)	3315 (3.7)	215 (0.2)	0 (0.0)
Big Indian Creek (I-20 to Little Indian Creek)	31 (0.1)	6885 (27.6)	15 (0.1)	5474 (21.9)	95 (0.4)	0 (0.0)	0 (0.0)	206 (0.8)	3131 (12.6)	133 (0.5)	140 (0.6)	5091 (20.4)	0 (0.0)	2467 (9.9)	590 (2.4)	683 (2.7)	0 (0.0)

Stream/Segment	Land Use Categories - in units of acres (percent)																
	Bare Rock/Sand/Clay	Deciduous Forest	Emergent Herbaceous Wetlands	Evergreen Forest	High Intensity Commercial/Industrial/Transportation	Low Intensity Commercial/Industrial/Transportation	High Intensity Residential	Low Intensity Residential	Mixed Forest	Open Water	Other Grasses Urban/Recreational	Pasture/Hay	Quarries/Strip Mines/Gravel Pits	Row Crops	Transitional	Woody Wetlands	Unclassified
Big Sandy Creek (Porter Creek to Oconee River)	262 (0.1)	74175 (37.9)	93 (0.0)	50610 (25.9)	143 (0.1)	0 (0.0)	73 (0.0)	428 (0.2)	34460 (17.6)	1083 (0.6)	13 (0.0)	2302 (1.2)	4346 (2.2)	10118 (5.2)	13424 (6.9)	4177 (2.1)	0 (0.0)
Carr Creek (Headwaters to North Oconee River)	11 (0.5)	281 (13.0)	1 (0.0)	295 (13.7)	192 (8.9)	0 (0.0)	145 (6.7)	561 (26.0)	143 (6.6)	17 (0.8)	258 (11.9)	30 (1.4)	152 (7.0)	64 (3.0)	0 (0.0)	11 (0.5)	0 (0.0)
Cedar Creek (Headwaters to Oconee River)	3 (0.1)	842 (25.4)	0 (0.0)	643 (19.4)	64 (1.9)	0 (0.0)	204 (6.1)	883 (26.6)	438 (13.2)	7 (0.2)	46 (1.4)	107 (3.2)	0 (0.0)	77 (2.3)	0 (0.0)	7 (0.2)	0 (0.0)
Cedar Creek (Headwaters to Winder Reservoir)	2 (0.0)	3194 (35.9)	1 (0.0)	1121 (12.6)	263 (3.0)	0 (0.0)	74 (0.8)	261 (2.9)	1364 (15.3)	33 (0.4)	181 (2.0)	1823 (20.5)	0 (0.0)	522 (5.9)	38 (0.4)	9 (0.1)	0 (0.0)
East Fork Trail Creek (Headwaters to West Fork Trail Creek)	11 (0.3)	643 (16.2)	1 (0.0)	925 (23.4)	239 (6.0)	0 (0.0)	13 (0.3)	321 (8.1)	484 (12.2)	25 (0.6)	79 (2.0)	723 (18.3)	0 (0.0)	474 (12.0)	0 (0.0)	21 (0.5)	0 (0.0)
Little Commissioner Creek (Ga Hwy 18 to Commissioner Creek)	61 (0.2)	12586 (40.1)	10 (0.0)	6965 (22.2)	201 (0.6)	0 (0.0)	84 (0.3)	341 (1.1)	3659 (11.7)	330 (1.1)	47 (0.1)	415 (1.3)	1007 (3.2)	2580 (8.2)	2795 (8.9)	323 (1.0)	0 (0.0)

Stream/Segment	Land Use Categories - in units of acres (percent)																
	Bare Rock/Sand/Clay	**Deciduous Forest**	**Emergent Herbaceous Wetlands**	**Evergreen Forest**	**High Intensity Commercial/Industrial/Transportation**	**Low Intensity Commercial/Industrial/Transportation**	**High Intensity Residential**	**Low Intensity Residential**	**Mixed Forest**	**Open Water**	**Other Grasses Urban/Recreational**	**Pasture/Hay**	**Quarries/Strip Mines/Gravel Pits**	**Row Crops**	**Transitional**	**Woody Wetlands**	**Unclassified**
Little River (Glady Creek to Lake Sinclair)	21 (0.0)	17502 (30.3)	35 (0.1)	11328 (19.6)	189 (0.3)	0 (0.0)	6 (0.0)	101 (0.2)	8052 (13.9)	290 (0.5)	287 (0.5)	11541 (20.0)	1 (0.0)	5728 (9.9)	1198 (2.1)	1505 (2.6)	0 (0.0)
Little River (Shoal Creek to Gap Creek)	143 (0.1)	59233 (31.0)	751 (0.4)	50846 (26.6)	677 (0.4)	0 (0.0)	85 (0.0)	1018 (0.5)	23931 (12.5)	1078 (0.6)	623 (0.3)	30132 (15.8)	248 (0.1)	14124 (7.4)	5369 (2.8)	2602 (1.4)	0 (0.0)
Little River (Social Circle to Nelson Creek)	1 (0.0)	5538 (31.9)	11 (0.1)	3131 (18.0)	118 (0.7)	0 (0.0)	5 (0.0)	53 (0.3)	2879 (16.6)	39 (0.2)	216 (1.2)	2953 (17.0)	0 (0.0)	1645 (9.5)	157 (0.9)	612 (3.5)	0 (0.0)
Little Sugar Creek (Headwaters to Lake Oconee)	23 (0.1)	6191 (29.1)	6 (0.0)	5681 (26.7)	1 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2381 (11.2)	234 (1.1)	0 (0.0)	4377 (20.5)	0 (0.0)	1928 (9.1)	414 (1.9)	64 (0.3)	0 (0.0)
Marburg Creek (Masseys Lake to Apalachee River)	2 (0.0)	5216 (31.5)	6 (0.0)	2306 (13.9)	286 (1.7)	0 (0.0)	46 (0.3)	109 (0.7)	2351 (14.2)	335 (2.0)	166 (1.0)	4433 (26.8)	0 (0.0)	1134 (6.8)	2 (0.0)	167 (1.0)	0 (0.0)
Middle Oconee River (Big Bear Creek to McNutt Creek)	*TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	0 (0.0)

Stream/Segment	Land Use Categories - in units of acres (percent)																
	Bare Rock/Sand/Clay	**Deciduous Forest**	**Emergent Herbaceous Wetlands**	**Evergreen Forest**	**High Intensity Commercial/Industrial/Transportation**	**Low Intensity Commercial/Industrial/Transportation**	**High Intensity Residential**	**Low Intensity Residential**	**Mixed Forest**	**Open Water**	**Other Grasses Urban/Recreational**	**Pasture/Hay**	**Quarries/Strip Mines/Gravel Pits**	**Row Crops**	**Transitional**	**Woody Wetlands**	**Unclassified**
Middle Oconee River (Mulberry River to Big Bear Creek)	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	0 (0.0)
Mulberry River (Little Mulberry River to Middle Oconee)	4 (0.0)	46273 (46.1)	38 (0.0)	7123 (7.1)	622 (0.6)	0 (0.0)	141 (0.1)	630 (0.6)	14292 (14.2)	365 (0.4)	469 (0.5)	21938 (21.9)	324 (0.3)	6581 (6.6)	529 (0.5)	1042 (1.0)	0 (0.0)
North Oconee River (Bordens Creek to Curry Creek)	20 (0.0)	27415 (40.5)	7 (0.0)	8159 (12.1)	566 (0.8)	0 (0.0)	40 (0.10	502 (0.7)	9655 (14.3)	105 (0.2)	322 (0.5)	15369 (22.7)	3 (0.0)	5239 (7.7)	41 (0.1)	271 (0.4)	0 (0.0)
North Oconee River (Chandler Creek to Bordens Creek)	7 (0.0)	17108 (39.7)	4 (0.0)	4336 (10.1)	194 (0.5)	0 (0.0)	5 (0.0)	61 (0.1)	6232 (14.5)	36 (0.1)	234 (0.5)	11124 (25.8)	0 (0.0)	3631 (8.4)	41 (0.1)	104 (0.2)	0 (0.0)
North Oconee River (Jackson County to Sandy Creek)	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	0 (0.0)
North Oconee River (Sandy Creek to Trail Creek)	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	0 (0.0)

Stream/Segment	Land Use Categories - in units of acres (percent)																
	Bare Rock/Sand/Clay	Deciduous Forest	Emergent Herbaceous Wetlands	Evergreen Forest	High Intensity Commercial/Industrial/Transportation	Low Intensity Commercial/Industrial/Transportation	High Intensity Residential	Low Intensity Residential	Mixed Forest	Open Water	Other Grasses Urban/Recreational	Pasture/Hay	Quarries/Strip Mines/Gravel Pits	Row Crops	Transitional	Woody Wetlands	Unclassified
North Oconee River (Trail Creek to Oconee River)	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	0 (0.0)
North Walnut Creek (Gainesville D/s Hall County Camp)	1 (0.1)	635 (46.3)	0 (0.0)	156 (11.4)	25 (1.8)	0 (0.0)	1 (0.1)	2 (0.2)	269 (19.6)	0 (0.0)	9 (0.6)	133 (9.7)	0 (0.0)	134 (9.7)	2 (0.2)	5 (0.3)	0 (0.0)
North Walnut Creek (Gainesville U/s Hall County Camp)	1 (0.2)	356 (48.8)	0 (0.0)	98 (13.4)	23 (3.2)	0 (0.0)	0 (0.0)	1 (0.2)	163 (22.2)	0 (0.0)	8 (1.1)	29 (4.0)	0 (0.0)	46 (6.4)	0 (0.0)	3 (0.4)	0 (0.0)
Oconee River (Barnett Shoals to Lake Oconee)	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	0 (0.0)
Oconee River (Confluence of North & Middle Oconee Rivers)	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	0 (0.0)
Oconee River (Long Branch to Turkey Creek)	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	0 (0.0)

Stream/Segment	Land Use Categories - in units of acres (percent)																
	Bare Rock/Sand/Clay	Deciduous Forest	Emergent Herbaceous Wetlands	Evergreen Forest	High Intensity Commercial/Industrial/Transportation	Low Intensity Commercial/Industrial/Transportation	High Intensity Residential	Low Intensity Residential	Mixed Forest	Open Water	Other Grasses Urban/Recreational	Pasture/Hay	Quarries/Strip Mines/Gravel Pits	Row Crops	Transitional	Woody Wetlands	Unclassified
Richland Creek (Interstate 20 to Beaverdam Creek)	50 (0.1)	10032 (29.6)	12 (0.0)	12103 (35.7)	277 (0.8)	0 (0.0)	58 (0.2)	664 (2.0)	3485 (10.3)	677 (2.0)	294 (0.9)	2891 (8.5)	47 (0.1)	2296 (6.8)	902 (2.7)	122 (0.4)	0 (0.0)
Rooty Creek (Rd. S926 Eatonton to Little Creek)	44 (0.2)	6990 (23.9)	11 (0.0)	8392 (28.7)	163 (0.6)	0 (0.0)	59 (0.2)	642 (2.2)	2771 (9.5)	937 (3.2)	113 (0.4)	4515 (15.4)	187 (0.6)	2501 (8.5)	1800 (6.2)	146 (0.5)	0 (0.0)
Tanyard Creek (U/s North Oconee River)	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	0 (0.0)
Town Creek (Hwy. 15 to Richland Creek)	20 (0.3)	1182 (20.2)	0 (0.0)	1269 (21.6)	249 (4.2)	0 (0.0)	56 (0.9)	608 (10.4)	692 (11.8)	40 (0.7)	146 (2.5)	836 (14.3)	3 (0.0)	591 (10.1)	156 (2.7)	22 (0.4)	0 (0.0)
Town Creek (Peavy Branch to Oconee River)	21 (0.1)	14409 (37.2)	1 (0.0)	11647 (30.1)	7 (0.0)	0 (0.0)	0 (0.0)	30 (0.1)	4207 (10.9)	91 (0.2)	4 (0.0)	798 (2.1)	4 (0.0)	3515 (9.1)	3295 (8.5)	675 (1.7)	0 (0.0)
Tributary 2 to Allen Creek (Gainesville d/s Old Landfill)	0 (0.0)	457 (66.9)	0 (0.0)	61 (8.9)	11 (1.6)	0 (0.0)	0 (0.0)	0 (0.0)	90 (13.2)	0 (0.0)	0 (0.0)	10 (1.5)	0 (0.0)	53 (7.8)	1 (0.1)	0 (0.0)	0 (0.0)

Stream/Segment	Land Use Categories - in units of acres (percent)																
	Bare Rock/Sand/Clay	**Deciduous Forest**	**Emergent Herbaceous Wetlands**	**Evergreen Forest**	**High Intensity Commercial/Industrial/Transportation**	**Low Intensity Commercial/Industrial/Transportation**	**High Intensity Residential**	**Low Intensity Residential**	**Mixed Forest**	**Open Water**	**Other Grasses Urban/Recreational**	**Pasture/Hay**	**Quarries/Strip Mines/Gravel Pits**	**Row Crops**	**Transitional**	**Woody Wetlands**	**Unclassified**
Tributary 5 to Allen Creek (Gainesville)	0	326 (82)	0	0	0	0	23 (8)	14 (3.5)	0	0	0	7 (2.2)	0	25 (6.3)	0	0.4 (0.1)	0 (0.0)
Tributary 7 to Allen Creek (Gainesville West side of New Landfill)	0 (0.0)	205 (56.6)	0 (0.0)	44 (12.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	79 (21.9)	1 (0.4)	0 (0.0)	5 (1.5)	0 (0.0)	27 (7.5)	0 (0.0)	0 (0.0)	0 (0.0)
Tributary 8 to Allen Creek (Gainesville East Side of New Landfill)	0 (0.0)	382 (54.0)	0 (0.0)	86 (12.2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	120 (17.0)	0 (0.0)	0 (0.0)	53 (7.5)	0 (0.0)	65 (9.2)	0 (0.0)	1 (0.1)	0 (0.0)
Tributary to N. Walnut Creek (Gainesville)	0	158 (76)	0	0	0	0	0.6 (0.3)	2 (0.9)	0	0	0	25 (12)	0	22 (11)	0	0	0 (0.0)
Turkey Creek (Horse Branch to Rocky Creek)	75 (0.1)	19037 (24.10	13 (0.0)	11398 (14.4)	347 (0.4)	0 (0.0)	53 (0.1)	468 (0.6)	9776 (12.4)	257 (0.3)	485 (0.6)	5536 (7.0)	18 (0.0)	17766 (22.5)	3523 (4.5)	10166 (12.9)	0 (0.0)
Turkey Creek (Rocky Creek to Oconee River)	215 (0.1)	36642 (16.0)	132 (0.1)	30832 (13.4)	1048 (0.5)	0 (0.0)	73 (0.0)	779 (0.3)	19311 (8.4)	807 (0.4)	825 (0.4)	24484 (10.7)	25 (0.0)	71175 (31.0)	13600 (5.9)	29618 (12.9)	0 (0.0)

Stream/Segment	Land Use Categories - in units of acres (percent)																
	Bare Rock/Sand/Clay	Deciduous Forest	Emergent Herbaceous Wetlands	Evergreen Forest	High Intensity Commercial/Industrial/Transportation	Low Intensity Commercial/Industrial/Transportation	High Intensity Residential	Low Intensity Residential	Mixed Forest	Open Water	Other Grasses Urban/Recreational	Pasture/Hay	Quarries/Strip Mines/Gravel Pits	Row Crops	Transitional	Woody Wetlands	Unclassified
Walnut Creek (Caney Fork to Middle Oconee River)	6 (0.0)	17493 (49.4)	10 (0.0)	2338 (6.6)	231 (0.7)	0 (0.0)	11 (0.0)	247 (0.7)	4433 (12.5)	53 (0.2)	655 (1.9)	6724 (19.0)	5 (0.0)	3038 (8.6)	42 (0.1)	144 (0.4)	0 (0.0)

TBD = TO BE DETERMINED

Table 2 Waterbodies Listed for Fecal Coliform Bacteria in the Oconee River Basin

Stream Name	Segment Description	Segment Length (miles)	Designated Use Classification	Partially Supporting Designated Uses	Not Supporting Designated Uses
Allen Creek	Monroe Driver to 1 mile d/s ga. Hwy 11	9	Fishing	X	
Apalachee River	Marburg Creek to Lake Oconee	35	Fishing	X	
Apalachee River	Williamson Creek to Marburg Creek	7	Fishing		X
Beaverdam Creek	Oliver creek to Lake Oconee	4	Fishing		X
Big Cedar Creek	Hog Creek to Lake Sinclair	11	Fishing	X	
Big Indian Creek	I-20 to Little Indian Creek	11	Fishing	X	
Big Sandy Creek	Porter Creek to Oconee River	14	Fishing		X
Carr Creek	Headwaters to North Oconee River	2	Fishing	X	
Cedar Creek	Headwaters to Oconee River	4	Fishing		X
Cedar Creek	Headwaters to Winder Reservoir	4	Fishing		X
East Fork Trail Creek	Headwaters to West Fork Trail Creek	3	Fishing	X	
Little Commissioner Creek	Ga Hwy 18 to Commissioner Creek	9	Fishing	X	
Little River	Glady Creek to Lake Sinclair	8	Fishing	X	
Little River	Shoal Creek to Gap Creek	14	Fishing		X
Little River	Social Circle to Nelson Creek	3	Fishing		X
Little Sugar Creek	Headwaters to Lake Oconee	9	Fishing		X
Marburg Creek	Masseys Lake to Apalachee River	7	Fishing		X
Middle Oconee River	Big Bear Creek to McNutt Creek	12	Fishing	X	
Middle Oconee River	Mulberry River to Big Bear Creek	11	Fishing		X
Mulberry River	Little Mulberry River to Middle Oconee	18	Fishing	X	
North Oconee River	Bordens Creek to Curry Creek	8	Fishing		X
North Oconee River	Chandler Creek to Bordens Creek	12	Fishing		X
North Oconee River	Jackson County to Sandy Creek	5	Fishing/ Drinking Water	X	
North Oconee River	Sandy Creek to Trail Creek	2	Fishing/ Drinking Water		X
North Oconee River	Trail Creek to Oconee River	8	Fishing	X	
North Walnut Creek	Gainesville D/s Hall County Camp	1	Fishing	X	
North Walnut Creek	Gainesville U/s Hall County Camp	2	Fishing	X	
Oconee River	Barnett Shoals to Lake Oconee	16	Fishing	X	
Oconee River	Confluence of North & Middle Oconee Rivers	4	Fishing		X

Stream Name	Segment Description	Segment Length (miles)	Designated Use Classification	Partially Supporting Designated Uses	Not Supporting Designated Uses
Oconee River	Long Branch to Turkey Creek	9	Fishing	X	
Richland Creek	Interstate 20 to Beaverdam Creek	8	Fishing		X
Rooty Creek	Rd. S926 Eatonton to Little Creek	9	Fishing		X
Tanyard Creek	U/s North Oconee River	1	Fishing		X
Town Creek	Hwy. 15 to Richland Creek	4	Fishing		X
Town Creek	Peavy Branch to Oconee River	16	Fishing	X	
Tributary 2 to Allen Creek	Gainesville d/s Old Landfill	1	Fishing	X	
Tributary 5 to Allen Creek	Gainesville	1	Fishing	X	
Tributary 7 to Allen Creek	Gainesville West side of New Landfill	1	Fishing		X
Tributary 8 to Allen Creek	Gainesville East Side of New Landfill	1	Fishing		X
Tributary to North Walnut Creek	Gainesville	1	Fishing	X	
Turkey Creek	Horse Branch to Rocky Creek	10	Fishing		X
Turkey Creek	Rocky Creek to Oconee River	11	Fishing	X	
Walnut Creek	Caney Fork to Middle Oconee River	14	Fishing	X	

Table 3 1999 Water Quality Monitoring Stations

Stream Name	Segment Description	USGS Monitoring Station No.	Monitoring Station Description
Allen Creek	Monroe Driver to 1 mile D/S Ga. Hwy 11	02216968	Allen Creek at Baker Road near Candler, Georgia
Apalachee River	Marburg Creek to Lake Oconee	02219000 02219148	Apalachee River near Boswick, Georgia and Apalachee River at State Road 24 near Apalachee, Georgia
Apalachee River	Williamson Creek to Marburg Creek	02218700	Apalachee River at State Road 11 near Bethlehem, Georgia
Beaverdam Creek	Oliver creek to Lake Oconee	02220395	Beaverdam Creek at Walkers Church Road (County Road 66) near Veazey, Georgia
Big Cedar Creek	Hog Creek to Lake Sinclair	02221900	Big Cedar Creek at U.S. Hwy 129 near Eatonton, Georgia
Big Indian Creek	I-20 to Little Indian Creek	02220850	Big Indian Creek at Georgia Hwy 83 near Madison, Georgia
Big Sandy Creek	Porter Creek to Oconee River	02223368	Big Sandy Creek at State Road 112 near Toomsboro, Georgia
Carr Creek	Headwaters to North Oconee River	02217915	Carr Creek at Bailey Street near Athens, Georgia
Cedar Creek	Headwaters to Oconee River	02217996	Cedar Creek at Barnett Shoals Drive near Athens, Georgia
Cedar Creek	Headwaters to Winder Reservoir	02217299	Cedar Creek at State Road 211 near Winder, Georgia
East Fork Trail Creek	Headwaters to West Fork Trail Creek	02217866	East Fork Trail Creek Tributary (Carver Branch) at Olympic Drive near Athens, Georgia
Little Commissioner Creek	Ga Hwy 18 to Commissioner Creek	02223182	Little Commissioner Creek at Vinson Road (County Road 183) near Gordon, Georgia
Little River	Glady Creek to Lake Sinclair	02220900	Little River at State Road 16 near Eatonton, Georgia
Little River	Shoal Creek to Gap Creek	02220800	Little River at Georgia Hwy 83 near Godfrey, Georgia
Little River	Social Circle to Nelson Creek	02220783	Little River at U.S. Hwy 278 near Covington, Georgia
Little Sugar Creek	Headwaters to Lake Oconee	02220100	Little Sugar Creek at Kingston Road (County Road 127) near Buckhead, Georgia
Marburg Creek	Masseys Lake to Apalachee River	02218805	Marburg Creek at Manning Gin Road near Bethlehem, Georgia
Middle Oconee River	Big Bear Creek to McNutt Creek	02217515	Middle Oconee River at U.S. Hwy 441 near Athens, Georgia
Middle Oconee River	Mulberry River to Big Bear Creek	02217475	Middle Oconee River at Georgia Hwy 82 near Arcade, Georgia
Mulberry River	Little Mulberry River to Middle Oconee	02217380	Mulberry River at Georgia Hwy 11 near Winder, Georgia
North Oconee River	Bordens Creek to Curry Creek	02217646	North Oconee River at State Hwy 335 near Nicholson, Georgia

Stream Name	Segment Description	USGS Monitoring Station No.	Monitoring Station Description
North Oconee River	Chandler Creek to Bordens Creek	02217610	North Oconee River at Georgia Hwy 82 near Maysville, Georgia
North Oconee River	Jackson County to Sandy Creek	02217740	North Oconee River – Athens Water Intake
North Oconee River	Sandy Creek to Trail Creek	No station	No station
North Oconee River	Trail Creek to Oconee River	02217950	North Oconee River at Whitehall Road near Whitehall, Georgia
North Walnut Creek	Gainesville D/S Hall County Camp	No station	No station
North Walnut Creek	Gainesville U/S Hall County Camp	No station	No station
Oconee River	Barnett Shoals to Lake Oconee	02218300	Oconee River at Georgia Hwy 15 near Penfield, Georgia
Oconee River	Confluence of North & Middle Oconee Rivers	02218000	Oconee River at Barnett Shoals Road near Athens, Georgia
Oconee River	Long Branch to Turkey Creek	02223600	Oconee River at U.S. Hwy 80 near Dublin, Georgia
Richland Creek	Interstate 20 to Beaverdam Creek	03038751*	Richland Creek at Interstate 20 near Greensboro, Georgia
Rooty Creek	Rd. S926 Eatonton to Little Creek	02220735	Rooty Creek at Martin Luther King Jr. Drive (County Road 90) near Eatonton, Georgia
Tanyard Creek	U/S North Oconee River	02217906	Tanyard Creek at East Campus Drive near Athens, Georgia
Town Creek	Hwy. 15 to Richland Creek	02220368	Town Creek at Old Covington Road (County Road 39) near Greensboro, Georgia
Town Creek	Peavy Branch to Oconee River	02223050	Town Creek at Georgia Hwy 24 near Milledgeville, Georgia
Tributary 2 to Allen Creek	Gainesville D/S Old Landfill	No station	No station
Tributary 5 to Allen Creek	Gainesville	No station	No station
Tributary 7 to Allen Creek	Gainesville West side of New Landfill	No station	No station
Tributary 8 to Allen Creek	Gainesville East Side of New Landfill	No station	No station
Tributary to North Walnut Creek	Gainesville	No station	No station
Turkey Creek	Horse Branch to Rocky Creek	02223940	Turkey Creek at Walker Dairy Road (County Road 338) near Dudley, Georgia
Turkey Creek	Rocky Creek to Oconee River	02224100	Turkey Creek at U.S. Hwy 441 near Dublin, Georgia

Stream Name	Segment Description	USGS Monitoring Station No.	Monitoring Station Description
Walnut Creek	Caney Fork to Middle Oconee River	02217170	Walnut Creek at Georgia Hwy 332 near Winder, Georgia

* Georgia monitoring station number; no corresponding USGS station

Table 4 CY 1999 Water Quality Monitoring Data

Stream/Segment	Sample Period	Geometric Mean (#/100 ml.)	Sample Period	Geometric Mean (#/100 ml.)	Sample Period	Geometric Mean (#/100 ml.)	Sample Period	Geometric Mean (#/100 ml.)
Allen Creek (Monroe Driver to 1 mile d/s ga. Hwy 11)	04/01/99 04/05/99 04/22/99 04/27/99	102	05/18/99 05/25/99 05/27/99 06/17/99	169	09/22/99 09/27/99 10/05/99 11/23/99	1941	12/01/99 12/14/99 12/16/99 12/20/99	366
Apalachee River (Marburg Creek to Lake Oconee)	01/05/1999 01/19/1999 01/25/1999 02/02/1999	795	05/26/1999 06/09/1999 06/15/1999 06/21/1999	299	07/28/1999 08/11/1999 08/18/1999 08/25/1999	158	11/28/1999 12/13/1999 12/15/1999 12/20/1999	255
Apalachee River (Williamson Creek to Marburg Creek)	01/19/1999 01/25/1999 02/02/1999 02/03/1999	469	05/26/1999 06/09/1999 06/15/1999 06/21/1999	501	07/28/1999 08/11/1999 08/18/1999 08/25/1999	255	11/29/1999 12/13/1999 12/15/1999 12/20/1999	367
Beaverdam Creek (Oliver creek to Lake Oconee)	01/06/1999 01/20/1999 01/26/1999 02/03/1999	490	05/25/1999 06/14/1999 06/16/1999 06/22/1999	732	07/27/1999 08/10/1999 08/17/1999 08/24/1999	436	11/09/1/99 11/16/1999 11/23/1999 12/07/1999	190
Big Cedar Creek (Hog Creek to Lake Sinclair)	01/26/1999 02/09/1999 02/16/1999 02/23/1999	184	05/11/1999 05/18/1999 06/01/1999 06/08/1999	113	08/17/1999 08/24/1999 08/31/1999 09/14/1999	243	11/16/1999 11/30/1999 12/07/1999 12/14/1999	208
Big Indian Creek (I-20 to Little Indian Creek)	01/05/1999 01/19/1999 01/25/1999 02/02/1999	1765	05/26/1999 06/09/1999 06/15/1999 06/21/1999	123	07/28/1999 08/11/1999 08/18/1999 08/25/1999	170	11/29/1999 12/13/1999 12/15/1999 12/20/1999	52
Big Sandy Creek (Porter Creek to Oconee River)	01/27/1999 02/10/1999 02/17/1999 02/24/1999	228	05/12/1999 05/19/1999 06/02/1999 06/09/1999	247	08/18/1999 08/25/1999 09/01/1999 09/15/1999	319	11/17/1999 12/01/1999 12/08/1999 12/15/1999	91
Carr Creek (Headwaters to North Oconee River)	11/23/1999 12/01/1999 12/16/1999 12/20/1999	55						

Stream/Segment	Sample Period	Geometric Mean (#/100 ml.)	Sample Period	Geometric Mean (#/100 ml.)	Sample Period	Geometric Mean (#/100 ml.)	Sample Period	Geometric Mean (#/100 ml.)
Cedar Creek (Headwaters to Oconee River)	03/30/1999 03/31/1999 04/05/1999 04/22/1999	215	05/03/1999 05/06/1999 05/19/1999 05/26/1999	961	09/07/1999 09/08/1999 09/21/1999 10/04/1999	1322	11/01/1999 11/09/1999 11/22/1999 11/29/1999	198
Cedar Creek (Headwaters to Winder Reservoir)	02/15/1999 02/21/1999 02/28/1999 03/03/1999	264	05/27/1999 06/10/1999 06/17/1999 06/22/1999	723	07/29/1999 08/12/1999 08/19/1999 08/26/1999	446	11/30/1999 12/14/1999 12/16/1999 12/21/1999	316
East Fork Trail Creek (Headwaters to West Fork Trail Creek)	03/15/1999 03/18/1999 03/30/1999 03/31/1999	171	05/03/1999 05/06/1999 05/16/1999 05/26/1999	171	09/07/1999 09/08/1999 09/21/1999 10/04/1999	509	11/01/1999 11/09/1999 11/22/1999 11/29/1999	51
Little Commissioner Cr. (Ga Hwy 18 to Commissioner Creek)	01/27/1999 02/10/1999 02/17/1999 02/24/1999	32	05/12/1999 05/19/1999 06/02/1999 06/09/1999	238	08/18/1999 08/25/1999 09/01/1999 09/15/1999	111	11/17/1999 12/01/1999 12/08/1999 12/15/1999	96
Little River (Glady Creek to Lake Sinclair)	01/07/1999 01/21/1999 01/27/1999 02/04/1999	392	05/24/1999 06/07/1999 06/14/1999 06/21/1999	170	08/10/1999 08/12/1999 0816/1999 08/23/1999	330	11/08/1999 11/15/1999 11/22/1999 12/06/1999	136
Little River (Shoal Creek to Gap Creek)	01/05/1999 01/19/1999 01/25/1999 02/02/1999	1239	05/26/1999 06/26/1999 06/15/1999 06/21/1999	706	07/28/1999 08/11/1999 08/18/1999 08/28/1999	2815	11/29/1999 12/13/1999 12/15/1999 12/20/1999	612
Little River (Social Circle to Nelson Creek)	01/05/1999 01/16/1999 01/25/1999 02/02/1999	1201	05/26/1999 06/09/1999 06/15/1999 06/21/1999	942	07/28/1999 08/11/1999 08/18/1999 08/25/1999	1650	11/29/1999 12/13/1999 12/15/1999 12/20/1999	365
Little Sugar Creek (Headwaters to Lake Oconee)	01/01/1999 01/20/1999 02/03/1999 03/22/1999	1016	05/25/1999 06/14/1999 06/16/1999 06/22/1999	1152	07/27/1999 08/24/1999 08/25/1999 09/25/1999	229	11/09/1999 11/16/1999 11/23/1999 12/06/1999	221

Stream/Segment	Sample Period	Geometric Mean (#/100 ml.)	Sample Period	Geometric Mean (#/100 ml.)	Sample Period	Geometric Mean (#/100 ml.)	Sample Period	Geometric Mean (#/100 ml.)
Marburg Creek (Masseys Lake to Apalachee River)	01/05/1999 01/19/1999 01/25/1999 0202/1999	325	06/26/1999 0609/1999 06/15/1999 06/21/1999	336	07/28/1999 08/11/1999 08/18/1999 08/25/1999	189	11/29/1999 12/13/1999 12/15/1999 12/20/1999	2107
Middle Oconee River (Big Bear Creek to McNutt Creek)	04/01/1999 04/05/1999 04/22/1999 04/27/1999	116	05/18/1999 05/25/1999 05/27/1999 06/17/1999	140	09/22/1999 09/27/1999 10/05/1999 10/13/1999	775	12/01/1999 12/14/1999 12/16/1999 12/20/1999	294
Middle Oconee River (Mulberry River to Big Bear Creek)	02/15/1999 02/21/1999 02/28/1999	390	05/27/1999 06/10/1999 06/17/1999 06/22/1999	407	07/29/1999 08/12/1999 08/19/1999 08/26/1999	500	11/30/1999 12/14/1999 12/16/1999 12/21/1999	398
Mulberry River (Little Mulberry River to Middle Oconee)	02/15/1999 02/21/1999 02/28/1999 03/03/1999	196	05/27/1999 06/10/1999 06/17/1999 06/22/1999	735	07/29/1999 08/12/1999 08/19/1999 08/26/1999	147	11/30/1999 12/14/1999 12/16/1999 12/21/1999	276
North Oconee River (Bordens Creek to Curry Creek)	02/15/1999 02/21/199 02/28/1999 03/03/1999	175	05/27/1999 06/10/1999 06/17/1999 06/22/1999	279	07/29/1999 08/12/1999 08/19/1999 08/26/1999	257	11/30/1999 12/14/1999 12/16/1999 12/21/1999	982
North Oconee River (Chandler Creek to Bordens Creek)	02/15/1999 02/21/1999 02/28/1999 03/03/1999	551	05/27/1999 06/10/1999 06/17/1999 06/22/1999	736	07/29/1999 08/12/1999 08/19/1999 08/26/1999	272	11/30/1999 12/14/1999 12/16/1999 12/21/1999	>1398
North Oconee River (Jackson County to Sandy Creek)	OMD		OMD		OMD		OMD	
North Oconee River (Sandy Creek to Trail Creek)	04/01/1999 04/05/1999 04/22/1999 04/27/1999	416	05/18/1999 05/25/1999 05/27/1999 06/15/1999	409	09/22/1999 09/27/1999 10/05/1999 10/13/1999	739	12/01/1999 12/14/1999 12/16/1999 12/20/1999	761
North Oconee River (Trail Creek to Oconee River)	04/01/1999 04/05/1999 04/22/1999 04/27/1999	196	05/18/1999 05/25/1999 05/27/1999 06/17/1999	98	09/22/1999 09/27/1999 10/05/1999 10/13/1999	826	12/01/1999 12/14/1999 12/16/1999 12/20/1999	301

Stream/Segment	Sample Period	Geometric Mean (#/100 ml.)	Sample Period	Geometric Mean (#/100 ml.)	Sample Period	Geometric Mean (#/100 ml.)	Sample Period	Geometric Mean (#/100 ml.)
North Walnut Creek (Gainesville D/s Hall County Camp)	OMD		OMD		OMD		OMD	
North Walnut Creek (Gainesville U/s Hall County Camp)	OMD		OMD		OMD		OMD	
Oconee River (Barnett Shoals to Lake Oconee)	01/06/1999 01/20/1999 01/26/1999 02/03/1999	571	05/25/1999 06/08/1999 06/16/1999 06/22/1999	585	07/27/1999 08/10/1999 08/17/1999 08/24/1999	166	11/09/1999 11/16/1999 11/23/1999 12/07/1999	524
Oconee River (Athens to Barnett Shoals Dam)	01/08/1999 01/14/1999 01/21/1999	389	05/18/1999 05/25/1999 05/27/1999 06/15/1999	256	09/22/1999 09/27/1999 10/05/1999 10/13/1999	2395	12/01/1999 12/14/1999 12/16/1999 12/20/1999	370
Oconee River (Long Branch to Turkey Creek)	01/28/1999 02/11/1999 02/18/1999 02/25/1999	236	05/13/1999 05/20/1999 06/03/1999 06/10/1999	212	08/19/1999 08/26/1999 09/02/1999 09/16/1999	49	11/18/1999 12/02/1999 12/09/1999 12/16/1999	87
Richland Creek (Interstate 20 to Beaverdam Creek)	01/06/1999 01/20/1999 01/26/1999 0203/1999	2127	05/25/1999 06/14/1999 06/16/1999 06/22/1999	3105	07/27/1999 0810/1999 08/17/1999 08/24/1999	1317	11/09/1999 11/16/1999 11/23/1999 12/07/1999	765
Rooty Creek (Rd. S926 Eatonton to Little Creek)	01/07/1999 01/21/1999 01/27/1999 02/04/1999	2358	5/24/1999 06/07/1999 06/14/1999 06/21/1999	458	08/10/1999 08/12/1999 08/16/1999 08/23/1999	524	11/08/1999 11/15/1999 11/22/1999 12/06/1999	390
Tanyard Creek (U/s North Oconee River)	03/15/1999 03/18/1999 03/30/1999 03/31/1999	229	05/03/1999 05/06/1999 05/19/1999 05/26/1999	3492	09/07/1999 09/08/1999 09/21/1999 10/04/1999	2104	11/01/1999 11/09/1999 11/22/1999 11/29/1999	164
Town Creek (Hwy. 15 to Richland Creek)	01/06/1999 01/20/1999 01/26/1999 02/03/1999	1695	05/25/1999 06/14/1999 06/16/1999 06/22/1999	978	07/27/1999 08/10/1999 08/17/1999 08/24/1999	2117	11/09/1999 11/16/1999 11/23/1999 12/07/1999	399

Stream/Segment	Sample Period	Geometric Mean (#/100 ml.)	Sample Period	Geometric Mean (#/100 ml.)	Sample Period	Geometric Mean (#/100 ml.)	Sample Period	Geometric Mean (#/100 ml.)
Town Creek (Peavy Branch to Oconee River)	01/26/1999 02/09/1999 02/16/1999 02/23/1999	75	05/11/1999 05/18/1999 06/01/1999 05/08/1999	98	08/17/1999 08/24/1999 08/31/1999 09/14/1999	258	11/16/1999 11/30/1999 12/07/1999 12/14/1999	51
Tributary 2 to Allen Cr. (Gainesville d/s Old Landfill)	OMD		OMD		OMD		OMD	
Tributary 5 to Allen Creek (Gainesville)	OMD		OMD		OMD		OMD	
Tributary 7 to Allen Cr. (Gainesville West side of New Landfill)	OMD		OMD		OMD		OMD	
Tributary 8 to Allen Cr. (Gainesville East Side of New Landfill)	OMD		OMD		OMD		OMD	
Tributary to N. Walnut Creek (Gainesville)	OMD		OMD		OMD		OMD	
Turkey Creek (Horse Branch to Rocky Creek)	01/28/1999 02/11/1999 02/18/1999 02/25/1999	76	05/13/1999 05/20/1999 06/03/1999 06/10/1999	278	08/19/1999 08/26/1999 09/02/1999 09/16/1999	854	11/18/1999 12/02/1999 12/09/1999 12/16/1999	331
Turkey Creek (Rocky Creek to Oconee River)	01/28/1999 02/11/1999 02/18/1999 02/25/1999	174	05/13/1999 05/20/1999 06/03/1999 06/10/1999	208	08/19/1999 08/26/1999 09/02/1999 09/16/1999	157	11/18/1999 12/02/1999 12/09/1999 12/16/1999	118
Walnut Creek (Caney Fork to Middle Oconee River)	02/15/1999 02/21/1999 02/28/1999 03/03/1999	69	05/27/1999 06/10/1999 06/17/1999 06/22/1999	660	07/29/1999 08/12/1999 08/19/1999 08/26/1999	185	11/30/1999 12/14/1999 12/16/1999 12/21/1999	320

* OTHER MONITORING DATA (ie. 1991 monitoring data from the City of Gainesville)

Table 5 NPDES Facilities Discharging Fecal Coliform in the Oconee River Basin

Facility Name	NPDES Permit No.	1999 Discharge Monitoring Reports		NPDES Permit Limits	
		Avg. Flow (MGD)	Avg. Fecal Coliform Loading[a] (counts/hr)	Avg. Flow (MGD)	Avg. Fecal Coliform Loading[b] (counts/hr)
Ailey WPCP	GA0049247	No data available		0.08	2.53E+07
Athens Cedar Cr	GA0034584	1.35	1.61E+07	2.00	6.32E+08
Athens Middle Oconee	GA0021733	3.95	6.07E+07	6.00	1.90E+09
Athens-North Oconee	GA0021725	8.70	1.24E+08	10.72	3.39E+09
Country Corners MHP	GA0023060	No data available		0.06	1.83E+07
Crawford Westside WPCP	GA0033707	No data available		0.04	1.17E+07
Dexter WPCP	GA0048682	No data available		0.08	2.37E+07
Dublin WPCP	GA0025569	2.72	3.59E+08	4.00	1.26E+09
Dudley WPCP	GA0023957	No data available		0.12	3.63E+07
East Hall High School	GA0034878	No data available		0.03	8.85E+06
E. Laurens Elem. School	GA0022691	No data available		0.03	1.07E+07
Eatonton East WPCP	GA0032271	0.27	1.37E+06	0.28	8.69E+07
Eatonton West WPCP	GA0032263	0.20	1.20E+06	0.39	1.23E+08
Forstmann Co.	GA0003760	1.45	0.00E+00	3.50	1.11E+09
GA College Lake Laurel	GA0031593	No data available		0.002	6.32E+05
Glenwood WPCP	GA0021377	No data available		0.11	3.48E+07
Gordon WPCP	GA0020397	No data available		0.75	2.37E+08
Greensboro North Pond	GA0021342	0.03	0.00E+00	0.10	3.16E+07
Greensboro South	GA0021351	0.35	4.32E+07	1.00	3.15E+08
H&H Mobile Home Village	GA0022438	No data available		0.01	2.84E+06
Hallmark Mobile Home	GA0030236	No data available		0.06	1.83E+07
Heartwood MHP	GA0049875	No data available		0.09	2.84E+07
Jackson County BD of Comm	GA0002712	No data available		0.10	3.16E+07
Jasper County BD of Comm	GA0034142	No data available		0.01	3.79E+06
Jefferson Pond	GA0023132	0.10	0.00E+00	0.29	9.16E+07
Jeffersonville WPCP	GA0020940	0.22	5.83E+07	0.25	7.90E+07
Madison Northside	GA0023159	No data available		0.14	4.42E+07
Madison Southside	GA0023141	No data available		0.66	2.09E+08
Maysville Pond	GA0032905	No data available		0.06	1.90E+07
Mid. GA Correction	GA0022110	No data available		0.03	9.48E+06
Milledgeville WPCP	GA0030775	4.47	7.49E+08	7.00	2.21E+09
Monroe Jacks Cr	GA0047171	1.11	3.73E+07	3.40	1.07E+09
Monticello Pearson	GA0020141	No data available		0.17	5.37E+07
Monticello White Oak	GA0020150	No data available		0.12	3.63E+07
Mt. Vernon WPCP	GA0033758	No data available		0.27	8.53E+07
Oconee Co/Calls Cr	GA0050211	No data available		0.40	1.26E+08
Oconee Health Care Center	GA0035238	No data available		0.01	1.90E+06
Pinewood So. MHP	GA0034215	No data available		0.03	8.22E+06
Pinewood Estates	GA0034223	No data available		0.04	1.39E+07
Rock Eagle 4-H Center	GA0022233	No data available		0.16	4.90E+07
Rutledge Pond	GA0025895	No data available		0.05	1.58E+07

Facility Name	NPDES Permit No.	1999 Discharge Monitoring Reports		NPDES Permit Limits	
		Avg. Flow (MGD)	Avg. Fecal Coliform Loading[a] (counts/hr)	Avg. Flow (MGD)	Avg. Fecal Coliform Loading[b] (counts/hr)
Sandersville WPCP	GA0032051	0.96	1.18E+07	1.70	5.37E+08
Social Circle	GA0026107	0.35	2.61E+07	0.45	1.42E+08
Soperton WPCP	GA0020826	No data available		0.40	1.26E+08
Southeast Paper MFG	GA0032620	15.91	No data	15.00	4.74E+09
Sparta Pond	GA0025593	No data available		0.08	2.53E+07
Statham WPCP	GA0020044	No data available		0.15	4.74E+07
W. Laurens High School	GA0022705	No data available		0.05	1.64E+07
White Sulfur Elem. School	GA0027120	No data available		0.00	4.11E+05
Wilkinson Co. High School	GA0031291	No data available		0.02	6.95E+06
Winder Barber Cr	GA0023205	0.03	0.00E+00	0.02	6.32E+06
Winder Marburg Cr	GA0023191	0.48	1.68E+07	0.60	1.90E+08
Woodland T. MHP	GA0033880	No data available		0.01	3.79E+06

a Loadings based on CY 1999 average fecal coliform concentration and mean flow reported on DMRs.

b Loadings based on Monthly Average fecal coliform permit limit at monthly average permitted flow (design flow used for facilities without a permitted monthly flow limit). A fecal coliform loading of 200 counts/100 mL was assumed for facilities without a fecal coliform bacteria permit limit.

Table 6 Livestock Distribution In The Oconee River Watershed

Stream/Segment	Livestock						
	Beef Cow	Milk Cow	Cattle	Chicken Layers	Chickens-Broilers Sold	Hogs	Sheep
Allen Creek - (Monroe Driver to 1 mile D/S Ga. Hwy 11)	613	86	1185	85426	2683172	66	11
Apalachee River - (Marburg Creek to Lake Oconee)	6959	823	14676	362910	14285928	1223	112
Apalachee River - (Williamson Creek to Marburg Creek)	1473	21	3486	139872	4023215	15	12
Beaverdam Creek - (Oliver creek to Lake Oconee)	499	296	1285	0	340436	1	0
Big Cedar Creek - (Hog Creek to Lake Sinclair)	1310	627	3065	28383	595562	2	9
Big Indian Creek - (I-20 to Little Indian Creek)	891	676	2679	55093	984847	1229	7
Big Sandy Creek - (Porter Creek to Oconee River)	55	3	1783	0	0	159	0
Carr Creek - (Headwaters to North Oconee River)	0	0	13	0	11068	0	0
Cedar Creek - (Headwaters to Oconee River)	0	0	47	0	39562	0	0
Cedar Creek - (Headwaters to Winder Reservoir)	412	6	729	47099	1151929	0	0
East Fork Trail Creek - (Headwaters to West Fork Trail Creek)	0	0	320	0	268676	0	0
Little Commissioner Cr. - (Ga Hwy 18 to Commissioner Cr.)	123	49	388	0	69084	7	0
Little River - (Glady Creek to Lake Sinclair)	1992	885	4969	70052	1388071	1338	12
Little River - (Shoal Creek to Gap Creek)	5379	4456	16142	282079	3722246	4082	55
Little River - (Social Circle to Nelson Creek)	481	53	969	6374	293834	83	3
Little Sugar Creek - (Headwaters to Lake Oconee)	756	794	2571	42700	756936	957	5
Marburg Creek - (Masseys Lake to Apalachee River)	1002	16	1773	114528	2801054	0	0
Middle Oconee River - (Big Bear Creek to McNutt Creek)	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Middle Oconee River - (Mulberry River to Big Bear Creek)	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Mulberry River - (Little Mulberry River to Middle Oconee)	5233	215	10073	628385	16764661	132	167
North Oconee River - (Bordens Creek to Curry Creek)	4975	317	8953	623188	17222211	242	285

Stream/Segment	Livestock						
	Beef Cow	Milk Cow	Cattle	Chicken Layers	Chickens-Broilers Sold	Hogs	Sheep
North Oconee River - (Chandler Creek to Bordens Creek)	3658	308	6714	472326	13564142	242	172
North Oconee River - (Jackson County to Sandy Creek)	TBD	TBD	TBD	TBD	TBD	TBD	TBD
North Oconee River - (Sandy Creek to Trail Creek)	TBD	TBD	TBD	TBD	TBD	TBD	TBD
North Oconee River - (Trail Creek to Oconee River)	TBD	TBD	TBD	TBD	TBD	TBD	TBD
North Walnut Creek - (Gainesville D/S Hall County Camp)	46	8	92	6651	214682	6	0
North Walnut Creek - (Gainesville U/S Hall County Camp)	10	2	20	1448	46748	1	0
Oconee River - (Barnett Shoals to Lake Oconee)	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Oconee River - (Confluence of North & Middle Oconee River)	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Oconee River - (Long Branch to Turkey Creek)	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Richland Creek - (Interstate 20 to Beaverdam Creek)	1055	628	2720	0	720564	4	0
Rooty Creek - (Rd. S926 Eatonton to Little Creek)	681	2616	4882	0	0	13	0
Tanyard Creek - (U/S North Oconee River)	**NA	NA	NA	NA	NA	NA	NA
Town Creek - (Hwy. 15 to Richland Creek)	305	182	787	0	208497	1	0
Town Creek - (Peavy Branch to Oconee River)	0	0	737	5	74044	13	0
Tributary 2 to Allen Creek - (Gainesville D/S Old Landfill)	3	1	7	479	15463	0	0
Tributary 5 to Allen Creek - (Gainesville)	3	0	6	435	14024	0	0
Tributary 7 to Allen Creek - (Gainesville W. of New Landfill)	2	0	4	267	8630	0	0
Tributary 8 to Allen Creek - (Gainesville E. of New Landfill)	19	3	37	2674	86304	2	0
Tributary to N. Walnut Creek - (Gainesville)	681	111	1342	3929	273587	104	123
Turkey Creek - (Horse Branch to Rocky Creek)	3	0	6	0	0	2	0
Turkey Creek - (Rocky Creek to Oconee River)	762	44	1423	0	0	493	0
Walnut Creek - (Caney Fork to Middle Oconee River)	2179	143	3929	273587	7590322	104	123

TBD = TO BE DETERMINED

Table 7 Estimated Number of Septic Systems In Oconee River Basin

Stream/Segment	Population on Septic Systems
Allen Creek - (Monroe Driver to 1 mile d/s ga. Hwy 11)	7656
Apalachee River - (Marburg Creek to Lake Oconee)	*TBD
Apalachee River - (Williamson Creek to Marburg Creek)	TBD
Beaverdam Creek - (Oliver creek to Lake Oconee)	TBD
Big Cedar Creek - (Hog Creek to Lake Sinclair)	TBD
Big Indian Creek - (I-20 to Little Indian Creek)	TBD
Big Sandy Creek - (Porter Creek to Oconee River)TBD	TBD
Carr Creek - (Headwaters to North Oconee River)	TBD
Cedar Creek - (Headwaters to Oconee River)	TBD
Cedar Creek - (Headwaters to Winder Reservoir)	TBD
East Fork Trail Creek - (Headwaters to West Fork Trail Creek)	TBD
Little Commissioner Cr. - (Ga Hwy 18 to Commissioner Cr.)	1822
Little River - (Glady Creek to Lake Sinclair)	TBD
Little River - (Shoal Creek to Gap Creek)	TBD
Little River - (Social Circle to Nelson Creek)	TBD
Little Sugar Creek - (Headwaters to Lake Oconee)	TBD
Marburg Creek - (Masseys Lake to Apalachee River)	TBD
Middle Oconee River - (Big Bear Creek to McNutt Creek)	TBD
Middle Oconee River - (Mulberry River to Big Bear Creek)	TBD
Mulberry River - (Little Mulberry River to Middle Oconee)	TBD
North Oconee River - (Bordens Creek to Curry Creek)	TBD
North Oconee River - (Chandler Creek to Bordens Creek)	TBD
North Oconee River - (Jackson County to Sandy Creek)	TBD
North Oconee River - (Sandy Creek to Trail Creek)	TBD
North Oconee River - (Trail Creek to Oconee River)	TBD
North Walnut Creek - (Gainesville D/s Hall County Camp)	5070
North Walnut Creek - (Gainesville U/s Hall County Camp)	330
Oconee River - (Barnett Shoals to Lake Oconee)	TBD
Oconee River - (Confluence of North & Middle Oconee River)	TBD
Oconee River - (Long Branch to Turkey Creek)	TBD
Richland Creek - (Interstate 20 to Beaverdam Creek)	TBD
Rooty Creek - (Rd. S926 Eatonton to Little Creek)	TBD
Tanyard Creek - (U/s North Oconee River)	TBD
Town Creek - (Hwy. 15 to Richland Creek)	TBD
Town Creek - (Peavy Branch to Oconee River)	11261
Tributary 2 to Allen Creek - (Gainesville d/s Old Landfill)	219
Tributary 5 to Allen Creek - (Gainesville)	171
Tributary 7 to Allen Creek - (Gainesville W. of New Landfill)	145
Tributary 8 to Allen Creek - (Gainesville E. of New Landfill)	324
Tributary to N. Walnut Creek - (Gainesville)	TBD
Turkey Creek - (Horse Branch to Rocky Creek)	TBD
Turkey Creek - (Rocky Creek to Oconee River)	TBD
Walnut Creek - (Caney Fork to Middle Oconee River)	10393

* TO BE DETERMINED

Table 8 Loading Rates and Instream Fecal Coliform Concentrations for Existing Conditions During Critical Period

Stream/Segment	Critical Conditions Period	Loading from NPDES Discharges (counts/30 days)	Loading from Other Direct Sources (counts/30 days)	Loading from Surface Runoff (counts/30 days)	Geometric Mean In-stream Fecal Coliform Concentration (counts/100 ml)
Allen Creek - (Monroe Driver to 1 mile d/s ga. Hwy 11)	10/2/98 – 10/31/98	0	$5.68x10^{12}$	$2.86x10^{12}$	1736
Apalachee River - (Marburg Creek to Lake Oconee)	TBD	TBD	TBD	TBD	TBD
Apalachee River - (Williamson Creek to Marburg Creek)	TBD	TBD	TBD	TBD	TBD
Beaverdam Creek - (Oliver creek to Lake Oconee)	TBD	TBD	TBD	TBD	TBD
Big Cedar Creek - (Hog Creek to Lake Sinclair)	TBD	TBD	TBD	TBD	TBD
Big Indian Creek - (I-20 to Little Indian Creek)	TBD	TBD	TBD	TBD	TBD
Big Sandy Creek - (Porter Creek to Oconee River)	TBD	TBD	TBD	TBD	TBD
Carr Creek - (Headwaters to North Oconee River)	TBD	TBD	TBD	TBD	TBD
Cedar Creek - (Headwaters to Oconee River)	TBD	TBD	TBD	TBD	TBD
Cedar Creek - (Headwaters to Winder Reservoir)	TBD	TBD	TBD	TBD	TBD
East Fork Trail Creek - (Headwaters to West Fork Trail Creek)	TBD	TBD	TBD	TBD	TBD
Little Commissioner Cr. - (Ga Hwy 18 to Commissioner Cr.)	9/24/93 - 10/23/93	$2.37x10^{8}$	$2.47x10^{11}$	$2.88x10^{10}$	315
Little River - (Glady Creek to Lake Sinclair)	TBD	TBD	TBD	TBD	TBD
Little River - (Shoal Creek to Gap Creek)	TBD	TBD	TBD	TBD	TBD

Stream/Segment	Critical Conditions Period	Loading from NPDES Discharges (counts/30 days)	Loading from Other Direct Sources (counts/30 days)	Loading from Surface Runoff (counts/30 days)	Geometric Mean In-stream Fecal Coliform Concentration (counts/100 ml)
Little River - (Social Circle to Nelson Creek)	TBD	TBD	TBD	TBD	TBD
Little Sugar Creek - (Headwaters to Lake Oconee)	TBD	TBD	TBD	TBD	TBD
Marburg Creek - (Masseys Lake to Apalachee River)	TBD	TBD	TBD	TBD	TBD
Middle Oconee River - (Big Bear Creek to McNutt Creek)	TBD	TBD	TBD	TBD	TBD
Middle Oconee River - (Mulberry River to Big Bear Creek)	TBD	TBD	TBD	TBD	TBD
Mulberry River - (Little Mulberry River to Middle Oconee)	TBD	TBD	TBD	TBD	TBD
North Oconee River - (Bordens Creek to Curry Creek)	TBD	TBD	TBD	TBD	TBD
North Oconee River - (Chandler Creek to Bordens Creek)	TBD	TBD	TBD	TBD	TBD
North Oconee River - (Jackson County to Sandy Creek)	TBD	TBD	TBD	TBD	TBD
North Oconee River - (Sandy Creek to Trail Creek)	TBD	TBD	TBD	TBD	TBD
North Oconee River - (Trail Creek to Oconee River)	TBD	TBD	TBD	TBD	TBD
North Walnut Creek - (Gainesville D/s Hall County Camp)	7/4/93 – 8/2/93	$316x10^{6}$	$4.39x10^{11}$	$4.45x10^{8}$	1256
North Walnut Creek - (Gainesville U/s Hall County Camp)	7/4/93 – 8/2/93	0	$5.4x10^{10}$	$3.27x10^{10}$	270
Oconee River - (Barnett Shoals to Lake Oconee)	TBD	TBD	TBD	TBD	TBD
Oconee River - (Confluence of North & Middle Oconee River)	TBD	TBD	TBD	TBD	TBD
Oconee River - (Long Branch to Turkey Creek)	TBD	TBD	TBD	TBD	TBD

Stream/Segment	Critical Conditions Period	Loading from NPDES Discharges (counts/30 days)	Loading from Other Direct Sources (counts/30 days)	Loading from Surface Runoff (counts/30 days)	Geometric Mean In-stream Fecal Coliform Concentration (counts/100 ml)
Richland Creek - (Interstate 20 to Beaverdam Creek)	TBD	TBD	TBD	TBD	TBD
Rooty Creek - (Rd. S926 Eatonton to Little Creek)	TBD	TBD	TBD	TBD	TBD
Tanyard Creek - (U/s North Oconee River)	TBD	TBD	TBD	TBD	TBD
Town Creek - (Hwy. 15 to Richland Creek)	TBD	TBD	TBD	TBD	TBD
Town Creek - (Peavy Branch to Oconee River)	7/15/95 – 8/13/95	0	$4.42x10^{11}$	$2.05x10^{12}$	294
Tributary 2 to Allen Creek - (Gainesville d/s Old Landfill)	10/2/98 – 10/30/98	0	$7.09x10^{10}$	$1.96x10^{9}$	249
Tributary 5 to Allen Creek - (Gainesville)	10/2/98 – 10/30/98	0	$1.87x10^{11}$	$1.76x10^{9}$	1238
Tributary 7 to Allen Creek - (Gainesville W. of New Landfill)	10/2/98 – 10/30/98	0	$1.5x10^{11}$	$8.36x10^{8}$	1048
Tributary 8 to Allen Creek - (Gainesville E. of New Landfill)	10/2/98 – 10/30/98	0	$3.01x10^{11}$	$1.03x10^{9}$	1132
Tributary to N. Walnut Creek - (Gainesville)	10/2/98 – 10/30/98	$3.16x10^{6}$	$1.28x10^{11}$	$3.27x10^{10}$	583
Turkey Creek - (Horse Branch to Rocky Creek)	TBD	TBD	TBD	TBD	TBD
Turkey Creek - (Rocky Creek to Oconee River)	TBD	TBD	TBD	TBD	TBD
Walnut Creek - (Caney Fork to Middle Oconee River)	10/2/98 – 10/30/98	$3.16x10^{6}$	$6.33x10^{11}$	$2.88x10^{10}$	3427

TBD = TO BE DETERMINED

Table 9 TMDL Components

Stream/Segment	WLAs (counts/30 days)	LAs (counts/30 days)	Margin of Safety	TMDL (counts/30 days)
Allen Creek - (Monroe Driver to 1 mile d/s ga. Hwy 11)	0	8.54×10^{12}	Implicit + 10% Explicit	1.73×10^{12}
Apalachee River - (Marburg Creek to Lake Oconee)	*TBD	TBD	Implicit + 10% Explicit	TBD
Apalachee River - (Williamson Creek to Marburg Creek)	TBD	TBD	Implicit + 10% Explicit	TBD
Beaverdam Creek - (Oliver creek to Lake Oconee)	TBD	TBD	Implicit + 10% Explicit	TBD
Big Cedar Creek - (Hog Creek to Lake Sinclair)	TBD	TBD	Implicit + 10% Explicit	TBD
Big Indian Creek - (I-20 to Little Indian Creek)	TBD	TBD	Implicit + 10% Explicit	TBD
Big Sandy Creek - (Porter Creek to Oconee River)	TBD	TBD	Implicit + 10% Explicit	TBD
Carr Creek - (Headwaters to North Oconee River)	TBD	TBD	Implicit + 10% Explicit	TBD
Cedar Creek - (Headwaters to Oconee River)	TBD	TBD	Implicit + 10% Explicit	TBD
Cedar Creek - (Headwaters to Winder Reservoir)	TBD	TBD	Implicit + 10% Explicit	TBD
East Fork Trail Creek - (Headwaters to West Fork Trail Creek)	TBD	TBD	Implicit + 10% Explicit	TBD
Little Commissioner Cr. - (Ga Hwy 18 to Commissioner Cr.)	2.37×10^{8}	2.76×10^{11}	Implicit + 10% Explicit	4.76×10^{10}
Little River - (Glady Creek to Lake Sinclair)	TBD	TBD	Implicit + 10% Explicit	TBD
Little River - (Shoal Creek to Gap Creek)	TBD	TBD	Implicit + 10% Explicit	TBD
Little River - (Social Circle to Nelson Creek)	TBD	TBD	Implicit + 10% Explicit	TBD
Little Sugar Creek - (Headwaters to Lake Oconee)	TBD	TBD	Implicit + 10% Explicit	TBD
Marburg Creek - (Masseys Lake to Apalachee River)	TBD	TBD	Implicit + 10% Explicit	TBD
Middle Oconee River - (Big Bear Creek to McNutt Creek)	TBD	TBD	Implicit + 10% Explicit	TBD
Middle Oconee River - (Mulberry River to Big Bear Creek)	TBD	TBD	Implicit + 10% Explicit	TBD
Mulberry River - (Little Mulberry River to Middle Oconee)	TBD	TBD	Implicit + 10% Explicit	TBD
North Oconee River - (Bordens Creek to Curry Creek)	TBD	TBD	Implicit + 10% Explicit	TBD
North Oconee River - (Chandler Creek to Bordens Creek)	TBD	TBD	Implicit + 10% Explicit	TBD
North Oconee River - (Jackson County to Sandy Creek)	TBD	TBD	Implicit + 10% Explicit	TBD
North Oconee River - (Sandy Creek to Trail Creek)	TBD	TBD	Implicit + 10% Explicit	TBD
North Oconee River - (Trail Creek to Oconee River)	TBD	TBD	Implicit + 10% Explicit	TBD
North Walnut Creek - (Gainesville D/s Hall County Camp)	3.16×10^{6}	5.43×10^{10}	Implicit + 10% Explicit	3.3×10^{10}
North Walnut Creek - (Gainesville U/s Hall County Camp)	0	4.4×10^{10}	Implicit + 10% Explicit	3.8×10^{10}
Oconee River - (Barnett Shoals to Lake Oconee)	TBD	TBD	Implicit + 10% Explicit	TBD
Oconee River - (Confluence of North & Middle Oconee River)	TBD	TBD	Implicit + 10% Explicit	TBD
Oconee River - (Long Branch to Turkey Creek)	TBD	TBD	Implicit + 10% Explicit	TBD
Richland Creek - (Interstate 20 to Beaverdam Creek)	TBD	TBD	Implicit + 10% Explicit	TBD

Stream/Segment	WLAs (counts/30 days)	LAs (counts/30 days)	Margin of Safety	TMDL (counts/30 days)
Rooty Creek - (Rd. S926 Eatonton to Little Creek)	TBD	TBD	Implicit + 10% Explicit	TBD
Tanyard Creek - (U/s North Oconee River)	TBD	TBD	Implicit + 10% Explicit	TBD
Town Creek - (Hwy. 15 to Richland Creek)	TBD	TBD	Implicit + 10% Explicit	TBD
Town Creek - (Peavy Branch to Oconee River)	0	$2.49x10^{12}$	Implicit + 10% Explicit	$2.85x10^{11}$
Tributary 2 to Allen Creek - (Gainesville d/s Old Landfill)	0	$7.28x10^{10}$	Implicit + 10% Explicit	$3.85x10^{10}$
Tributary 5 to Allen Creek - (Gainesville)	0	$1.89x10^{11}$	Implicit + 10% Explicit	$2.91x10^{10}$
Tributary 7 to Allen Creek - (Gainesville W. of New Landfill)	0	$1.5x10^{11}$	Implicit + 10% Explicit	$2.25x10^{10}$
Tributary 8 to Allen Creek - (Gainesville E. of New Landfill)	0	$4.18x10^{11}$	Implicit + 10% Explicit	$6.29x10^{10}$
Tributary to N. Walnut Creek - (Gainesville)	$3.16x10^{6}$	$1.28x10^{11}$	Implicit + 10% Explicit	$1.28x10^{10}$
Turkey Creek - (Horse Branch to Rocky Creek)	TBD	TBD	Implicit + 10% Explicit	TBD
Turkey Creek - (Rocky Creek to Oconee River)	TBD	TBD	Implicit + 10% Explicit	TBD
Walnut Creek - (Caney Fork to Middle Oconee River)	$3.16x10^{6}$	$6.62x10^{11}$	Implicit + 10% Explicit	$1.7x10^{11}$

TBD = TO BE DETERMINED

Table 10 Load Allocations for Oconee River Basin

Stream/Segment	Most Significant Impact(s)	Loading from Point Sources (counts/30 days)	Non-point Sources		Overall Loading (counts/30 days)
			Loading from Other Direct Sources (counts/30 days)	Loading from Surface Runoff (counts/30 days)	
Allen Creek (Monroe Driver to 1 mile d/s ga. Hwy 11)	Nonpoint Source Loadings and Runoff	0	6.29×10^{12}	1.1×10^{12}	1.73×10^{12}
Apalachee River (Marburg Creek to Lake Oconee)	*TBD	TBD	TBD	TBD	TBD
Apalachee River (Williamson Creek to Marburg Creek)	TBD	TBD	TBD	TBD	TBD
Beaverdam Creek (Oliver creek to Lake Oconee)	TBD	TBD	TBD	TBD	TBD
Big Cedar Creek (Hog Creek to Lake Sinclair)	TBD	TBD	TBD	TBD	TBD
Big Indian Creek (I-20 to Little Indian Creek)	TBD	TBD	TBD	TBD	TBD
Big Sandy Creek (Porter Creek to Oconee River)	TBD	TBD	TBD	TBD	TBD
Carr Creek (Headwaters to North Oconee River)	TBD	TBD	TBD	TBD	TBD
Cedar Creek (Headwaters to Oconee River)	TBD	TBD	TBD	TBD	TBD
Cedar Creek (Headwaters to Winder Reservoir)	TBD	TBD	TBD	TBD	TBD
East Fork Trail Creek (Headwaters to West Fork Trail Creek)	TBD	TBD	TBD	TBD	TBD
Little Commissioner Creek (Ga Hwy 18 to Commissioner Creek)	Nonpoint Source Loadings and Runoff	2.37×10^{8}	3.4×10^{10}	1.39×10^{10}	4.79×10^{10}
Little River (Glady Creek to Lake Sinclair)	TBD	TBD	TBD	TBD	TBD
Little River (Shoal Creek to Gap Creek)	TBD	TBD	TBD	TBD	TBD

Stream/Segment	Most Significant Impact(s)	Loading from Point Sources (counts/30 days)	Non-point Sources		Overall Loading (counts/30 days)
			Loading from Other Direct Sources (counts/30 days)	Loading from Surface Runoff (counts/30 days)	
Little River (Social Circle to Nelson Creek)	TBD	TBD	TBD	TBD	TBD
Little Sugar Creek (Headwaters to Lake Oconee)	TBD	TBD	TBD	TBD	TBD
Marburg Creek (Masseys Lake to Apalachee River)	TBD	TBD	TBD	TBD	TBD
Middle Oconee River (Big Bear Creek to McNutt Creek)	TBD	TBD	TBD	TBD	TBD
Middle Oconee River (Mulberry River to Big Bear Creek)	TBD	TBD	TBD	TBD	TBD
Mulberry River (Little Mulberry River to Middle Oconee)	TBD	TBD	TBD	TBD	TBD
North Oconee River (Bordens Creek to Curry Creek)	TBD	TBD	TBD	TBD	TBD
North Oconee River (Chandler Creek to Bordens Creek)	TBD	TBD	TBD	TBD	TBD
North Oconee River (Jackson County to Sandy Creek)	TBD	TBD	TBD	TBD	TBD
North Oconee River (Sandy Creek to Trail Creek)	TBD	TBD	TBD	TBD	TBD
North Oconee River (Trail Creek to Oconee River)	TBD	TBD	TBD	TBD	TBD
North Walnut Creek (Gainesville D/s Hall County Camp)	Nonpoint Source Loadings	$3.6x10^{6}$	$3.76x10^{10}$	$4.45x10^{8}$	$3.8x10^{10}$
North Walnut Creek (Gainesville U/s Hall County Camp)	Nonpoint Source Loadings	0	$5.4x10^{10}$	$3.08x10^{8}$	$3.3x10^{10}$
Oconee River (Barnett Shoals to Lake Oconee)	TBD	TBD	TBD	TBD	TBD
Oconee River (Confluence of North & Middle Oconee Rivers)	TBD	TBD	TBD	TBD	TBD

Stream/Segment	Most Significant Impact(s)	Loading from Point Sources (counts/30 days)	Non-point Sources		Overall Loading (counts/30 days)
			Loading from Other Direct Sources (counts/30 days)	Loading from Surface Runoff (counts/30 days)	
Oconee River (Long Branch to Turkey Creek)	TBD	TBD	TBD	TBD	TBD
Richland Creek (Interstate 20 to Beaverdam Creek)	TBD	TBD	TBD	TBD	TBD
Rooty Creek (Rd. S926 Eatonton to Little Creek)	TBD	TBD	TBD	TBD	TBD
Tanyard Creek (U/s North Oconee River)	TBD	TBD	TBD	TBD	TBD
Town Creek (Hwy. 15 to Richland Creek)	TBD	TBD	TBD	TBD	TBD
Town Creek (Peavy Branch to Oconee River)	Nonpoint Source Loadings and Runoff	0	$2.21x10^{11}$	$6.73x10^{10}$	$2.85x10^{11}$
Tributary 2 to Allen Creek (Gainesville D/S Old Landfill)	Runoff	0	$3.75x10^{10}$	$9.92x10^{8}$	$3.85x10^{10}$
Tributary 5 to Allen Creek (Gainesville)	Runoff	0	$2.81x10^{10}$	$9.92x10^{8}$	$2.91x10^{10}$
Tributary 7 to Allen Creek (Gainesville West side of New Landfill)	Runoff	0	$2.25x10^{10}$	$4.3x10^{7}$	$2.25x10^{11}$
Tributary 8 to Allen Creek (Gainesville East Side of New Landfill)	Runoff and Nonpoint Source Loadings	0	$4.51x10^{10}$	$3.87x10^{8}$	$4.55x10^{10}$
Tributary to N. Walnut Creek (Gainesville)	Nonpoint Source Loadings	$3.16x10^{6}$	$1.28x10^{10}$	$3.27x10^{7}$	$1.28x10^{10}$
Turkey Creek (Horse Branch to Rocky Creek)	TBD	TBD	TBD	TBD	TBD
Turkey Creek (Rocky Creek to Oconee River)	TBD	TBD	TBD	TBD	TBD
Walnut Creek (Caney Fork to Middle Oconee River)	Nonpoint Source Loadings and Runoff	$3.16x10^{6}$	$1.53x10^{11}$	$1.78x10^{10}$	$1.7x10^{11}$

TBD = TO BE DETERMINED

Table 11 Possible Load Reduction Scenarios for the Oconee River Basin

Stream/Segment	Reduction from Point Sources (percentage)	Non-point Sources		Overall Reduction (percentage)
		Reduction from Other Direct Sources (percentage)	Reduction from Surface Runoff (percentage)	
Allen Creek - (Monroe Driver to 1 mile D/S ga. Hwy 11)	0	88.9	61.5	79.8
Apalachee River - (Marburg Creek to Lake Oconee)	TBD	TBD	TBD	TBD
Apalachee River - (Williamson Creek to Marburg Creek)	TBD	TBD	TBD	TBD
Beaverdam Creek - (Oliver creek to Lake Oconee)	TBD	TBD	TBD	TBD
Big Cedar Creek - (Hog Creek to Lake Sinclair)	TBD	TBD	TBD	TBD
Big Indian Creek - (I-20 to Little Indian Creek)	TBD	TBD	TBD	TBD
Big Sandy Creek - (Porter Creek to Oconee River)	TBD	TBD	TBD	TBD
Carr Creek - (Headwaters to North Oconee River)	TBD	TBD	TBD	TBD
Cedar Creek - (Headwaters to Oconee River)	TBD	TBD	TBD	TBD
Cedar Creek - (Headwaters to Winder Reservoir)	TBD	TBD	TBD	TBD
East Fork Trail Creek - (Headwaters to West Fork Trail Creek)	TBD	TBD	TBD	TBD
Little Commissioner Cr. - (Ga Hwy 18 to Commissioner Cr.)	0	86.2	51.7	82.6
Little River - (Glady Creek to Lake Sinclair)	TBD	TBD	TBD	TBD
Little River - (Shoal Creek to Gap Creek)	TBD	TBD	TBD	TBD
Little River - (Social Circle to Nelson Creek)	TBD	TBD	TBD	TBD
Little Sugar Creek - (Headwaters to Lake Oconee)	TBD	TBD	TBD	TBD
Marburg Creek - (Masseys Lake to Apalachee River)	TBD	TBD	TBD	TBD
Middle Oconee River - (Big Bear Creek to McNutt Creek)	TBD	TBD	TBD	TBD
Middle Oconee River - (Mulberry River to Big Bear Creek)	TBD	TBD	TBD	TBD
Mulberry River - (Little Mulberry River to Middle Oconee)	TBD	TBD	TBD	TBD
North Oconee River - (Bordens Creek to Curry Creek)	TBD	TBD	TBD	TBD
North Oconee River - (Chandler Creek to Bordens Creek)	TBD	TBD	TBD	TBD
North Oconee River - (Jackson County to Sandy Creek)	TBD	TBD	TBD	TBD
North Oconee River - (Sandy Creek to Trail Creek)	TBD	TBD	TBD	TBD
North Oconee River - (Trail Creek to Oconee River)	TBD	TBD	TBD	TBD
North Walnut Creek - (Gainesville D/s Hall County Camp)	0	91.4	0	91.4
North Walnut Creek - (Gainesville U/s Hall County Camp)	0	39.4	0	39.4
Oconee River - (Barnett Shoals to Lake Oconee)	TBD	TBD	TBD	TBD

Stream/Segment	Reduction from Point Sources (percentage)	Non-point Sources		Overall Reduction (percentage)
		Reduction from Other Direct Sources (percentage)	Reduction from Surface Runoff (percentage)	
Oconee River - (Confluence of North & Middle Oconee River)	TBD	TBD	TBD	TBD
Oconee River - (Long Branch to Turkey Creek)	TBD	TBD	TBD	TBD
Richland Creek - (Interstate 20 to Beaverdam Creek)	TBD	TBD	TBD	TBD
Rooty Creek - (Rd. S926 Eatonton to Little Creek)	TBD	TBD	TBD	TBD
Tanyard Creek - (U/s North Oconee River)	TBD	TBD	TBD	TBD
Town Creek - (Hwy. 15 to Richland Creek)	TBD	TBD	TBD	TBD
Town Creek - (Peavy Branch to Oconee River)	0	50	96.7	88.5
Tributary 2 to Allen Creek - (Gainesville d/s Old Landfill)	0	47	94	47.1
Tributary 5 to Allen Creek - (Gainesville)	0	85	92	84.6
Tributary 7 to Allen Creek - (Gainesville W. of New Landfill)	0	85	87	85
Tributary 8 to Allen Creek - (Gainesville E. of New Landfill)	0	85	62.6	85.5
Tributary to N. Walnut Creek - (Gainesville)	0	91.4	0	90
Turkey Creek - (Horse Branch to Rocky Creek)	TBD	TBD	TBD	TBD
Turkey Creek - (Rocky Creek to Oconee River)	TBD	TBD	TBD	TBD
Walnut Creek - (Caney Fork to Middle Oconee River)	0	76	39.2	74

TBD = TO BE DETERMINED

APPENDIX A:

WATER QUALITY MONITORING DATA

Oconee River Basin

Stream/Segment	Sample Dates	Fecal Coliform Bacteria (MPN/100 ml.)	Geometric Mean (#/100 ml.)	Sample Dates	Fecal Coliform Bacteria (MPN/100 ml.)	Geometric Mean (#/100 ml.)	Sample Dates	Fecal Coliform Bacteria (MPN/100 ml.)	Geometric Mean (#/100 ml.)	Sample Dates	Fecal Coliform Bacteria (MPN/100 ml.)	Geometric Mean (#/100 ml.)
Allen Creek (Monroe Driver to 1 mile d/s ga. Hwy 11)												
Apalachee River (Marburg Creek to Lake Oconee)	01/05/1999 01/19/1999 01/25/1999 02/02/1999	4900 20 1700 2400	795	05/26/1999 06/09/1999 06/15/1999 06/21/1999	80 80 5400 230	299	07/28/1999 08/11/1999 08/18/1999 08/25/1999	170 220 330 50	158	11/28/1999 12/13/1999 12/15/1999 12/20/1999	490 220 790 50	255
Apalachee River (Williamson Creek to Marburg Creek)	01/19/1999 01/25/1999 02/02/1999 02/03/1999	230 1300 490 330	469	05/26/1999 06/09/1999 06/15/1999 06/21/1999	330 1800 230 460	501	07/28/1999 08/11/1999 08/18/1999 08/25/1999	1100 130 60 490	255	11/29/1999 12/13/1999 12/15/1999 12/20/1999	230 490 490 330	367
Beaverdam Creek (Oliver creek to Lake Oconee)	01/06/1999 01/20/1999 01/26/1999 02/03/1999	490 460 490 490	490	05/25/1999 06/14/1999 06/16/1999 06/22/1999	490 130 9200 490	732	07/27/1999 08/10/1999 08/17/1999 08/24/1999	130 1100 110 2300	436	11/09/1/99 11/16/1999 11/23/1999 12/07/1999	130 110 130 700	190
Big Cedar Creek (Hog Creek to Lake Sinclair)	01/26/1999 02/09/1999 02/16/1999 02/23/1999	790 130 140 80	184	05/11/1999 05/18/1999 06/01/1999 06/08/1999	110 80 80 230	113	08/17/1999 08/24/1999 08/31/1999 09/14/1999	80 700 230 270	243	11/16/1999 11/30/1999 12/07/1999 12/14/1999	310 120 230 210	208
Big Indian Creek (I-20 to Little Indian Creek)	01/05/1999 01/19/1999 01/25/1999 02/02/1999	9200 20 24000 2200	1765	05/26/1999 06/09/1999 06/15/1999 06/21/1999	80 220 330 40	123	07/28/1999 08/11/1999 08/18/1999 08/25/1999	130 490 50 330	170	11/29/1999 12/13/1999 12/15/1999 12/20/1999	20 20 230 80	52
Big Sandy Creek (Porter Creek to Oconee River)	01/27/1999 02/10/1999 02/17/1999 02/24/1999	230 140 490 170	228	05/12/1999 05/19/1999 06/02/1999 06/09/1999	1100 220 170 90	247	08/18/1999 08/25/1999 09/01/1999 09/15/1999	490 490 130 330	319	11/17/1999 12/01/1999 12/08/1999 12/15/1999	130 80 50 130	91
	07/14/1999	760										
Carr Creek (Headwaters to North Oconee River)	11/23/1999 12/01/1999 12/16/1999 12/20/1999	<20 330 70 20	55	03/15/1999 04/01/1999 04/05/1999	<20 2300 20		05/18/1999 06/15/1999 07/20/1999	130 20 170		08/10/1999 09/27/1999 10/13/1999	20 2200 17000	
Cedar Creek (Headwaters to Oconee River)	03/30/1999 03/31/1999 04/05/1999 04/22/1999	130 1400 90 130	215	05/03/1999 05/06/1999 05/19/1999 05/26/1999	330 16000 490 330	961	09/07/1999 09/08/1999 09/21/1999 10/04/1999	230 790 700 >24000	1322	11/01/1999 11/09/1999 11/22/1999 11/29/1999	130 170 3500 <20	198
Cedar Creek (Headwaters to Winder Reservoir)	02/15/1999 02/21/1999 02/28/1999 03/03/1999	460 40 110 2400	264	05/27/1999 06/10/1999 06/17/1999 06/22/1999	330 1300 1300 490	723	07/29/1999 08/12/1999 08/19/1999 08/26/1999	330 1100 330 330	446	11/30/1999 12/14/1999 12/16/1999 12/21/1999	140 1800 790 50	316
East Fork Trail Creek (Headwaters to West Fork Trail Creek)	03/15/1999 03/18/1999 03/30/1999 03/31/1999	210 80 630 80	171	05/03/1999 05/06/1999 05/16/1999 05/26/1999	490 790 20 110	171	09/07/1999 09/08/1999 09/21/1999 10/04/1999	130 140 230 16000	509	11/01/1999 11/09/1999 11/22/1999 11/29/1999	20 50 330 <20	51
	12/06/1999	460										

Table A1 – Water Quality Monitoring Data, Oconee River Basin

Stream/Segment	Sample Dates	Fecal Coliform Bacteria (MPN/100 ml.)	Geometric Mean (#/100 ml.)	Sample Dates	Fecal Coliform Bacteria (MPN/100 ml.)	Geometric Mean (#/100 ml.)	Sample Dates	Fecal Coliform Bacteria (MPN/100 ml.)	Geometric Mean (#/100 ml.)	Sample Dates	Fecal Coliform Bacteria (MPN/100 ml.)	Geometric Mean (#/100 ml.)
Little Commissioner Cr. (Ga Hwy 18 to Commissioner Creek)	01/27/1999	50	32	05/12/1999	800	238	08/18/1999	330	111	11/17/1999	220	96
	02/10/1999	50		05/19/1999	130		08/25/1999	50		12/01/1999	70	
	02/17/1999	20		06/02/1999	220		09/01/1999	70		12/08/1999	50	
	02/24/1999	20		06/09/1999	140		09/15/1999	130		12/15/1999	110	
	07/14/1999	460										
Little River (Glady Creek to Lake Sinclair)	01/07/1999	790	392	05/24/1999	80	170	08/10/1999	330	330	11/08/1999	140	136
	01/21/1999	70		06/07/1999	80		08/12/1999	330		11/15/1999	130	
	01/27/1999	330		06/14/1999	400		0816/1999	330		11/22/1999	170	
	02/04/1999	1300		06/21/1999	330		08/23/1999	330		12/06/1999	110	
Little River (Shoal Creek to Gap Creek)	01/05/1999	790	1239	05/26/1999	230	706	07/28/1999	700	2815	11/29/1999	700	612
	01/19/1999	230		06/26/1999	1700		08/11/1999	1700		12/13/1999	170	
	01/25/1999	5400		06/15/1999	490		08/18/1999	2200		12/15/1999	2400	
	02/02/1999	2400		06/21/1999	1300		08/28/1999	24000		12/20/1999	490	
Little River (Social Circle to Nelson Creek)	01/05/1999	2200	1201	05/26/1999	3500	942	07/28/1999	1800	1650	11/29/1999	170	365
	01/16/1999	130		06/09/1999	700		08/11/1999	1100		12/13/1999	3500	
	01/25/1999	9200		06/15/1999	460		08/18/1999	2200		12/15/1999	270	
	02/02/1999	790		06/21/1999	700		08/25/1999	1700		12/20/1999	110	
Little Sugar Creek (Headwaters to Lake Oconee)	01/01/1999	790	1016	05/25/1999	790	1152	07/27/1999	460	229	11/09/1999	330	221
	01/20/1999	330		06/14/1999	490		08/24/1999	110		11/16/1999	130	
	02/03/1999	1700		06/16/1999	3500		08/25/1999	20		11/23/1999	70	
	03/22/1999	2400		06/22/1999	1300		09/25/1999	7900		12/06/1999	790	
Marburg Creek (Masseys Lake to Apalachee River)	01/05/1999	170	325	06/26/1999	130	336	07/28/1999	330	189	11/29/1999	790	2107
	01/19/1999	1100		0609/1999	270		08/11/1999	230		12/13/1999	24000	
	01/25/1999	260		06/15/1999	790		08/18/1999	130		12/15/1999	80	
	0202/1999	230		06/21/1999	460		08/25/1999	130		12/20/1999	13000	
Middle Oconee River (Big Bear Creek to McNutt Creek)	04/01/1999	330	116	05/18/1999	80	140	09/22/1999	330	775	12/01/1999	330	294
	04/05/1999	220		05/25/1999	460		09/27/1999	360		12/14/1999	790	
	04/22/1999	50		05/27/1999	80		10/05/1999	9200		12/16/1999	260	
	04/27/1999	50		06/17/1999	130		10/13/1999	330		12/20/1999	110	
	11/23/1999	110										
Middle Oconee River (Mulberry River to Big Bear Creek)	02/15/1999	2200	390	05/27/1999	130	407	07/29/1999	790	500	11/30/1999	310	398
	02/21/1999	230		06/10/1999	330		08/12/1999	330		12/14/1999	2800	
	02/28/1999	270		06/17/1999	4900		08/19/1999	490		12/16/1999	170	
		170		06/22/1999	130		08/26/1999	490		12/21/1999	170	
Mulberry River (Little Mulberry River to Middle Oconee)	02/15/1999	170	196	05/27/1999	1300	735	07/29/1999	20	147	11/30/1999	110	276
	02/21/1999	330		06/10/1999	170		08/12/1999	130		12/14/1999	490	
	02/28/1999	80		06/17/1999	4900		08/19/1999	790		12/16/1999	220	
	03/03/1999	330		06/22/1999	270		08/26/1999	230		12/21/1999	490	
North Oconee River (Bordens Creek to Curry Creek)	02/15/1999	170	175	05/27/1999	50	279	07/29/1999	220	257	11/30/1999	460	982
	02/21/199	330		06/10/1999	230		08/12/1999	130		12/14/1999	2200	
	02/28/1999	130		06/17/1999	3100		08/19/1999	460		12/16/1999	5400	
	03/03/1999	130		06/22/1999	170		08/26/1999	330		12/21/1999	170	
North Oconee River (Chandler Creek to Bordens Creek)	02/15/1999	460	551	05/27/1999	230	736	07/29/1999	230	272	11/30/1999	490	>1398
	02/21/1999	700		06/10/1999	330		08/12/1999	70		12/14/1999	>24000	
	02/28/1999	220		06/17/1999	7900		08/19/1999	310		12/16/1999	1300	
	03/03/1999	1300		06/22/1999	490		08/26/1999	1100		12/21/1999	250	

Table A1 – Water Quality Monitoring Data, Oconee River Basin

Stream/Segment	Sample Dates	Fecal Coliform Bacteria (MPN/100 ml.)	Geometric Mean (#/100 ml.)	Sample Dates	Fecal Coliform Bacteria (MPN/100 ml.)	Geometric Mean (#/100 ml.)	Sample Dates	Fecal Coliform Bacteria (MPN/100 ml.)	Geometric Mean (#/100 ml.)	Sample Dates	Fecal Coliform Bacteria (MPN/100 ml.)	Geometric Mean (#/100 ml.)
North Oconee River (Sandy Creek to Trail Creek)	04/01/1999	4100	416	05/18/1999	490	409	09/22/1999	790	739	12/01/1999	330	761
	04/05/1999	330		05/25/1999	330		09/27/1999	700		12/14/1999	630	
	04/22/1999	130		05/27/1999	220		10/05/1999	1100		12/16/1999	4900	
	04/27/1999	170		06/15/1999	790		10/13/1999	490		12/20/1999	330	
	07/20/1999	150		08/10/1999	460		11/23/1999	140				
North Oconee River (Jackson County to Sandy Creek)												
North Oconee River (Trail Creek to Oconee River)	04/01/1999	5400	196	05/18/1999	50	98	09/22/1999	170	826	12/01/1999	130	301
	04/05/1999	170		05/25/1999	50		09/27/1999	7000		12/14/1999	2400	
	04/22/1999	20		05/27/1999	110		10/05/1999	1700		12/16/1999	330	
	04/27/1999	80		06/17/1999	340		10/13/1999	230		12/20/1999	80	
	11/23/1999	50										
North Walnut Creek (Gainesville D/s Hall County Camp)												
North Walnut Creek (Gainesville U/s Hall County Camp)												
Oconee River (Barnett Shoals to Lake Oconee)	01/06/1999	3100	571	05/25/1999	330	585	07/27/1999	130	166	11/09/1999	310	524
	01/20/1999	20		06/08/1999	220		08/10/1999	70		11/16/1999	310	
	01/26/1999	490		06/16/1999	7000		08/17/1999	170		11/23/1999	1700	
	02/03/1999	3500		06/22/1999	230		08/24/1999	490		12/07/1999	460	
Oconee River (Athens to Barnett Shoals Dam)	01/08/1999	1300	389	05/18/1999	170	256	09/22/1999	790	2395	12/01/1999	80	370
	01/14/1999	1300		05/25/1999	460		09/27/1999	7000		12/14/1999	1100	
	01/21/1999	40		05/27/1999	50		10/05/1999	3500		12/16/1999	790	
		340		06/15/1999	1100		10/13/1999	1700		12/20/1999	270	
	04/01/1999	3300		07/20/1999	70		08/10/1999	4900		11/23/1999	50	
	04/27/1999	220										
Oconee River (Long Branch to Turkey Creek)	01/28/1999	50	236	05/13/1999	330	212	08/19/1999	80	49	11/18/1999	40	87
	02/11/1999	1300		05/20/1999	170		08/26/1999	50		12/02/1999	170	
	02/18/1999	2400		06/03/1999	330		09/02/1999	70		12/09/1999	50	
	02/25/1999	<20		06/10/1999	110		09/16/1999	<20		12/16/1999	170	
Richland Creek (Interstate 20 to Beaverdam Creek)	01/06/1999	5400	2127	05/25/1999	2200	3105	07/27/1999	1300	1317	11/09/1999	490	765
	01/20/1999	130		06/14/1999	5400		0810/1999	330		11/16/1999	490	
	01/26/1999	5400		06/16/1999	17000		08/17/1999	5400		11/23/1999	1100	
	0203/1999	5400		06/22/1999	460		08/24/1999	1300		12/07/1999	1300	
Rooty Creek (Rd. S926 Eatonton to Little Creek)	01/07/1999	3500	2358	5/24/1999	130	458	08/10/1999	170	524	11/08/1999	220	390
	01/21/1999	40		06/07/1999	80		08/12/1999	330		11/15/1999	230	
	01/27/1999	9200		06/14/1999	9200		08/16/1999	1700		11/22/1999	330	
	02/04/1999	24000		06/21/1999	460		08/23/1999	790		12/06/1999	330	
Tanyard Creek (U/s North Oconee River)	03/15/1999	20	229	05/03/1999	490	3492	09/07/1999	25400	2104	11/01/1999	330	164
	03/18/1999	230		05/06/1999	24000		09/08/1999	740		11/09/1999	330	
	03/30/1999	170		05/19/1999	16000		09/21/1999	1400		11/22/1999	330	
	03/31/1999	3500		05/26/1999	790		10/04/1999	3500		11/29/1999	20	

Table A1 – Water Quality Monitoring Data, Oconee River Basin

Stream/Segment	Sample Dates	Fecal Coliform Bacteria (MPN/100 ml.)	Geometric Mean (#/100 ml.)	Sample Dates	Fecal Coliform Bacteria (MPN/100 ml.)	Geometric Mean (#/100 ml.)	Sample Dates	Fecal Coliform Bacteria (MPN/100 ml.)	Geometric Mean (#/100 ml.)	Sample Dates	Fecal Coliform Bacteria (MPN/100 ml.)	Geometric Mean (#/100 ml.)
Town Creek (Hwy. 15 to Richland Creek)	01/06/1999 01/20/1999 01/26/1999 02/03/1999	2400 490 1300 5400	1695	05/25/1999 06/14/1999 06/16/1999 06/22/1999	700 170 2200 3500	978	07/27/1999 08/10/1999 08/17/1999 08/24/1999	490 54000 330 2300	2117	11/09/1999 11/16/1999 11/23/1999 12/07/1999	50 70 790 9200	399
Town Creek (Peavy Branch to Oconee River)	01/26/1999 02/09/1999 02/16/1999 02/23/1999	230 20 50 140	75	05/11/1999 05/18/1999 06/01/1999 05/08/1999	50 130 110 130	98	08/17/1999 08/24/1999 08/31/1999 09/14/1999	80 460 1100 110	258	11/16/1999 11/30/1999 12/07/1999 12/14/1999	20 20 130 130	51
Tributary 2 to Allen Cr. (Gainesville d/s Old Landfill)												
Tributary 5 to Allen Creek (Gainesville)												
Tributary 7 to Allen Cr. (Gainesville West side of New Landfill)												
Tributary 8 to Allen Cr. (Gainesville East Side of New Landfill)												
Tributary to N. Walnut Creek (Gainesville)												
Turkey Creek (Horse Branch to Rocky Creek)	01/28/1999 02/11/1999 02/18/1999 02/25/1999	20 490 <20 170	76	05/13/1999 05/20/1999 06/03/1999 06/10/1999	80 490 460 330	278	08/19/1999 08/26/1999 09/02/1999 09/16/1999	1700 1200 330 790	854	11/18/1999 12/02/1999 12/09/1999 12/16/1999	170 460 220 700	331
Turkey Creek (Rocky Creek to Oconee River)	01/28/1999 02/11/1999 02/18/1999 02/25/1999	70 330 790 50	174	05/13/1999 05/20/1999 06/03/1999 06/10/1999	790 80 130 230	208	08/19/1999 08/26/1999 09/02/1999 09/16/1999	230 170 110 140	157	11/18/1999 12/02/1999 12/09/1999 12/16/1999	230 130 80 80	118
Walnut Creek (Caney Fork to Middle Oconee River)	02/15/1999 02/21/1999 02/28/1999 03/03/1999	80 40 90 80	69	05/27/1999 06/10/1999 06/17/1999 06/22/1999	330 790 3300 220	660	07/29/1999 08/12/1999 08/19/1999 08/26/1999	270 80 490 110	185	11/30/1999 12/14/1999 12/16/1999 12/21/1999	110 9200 130 80	320

APPENDIX B:

MODEL DEVELOPMENT AND CALIBRATION

B.1 Model Selection

The Hydrological Simulation Program Fortran (HSPF) - Version 12.0 was selected to represent the hydrological conditions for the Oconee River Basin. The watershed modeling provided a consistent hydrology and modeling framework for TMDL development in 2001. The Nonpoint Source Model Program (NPSM), a detailed graphical user interface (GUI), was used as the link between the user and HSPF.

B.2 Model Development

The watershed model represents the variability of nonpoint source contributions through dynamic representation of hydrology and land practices. The watershed model includes all point and nonpoint source contributions within the Oconee River Basin. Key components of the watershed modeling included:

- Watershed segmentation
- Meteorological data
- Simulation period
- Land use representation
- Hydrological representation
- USGS Flow Data

B.2.1 Watershed Segmentation

In order to evaluate the sources contributing to an impaired waterbody and to represent the spatial variability of these sources within the watershed model, the contributing drainage area was represented by a series of subwatersheds. These subwatersheds were represented using the Georgia 12-digit watershed data layer. In some situations, the 12-digit data layer required further subdivision for appropriate hydrological connectivity and representation.

Boundaries were constructed so that subwatershed "pour points" coincided, when possible, with water quality monitoring stations or USGS flow gages. Watershed delineation was based on the Rf3 stream coverage and Digital Elevation Model (DEM) data. This discretization allows management and load reduction alternatives to be varied by subwatershed. Initial input for model variables was developed using WCS and the associated spreadsheet tools.

B.2.2 Meteorological Data

An important factor influencing model results is the precipitation data contained in the meteorological data file used in the simulation. The pattern and intensity of rainfall affects the build-up and wash-off of fecal coliform bacteria from the land into the streams, as well as the dilution potential of the stream. Hourly data from weather stations within the boundaries of or in close proximity to the subwatersheds were applied to the watershed model. These data include precipitation, air temperature, dew point temperature, wind speed, cloud cover, evaporation, and solar radiation. These data are used directly, or calculated from the observed data.

Hourly precipitation data for numerous stations in and adjacent to the Oconee River Basin were extracted from the EarthInfo CD set. After review of precipitation data and graphs, 7 precipitation stations were chosen for inclusion. This information was processed and patched, to construct a continuous period of record. The stations used are shown in Table B1. The 7 precipitation stations are shown in Figure B1. Meteorological data, other than precipitation, was used from two stations in or near to the project study watershed area. The data from these meteorological stations were assigned, using engineering judgment, to each of the 7 precipitation stations. The data from meteorological stations area applied to the precipitation stations are shown in Table B2. The two meteorological stations are shown in Figure B1 as HUSWO and SAMSON sites.

Cloud cover data was incomplete for the period 1996 to 1999. The solution for this missing data was to evaluate the annual total rainfall values for the period of record of the meteorological stations. It was assumed that the cloud cover data from a prior year with a similar annual rainfall value would be representative.

Figure B1 – Location of Precipitation and Meteorological Stations

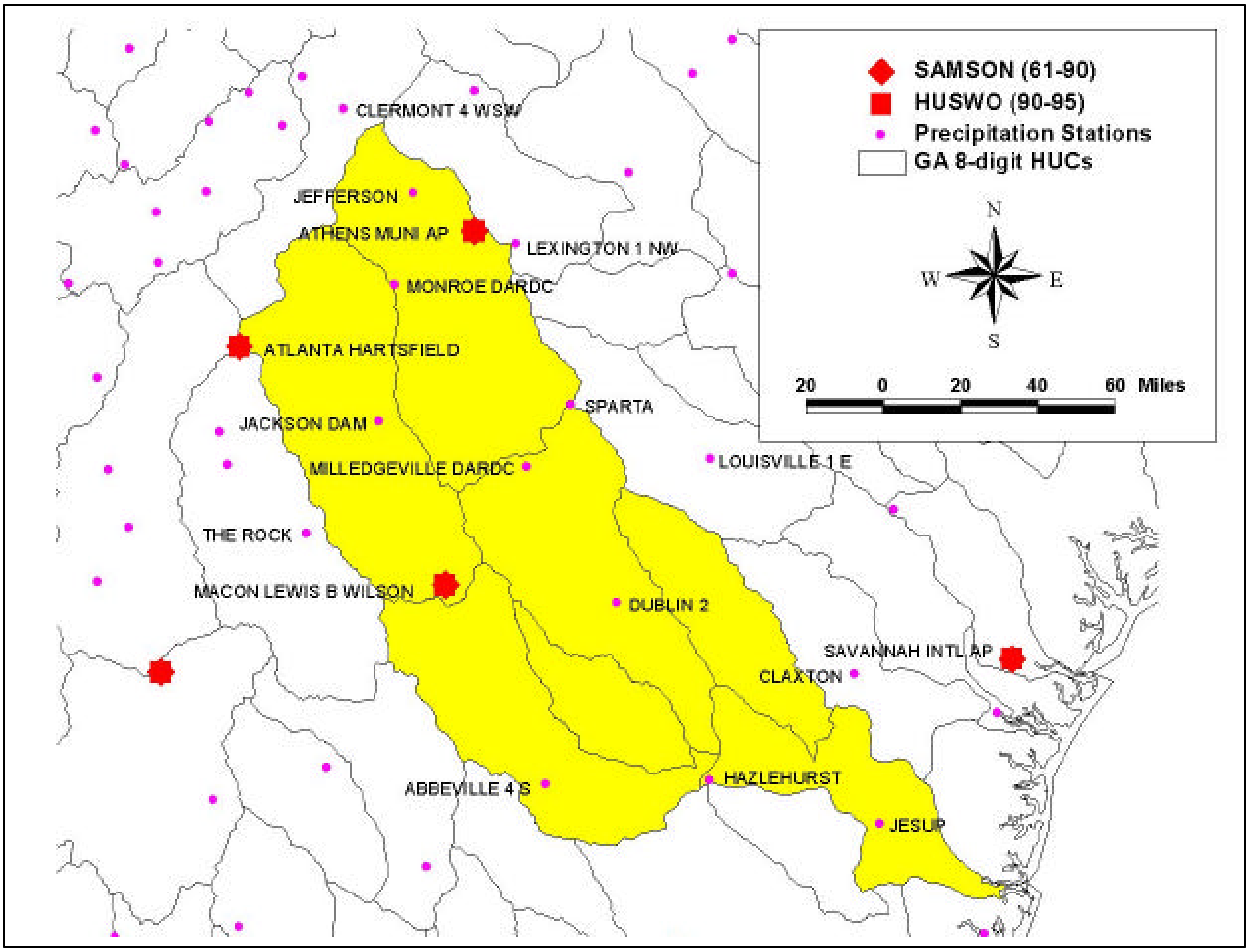


Table B1 - Precipitation Stations and Associated Patching Stations

WDM File Station Number	Description	Station ID	Stations Used to Patch the WDM File Station
04	Clermont 4 WSW	GA1998	GA1619, GA2578, GA4659
05	Dublin 2	GA2844	GA4204, GA5314, GA5443
07	Jefferson	GA4659	GA1619, GA5165, GA5974
09	Lexington 1 NW	GA5165	GA4659, GA5974, GA8223
12	Milledgeville Dardc	GA5876	GA2844, GA5443, GA8223
13	Monroe Dardc	GA5974	GA0451, GA4659, GA5165
15	Sparta	GA8223	GA5165, GA5314, GA5876

Table B2 – Meteorological Stations Used at Each Precipitation Station

WDM File Station Number	Description	Station ID	Station Used for Meteorological Data at the WDM File Precipitation Stations
04	Clermont 4 WSW	GA1998	GA0435, Athens Muni AP
05	Dublin 2	GA2844	GA5443, Macon Lewis B Wilson
07	Jefferson	GA4659	GA0435, Athens Muni AP
09	Lexington 1 NW	GA5165	GA0435, Athens Muni AP
12	Milledgeville Dardc	GA5876	GA5443, Macon Lewis B Wilson
13	Monroe Dardc	GA5974	GA0435, Athens Muni AP
15	Sparta	GA8223	GA0435, Athens Muni AP

B.2.3 Simulation Period

EPA recommends looking at an extended time period for hydrology calibrations. This is due to the fact that over an extended period, a variety of hydrological conditions will exist, and a model that is calibrated over this time period will have a greater chance of success in predicting future hydrological conditions. The hydrological models were calibrated from October 1, 1994 through December 31, 1999. In 1999, there was a comprehensive water quality data set that was collected for the Oconee River Basin.

B.2.4 Land Use Representation

The watershed model uses land use data as the basis for representing hydrology and nonpoint source loading. Land use categories for modeling were selected based on the USGS Multi-Resolution Landuse Classification (MRLC) data set, and included built-up, forest, cropland, pasture, and wetlands. The USGS data represents conditions in the early to middle 1990's. The modeling categories and their corresponding USGS classifications are presented in Table B3.

The HSPF model requires division of land uses in each subwatershed into separate pervious and impervious land units. For each land use, this division can be made based on typical imperviousness percentages from individual land use categories, such as those used in the Soil Conservation Service's TR-55 method. For modeling purposes, the percent imperviousness of a given land category can be calculated as an area-weighted average of land use classes encompassing the modeling land category.

Table B3 – Land Use Representation

Land Categories Represented in the Model	MRLC Land Use Code	MRLC Land Use Classes	% Impervious
Built-up	21	Low Intensity Residential	19
	22	High Intensity Residential	65
	23	High Intensity Comm./Ind./Trans.	80
	33	Transitional	10
Forest	31	Bare Rock/Sand/Clay	0
	32	Quarries/Strip Mines/Gravel Pits	0
	41	Deciduous Forest	0
	42	Evergreen Forest	0
Forest	43	Mixed Forest	0
	51	Deciduous Shrubland	0
	52	Evergreen Shrubland	0
	53	Mixed Shrubland	0
	71	Grassland/Herbaceous	0
	85	Other Grasses	0
Wetland	91	Woody Wetlands	0
	92	Emergent Herbaceous Wetlands	0
Cropland	61	Planted/Cultivated	0
	82	Row Crops	0
	83	Small Grains	0
	84	Bare Soil	0
Pasture	81	Pasture/Hay	0

B.2.5 Hydrological Representation

Watershed hydrology plays an important role in the determination of nonpoint source flow and ultimately nonpoint source loadings to a waterbody. The watershed model must appropriately represent the spatial and temporal variability of hydrological characteristics within a watershed. Key hydrological characteristics include interception storage capacities, infiltration properties, evaporation and transpiration rates, and watershed slope and roughness. The HSPF modules used to represent watershed hydrology for TMDL development included PWATER (water budget simulation for pervious land units) and IWATER (water budget simulation for impervious land units).

During the hydrologic calibration process, model parameters were adjusted within reasonable constraints until an acceptable agreement was achieved between simulated and observed stream flow. Model parameters adjusted included: evapotranspiration, infiltration, upper and lower zone storage, groundwater storage, recession rates, losses to the deep groundwater system, and interflow discharge.

B.2.6 USGS Flow Data

There are 25 historical USGS flow stations in the Georgia Middle 3 Basins that contained complete flow data from

January 1, 1990 through December 31, 1999. Of those 25 historical flow stations, 2 stations were used for model calibration and 10 stations were used for model validation (Refer to Tables C1 and C2 in Appendix C).

B.3 Model Organization

The main division within the modeling schematic for the Oconee River Basin is the 8-digit HUC number. The Oconee River Basin is comprised of 2 HUCs, 03070101 (Upper Oconee) and 03070102 (Lower Oconee). Within each of these HUCs, individual projects were created that identify and appropriately model the subwatersheds within each HUC. There are 17 projects within the Upper Oconee HUC and 11 projects within the Lower Oconee HUC.

The development of the modeling schematic for each HUC in the Oconee River Basin is provided in Appendix G. The information included for each HUC includes:

- Tables of 303(d) Listed Segments located within each 8-digit HUC for Fecal Coliform and their associated project names,
- Modeling schematic of each 8-digit HUC,
- Location of Projects within each 8-digit HUC,
- Subwatershed ID Numbering for each of the Projects,
- Location of the Active Point Sources that were included within each 8-digit HUC,
- Location of the 1999 Monitoring Stations that were included within each 8-digit HUC,
- Project Summary Sheets.

There is one project summary sheet for each project contained in the 8-digit HUC. These sheets contain all of the information about each of the subwatersheds contained within each individual project.

B.4 Model Calibration

The calibration of the NPSM watershed model involves both hydrology and water quality components. The model must be calibrated to appropriately represent hydrologic response in the watershed before subsequent calibrations and reasonable water quality simulations can be performed.

B.4.1 Hydrologic Calibration

The hydrology calibration of the watershed model involved comparing simulated stream flows to historic stream flow data from a USGS stream gaging station for the same period of time. Since there were two sets of hydrological parameters that were used for the Oconee River Basin model, two calibrations were performed (one for each set).

In the area above the GA fall line (Piedmont), the hydrological parameters were calibrated using the USGS flow gage 02204070 – South River at Klondike Road, which is located in the Upper Ocmulgee Basin (Refer to Table C1 in Appendix C). Typically, a 10-year calibration is performed on the watershed model, however, in this case only a 5.2-year calibration was performed. This is due to the fact that this area is dominated by combined sewer overflows (CSOs), and data for the CSOs only date back to October 1, 1994. Therefore, the calibration on the hydrological parameters above the GA fall line was from October 1, 1994 to December 21, 1999.

For the area below the GA Fall Line (Coastal Plain), the hydrological parameters were calibrated using the USGS flow gage 02225500 – Ohoopee River near Reidsville, GA, which is located in the Ohoopee Basin (Refer to Table C2 in Appendix C). The calibration of the hydrological parameters below the fall line was from January 1, 1990 through December 31, 1999. Results of the model calibrations are in Appendix C.

Initial values for hydrological variables were taken from an EPA developed default data set. During the calibration process, model parameters were adjusted within reasonable constraints until acceptable agreement was achieved between simulated and observed stream flow. Model parameters adjusted include: evapotranspiration, infiltration, upper and lower zone storage, groundwater storage, recession, losses to the deep groundwater system, and interflow discharge. Measures which can reduce urban contributions include: repair and renovation of leaking sewer collection systems; reduction of sewer overflows and surcharges by use of separate conduit systems for domestic wastewater and stormwater; encouraging households and businesses to connect to public sewer systems and reduce the population using septic systems.

Calibrated models were then subjected to model validation to ensure that generated model streamflows for each of the impaired segments were acceptable. Model generated hydrographs for each of the impaired streams are presented in Appendix D.

B.4.2 Model Validation

An important step of the modeling process is model validation. Model validation is the process of taking the hydrological parameters that have been calibrated, applying those parameters to other watersheds, and comparing the simulated flow to measured flow from a USGS stream gaging station for the same period of time. Model validation is sometimes called model verification, as essentially you are validating or verifying that hydrological parameters calibrated in one watershed will produce acceptable results in another watershed. It is important that when selecting watersheds to perform validations, those watersheds represent a wide variety of landuses as well as drainage areas. This will help to ensure that the hydrological parameters that were calibrated apply to a wide range of conditions. Every validation was carried over an extended multi-year period.

For the hydrological parameters calibrated above the fall line, validations were performed at 6 other watersheds. Table C1 (Appendix C) summarizes the calibration station and validation stations for above the fall line. For the hydrological parameters calibrated below the fall line, validations were performed at 4 other watersheds. Table C2 (Appendix C) summarizes the calibration station and validation stations for below the fall line.

B.5 Water Quality Calibration

Oconee River Basin data, generated by WCS, was processed through the spreadsheet applications developed by Tetra Tech, Inc. to generate fecal coliform loading data for use as initial input to the NPSM model.

The figures presented in Appendix F show the resulting 30-day geometric mean results for the existing and TMDL conditions for the modeled period. The existing conditions results provided the basis for selection of the 30-day critical conditions period for the TMDL modeling.

B.5.1 Point Sources

For existing conditions, NPDES facilities located in modeled subwatersheds are represented as point sources of constant flow and concentration based on the facility's average flow and effluent fecal coliform concentration as reported on DMRs (see Table 6).

A.5.2 Nonpoint Sources

A number of nonpoint source categories are not associated with land loading processes and are represented as direct, instream source contributions in the model. These may include, but are not limited to, failing septic systems, leaking sewer lines, animals in streams, direct discharge of raw sewage, and undefined sources. All other nonpoint sources involve land loading of fecal coliform bacteria and washoff as a result of storm events. Only a portion of the load from these sources are actually delivered to streams due to the mechanisms of washoff (efficiency), decay, and incorporation into soil (adsorption, absorption, filtering) before being transported to the stream. Therefore, land loading nonpoint sources are represented as indirect contributions to the stream. Buildup, washoff, and die-off rates are dependent on seasonal and hydrologic processes.

Initial input for nonpoint sources of fecal coliform loading in the water quality model was developed using watershed information generated with WCS and the Tetra Tech loading calculation spreadsheets.

B.5.2.1 *Wildlife*

Fecal coliform loading from wildlife is considered to be uniformly distributed to forest, pasture, cropland, and wetland areas in the modeled subwatersheds. A loading rate of 5.0×10^8 counts/animal/day for deer is based on best professional judgment (BPJ) of EPA. An animal density of 45 animals/square mile is used to account for deer and all other wildlife. The resulting fecal coliform loading is 2.5×10^6 counts/acre/day and is considered background.

B.5.2.2 *Land Application of Agricultural Manure*

In the water quality model, county livestock populations (see Table 7) are distributed to subwatersheds based on the percentage of agricultural area in each subwatershed classified as pasture/hay. Fecal coliform loading rates were calculated from livestock populations based on manure application rates, literature values for bacteria concentrations in livestock manure, and the following assumptions:

- Fecal content in manure was adjusted to account for die-off due to known treatment/storage methods.
- Manure application rates from the various animal sources vary monthly according to management practices. Hog manure and chicken litter are applied from March through October; beef cattle manure is applied throughout the year; dairy cow manure is applied from February through October as well as in December.
- The fraction of manure available for runoff is dependent on the method of manure application. In the water quality model, the fraction available is estimated based on incorporation into the soil.
- In Georgia, manure is generally not applied to cropland, only pastureland.
- Fecal coliform production rates used in the model are 1.04×10^{11} counts/day/dairy cow, 1.22×10^{10} counts/day/sheep, 1.98×10^8 counts/day/chicken layer, and 2.4×10^8 counts/day/chicken (Metcalf and Eddy, 1991).

Since manure is not applied to cropland in the Oconee River Basin, the only source of fecal coliform bacteria from cropland is from wildlife that deposits feces on the land surface. The in-stream loading from cropland is considered background.

B.5.2.3 *Grazing Animals*

Cattle spend time grazing on pastureland and deposit feces onto the land. During storm events, a portion of this material containing fecal coliform bacteria is transported to streams. Beef cattle are assumed to spend all their time in pasture. The percentage of feces deposited during grazing time is used to estimate fecal coliform loading rates from pastureland. Because there is no assumed monthly variation in animal access to pastures, the fecal loading rate does not vary significantly throughout the year. Therefore, the loading rate to pastureland from grazing animals used in the model is assumed to be constant. Contributions of fecal coliform from wildlife (as noted in Section B.5.2.1) are also included in these rates.

B.5.2.4 *Urban Development*

Urban land use represented in the MRLC database includes areas classified as: high intensity commercial, industrial, transportation, low intensity residential, high intensity residential, and transitional. Associated with each of these classifications a percent of the land area that is impervious. A single, area-weighted loading rate from urban areas is used in the model and is based on the percentage of each urban land use type in the watershed and build-up and accumulation rates referenced in Horner (1992). In the water quality calibrated model, this rate varies from 7.5×10^9 to 2.5×10^{10} counts/acre-day and is assumed constant throughout the year.

B.5.2.5 *Other Sources*

As previously stated, there are a number of nonpoint sources of fecal coliform bacteria that are not associated with land loading and washoff processes. These include animal access to streams, failing septic systems, leaking sewer lines, illicit discharges, and other undefined sources. In each subwatershed, all of these miscellaneous sources have been grouped together and modeled as a point source of constant flow and fecal coliform concentration. The initial baseline values of flow and concentration were estimated using the Tetra Tech, Inc. developed spreadsheets and the following assumptions:

- The load attributed to animals having access to streams is initially based on the beef cow population in the watershed. It was assumed that 50% have access to streams and, of those, 25% defecate in or near the stream banks during a short portion of the day. The resulting percentage of time fecal coliform bacteria is discharged into the streams from grazing cattle is 0.025%. Literature values were used to estimate the fecal coliform bacteria concentration in beef cow manure.

- The initial baseline loads attributable to leaking septic systems is based on an assumed failure rate of 5 percent. This rate was selected based on a survey conducted by EPD that included all counties within the Oconee River Basin watersheds that had septic system failure data.

These flow and concentration variables were adjusted during water quality calibration to alter simulated instream fecal concentrations during dry weather conditions.

B.5.3 Water Quality Calibration Results

During water quality calibration, model parameters were adjusted within reasonable limits until acceptable agreement between simulation output and instream observed data was achieved. Model variables adjusted include:

- Rate of fecal coliform bacteria accumulation

- Maximum storage of fecal coliform bacteria

- Rate of surface runoff that will remove 90% of stored fecal coliform bacteria

- Concentration of fecal coliform bacteria in interflow

- Concentration of fecal coliform bacteria in groundwater

- Concentration of fecal coliform bacteria and rate of flow of "other direct sources" described in Section B.5.2.5

The portion of the each impaired stream segment modeled for each water quality calibration represented the drainage area upstream of the monitoring station. A comparison of simulated and observed daily fecal coliform concentrations at sampling stations in the 303(d) listed streams are presented in Appendix E. No geometric mean values were available from USGS water quality monitoring stations for the following listed segments:

- North Walnut Creek - (Gainesville D/s Hall County Camp)
- North Walnut Creek - (Gainesville U/s Hall County Camp)
- Tributary 2 to Allen Creek - (Gainesville d/s Old Landfill)
- Tributary 5 to Allen Creek - (Gainesville)
- Tributary 7 to Allen Creek - (Gainesville W. of New Landfill)
- Tributary 8 to Allen Creek - (Gainesville E. of New Landfill)
- Tributary to N. Walnut Creek - (Gainesville)

Water quality calibrations were performed for these segments utilizing monthly monitoring data provided by the city of Gainesville. Although this data provided the means for a satisfactory calibration, the quantity and frequency of the data prevented the calculation of valid geometric means for the purpose of determining compliance with the water quality standard for fecal coliform bacteria.

Results show that the model adequately simulates peaks in fecal coliform bacteria in response to rainfall events. Often a high observed value is not simulated in the model due to lack of rainfall at the meteorological station as compared to the rainfall occurring in the watershed, or is the result of an unknown source that is not included in the model.

APPENDIX C:

HYDROLOGY CALIBRATIONS

Table C1 - Calibration and Validation Stations for Hydrological Parameters
Above the GA Fall Line (Piedmont)

Station Number	Station Name	Type	Drainage Area (acres)	Reference WDM station
02204070	South River at Klondike Road	Calibration	117978	Atlanta Hartsfield
02219000	Apalachee River near Bostwick, GA	Validation	119738	Monroe
02217500	Middle Oconee River near Athens, GA	Validation	252006	Jefferson
02220900	Little River near Eatonton, GA	Validation	174445	Milledgeville
02221525	Murder Creek Below Eatonton, GA	Validation	121690	Milledgeville
02208450	Alcovy River above Covington, GA	Validation	122720	Monroe
02213000	Ocmulgee River at Macon, GA	Validation	1450880	Macon Lewis

Table C2 - Calibration and Validation Stations for Hydrological Parameters
Below the GA Fall Line (Coastal Plain)

Station Number	Station Name	Type	Drainage Area (acres)	Reference WDM station
02225500	Ohoopee River near Reidsville, GA	Calibration	735216	Dublin
02215500	Ocmulgee River at Lumber City, GA	Validation	3366386	Abbeville
02223500	Oconee River at Dublin, GA	Validation	2804097	Milledgeville
02225000	Altamaha River near Baxley, GA	Validation	7414025	Hazlehurst
02226000	Altamaha River at Doctortown, GA	Validation	8738182	Jesup

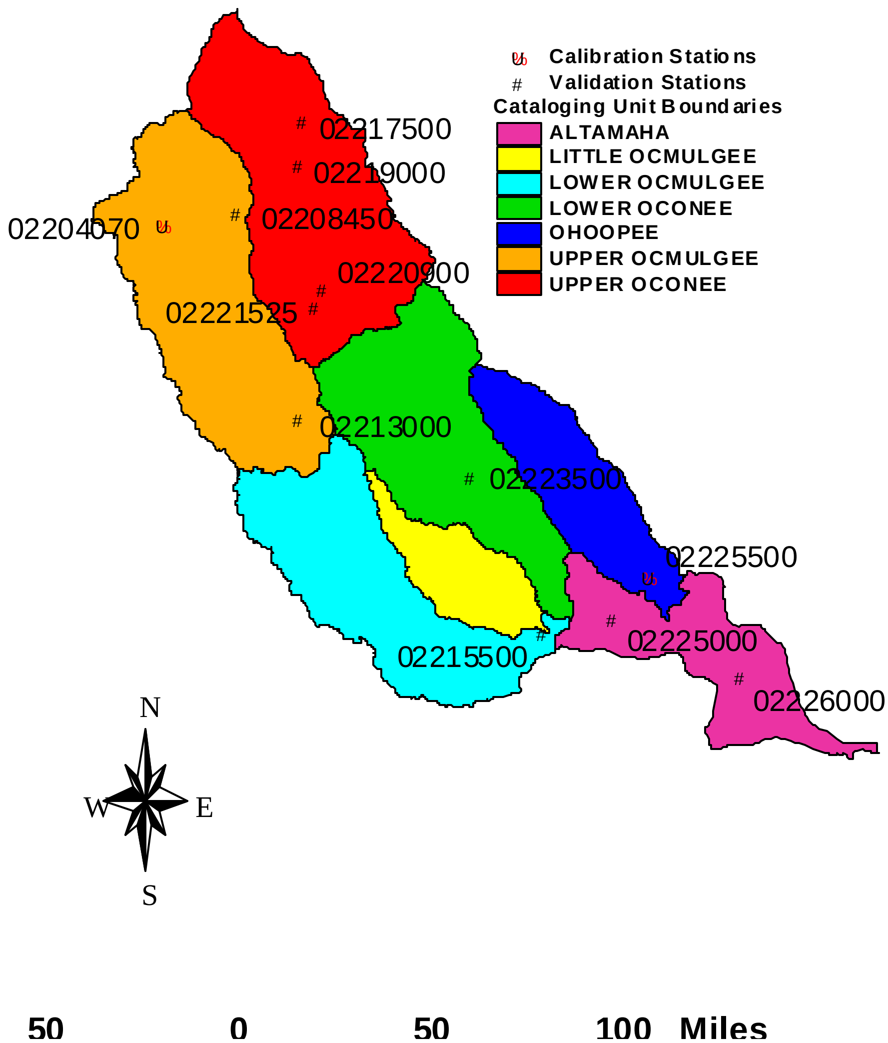


Figure C.1. Location of Hydrology Calibration and Validation Stations

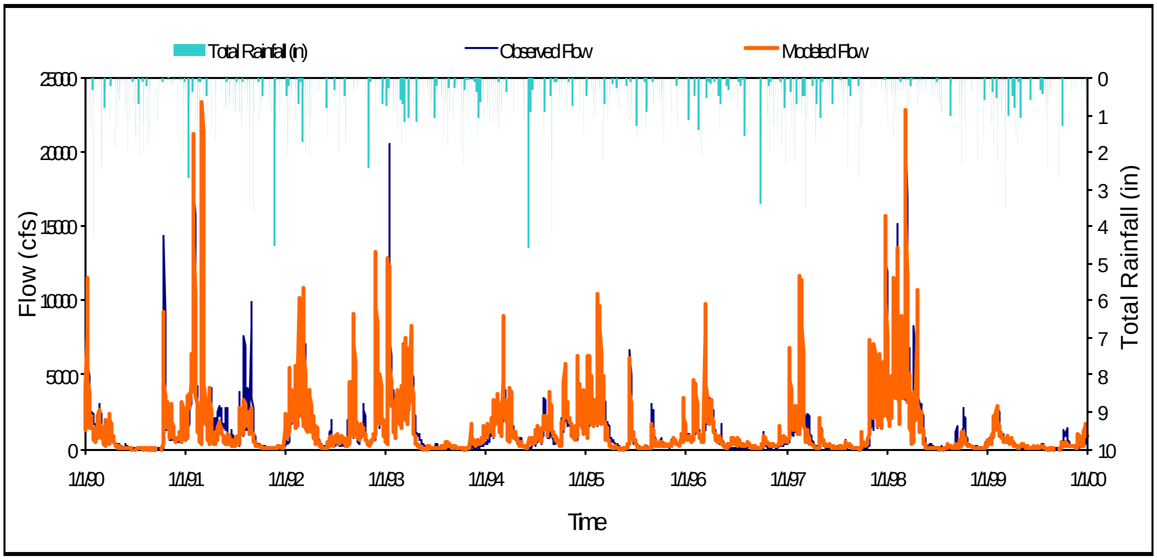


Figure C.2. 10-Year Calibration (Daily Flow) at 02225500 – Ohoopee River near Reidsville, GA.

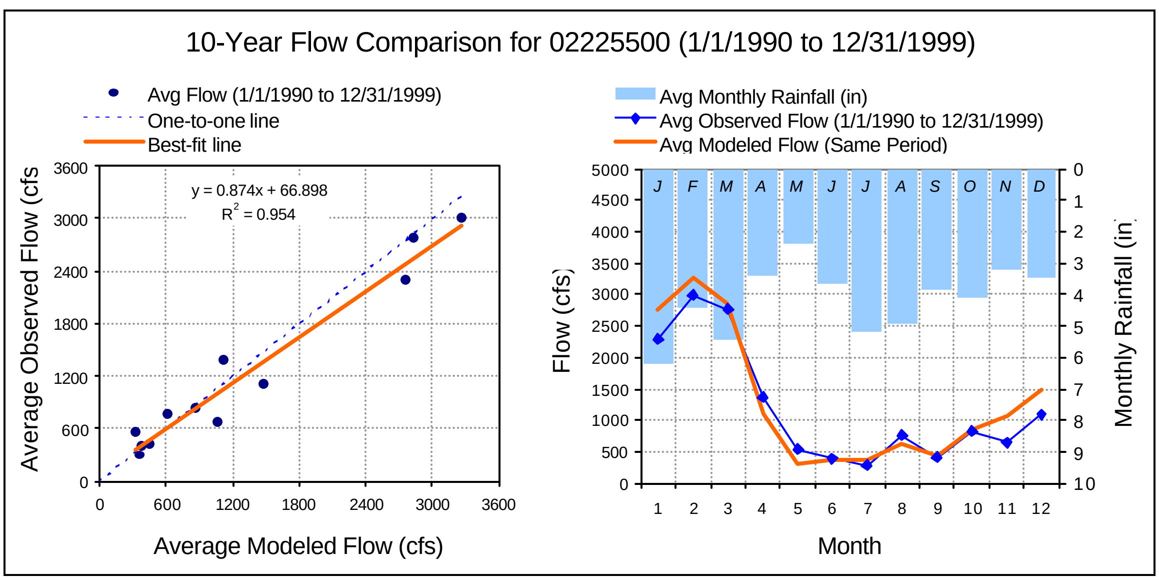


Figure C.3. 10-Year Calibration (Monthly Average) at 02225500 – Ohoopee River near Reidsville, GA.

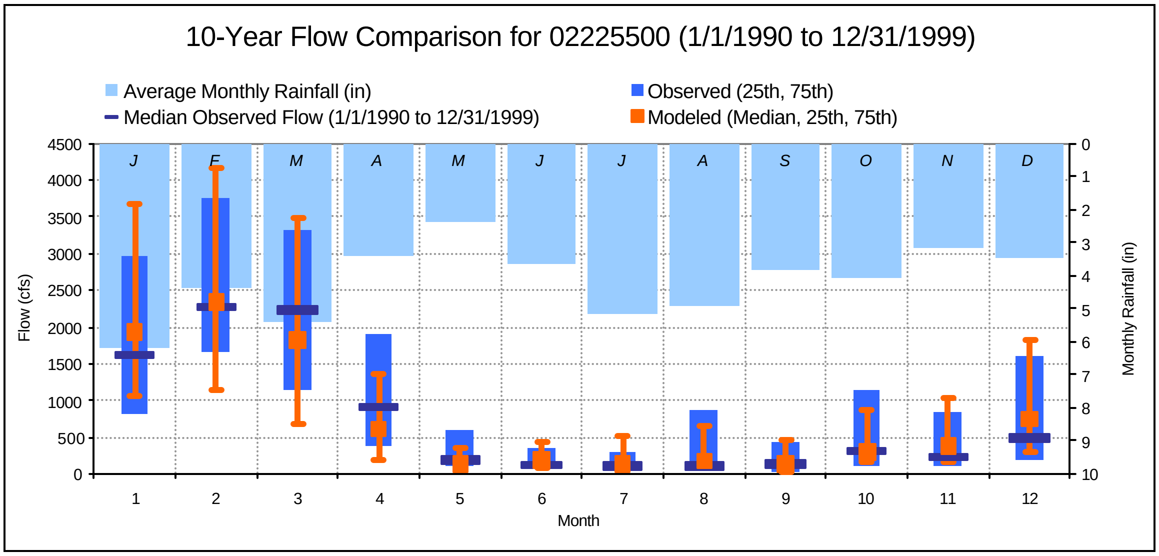


Figure C.4. 10-Year Calibration (Monthly Medians) at 02225500 – Ohoopee River near Reidsville, GA.

Simulation Name:	02225500	**Simulation Period:**	
		Watershed Area (ac):	730428.00
Period for Flow Analysis			
Begin Date:	**01/01/90**	**Baseflow PERCENTILE:**	2.5
End Date:	**12/31/99**	*Usually 1%-5%*	
Total Simulated In-stream Flow:	**153.74**	Total Observed In-stream Flow:	**142.28**
Total of highest 10% flows:	**76.16**	Total of Observed highest 10% flows:	**63.14**
Total of lowest 50% flows:	**9.69**	Total of Observed Lowest 50% flows:	**9.59**
Simulated Summer Flow Volume (months 7-9):	**14.54**	Observed Summer Flow Volume (7-9):	**14.79**
Simulated Fall Flow Volume (months 10-12):	**34.37**	Observed Fall Flow Volume (10-12):	**26.02**
Simulated Winter Flow Volume (months 1-3):	**86.76**	Observed Winter Flow Volume (1-3):	**78.63**
Simulated Spring Flow Volume (months 4-6):	**18.07**	Observed Spring Flow Volume (4-6):	**22.84**
Total Simulated Storm Volume:	**153.40**	Total Observed Storm Volume:	**138.34**
Simulated Summer Storm Volume (7-9):	**14.46**	Observed Summer Storm Volume (7-9):	**13.80**
Errors (Simulated-Observed)		*Recommended Criteria*	Last run
Error in total volume:	**7.45**	10	
Error in 50% lowest flows:	**1.04**	10	
Error in 10% highest flows:	**17.10**	15	
Seasonal volume error - Summer:	**-1.72**	30	
Seasonal volume error - Fall:	**24.29**	30	
Seasonal volume error - Winter:	**9.36**	30	
Seasonal volume error - Spring:	**-26.38**	30	
Error in storm volumes:	**9.81**	20	
Error in summer storm volumes:	**4.52**	50	

Figure C.5. 10-Year Calibration Statistics at 02225500 – Ohoopee River near Reidsville, GA.

Figure C.6. Calendar Year 1999 (Daily Flow) at 02225500 – Ohoopee River near Reidsville, GA.

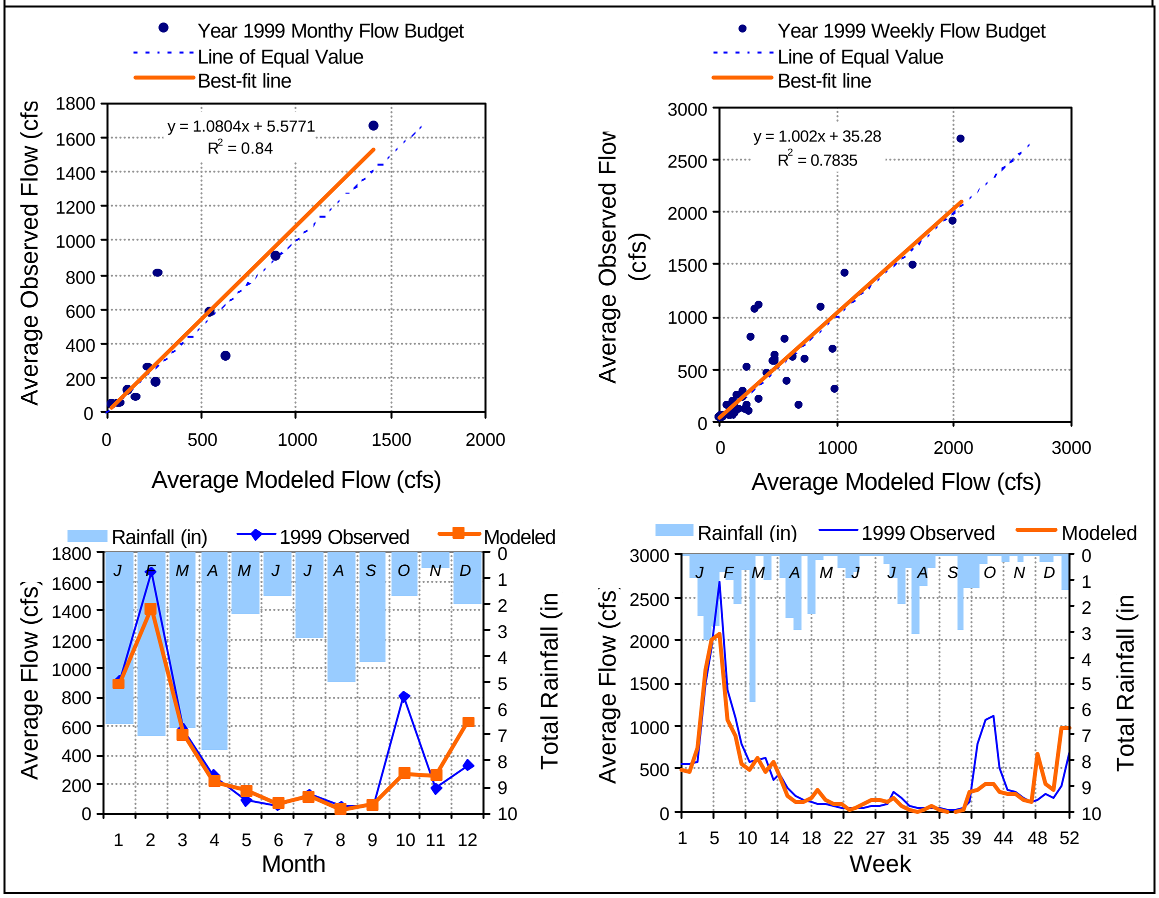


Figure C.7. Calendar Year 1999 (Monthly and Weekly) at 02225500 – Ohoopee River near Reidsville, GA.

Simulation Name:	02225500	**Simulation Period:**	
		Watershed Area (ac):	730428.00
Selected a Year for Flow Analysis:	**1999**		
Type of Year (1=Calendar, 2=Water Year)	**1**	**Baseflow PERCENTILE:**	2.5
Calendar Year 1999:		*Usually 1%-5%*	
1/1/1999 to 12/31/1999			
Total Simulated In-stream Flow:	**4.54**	Total Observed In-stream Flow:	**4.96**
Total of highest 10% flows:	**1.95**	Total of Observed highest 10% flows:	**2.08**
Total of lowest 50% flows:	**0.50**	Total of Observed Lowest 50% flows:	**0.47**
Simulated Summer Flow Volume (months 7-9):	**0.20**	Observed Summer Flow Volume (7-9):	**0.23**
Simulated Fall Flow Volume (months 10-12):	**1.17**	Observed Fall Flow Volume (10-12):	**1.32**
Simulated Winter Flow Volume (months 1-3):	**2.74**	Observed Winter Flow Volume (1-3):	**3.02**
Simulated Spring Flow Volume (months 4-6):	**0.44**	Observed Spring Flow Volume (4-6):	**0.39**
Total Simulated Storm Volume:	**4.52**	Total Observed Storm Volume:	**4.60**
Simulated Summer Storm Volume (7-9):	**0.20**	Observed Summer Storm Volume (7-9):	**0.14**
Errors (Simulated-Observed)		*Recommended Criteria*	Last run
Error in total volume:	**-9.32**	10	
Error in 50% lowest flows:	**5.09**	10	
Error in 10% highest flows:	**-6.78**	15	
Seasonal volume error - Summer:	**-16.27**	30	
Seasonal volume error - Fall:	**-13.02**	30	
Seasonal volume error - Winter:	**-10.35**	30	
Seasonal volume error - Spring:	**10.12**	30	
Error in storm volumes:	**-1.56**	20	
Error in summer storm volumes:	**28.69**	50	

Figure C.8. Calendar Year 1999 Statistics at 02225500 – Ohoopee River near Reidsville, GA.

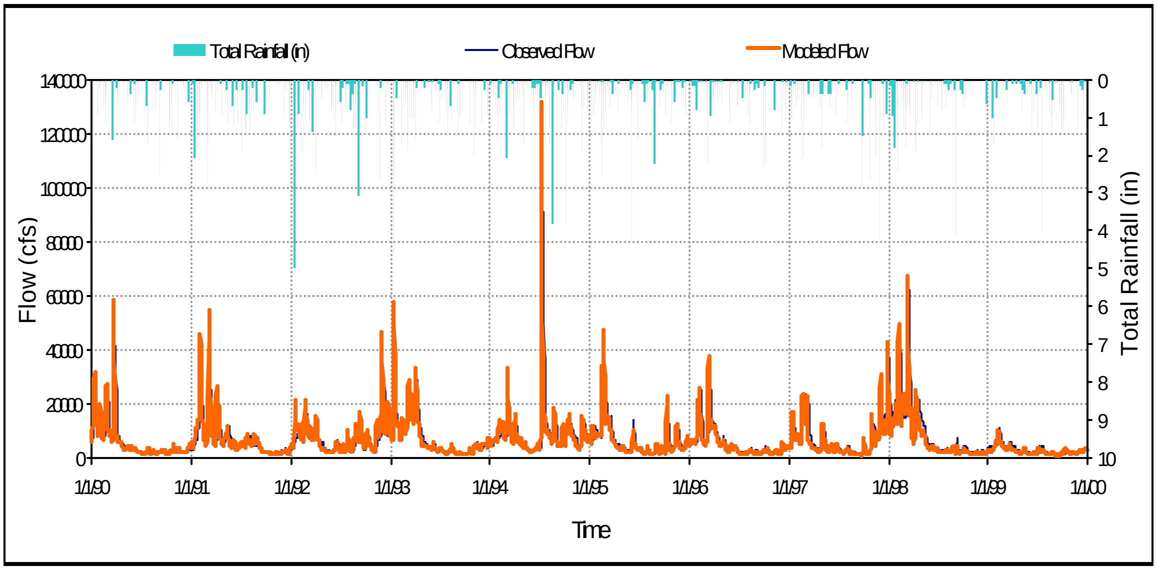


Figure C.9. 10-Year Validation (Daily Flow) at 02215500 – Ocmulgee River at Lumber City, GA.

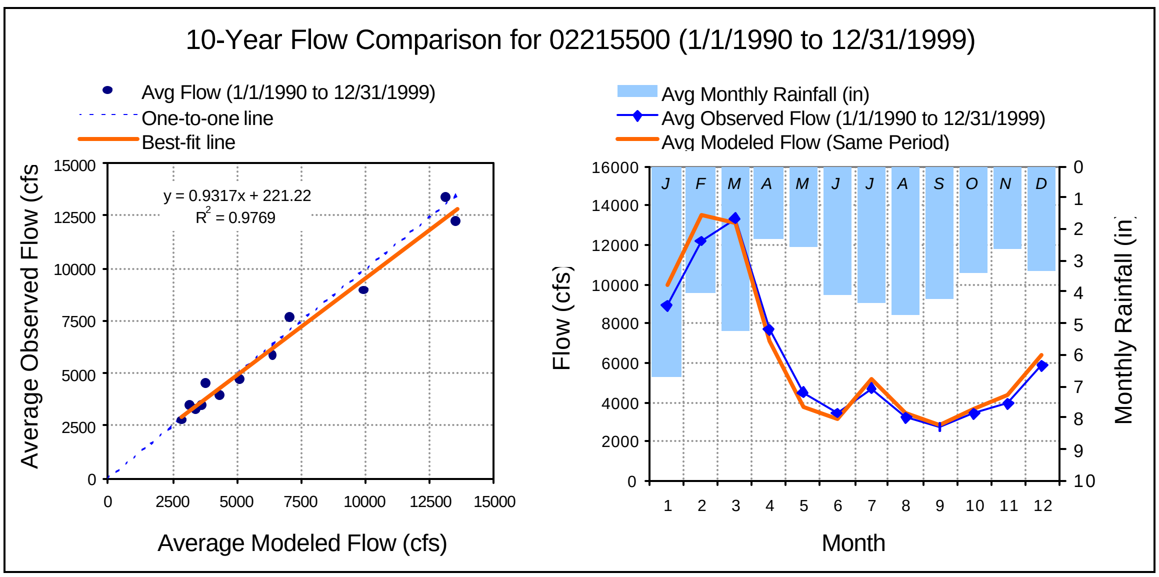


Figure C.10. 10-Year Validation (Monthly Average) at 02215500 – Ocmulgee River at Lumber City, GA.

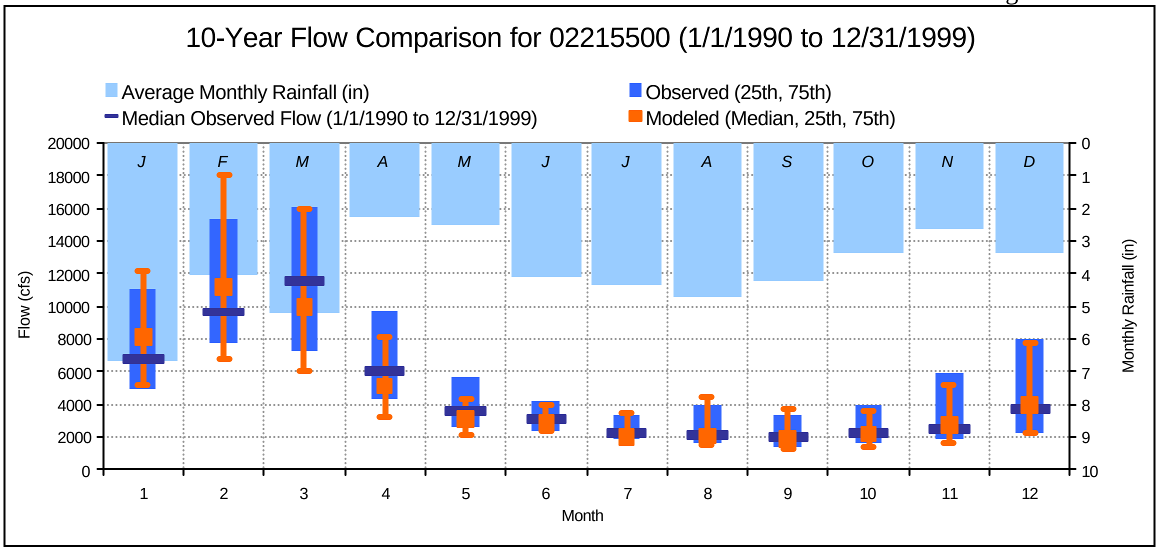


Figure C.11. 10-Year Validation (Monthly Medians) at 02215500 – Ocmulgee River at Lumber City, GA.

Simulation Name:	02215500	**Simulation Period:**	
		Watershed Area (ac):	3366386
Period for Flow Analysis			
Begin Date:	**01/01/90**	**Baseflow PERCENTILE:**	2.5
End Date:	**12/31/99**	*Usually 1%-5%*	
Total Simulated In-stream Flow:	**163.87**	Total Observed In-stream Flow:	**158.47**
Total of highest 10% flows:	**61.83**	Total of Observed highest 10% flows:	**53.58**
Total of lowest 50% flows:	**27.34**	Total of Observed Lowest 50% flows:	**30.16**
Simulated Summer Flow Volume (months 7-9):	**24.86**	Observed Summer Flow Volume (7-9):	**23.16**
Simulated Fall Flow Volume (months 10-12):	**31.41**	Observed Fall Flow Volume (10-12):	**28.73**
Simulated Winter Flow Volume (months 1-3):	**77.60**	Observed Winter Flow Volume (1-3):	**73.13**
Simulated Spring Flow Volume (months 4-6):	**29.99**	Observed Spring Flow Volume (4-6):	**33.45**
Total Simulated Storm Volume:	**136.76**	Total Observed Storm Volume:	**126.78**
Simulated Summer Storm Volume (7-9):	**18.11**	Observed Summer Storm Volume (7-9):	**15.23**
Errors (Simulated-Observed)		*Recommended Criteria*	Last run
Error in total volume:	**3.29**	10	
Error in 50% lowest flows:	**-10.33**	10	
Error in 10% highest flows:	**13.35**	15	
Seasonal volume error - Summer:	**6.84**	30	
Seasonal volume error - Fall:	**8.53**	30	
Seasonal volume error - Winter:	**5.76**	30	
Seasonal volume error - Spring:	**-11.51**	30	
Error in storm volumes:	**7.29**	20	
Error in summer storm volumes:	**15.93**	50	

Figure C.12. 10-Year Validation Statistics at 02215500 – Ocmulgee River at Lumber City, GA.

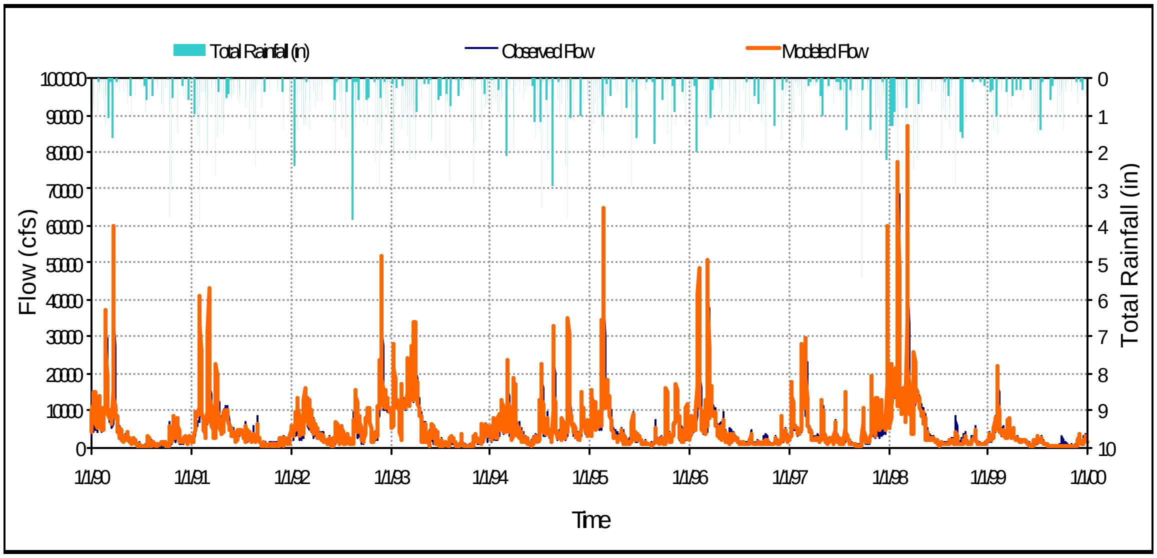


Figure C.13. 10-Year Validation (Daily Flow) at 02223500 – Oconee River at Dublin, GA.

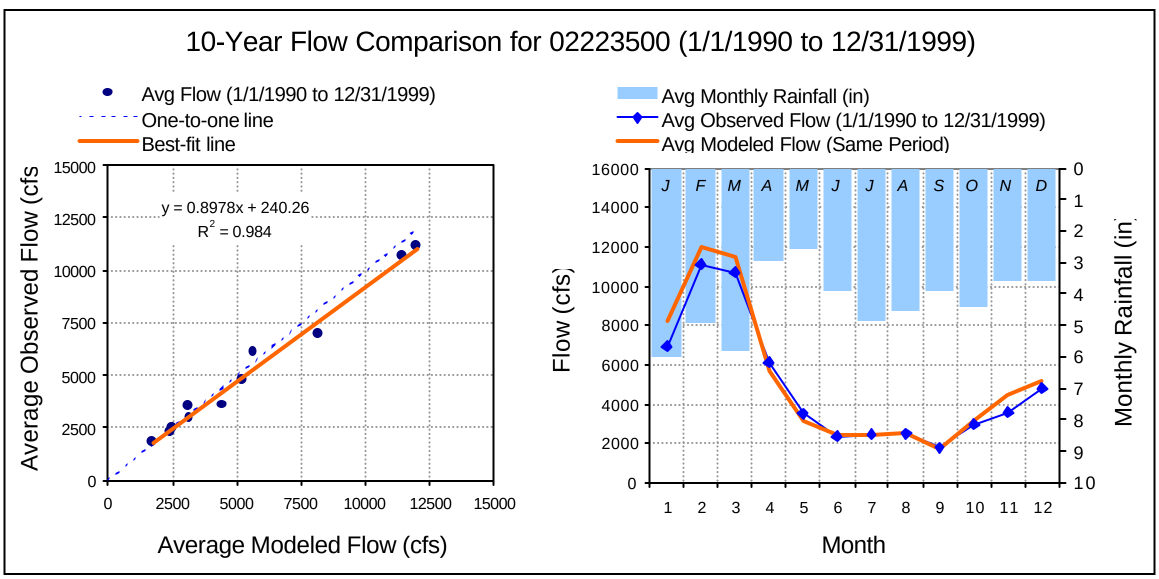


Figure C.14 10-Year Validation (Monthly Average) at 02223500 – Oconee River at Dublin, GA.

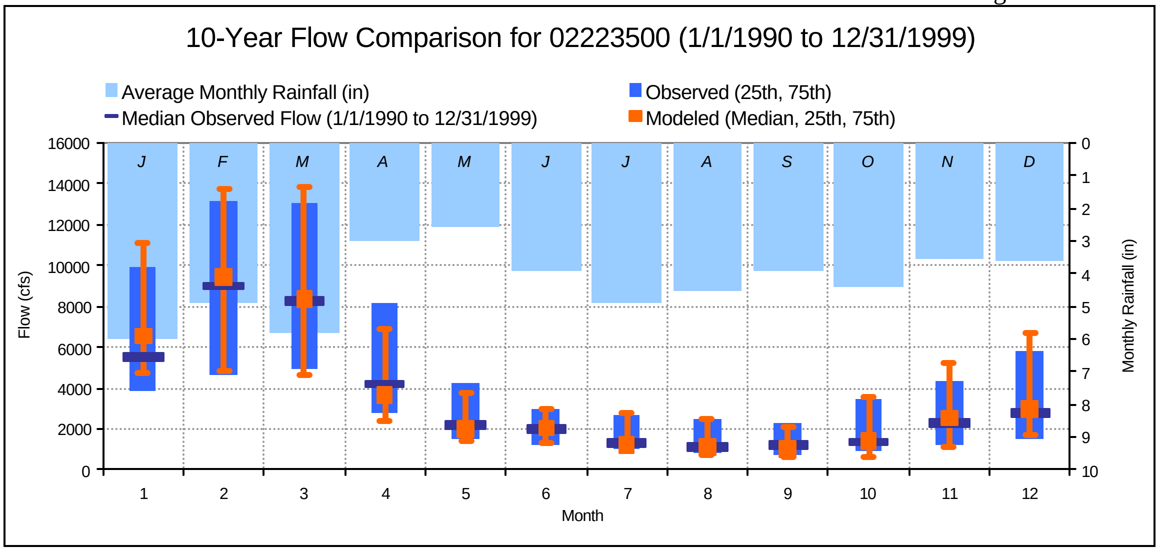


Figure C.15. 10-Year Validation (Monthly Medians) at 02223500 – Oconee River at Dublin, GA.

Simulation Name:	02223500	**Simulation Period:**	
		Watershed Area (ac):	2804097
Period for Flow Analysis			
Begin Date:	**01/01/90**	**Baseflow PERCENTILE:**	2.5
End Date:	**12/31/99**	*Usually 1%-5%*	
Total Simulated In-stream Flow:	**159.89**	Total Observed In-stream Flow:	**150.96**
Total of highest 10% flows:	**63.23**	Total of Observed highest 10% flows:	**56.09**
Total of lowest 50% flows:	**21.46**	Total of Observed Lowest 50% flows:	**22.45**
Simulated Summer Flow Volume (months 7-9):	**17.58**	Observed Summer Flow Volume (7-9):	**17.62**
Simulated Fall Flow Volume (months 10-12):	**33.23**	Observed Fall Flow Volume (10-12):	**29.53**
Simulated Winter Flow Volume (months 1-3):	**80.43**	Observed Winter Flow Volume (1-3):	**73.00**
Simulated Spring Flow Volume (months 4-6):	**28.64**	Observed Spring Flow Volume (4-6):	**30.81**
Total Simulated Storm Volume:	**145.27**	Total Observed Storm Volume:	**132.05**
Simulated Summer Storm Volume (7-9):	**13.93**	Observed Summer Storm Volume (7-9):	**12.90**
Errors (Simulated-Observed)		*Recommended Criteria*	Last run
Error in total volume:	**5.59**	10	
Error in 50% lowest flows:	**-4.62**	10	
Error in 10% highest flows:	**11.30**	15	
Seasonal volume error - Summer:	**-0.22**	30	
Seasonal volume error - Fall:	**11.13**	30	
Seasonal volume error - Winter:	**9.24**	30	
Seasonal volume error - Spring:	**-7.55**	30	
Error in storm volumes:	**9.10**	20	
Error in summer storm volumes:	**7.39**	50	

Figure C.16. 10-Year Validation Statistics at 02223500 – Oconee River at Dublin, GA.

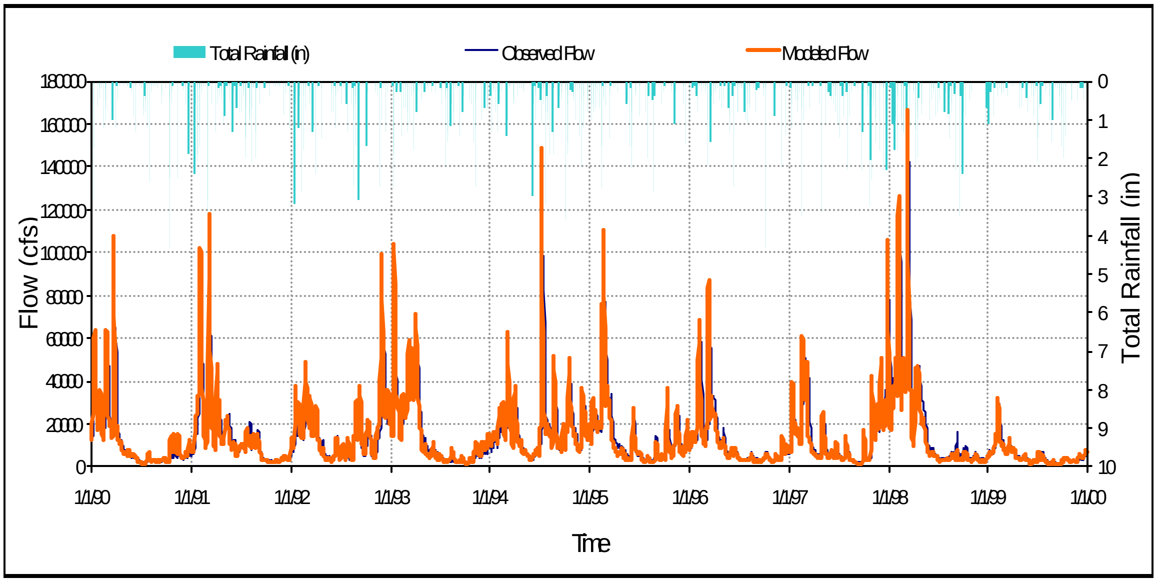


Figure C.17. 10-Year Validation (Daily Flow) at 02225000 – Altamaha River near Baxley, GA.

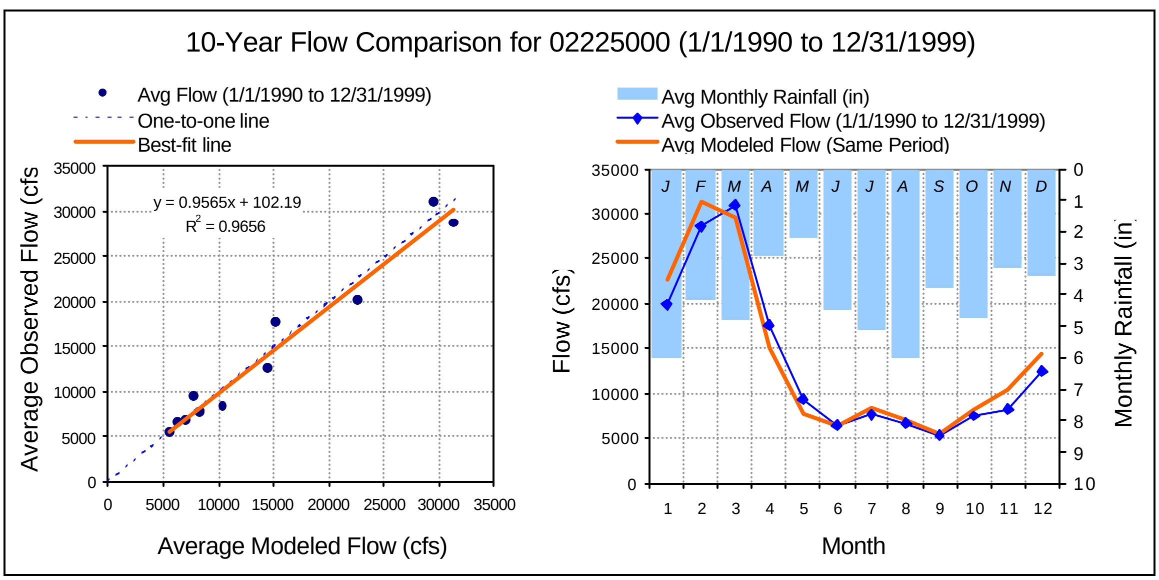


Figure C.18. 10-Year Validation (Monthly Average) at 02225000 – Altamaha River near Baxley, GA.

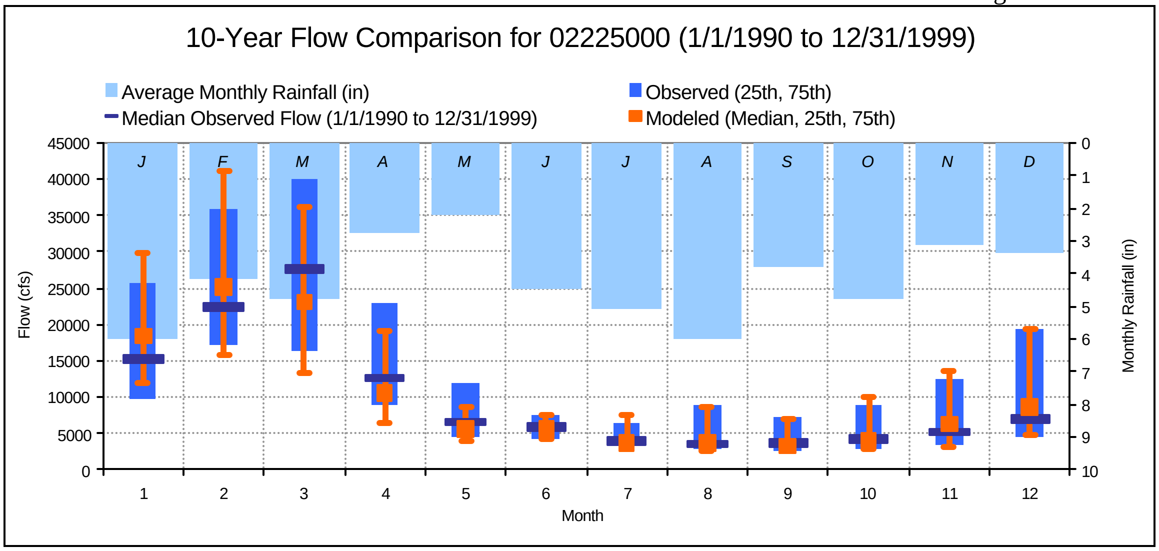


Figure C.19. 10-Year Validation (Monthly Medians) at 02225000 – Altamaha River near Baxley, GA.

Simulation Name:	02225000	**Simulation Period:**	
		Watershed Area (ac):	7414025
Period for Flow Analysis			
Begin Date:	**01/01/90**	**Baseflow PERCENTILE:**	2.5
End Date:	**12/31/99**	*Usually 1%-5%*	
Total Simulated In-stream Flow:	**162.30**	Total Observed In-stream Flow:	**156.52**
Total of highest 10% flows:	**61.54**	Total of Observed highest 10% flows:	**55.32**
Total of lowest 50% flows:	**24.30**	Total of Observed Lowest 50% flows:	**25.45**
Simulated Summer Flow Volume (months 7-9):	**20.78**	Observed Summer Flow Volume (7-9):	**19.53**
Simulated Fall Flow Volume (months 10-12):	**32.68**	Observed Fall Flow Volume (10-12):	**27.94**
Simulated Winter Flow Volume (months 1-3):	**80.39**	Observed Winter Flow Volume (1-3):	**76.56**
Simulated Spring Flow Volume (months 4-6):	**28.45**	Observed Spring Flow Volume (4-6):	**32.50**
Total Simulated Storm Volume:	**141.79**	Total Observed Storm Volume:	**132.50**
Simulated Summer Storm Volume (7-9):	**15.67**	Observed Summer Storm Volume (7-9):	**13.53**
Errors (Simulated-Observed)		*Recommended Criteria*	Last run
Error in total volume:	**3.56**	10	
Error in 50% lowest flows:	**-4.72**	10	
Error in 10% highest flows:	**10.10**	15	
Seasonal volume error - Summer:	**6.06**	30	
Seasonal volume error - Fall:	**14.50**	30	
Seasonal volume error - Winter:	**4.77**	30	
Seasonal volume error - Spring:	**-14.24**	30	
Error in storm volumes:	**6.56**	20	
Error in summer storm volumes:	**13.68**	50	

Figure C.20. 10-Year Validation Statistics at 02225000 – Altamaha River near Baxley, GA.

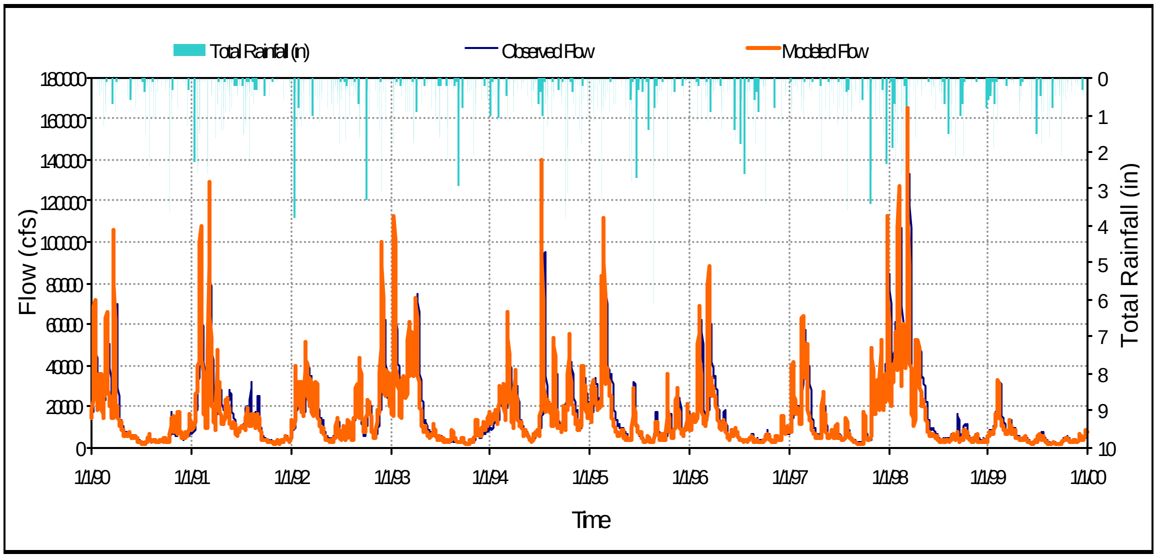


Figure C.21. 10-Year Validation (Daily Flow) at 02226000 – Altamaha River at Doctortown, GA.

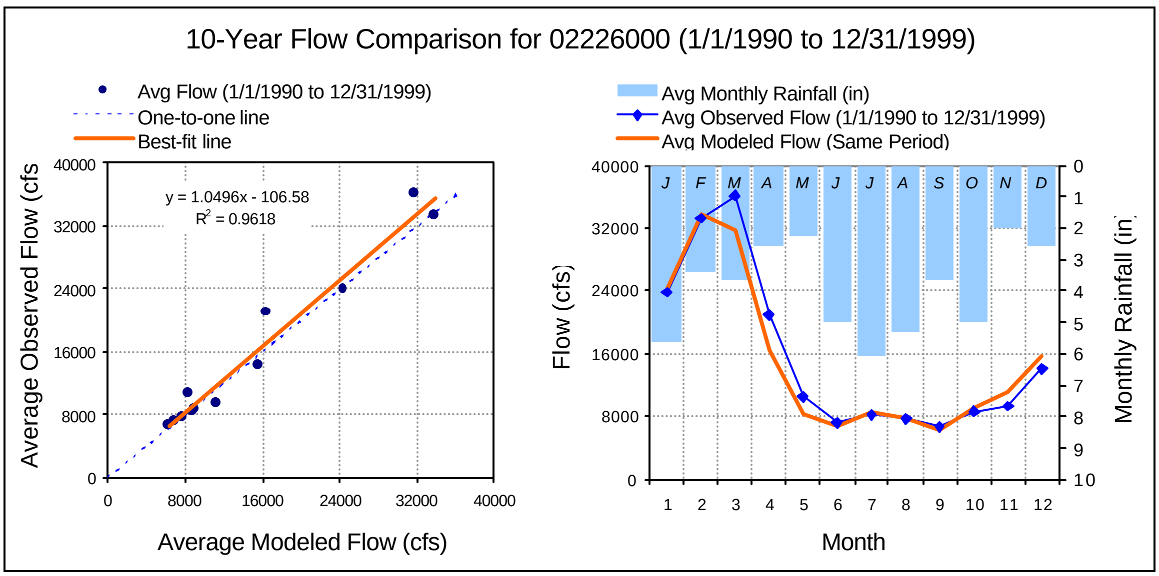


Figure C.22. 10-Year Validation (Monthly Average) at 02226000 – Altamaha River at Doctortown, GA.

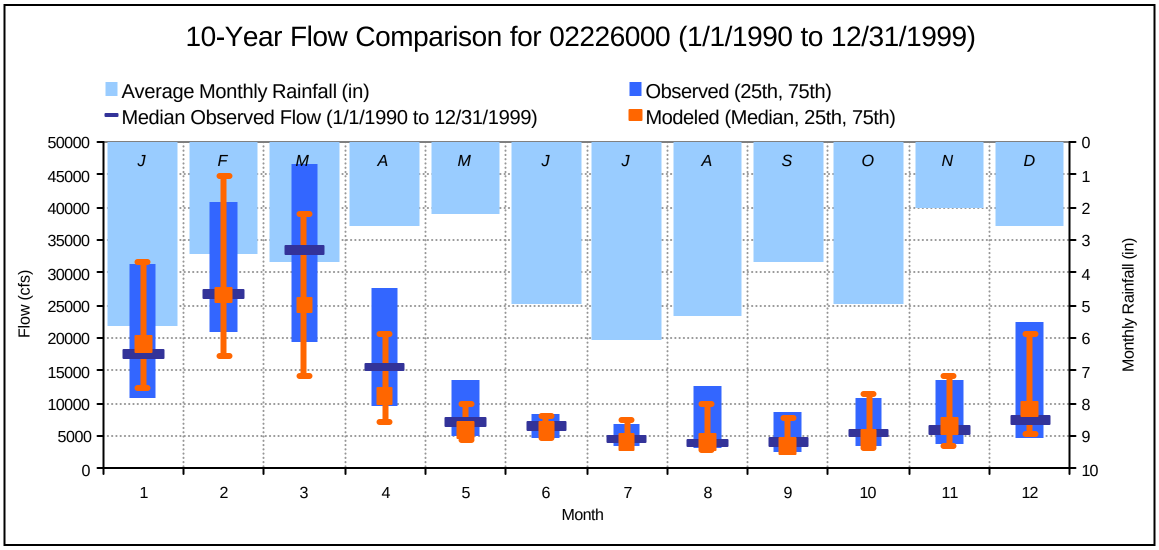


Figure C.23. 10-Year Validation (Monthly Medians) at 02226000 – Altamaha River at Doctortown, GA.

Simulation Name:	02226000	**Simulation Period:**	
		Watershed Area (ac):	8738182
Period for Flow Analysis			
Begin Date:	**01/01/90**	**Baseflow PERCENTILE:**	2.5
End Date:	**12/31/99**	*Usually 1%-5%*	
Total Simulated In-stream Flow:	**148.01**	Total Observed In-stream Flow:	**154.40**
Total of highest 10% flows:	**55.97**	Total of Observed highest 10% flows:	**54.45**
Total of lowest 50% flows:	**22.16**	Total of Observed Lowest 50% flows:	**23.94**
Simulated Summer Flow Volume (months 7-9):	**18.93**	Observed Summer Flow Volume (7-9):	**19.10**
Simulated Fall Flow Volume (months 10-12):	**29.89**	Observed Fall Flow Volume (10-12):	**26.97**
Simulated Winter Flow Volume (months 1-3):	**73.27**	Observed Winter Flow Volume (1-3):	**76.27**
Simulated Spring Flow Volume (months 4-6):	**25.92**	Observed Spring Flow Volume (4-6):	**32.06**
Total Simulated Storm Volume:	**128.79**	Total Observed Storm Volume:	**132.15**
Simulated Summer Storm Volume (7-9):	**14.13**	Observed Summer Storm Volume (7-9):	**13.53**
Errors (Simulated-Observed)		*Recommended Criteria*	Last run
Error in total volume:	**-4.32**	10	
Error in 50% lowest flows:	**-8.01**	10	
Error in 10% highest flows:	**2.72**	15	
Seasonal volume error - Summer:	**-0.90**	30	
Seasonal volume error - Fall:	**9.77**	30	
Seasonal volume error - Winter:	**-4.09**	30	
Seasonal volume error - Spring:	**-23.71**	30	
Error in storm volumes:	**-2.61**	20	
Error in summer storm volumes:	**4.26**	50	

Figure C.24. 10-Year Validation Statistics at 02226000 – Altamaha River at Doctortown, GA.

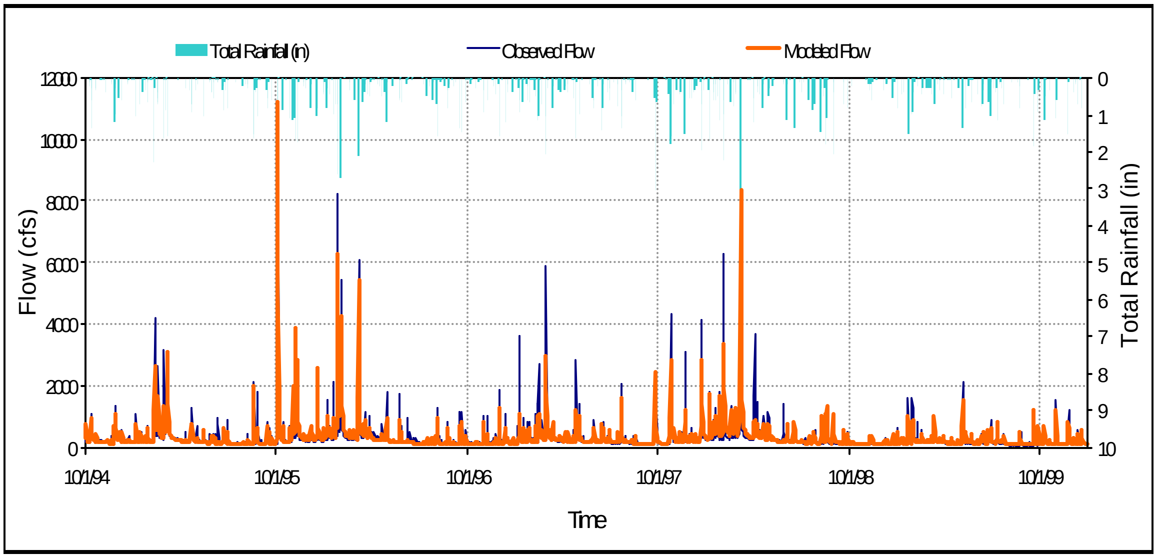


Figure C.25. 5.2-Year Calibration (Daily Flow) at 02204070 – South River at Klondike Road.

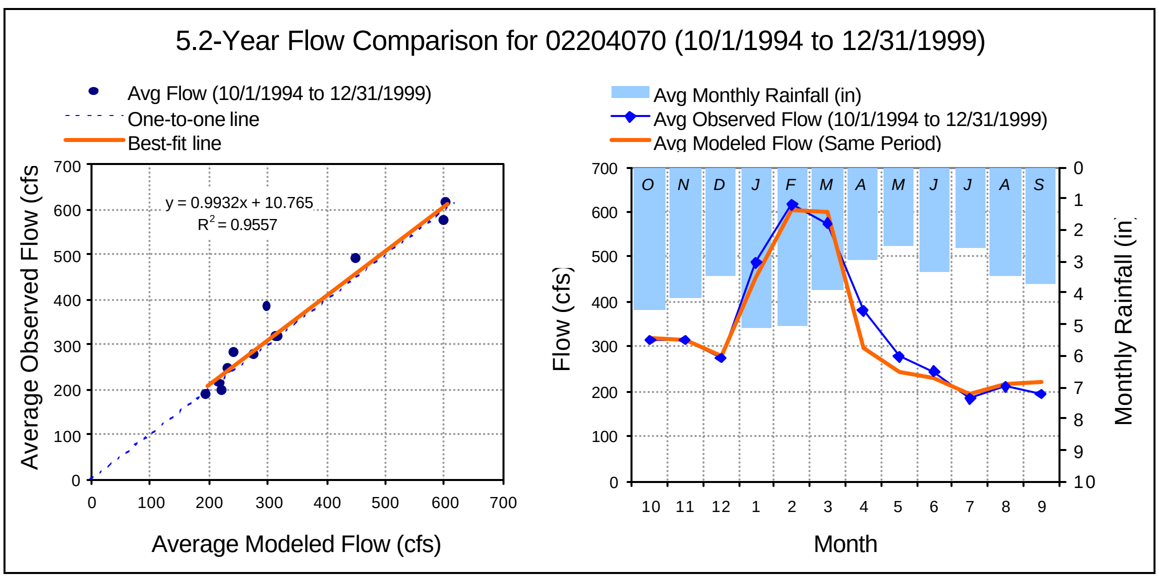


Figure C.26. 5.2-Year Calibration (Monthly Average) at 02204070 – South River at Klondike Road.

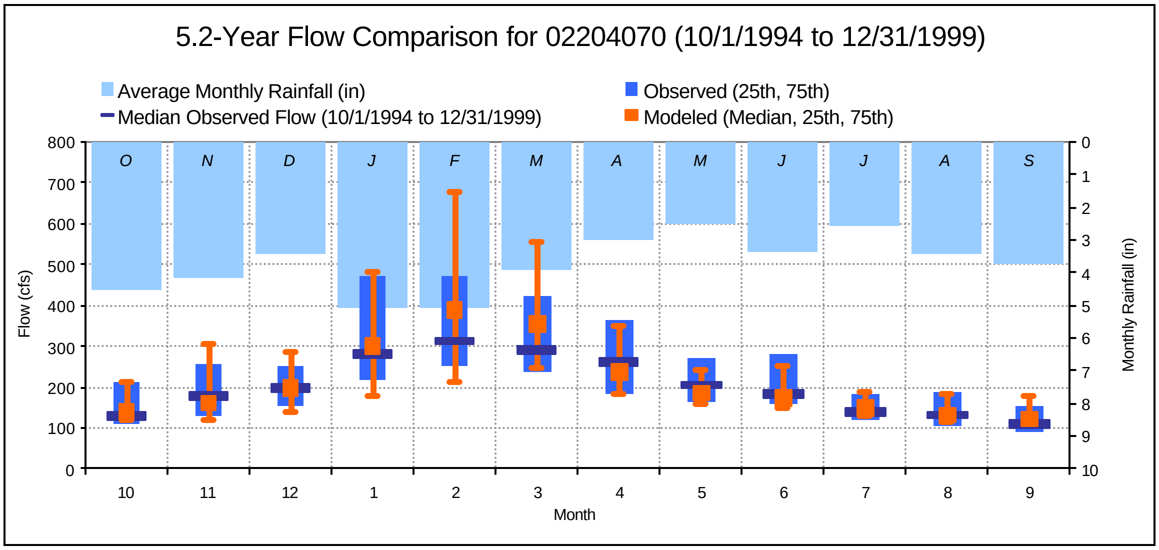


Figure C.27. 5.2-Year Calibration (Monthly Medians) at 02204070 – South River at Klondike Road.

Simulation Name:	02204070	**Simulation Period:**	
		Watershed Area (ac):	117978
Period for Flow Analysis			
Begin Date:	**10/01/94**	**Baseflow PERCENTILE:**	2.5
End Date:	**12/31/99**	*Usually 1%-5%*	
Total Simulated In-stream Flow:	**127.39**	Total Observed In-stream Flow:	**130.44**
Total of highest 10% flows:	**50.64**	Total of Observed highest 10% flows:	**58.20**
Total of lowest 50% flows:	**27.00**	Total of Observed Lowest 50% flows:	**26.39**
Simulated Summer Flow Volume (months 7-9):	**19.70**	Observed Summer Flow Volume (7-9):	**18.35**
Simulated Fall Flow Volume (months 10-12):	**33.85**	Observed Fall Flow Volume (10-12):	**33.63**
Simulated Winter Flow Volume (months 1-3):	**50.13**	Observed Winter Flow Volume (1-3):	**50.76**
Simulated Spring Flow Volume (months 4-6):	**23.70**	Observed Spring Flow Volume (4-6):	**27.71**
Total Simulated Storm Volume:	**85.31**	Total Observed Storm Volume:	**98.06**
Simulated Summer Storm Volume (7-9):	**9.62**	Observed Summer Storm Volume (7-9):	**10.67**
Errors (Simulated-Observed)		*Recommended Criteria*	Last run
Error in total volume:	**-2.40**	10	
Error in 50% lowest flows:	**2.25**	10	
Error in 10% highest flows:	**-14.92**	15	
Seasonal volume error - Summer:	**6.87**	30	
Seasonal volume error - Fall:	**0.65**	30	
Seasonal volume error - Winter:	**-1.24**	30	
Seasonal volume error - Spring:	**-16.90**	30	
Error in storm volumes:	**-14.94**	20	
Error in summer storm volumes:	**-10.85**	50	

Figure C.28. 5.2-Year Calibration Statistics at 02204070 – South River at Klondike Road.

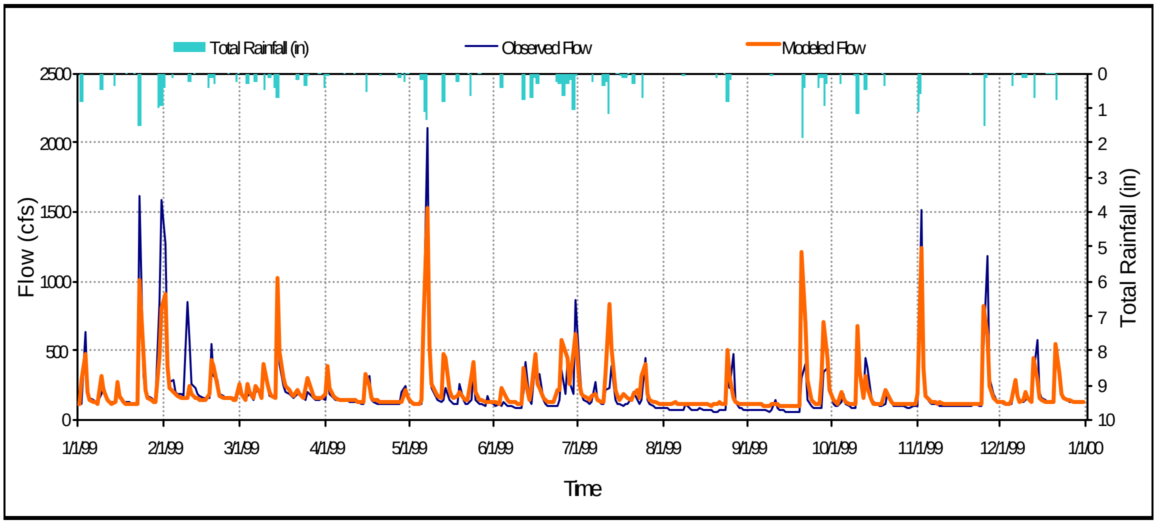


Figure C.29. Calendar Year 1999 (Daily Flow) at 02204070 – South River at Klondike Road.

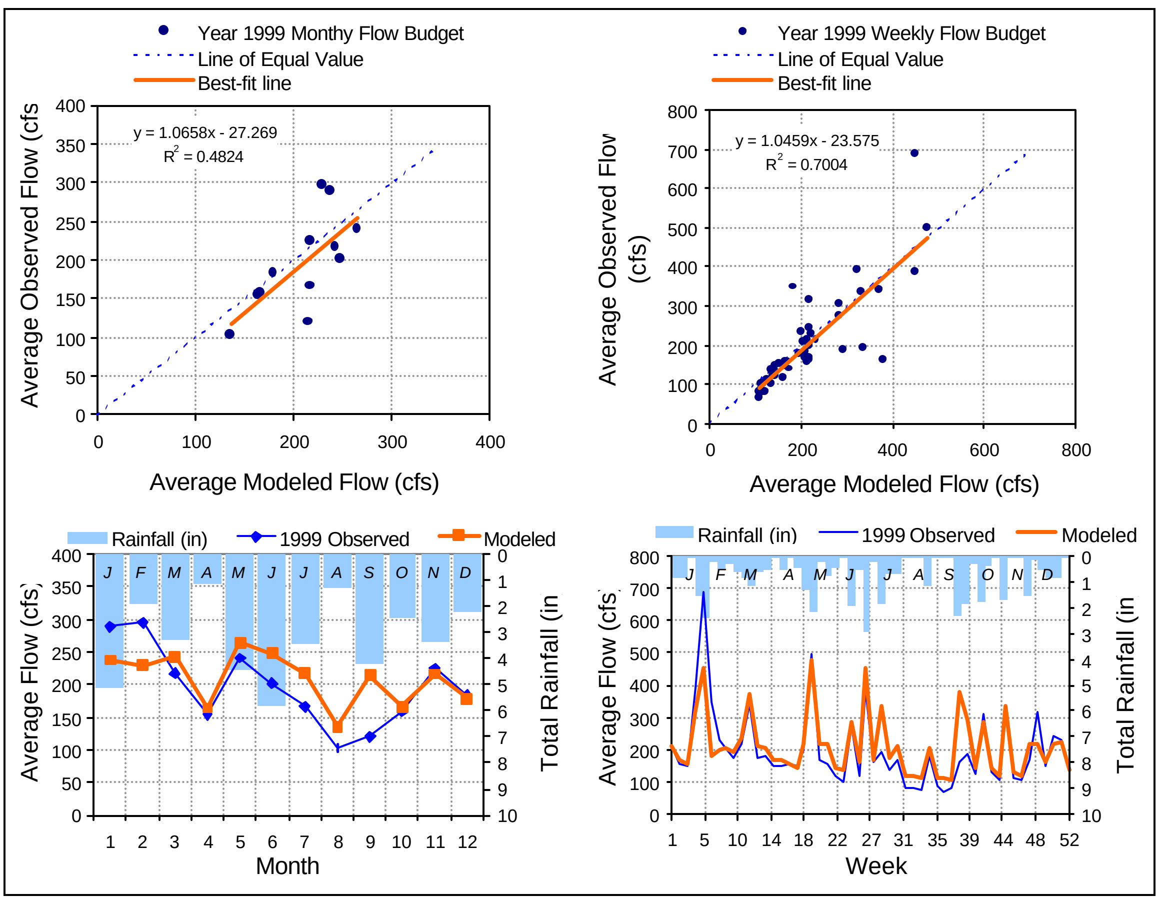


Figure C.30. Calendar Year 1999 (Monthly and Weekly) at 02204070 – South River at Klondike Road.

Simulation Name:	02204070	**Simulation Period:**	
		Watershed Area (ac):	117978
Selected a Year for Flow Analysis:	**1999**		
Type of Year (1=Calendar, 2=Water Year)	**1**	**Baseflow PERCENTILE:**	2.5
Calendar Year 1999:		*Usually 1%-5%*	
1/1/1999 to 12/31/1999			
Total Simulated In-stream Flow:	**15.43**	Total Observed In-stream Flow:	**14.41**
Total of highest 10% flows:	**4.80**	Total of Observed highest 10% flows:	**5.09**
Total of lowest 50% flows:	**4.55**	Total of Observed Lowest 50% flows:	**3.79**
Simulated Summer Flow Volume (months 7-9):	**3.51**	Observed Summer Flow Volume (7-9):	**2.41**
Simulated Fall Flow Volume (months 10-12):	**3.47**	Observed Fall Flow Volume (10-12):	**3.50**
Simulated Winter Flow Volume (months 1-3):	**4.30**	Observed Winter Flow Volume (1-3):	**4.83**
Simulated Spring Flow Volume (months 4-6):	**4.15**	Observed Spring Flow Volume (4-6):	**3.67**
Total Simulated Storm Volume:	**7.54**	Total Observed Storm Volume:	**9.61**
Simulated Summer Storm Volume (7-9):	**1.52**	Observed Summer Storm Volume (7-9):	**1.21**
Errors (Simulated-Observed)		*Recommended Criteria*	Last run
Error in total volume:	**6.63**	10	
Error in 50% lowest flows:	**16.82**	10	
Error in 10% highest flows:	**-6.11**	15	
Seasonal volume error - Summer:	**31.30**	30	
Seasonal volume error - Fall:	**-0.75**	30	
Seasonal volume error - Winter:	**-12.36**	30	
Seasonal volume error - Spring:	**11.63**	30	
Error in storm volumes:	**-27.51**	20	
Error in summer storm volumes:	**20.76**	50	

Figure C.31. Calendar Year 1999 Statistics at 02204070 – South River at Klondike Road.

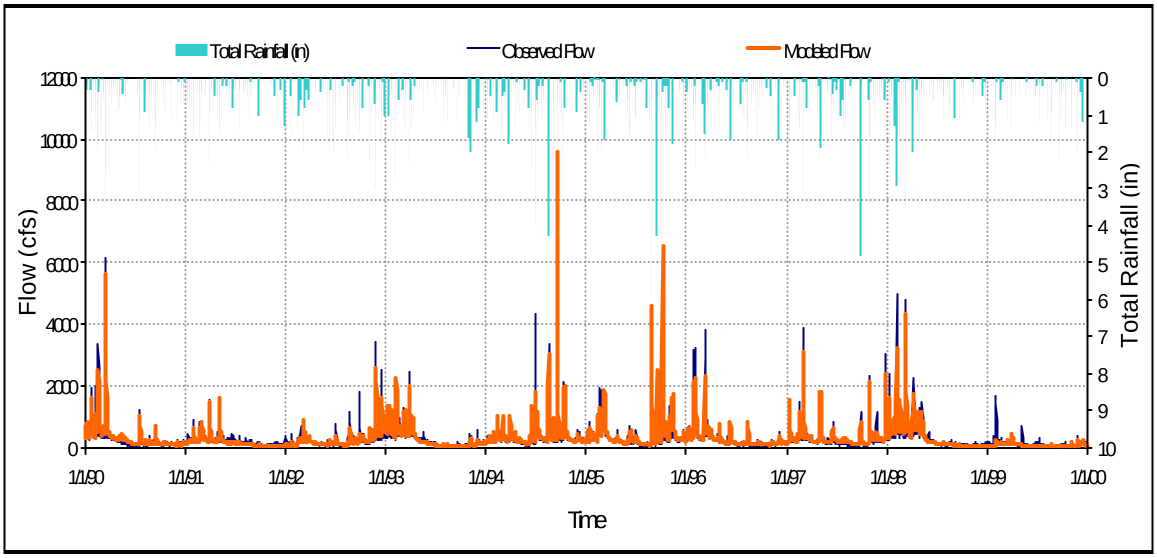


Figure C.32. 10-Year Validation (Daily Flow) at 02219000 – Apalachee River near Bostwick, GA.

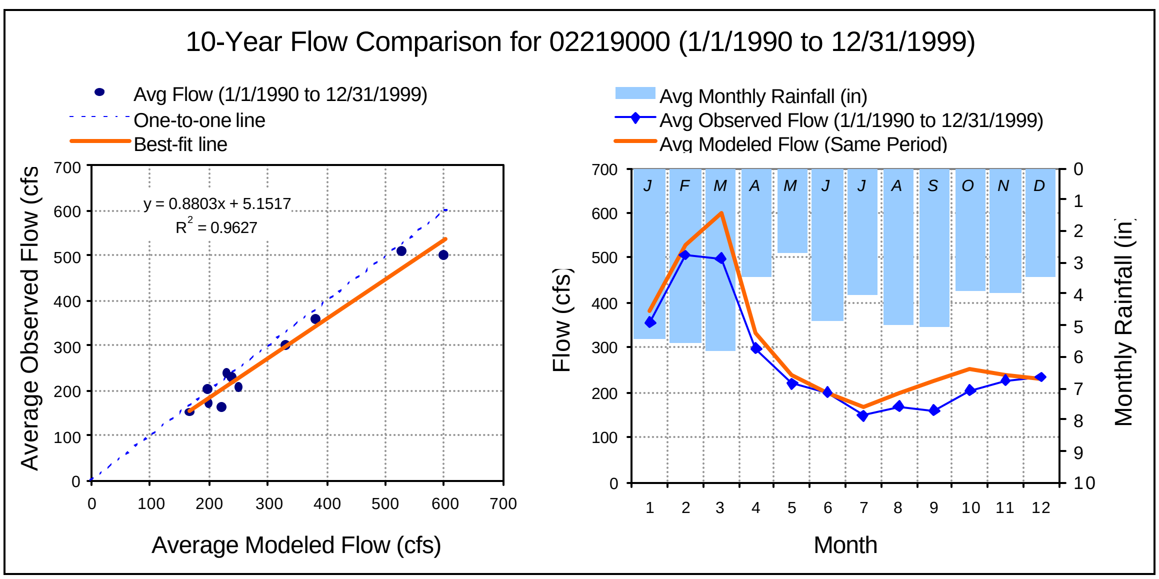


Figure C.33. 10-Year Validation (Monthly Average) at 02219000 – Apalachee River near Bostwick, GA.

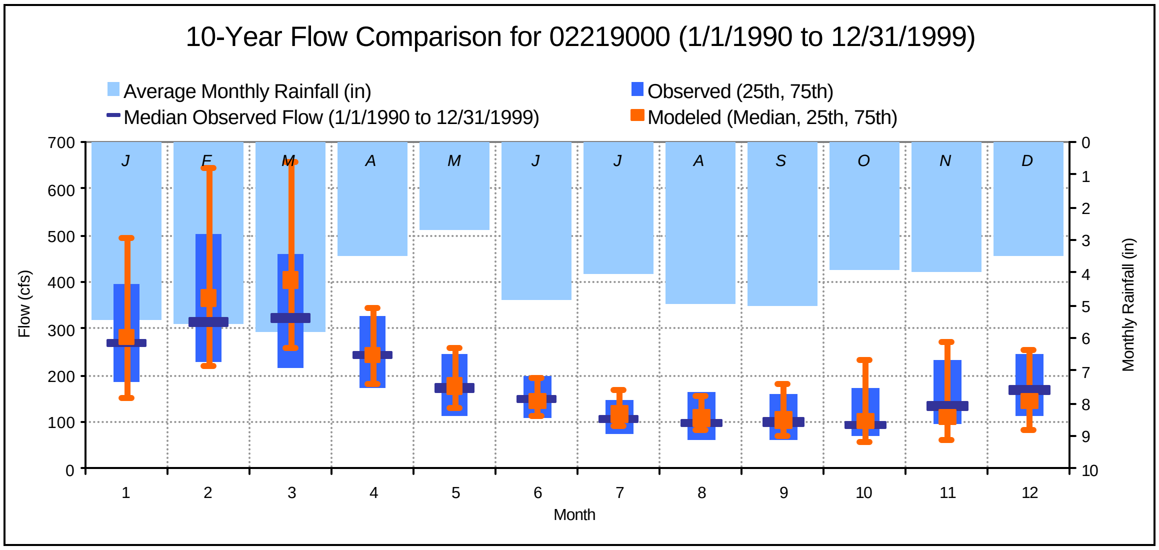


Figure C.34. 10-Year Validation (Monthly Medians) at 02219000 – Apalachee River near Bostwick, GA.

Simulation Name:	02219000	**Simulation Period:**	
		Watershed Area (ac):	119738
Period for Flow Analysis			
Begin Date:	**01/01/90**	**Baseflow PERCENTILE:**	2.5
End Date:	**12/31/99**	*Usually 1%-5%*	
Total Simulated In-stream Flow:	**217.08**	Total Observed In-stream Flow:	**194.66**
Total of highest 10% flows:	**90.29**	Total of Observed highest 10% flows:	**78.55**
Total of lowest 50% flows:	**35.38**	Total of Observed Lowest 50% flows:	**37.57**
Simulated Summer Flow Volume (months 7-9):	**36.16**	Observed Summer Flow Volume (7-9):	**29.31**
Simulated Fall Flow Volume (months 10-12):	**44.03**	Observed Fall Flow Volume (10-12):	**40.69**
Simulated Winter Flow Volume (months 1-3):	**90.27**	Observed Winter Flow Volume (1-3):	**81.15**
Simulated Spring Flow Volume (months 4-6):	**46.62**	Observed Spring Flow Volume (4-6):	**43.51**
Total Simulated Storm Volume:	**185.93**	Total Observed Storm Volume:	**162.94**
Simulated Summer Storm Volume (7-9):	**28.43**	Observed Summer Storm Volume (7-9):	**21.48**
Errors (Simulated-Observed)		*Recommended Criteria*	Last run
Error in total volume:	**10.33**	10	
Error in 50% lowest flows:	**-6.21**	10	
Error in 10% highest flows:	**13.01**	15	
Seasonal volume error - Summer:	**18.93**	30	
Seasonal volume error - Fall:	**7.60**	30	
Seasonal volume error - Winter:	**10.10**	30	
Seasonal volume error - Spring:	**6.66**	30	
Error in storm volumes:	**12.36**	20	
Error in summer storm volumes:	**24.43**	50	

Figure C.35. 10-Year Validation Statistics at 02219000 – Apalachee River near Bostwick, GA.

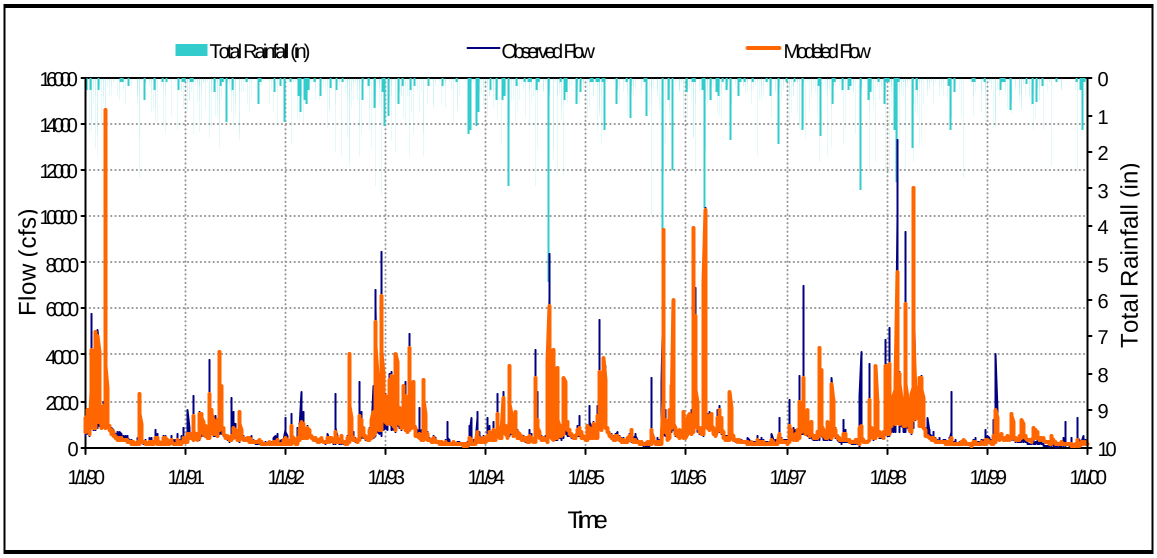


Figure C.36. 10-Year Validation (Daily Flow) at 02217500 – Middle Oconee River near Athens, GA.

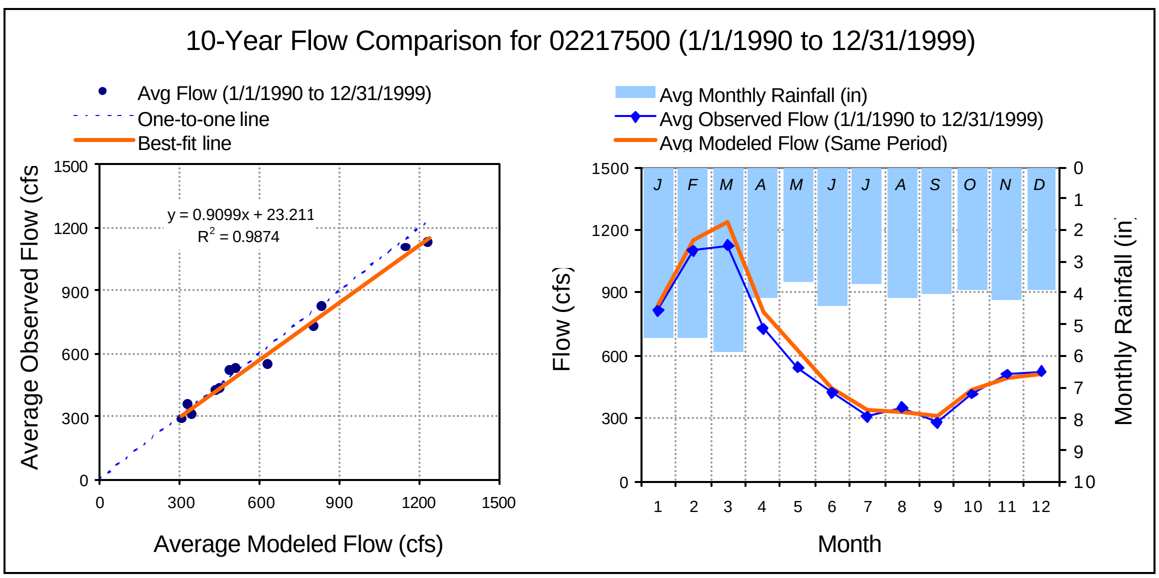


Figure C.37. 10-Year Validation (Monthly Average) at 02217500 – Middle Oconee River near Athens, GA.

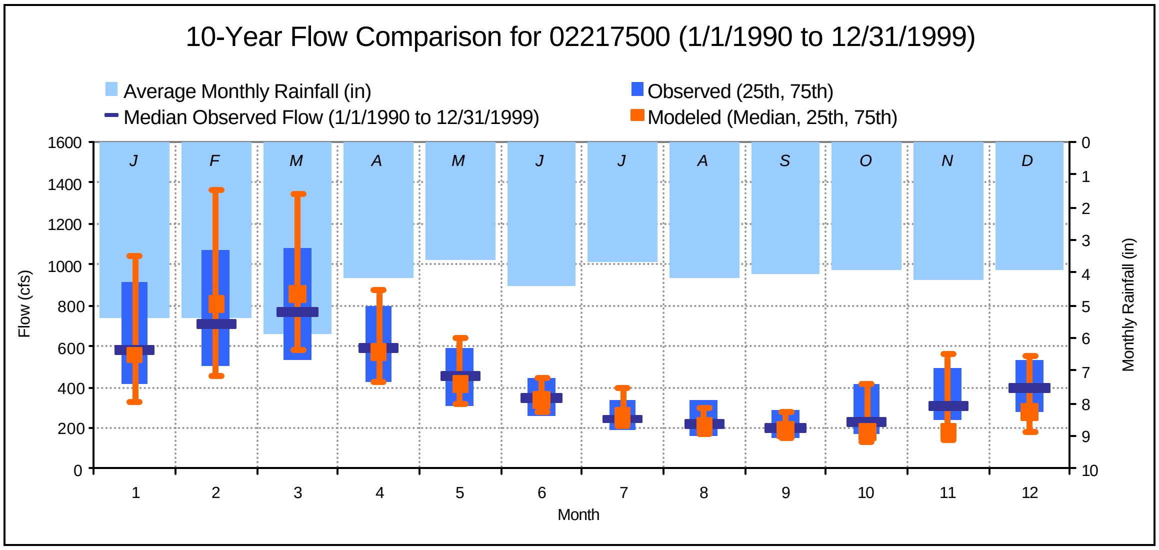


Figure C.38. 10-Year Validation (Monthly Medians) at 02217500 – Middle Oconee River near Athens, GA.

Simulation Name:	02217500	**Simulation Period:**	
		Watershed Area (ac):	252006
Period for Flow Analysis			
Begin Date:	**01/01/90**	**Baseflow PERCENTILE:**	2.5
End Date:	**12/31/99**	*Usually 1%-5%*	
Total Simulated In-stream Flow:	**216.24**	Total Observed In-stream Flow:	**204.71**
Total of highest 10% flows:	**86.28**	Total of Observed highest 10% flows:	**78.78**
Total of lowest 50% flows:	**38.25**	Total of Observed Lowest 50% flows:	**41.80**
Simulated Summer Flow Volume (months 7-9):	**28.67**	Observed Summer Flow Volume (7-9):	**27.55**
Simulated Fall Flow Volume (months 10-12):	**41.92**	Observed Fall Flow Volume (10-12):	**42.23**
Simulated Winter Flow Volume (months 1-3):	**91.48**	Observed Winter Flow Volume (1-3):	**86.27**
Simulated Spring Flow Volume (months 4-6):	**54.17**	Observed Spring Flow Volume (4-6):	**48.65**
Total Simulated Storm Volume:	**175.96**	Total Observed Storm Volume:	**167.18**
Simulated Summer Storm Volume (7-9):	**18.50**	Observed Summer Storm Volume (7-9):	**18.39**
Errors (Simulated-Observed)		*Recommended Criteria*	Last run
Error in total volume:	**5.33**	10	
Error in 50% lowest flows:	**-9.30**	10	
Error in 10% highest flows:	**8.69**	15	
Seasonal volume error - Summer:	**3.89**	30	
Seasonal volume error - Fall:	**-0.74**	30	
Seasonal volume error - Winter:	**5.69**	30	
Seasonal volume error - Spring:	**10.19**	30	
Error in storm volumes:	**4.99**	20	
Error in summer storm volumes:	**0.61**	50	

Figure C.39. 10-Year Validation Statistics at 02217500 – Middle Oconee River near Athens, GA.

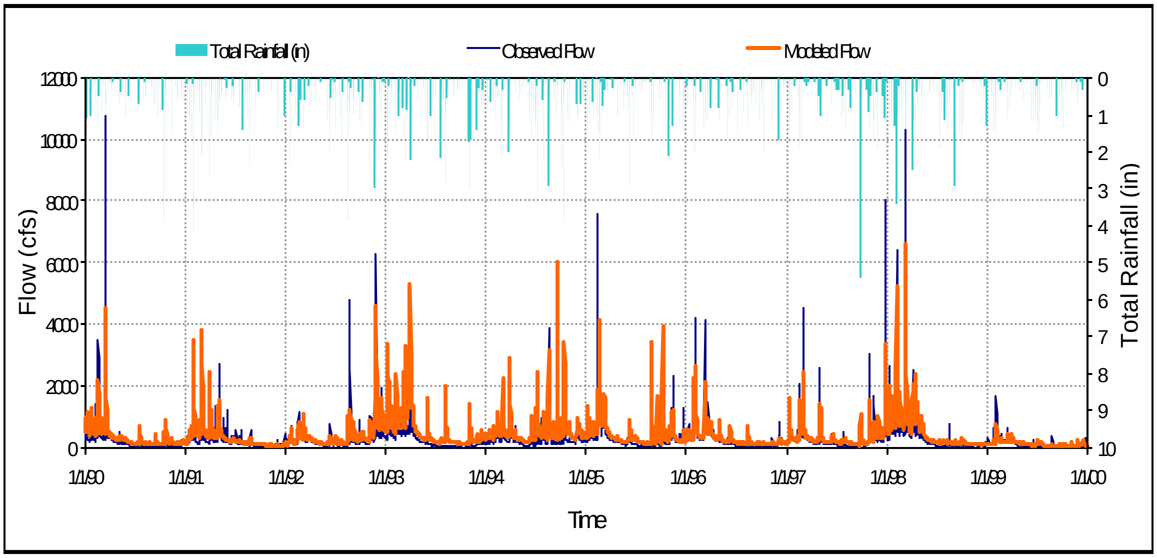


Figure C.40. 10-Year Validation (Daily Flow) at 02220900 – Little River near Eatonton, GA.

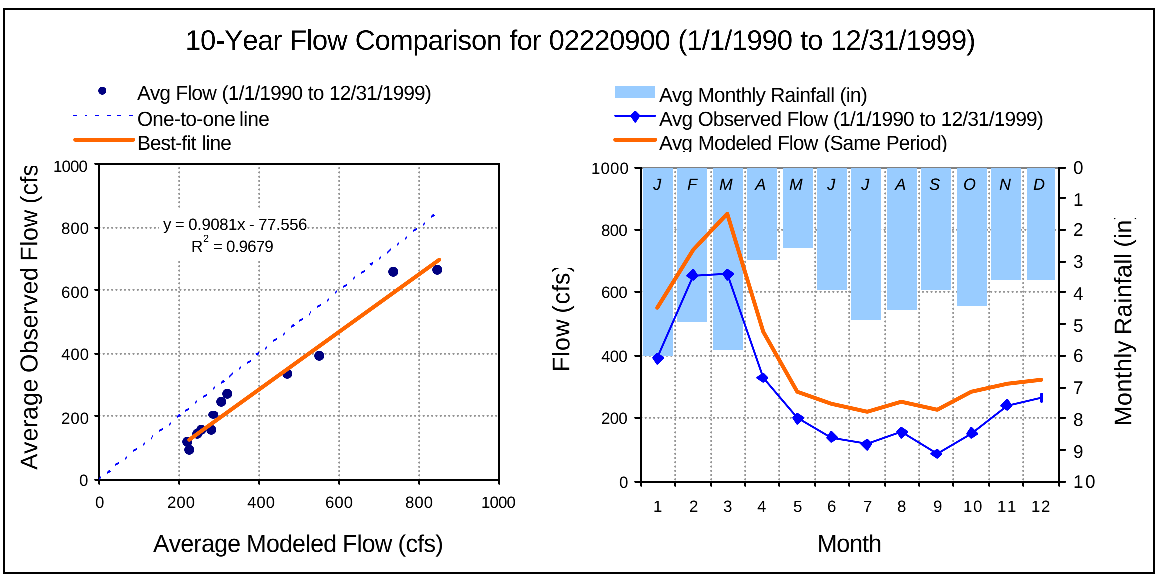


Figure C.41. 10-Year Validation (Monthly Average) at 02220900 – Little River near Eatonton, GA.

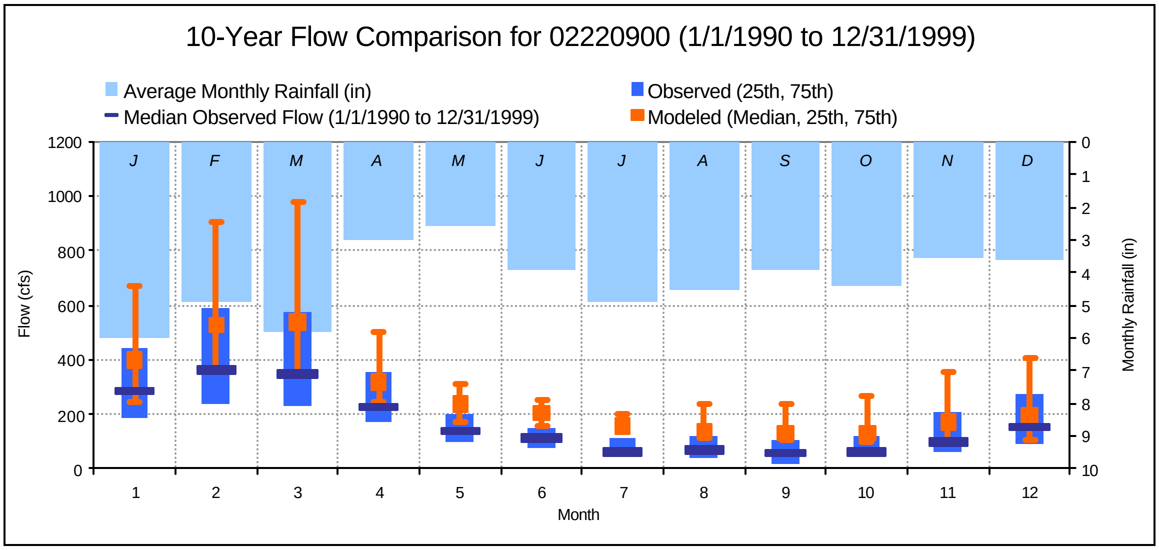


Figure C.42. 10-Year Validation (Monthly Medians) at 02220900 – Little River near Eatonton, GA.

Simulation Name:	02220900	**Simulation Period:**	
		Watershed Area (ac):	174445
Period for Flow Analysis			
Begin Date:	**01/01/90**	**Baseflow PERCENTILE:**	2.5
End Date:	**12/31/99**	*Usually 1%-5%*	
Total Simulated In-stream Flow:	**197.17**	Total Observed In-stream Flow:	**140.21**
Total of highest 10% flows:	**77.93**	Total of Observed highest 10% flows:	**67.14**
Total of lowest 50% flows:	**34.87**	Total of Observed Lowest 50% flows:	**18.88**
Simulated Summer Flow Volume (months 7-9):	**29.53**	Observed Summer Flow Volume (7-9):	**15.17**
Simulated Fall Flow Volume (months 10-12):	**38.32**	Observed Fall Flow Volume (10-12):	**27.72**
Simulated Winter Flow Volume (months 1-3):	**87.78**	Observed Winter Flow Volume (1-3):	**69.58**
Simulated Spring Flow Volume (months 4-6):	**41.54**	Observed Spring Flow Volume (4-6):	**27.75**
Total Simulated Storm Volume:	**162.94**	Total Observed Storm Volume:	**131.80**
Simulated Summer Storm Volume (7-9):	**20.93**	Observed Summer Storm Volume (7-9):	**13.08**
Errors (Simulated-Observed)		*Recommended Criteria*	Last run
Error in total volume:	**28.89**	10	
Error in 50% lowest flows:	**45.86**	10	
Error in 10% highest flows:	**13.84**	15	
Seasonal volume error - Summer:	**48.64**	30	
Seasonal volume error - Fall:	**27.66**	30	
Seasonal volume error - Winter:	**20.74**	30	
Seasonal volume error - Spring:	**33.20**	30	
Error in storm volumes:	**19.11**	20	
Error in summer storm volumes:	**37.52**	50	

Figure C.43. 10-Year Validation Statistics at 02220900 – Little River near Eatonton, GA.

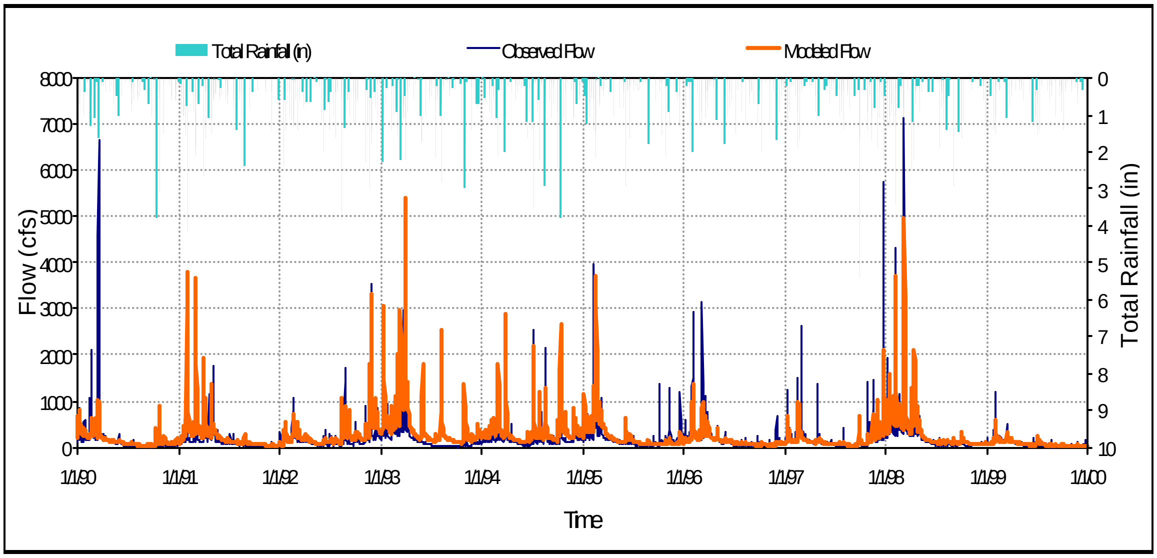


Figure C.44. 10-Year Validation (Daily Flow) at 02221525 – Murder Creek below Eatonton, GA.

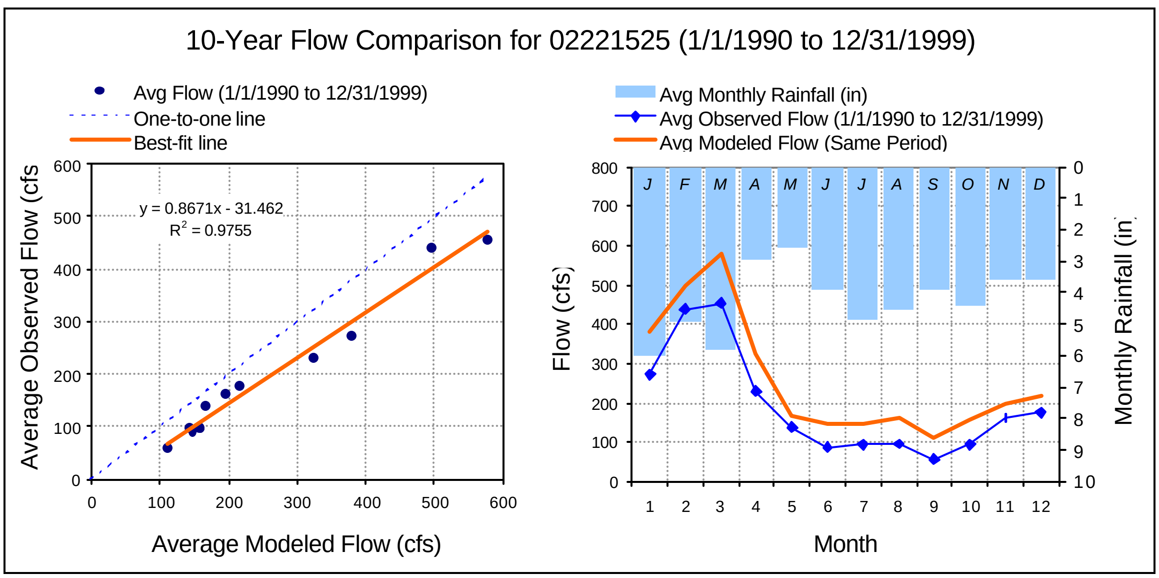


Figure C.45. 10-Year Validation (Monthly Average) at 02221525 – Murder Creek below Eatonton, GA.

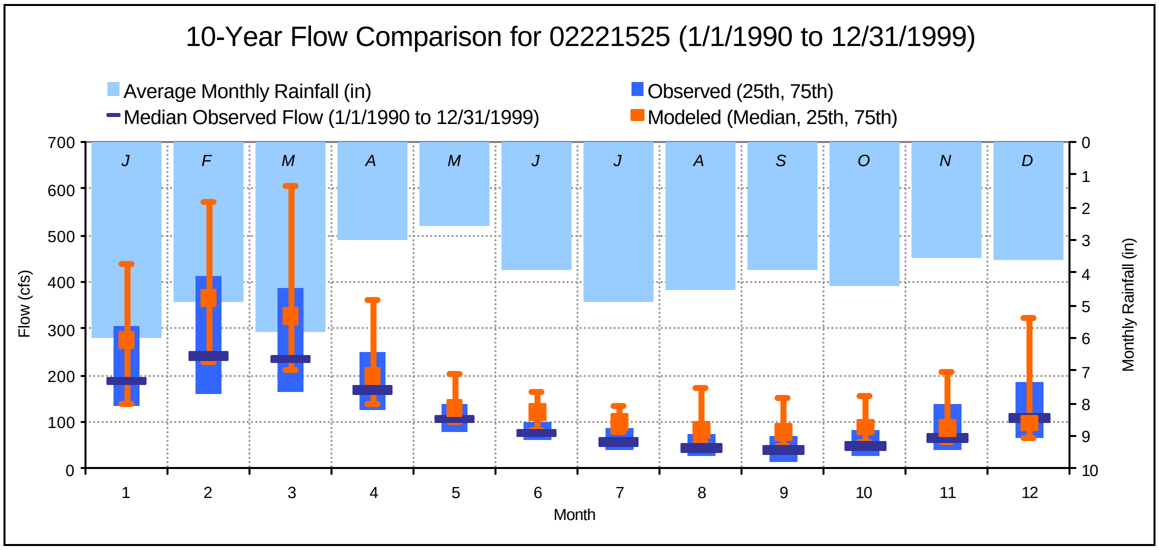


Figure C.46. 10-Year Validation (Monthly Medians) at 02221525 – Murder Creek below Eatonton, GA.

Simulation Name:	02221525	**Simulation Period:**	
		Watershed Area (ac):	121690
Period for Flow Analysis			
Begin Date:	**01/01/90**	**Baseflow PERCENTILE:**	2.5
End Date:	**12/31/99**	*Usually 1%-5%*	
Total Simulated In-stream Flow:	**183.13**	Total Observed In-stream Flow:	**136.13**
Total of highest 10% flows:	**77.13**	Total of Observed highest 10% flows:	**65.23**
Total of lowest 50% flows:	**29.68**	Total of Observed Lowest 50% flows:	**19.42**
Simulated Summer Flow Volume (months 7-9):	**25.17**	Observed Summer Flow Volume (7-9):	**14.98**
Simulated Fall Flow Volume (months 10-12):	**34.40**	Observed Fall Flow Volume (10-12):	**25.89**
Simulated Winter Flow Volume (months 1-3):	**85.48**	Observed Winter Flow Volume (1-3):	**68.24**
Simulated Spring Flow Volume (months 4-6):	**38.09**	Observed Spring Flow Volume (4-6):	**27.02**
Total Simulated Storm Volume:	**154.89**	Total Observed Storm Volume:	**126.19**
Simulated Summer Storm Volume (7-9):	**18.04**	Observed Summer Storm Volume (7-9):	**12.51**
Errors (Simulated-Observed)		*Recommended Criteria*	Last run
Error in total volume:	**25.67**	10	
Error in 50% lowest flows:	**34.59**	10	
Error in 10% highest flows:	**15.43**	15	
Seasonal volume error - Summer:	**40.47**	30	
Seasonal volume error - Fall:	**24.73**	30	
Seasonal volume error - Winter:	**20.17**	30	
Seasonal volume error - Spring:	**29.06**	30	
Error in storm volumes:	**18.52**	20	
Error in summer storm volumes:	**30.66**	50	

Figure C.47. 10-Year Validation Statistics at 02221525 – Murder Creek below Eatonton, GA.

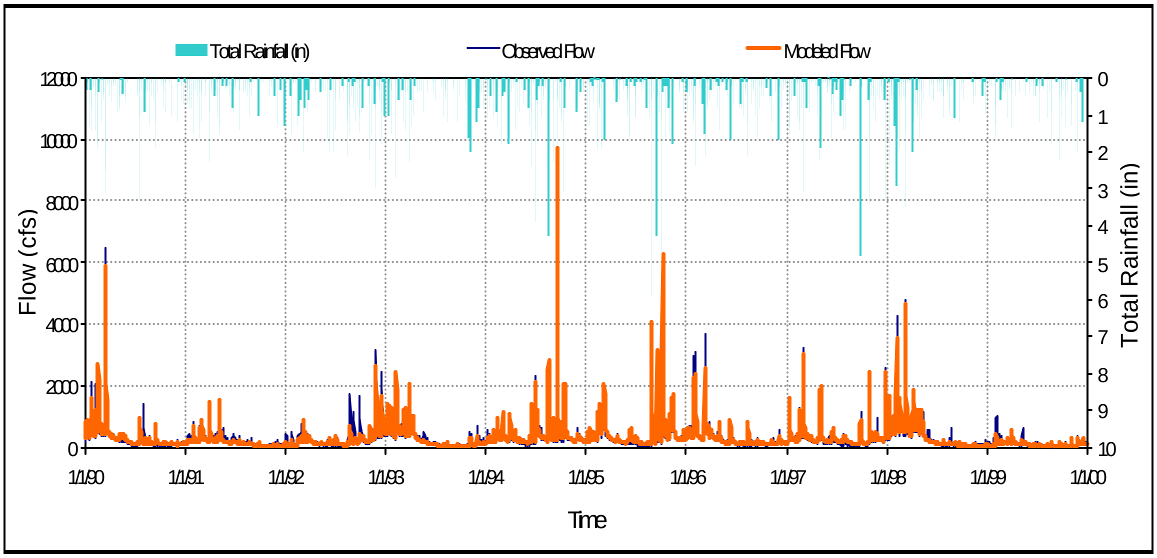


Figure C.48. 10-Year Validation (Daily Flow) at 02208450 – Alcovy River above Covington, GA.

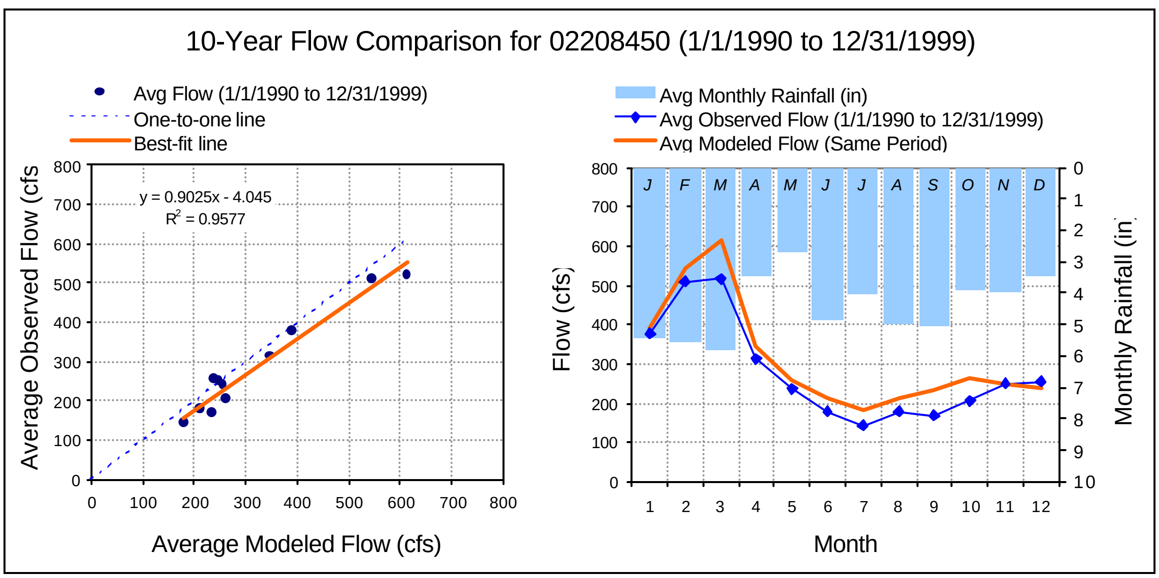


Figure C.49. 10-Year Validation (Monthly Average) at 02208450 – Alcovy River above Covington, GA.

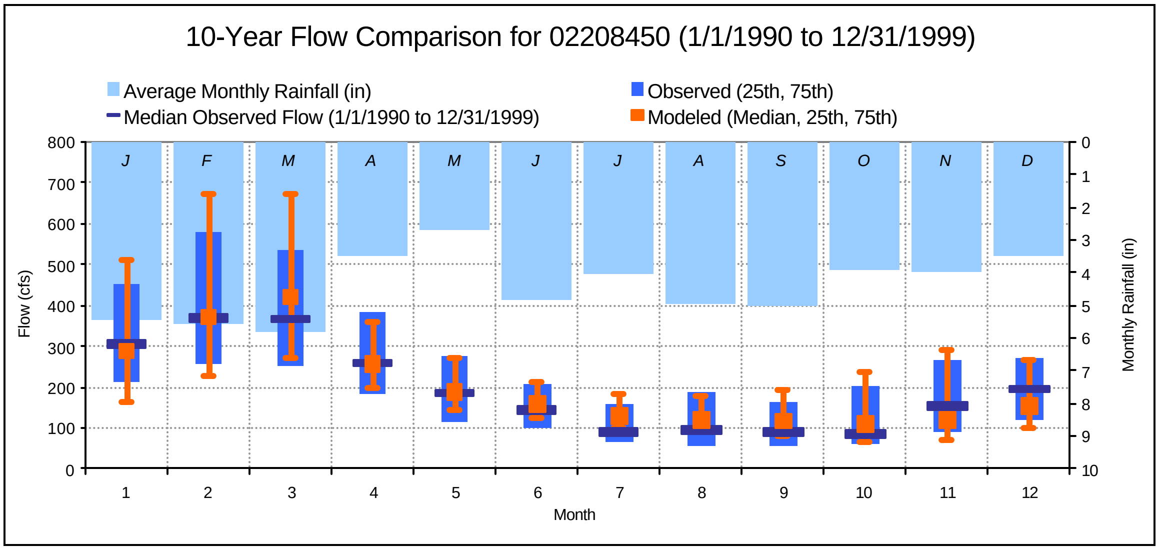


Figure C.50. 10-Year Validation (Monthly Medians) at 02208450 – Alcovy River above Covington, GA.

Simulation Name:	02208450	**Simulation Period:**	
		Watershed Area (ac):	122720
Period for Flow Analysis			
Begin Date:	**01/01/90**	**Baseflow PERCENTILE:**	2.5
End Date:	**12/31/99**	*Usually 1%-5%*	
Total Simulated In-stream Flow:	**220.25**	Total Observed In-stream Flow:	**195.82**
Total of highest 10% flows:	**89.19**	Total of Observed highest 10% flows:	**72.34**
Total of lowest 50% flows:	**38.46**	Total of Observed Lowest 50% flows:	**35.50**
Simulated Summer Flow Volume (months 7-9):	**37.13**	Observed Summer Flow Volume (7-9):	**29.05**
Simulated Fall Flow Volume (months 10-12):	**44.68**	Observed Fall Flow Volume (10-12):	**42.19**
Simulated Winter Flow Volume (months 1-3):	**90.33**	Observed Winter Flow Volume (1-3):	**81.59**
Simulated Spring Flow Volume (months 4-6):	**48.11**	Observed Spring Flow Volume (4-6):	**42.99**
Total Simulated Storm Volume:	**184.55**	Total Observed Storm Volume:	**171.05**
Simulated Summer Storm Volume (7-9):	**28.18**	Observed Summer Storm Volume (7-9):	**22.97**
Errors (Simulated-Observed)		*Recommended Criteria*	Last run
Error in total volume:	**11.09**	10	
Error in 50% lowest flows:	**7.69**	10	
Error in 10% highest flows:	**18.90**	15	
Seasonal volume error - Summer:	**21.75**	30	
Seasonal volume error - Fall:	**5.57**	30	
Seasonal volume error - Winter:	**9.68**	30	
Seasonal volume error - Spring:	**10.64**	30	
Error in storm volumes:	**7.31**	20	
Error in summer storm volumes:	**18.49**	50	

Figure C.51. 10-Year Validation Statistics at 02208450 – Alcovy River above Covington, GA.

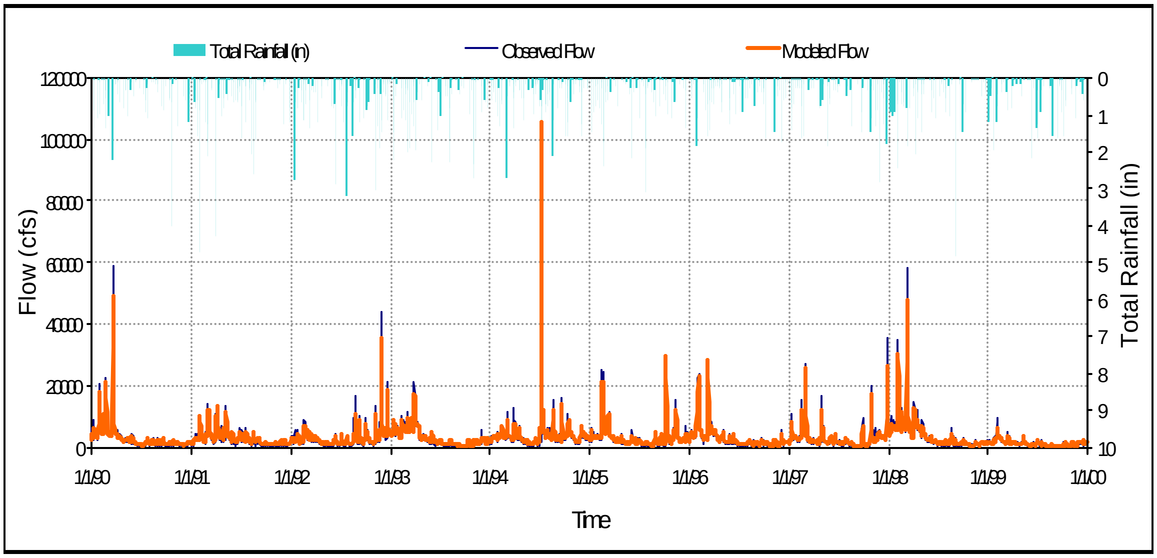


Figure C.52. 10-Year Validation (Daily Flow) at 02213000 – Ocmulgee River at Macon, GA.

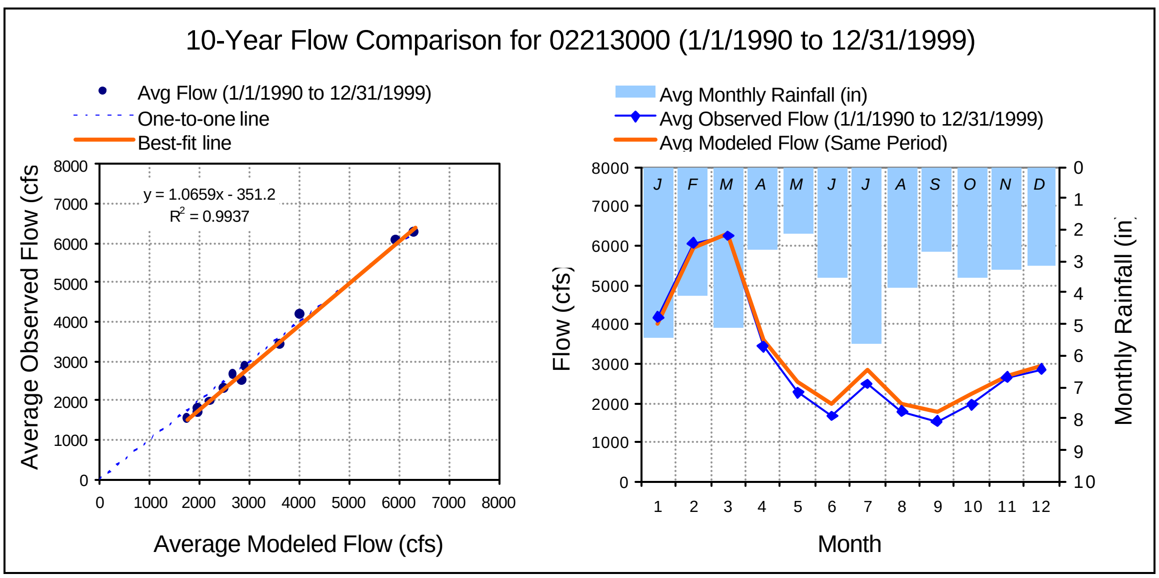


Figure C.53. 10-Year Validation (Monthly Average) at 02213000 – Ocmulgee River at Macon, GA.

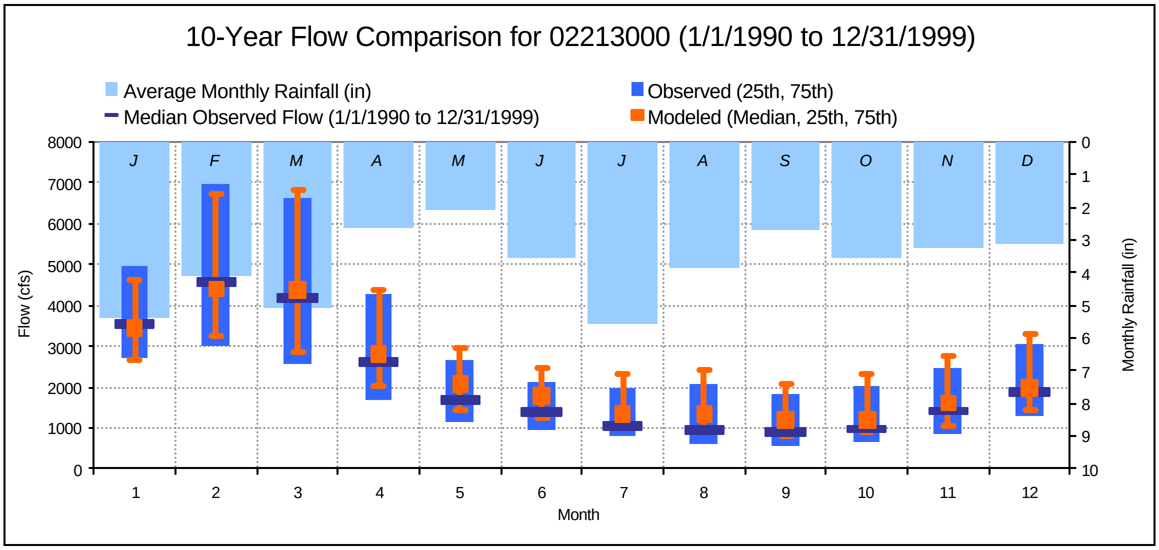


Figure C.54. 10-Year Validation (Monthly Medians) at 02213000 – Ocmulgee River at Macon, GA.

Simulation Name:	02213000	**Simulation Period:**	
		Watershed Area (ac):	1450880
Period for Flow Analysis			
Begin Date:	**01/01/90**	**Baseflow PERCENTILE:**	2.5
End Date:	**12/31/99**	*Usually 1%-5%*	
Total Simulated In-stream Flow:	**193.01**	Total Observed In-stream Flow:	**184.66**
Total of highest 10% flows:	**69.82**	Total of Observed highest 10% flows:	**72.06**
Total of lowest 50% flows:	**38.75**	Total of Observed Lowest 50% flows:	**31.13**
Simulated Summer Flow Volume (months 7-9):	**33.16**	Observed Summer Flow Volume (7-9):	**29.35**
Simulated Fall Flow Volume (months 10-12):	**39.39**	Observed Fall Flow Volume (10-12):	**37.54**
Simulated Winter Flow Volume (months 1-3):	**80.11**	Observed Winter Flow Volume (1-3):	**81.07**
Simulated Spring Flow Volume (months 4-6):	**40.35**	Observed Spring Flow Volume (4-6):	**36.70**
Total Simulated Storm Volume:	**154.66**	Total Observed Storm Volume:	**157.23**
Simulated Summer Storm Volume (7-9):	**23.59**	Observed Summer Storm Volume (7-9):	**22.55**
Errors (Simulated-Observed)		*Recommended Criteria*	Last run
Error in total volume:	**4.33**	10	
Error in 50% lowest flows:	**19.67**	10	
Error in 10% highest flows:	**-3.21**	15	
Seasonal volume error - Summer:	**11.50**	30	
Seasonal volume error - Fall:	**4.71**	30	
Seasonal volume error - Winter:	**-1.20**	30	
Seasonal volume error - Spring:	**9.03**	30	
Error in storm volumes:	**-1.66**	20	
Error in summer storm volumes:	**4.41**	50	

Figure C.55. 10-Year Validation Statistics at 02213000 – Ocmulgee River at Macon, GA.

APPENDIX D:

SIMULATION PERIOD HYDROGRAPHS

FIGURE D1
ALLEN CREEK
SIMULATION PERIOD STREAMFLOW HYDROGRAPH

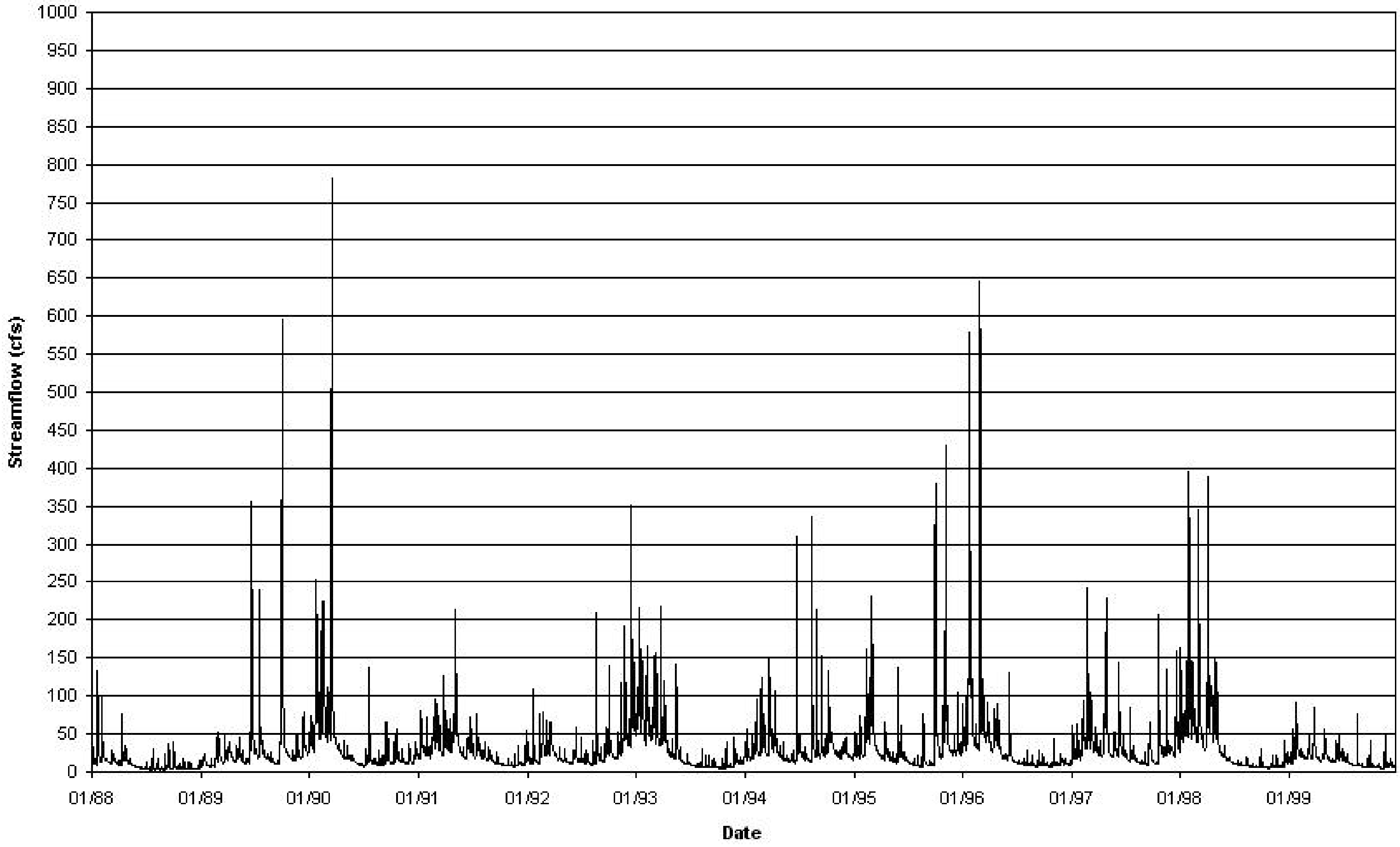


FIGURE D2
TRIBUTARY 2 TO ALLEN CREEK
SIMULATION PERIOD STREAMFLOW HYDROGRAPH

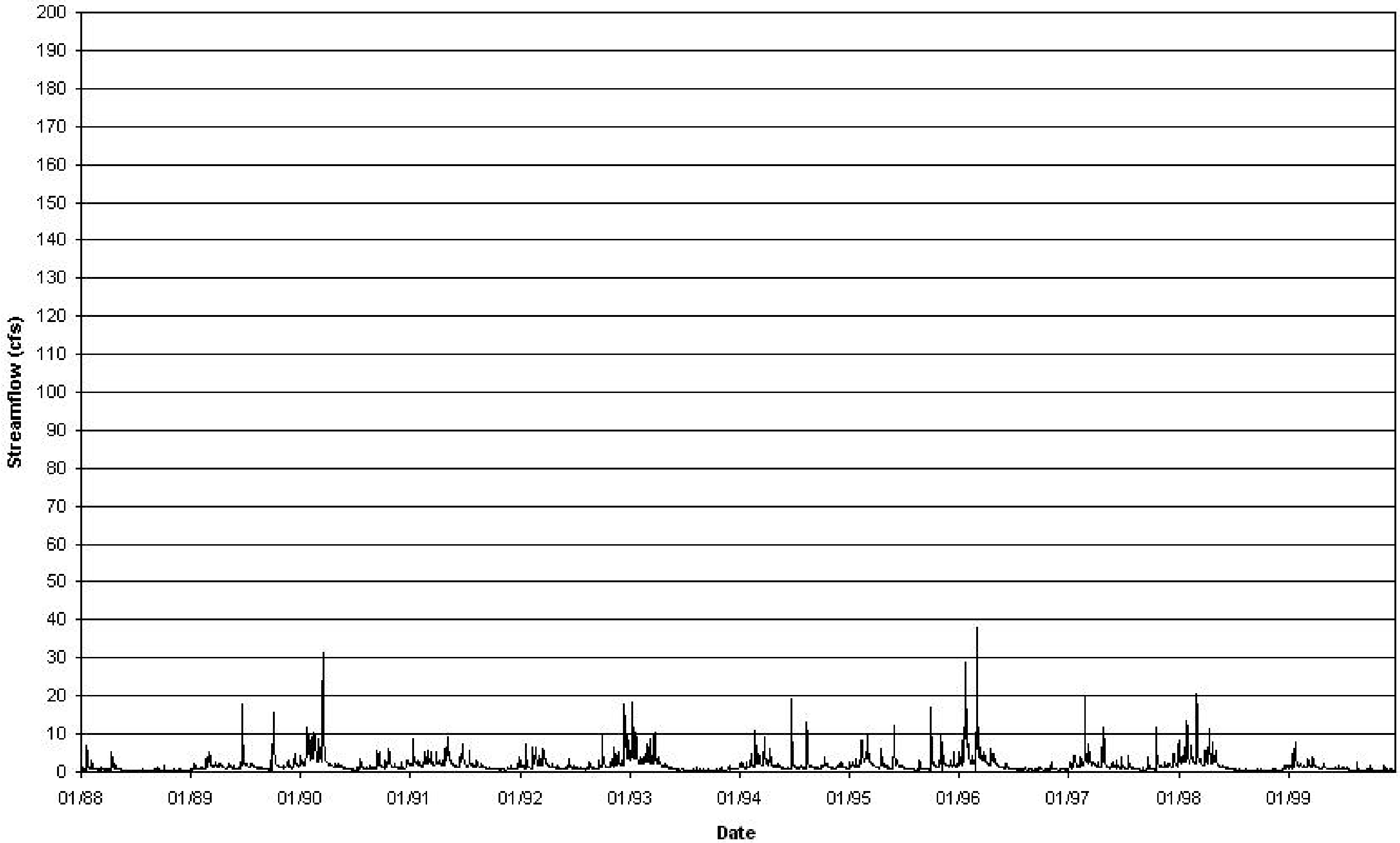


FIGURE D3
TRIBUTARY 5 TO ALLEN CREEK
SIMULATION PERIOD STREAMFLOW HYDROGRAPH

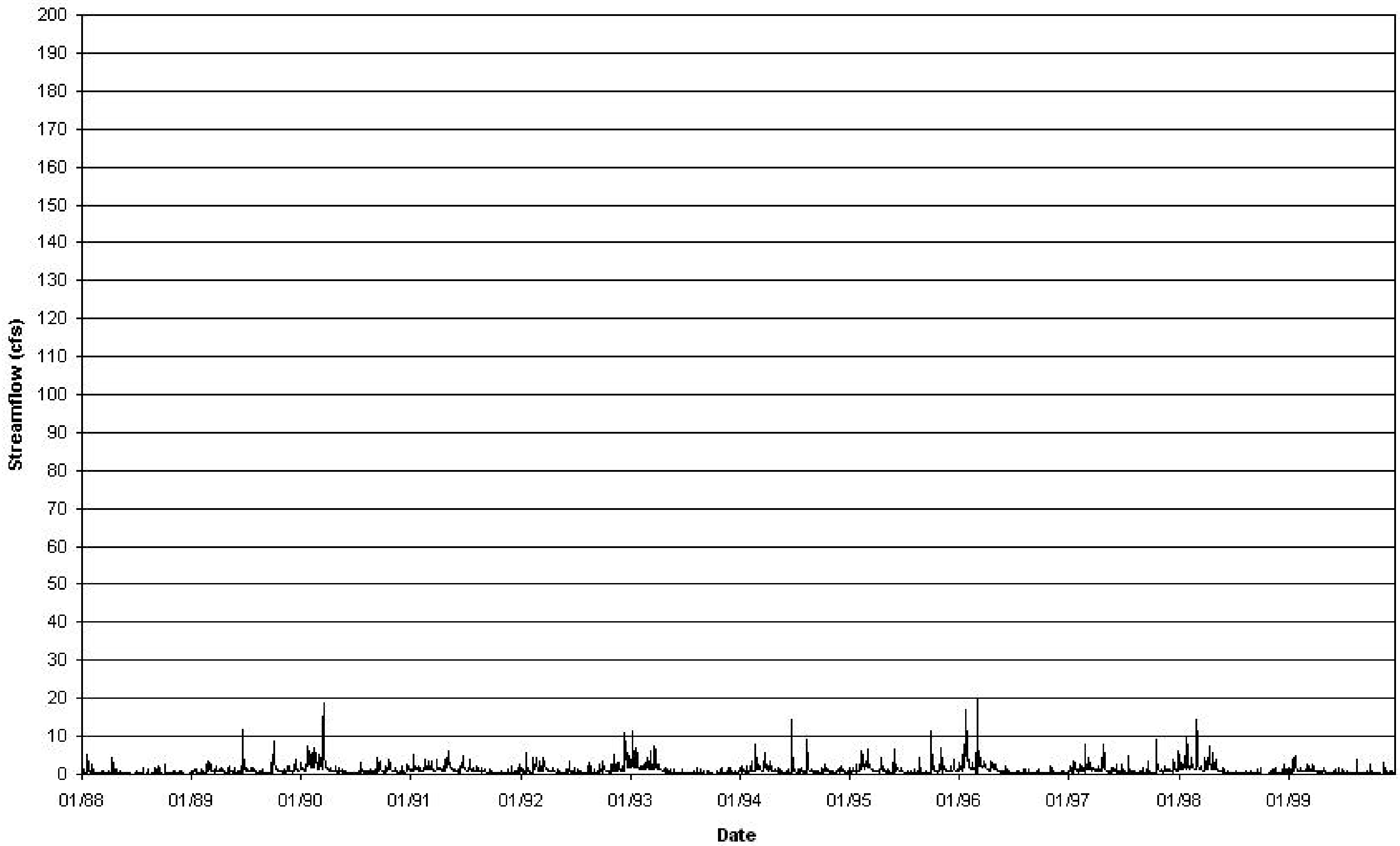


FIGURE D4
TRIBUTARY 7 TO ALLEN CREEK
SIMULATION PERIOD STREAMFLOW HYDROGRAPH

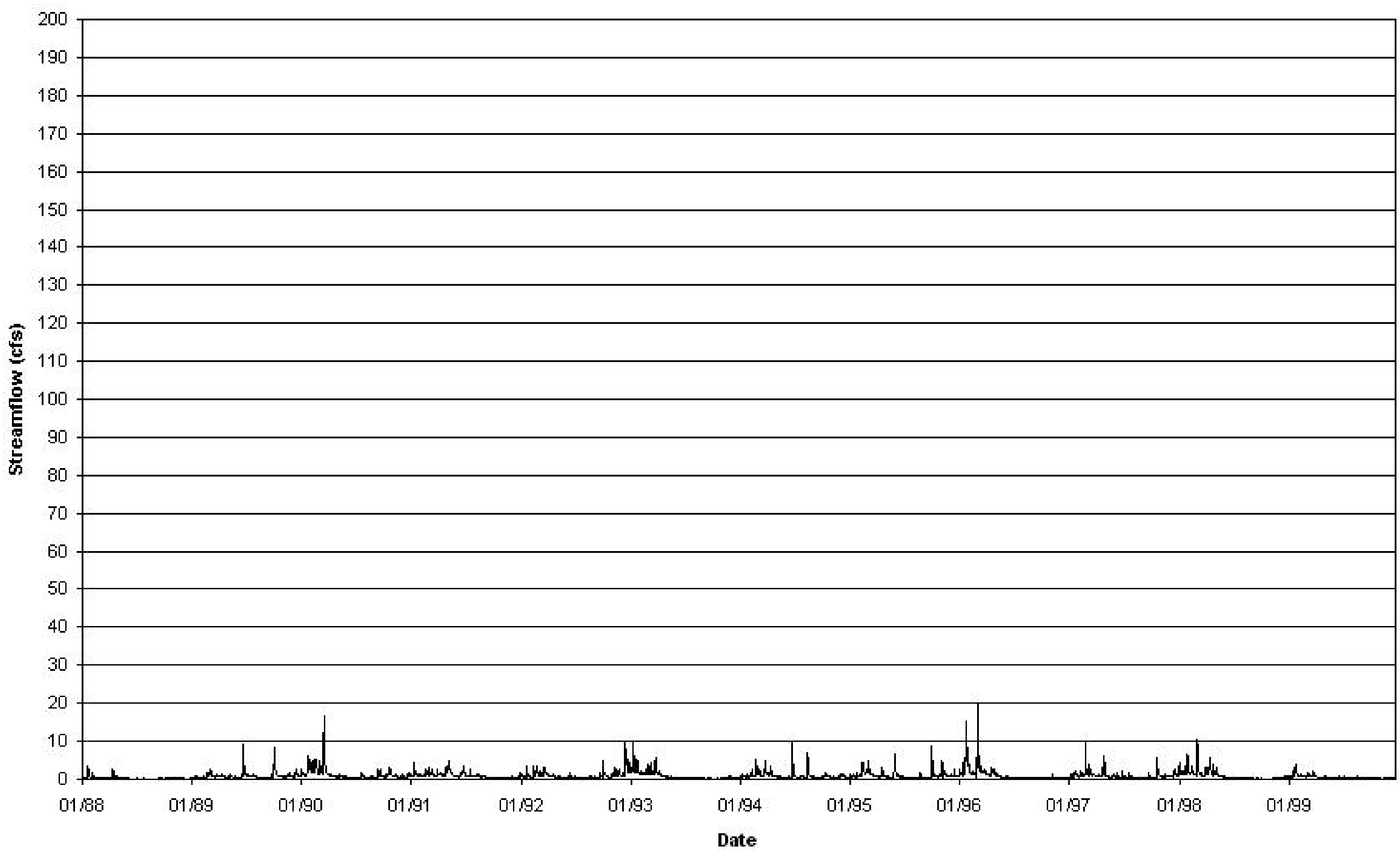


FIGURE D5
TRIBUTARY 8 TO ALLEN CREEK
SIMULATION PERIOD STREAMFLOW HYDROGRAPH

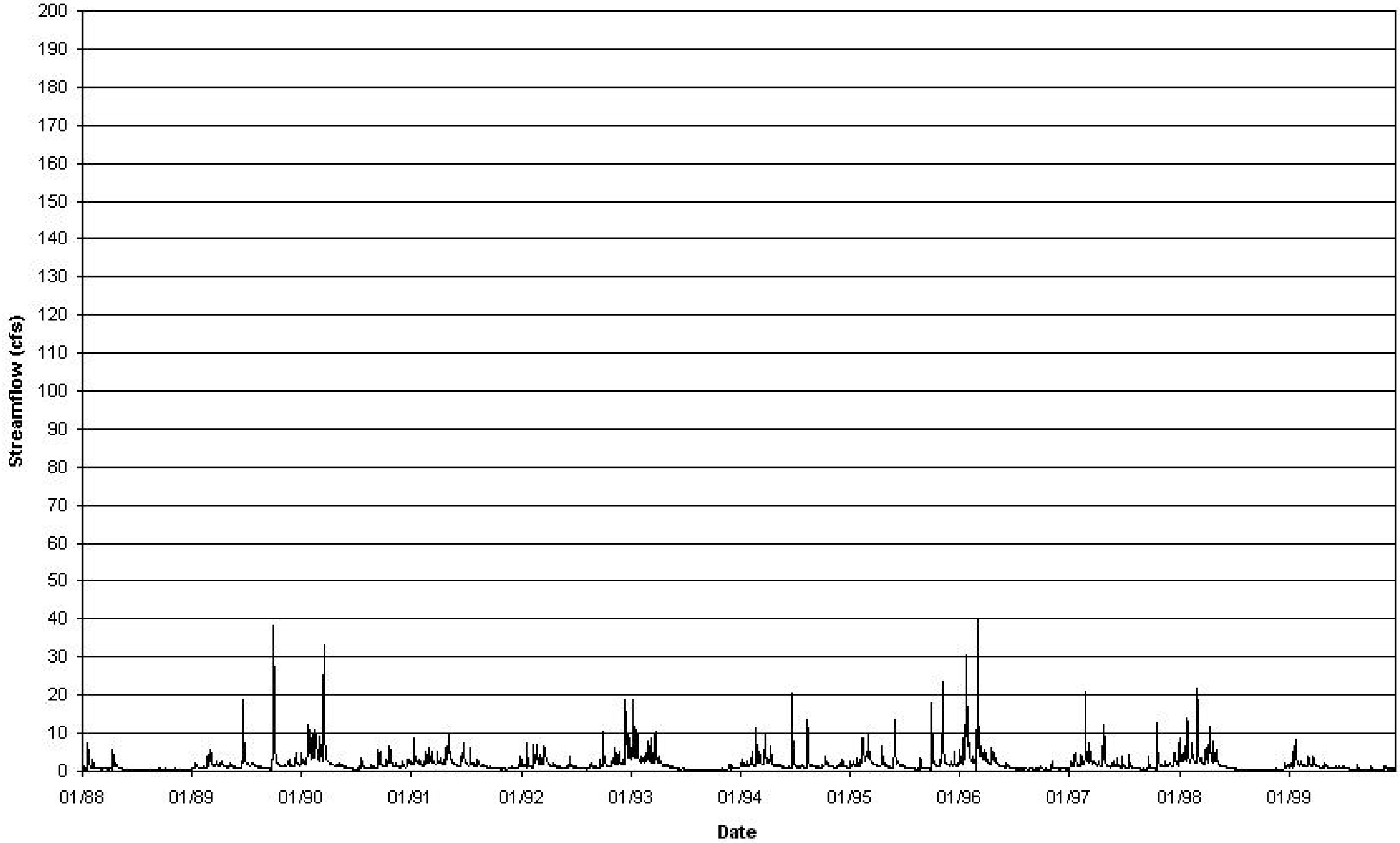


FIGURE D-6
NORTH WALNUT CREEK - (GAINESVILLE U/S HALL COUNTY CAMP)
SIMULATION PERIOD STREAMFLOW HYDROGRAPH

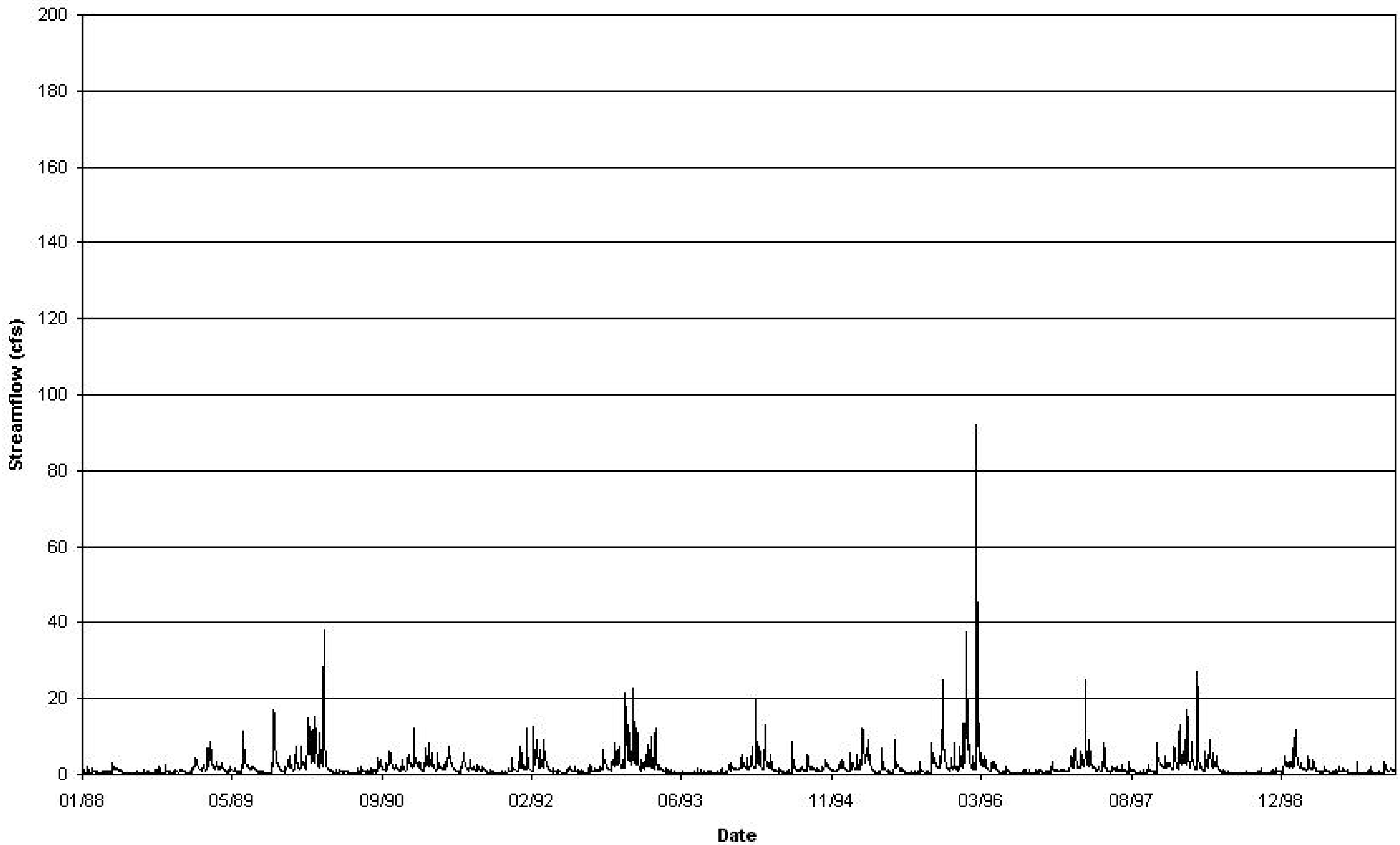


FIGURE D-7
TRIBUTARY TO NORTH WALNUT CREEK - (GAINESVILLE)
SIMULATION PERIOD STREAMFLOW HYDROGRAPH

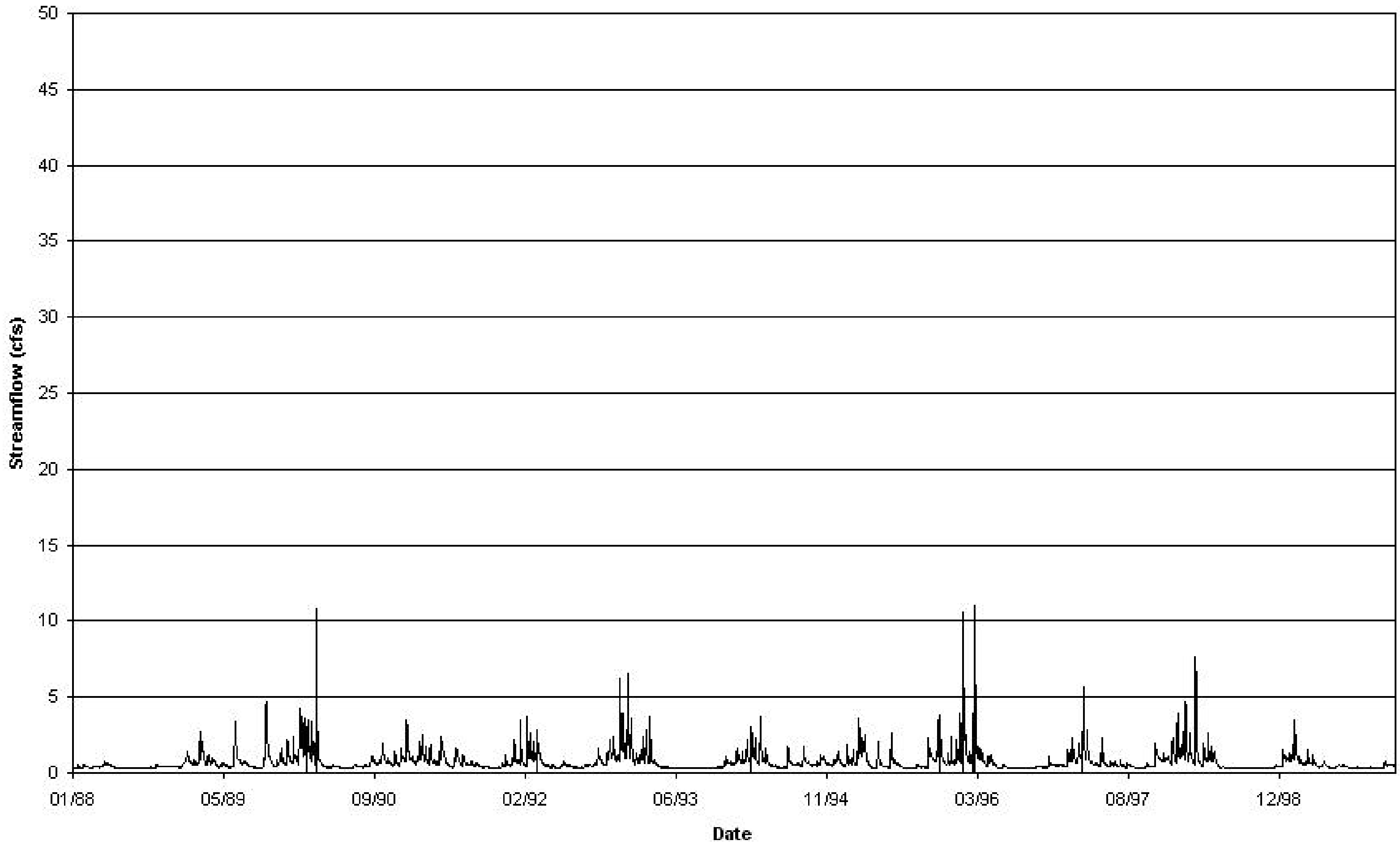


FIGURE D-8
NORTH WALNUT CREEK - (GAINESVILLE D/S HALL COUNTY CAMP)
SIMULATION PERIOD STREAMFLOW HYDROGRAPH

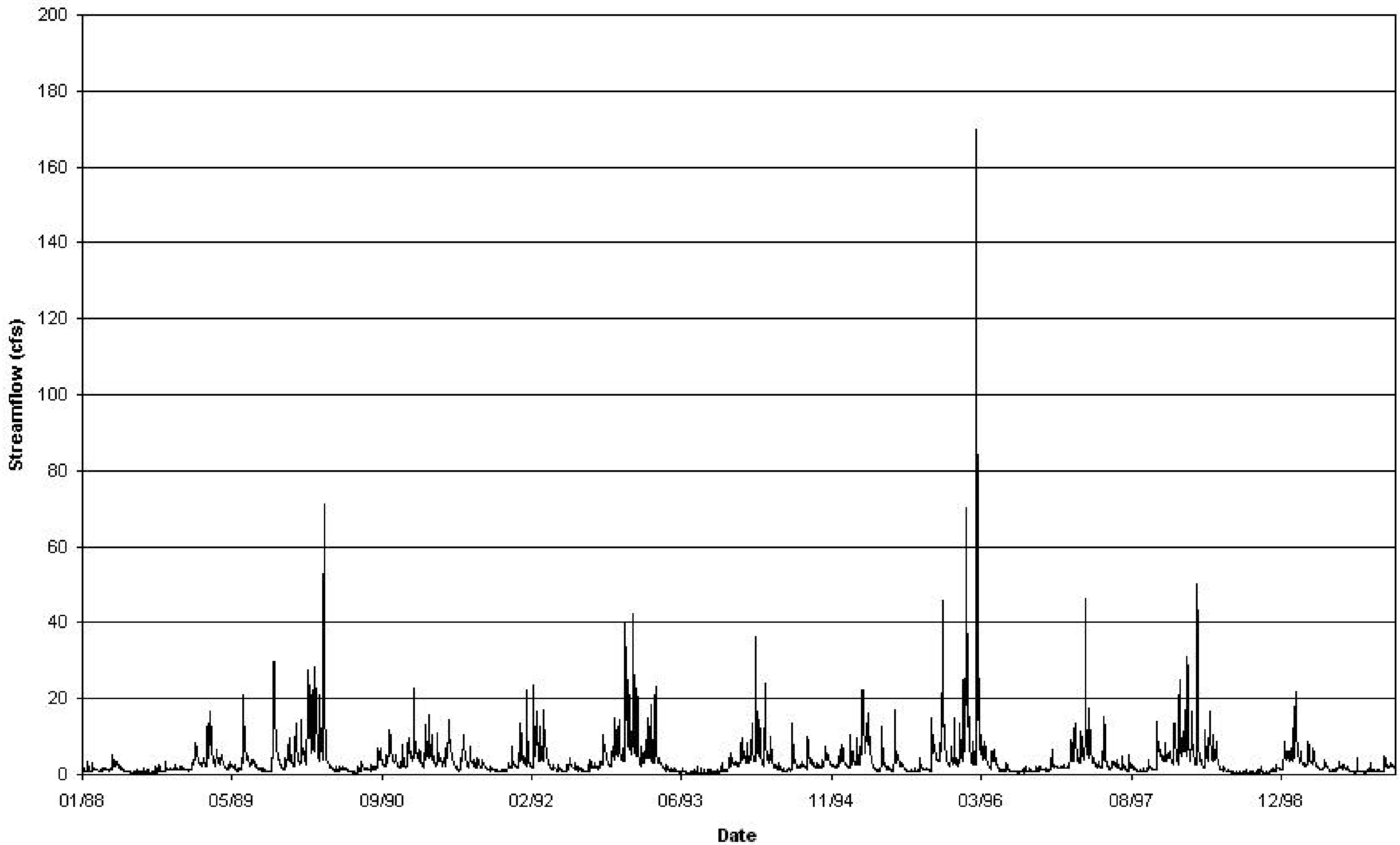


FIGURE D-9
WALNUT CREEK - (CANEY FORK TO MIDDLE OCONEE RIVER)
SIMULATION PERIOD STREAMFLOW HYDROGRAPH

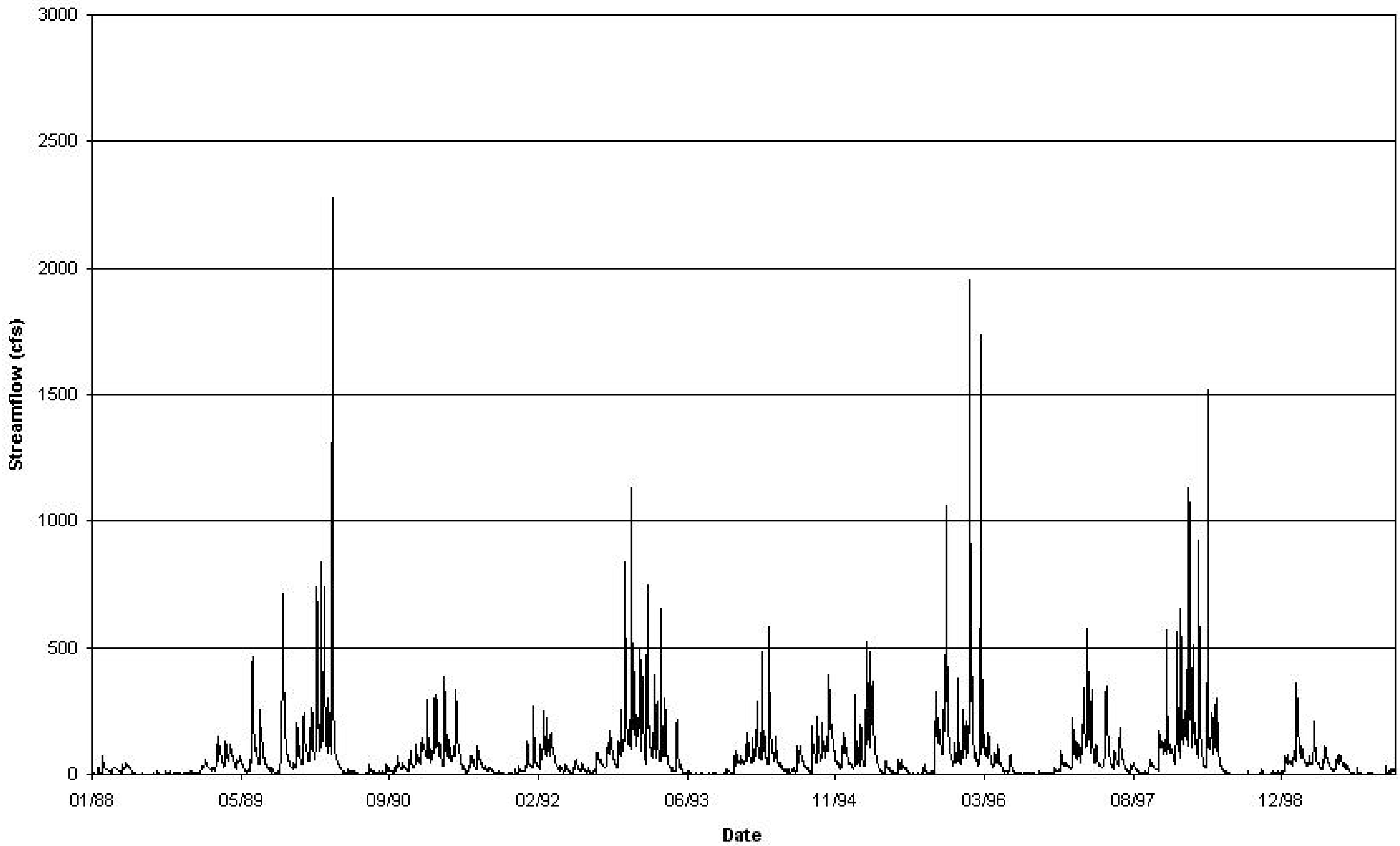


FIGURE D-38
TOWN CREEK - (PEAVEY BRANCH TO OCONEE RIVER)
SIMULATION PERIOD STREAMFLOW HYDROGRAPH

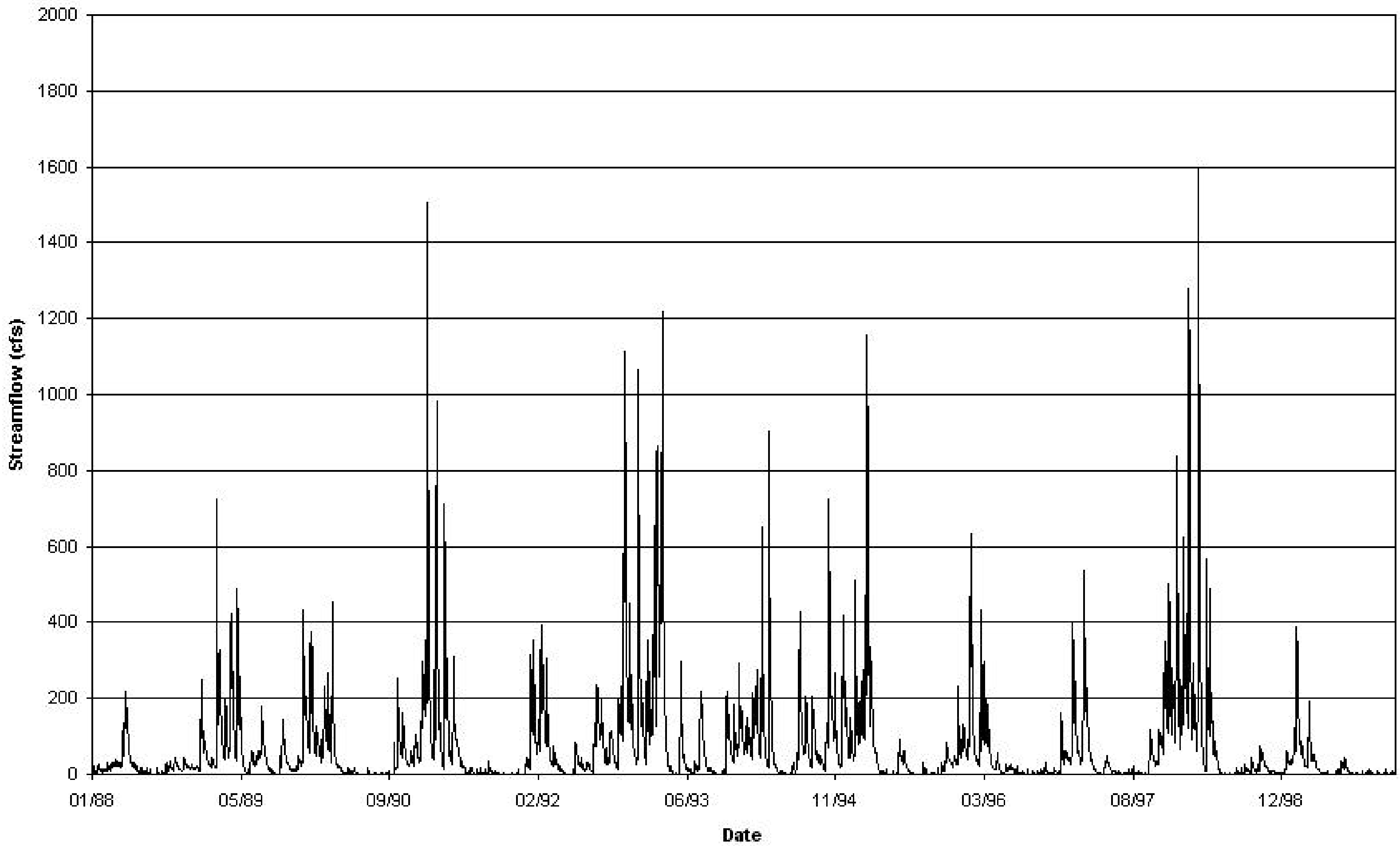
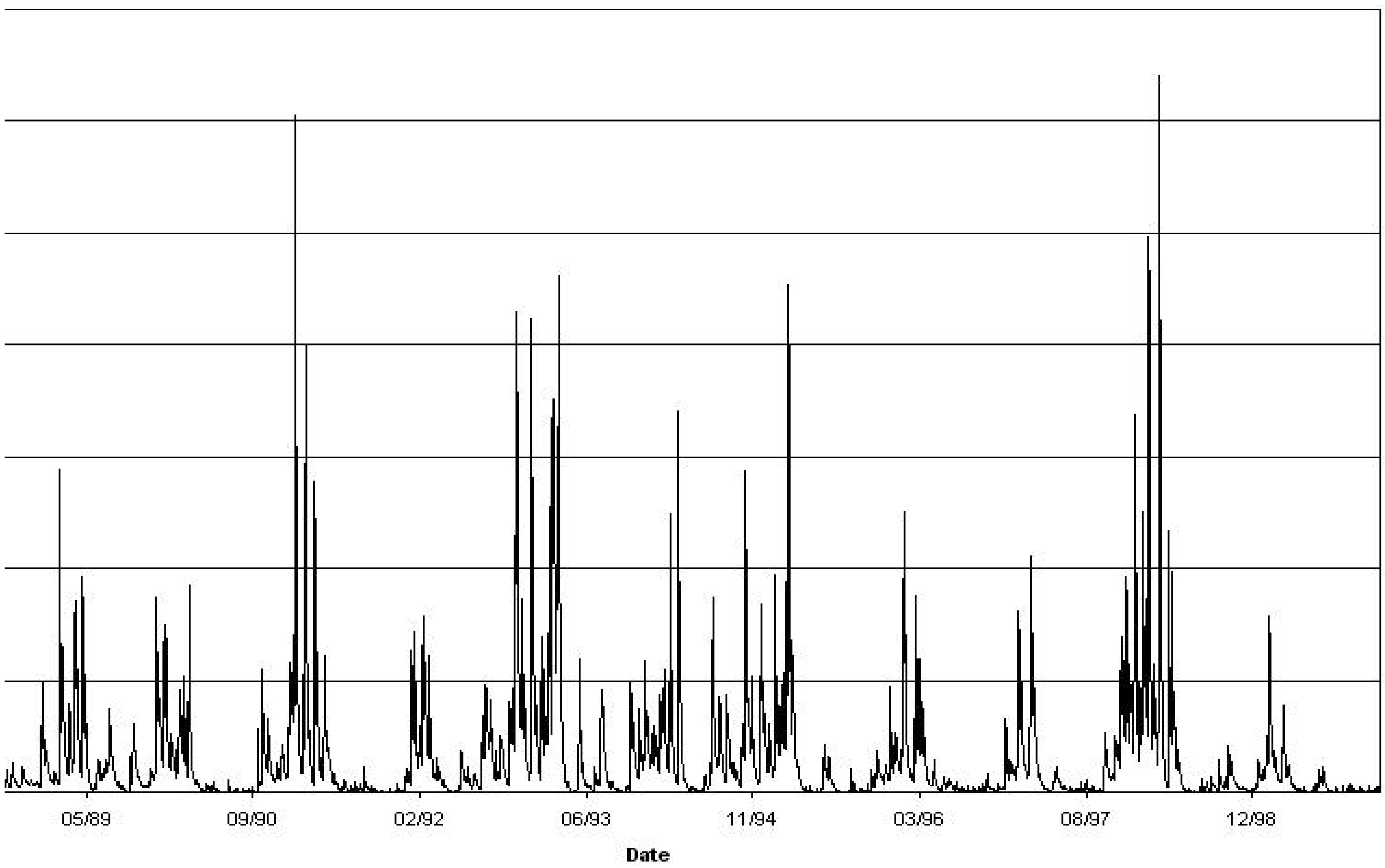


FIGURE D-39
LITTLE COMMISSIONER CREEK - (GA HWY 18 to COMMISSONIER)
SIMULATION PERIOD STREAMFLOW HYDROGRAPH

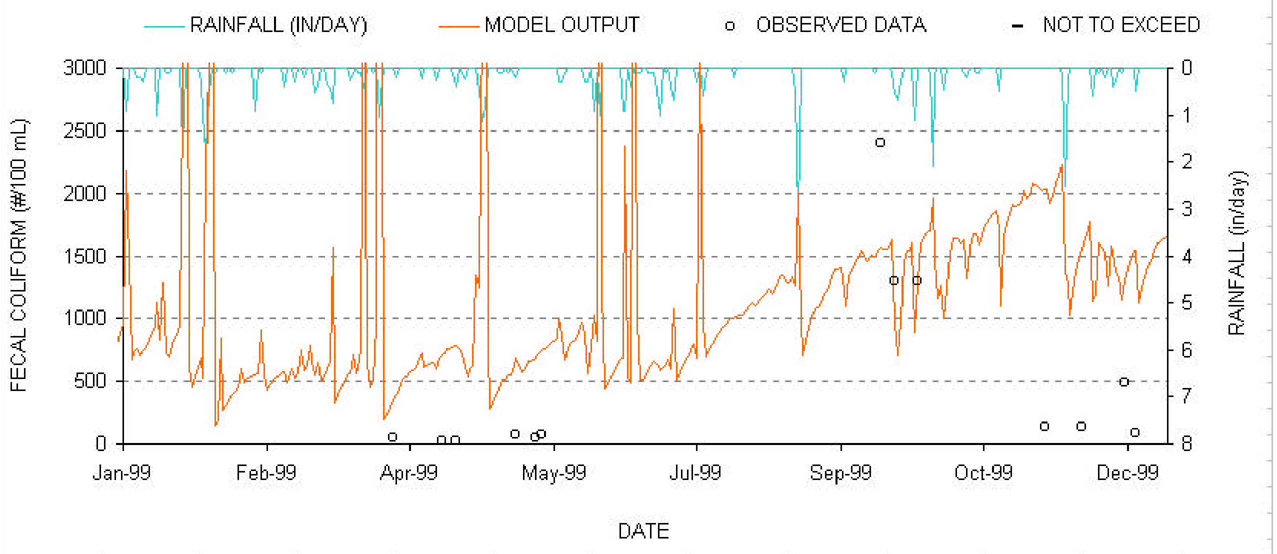


APPENDIX E:

WATER QUALITY CALIBRATIONS

FIGURE E-1

WATER QUALITY CALIBRATION
ALLEN CREEK (Monroe Dr. To GA.HWY 11)



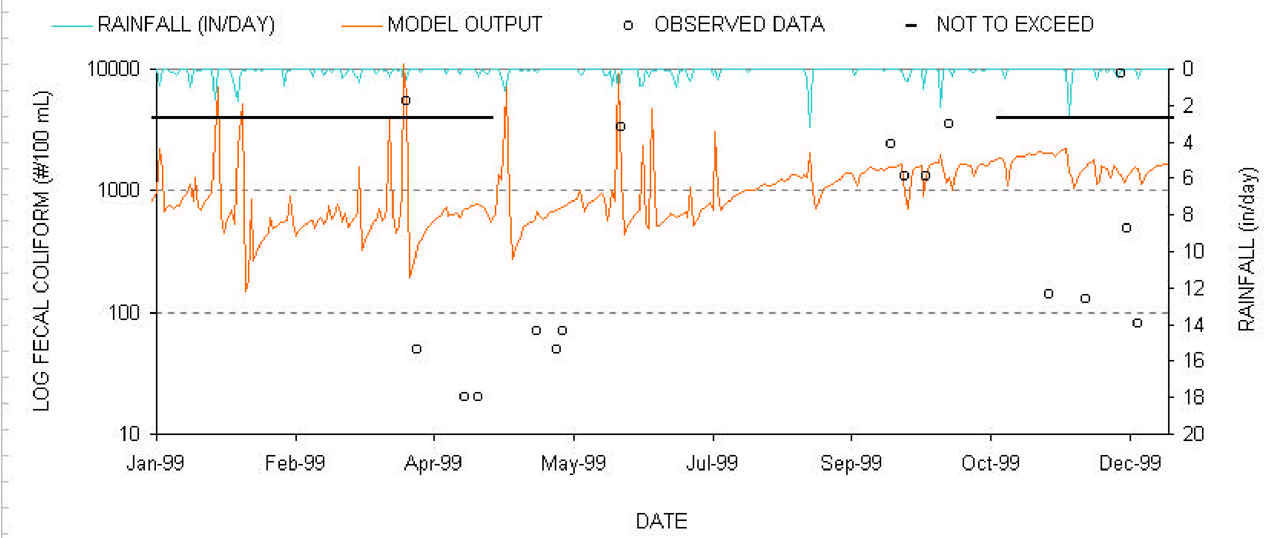
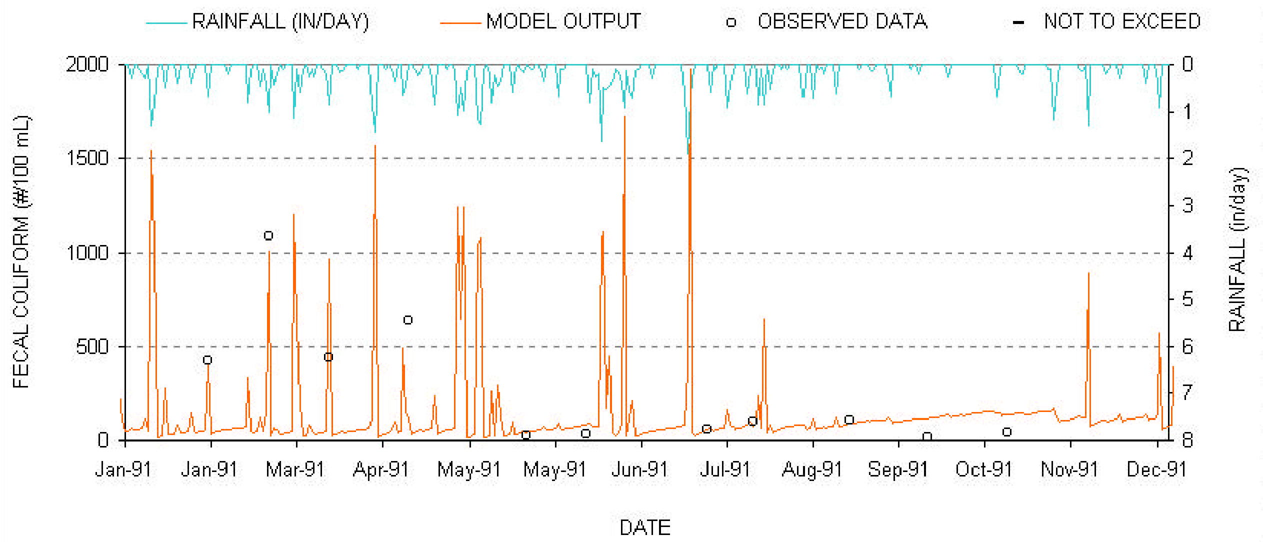


FIGURE E-2

WATER QUALITY CALIBRATION
TRIBUTERY 2 TO ALLEN CREEK



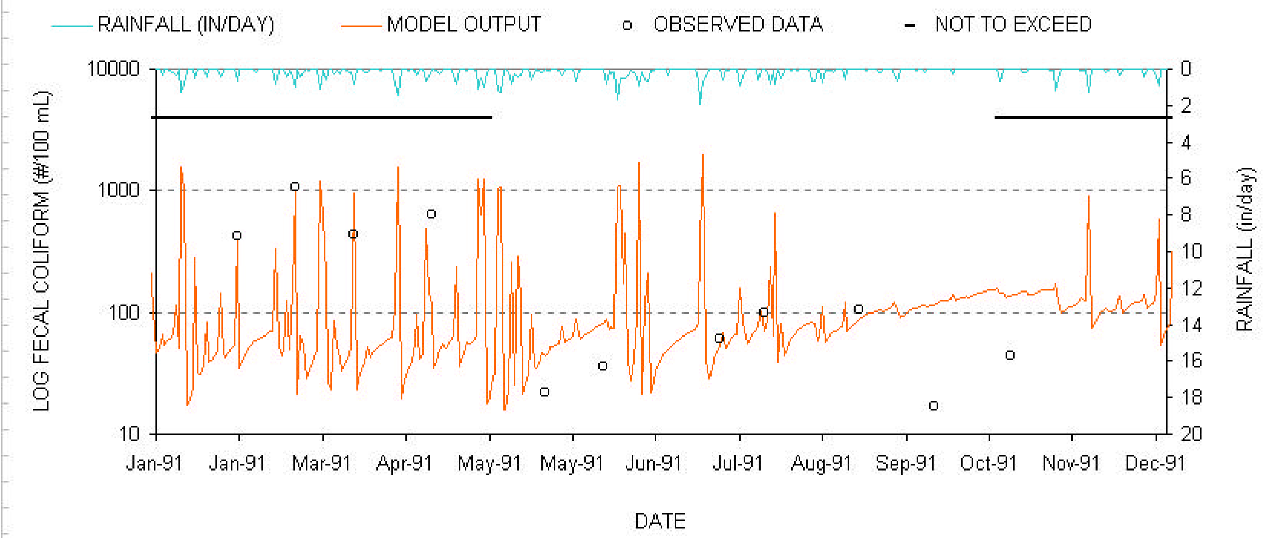
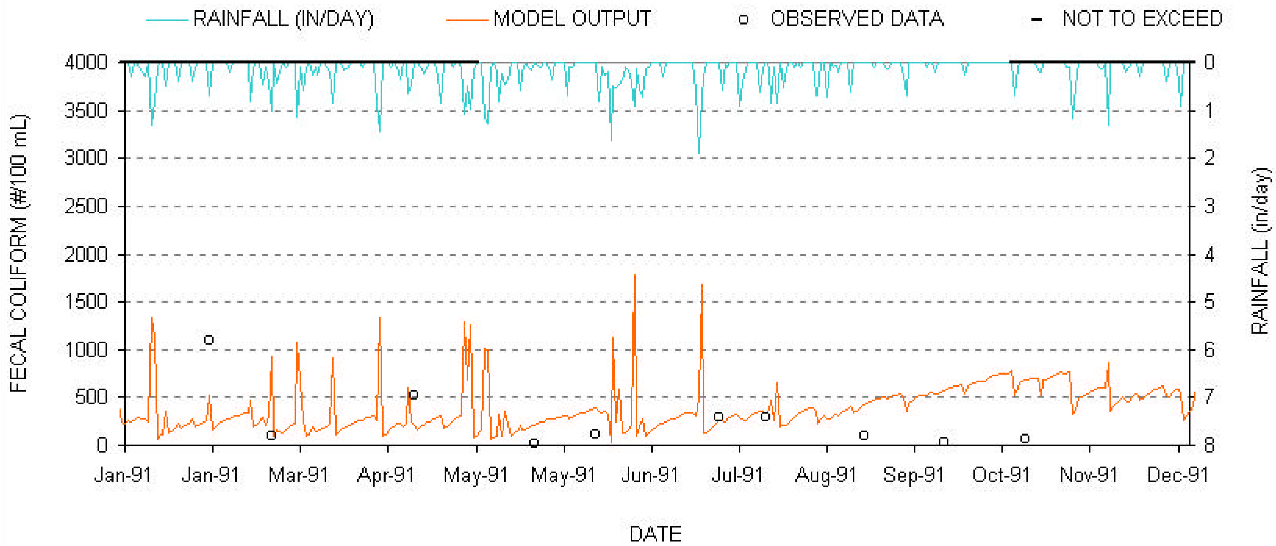


FIGURE E-3

WATER QUALITY CALIBRATION
TRIBUTARY 5 TO ALLEN CREEK



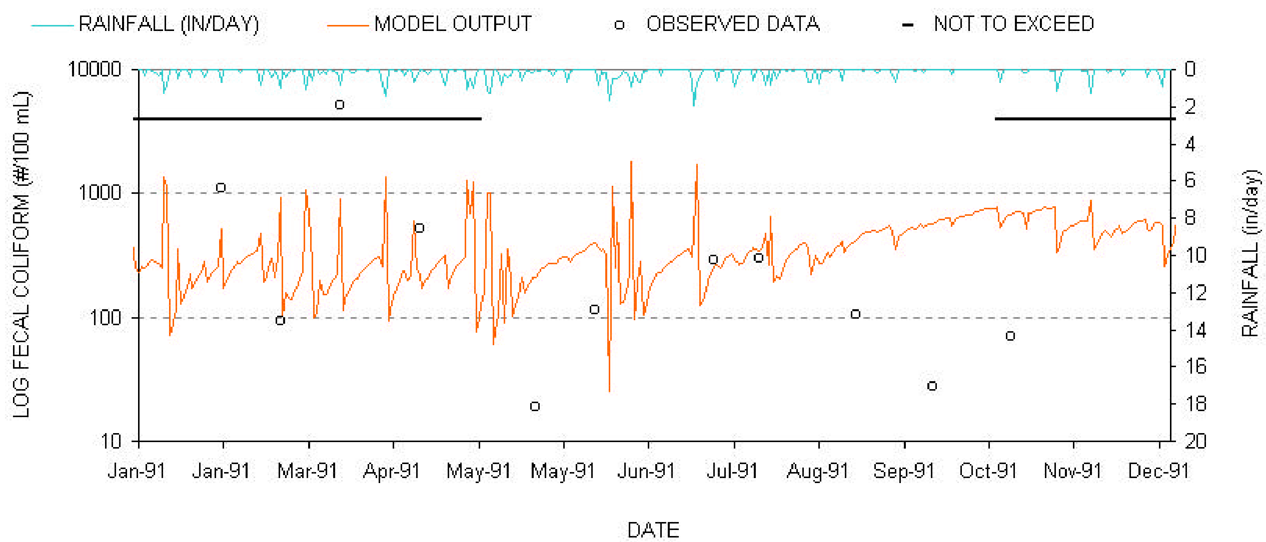
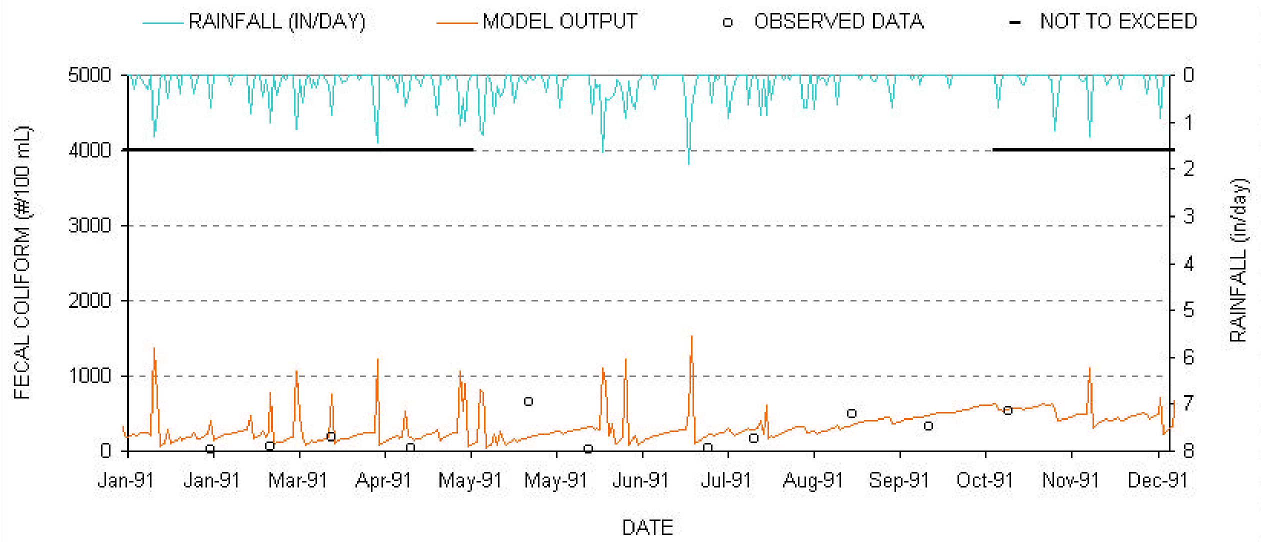


FIGURE E-4

WATER QUALITY CALIBRATION
TRIBUTARY 7 TO ALLEN CREEK



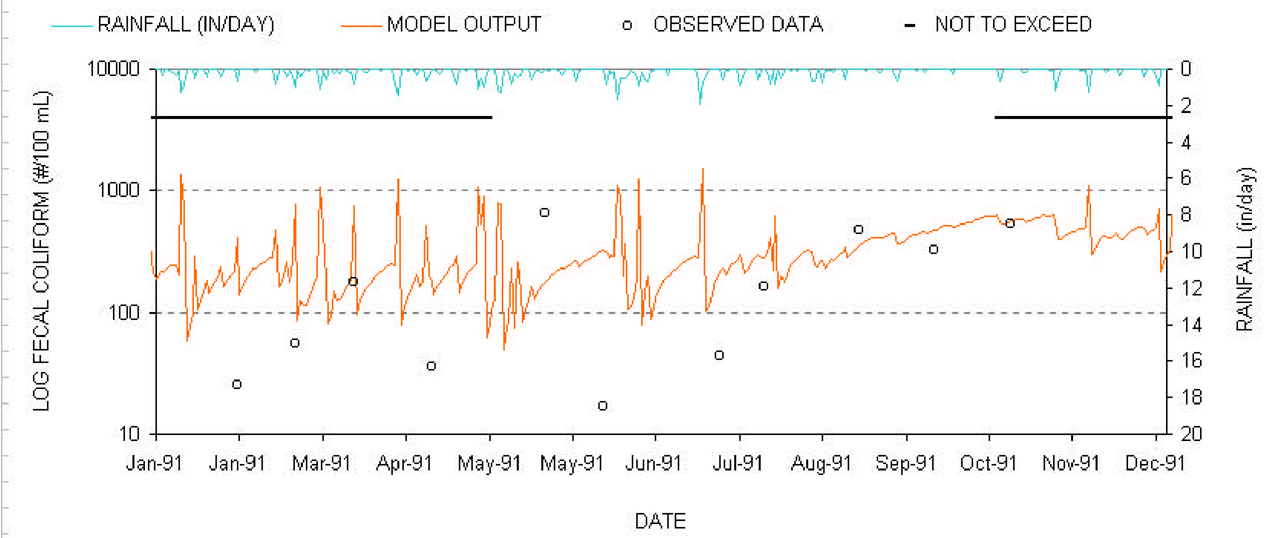


FIGURE E-5

WATER QUALITY CALIBRATION
TRIBUTARY 8 TO ALLEN CREEK

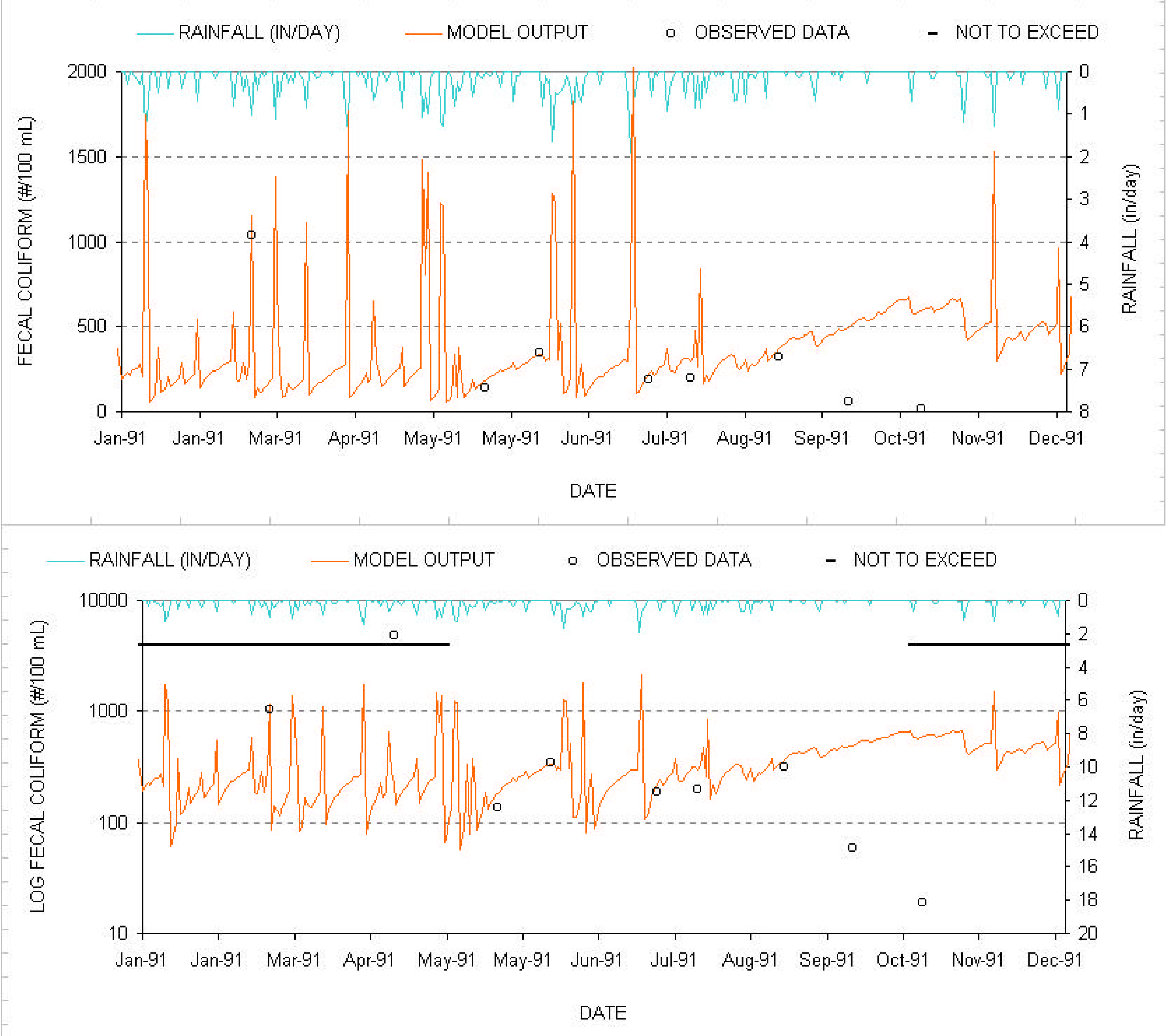
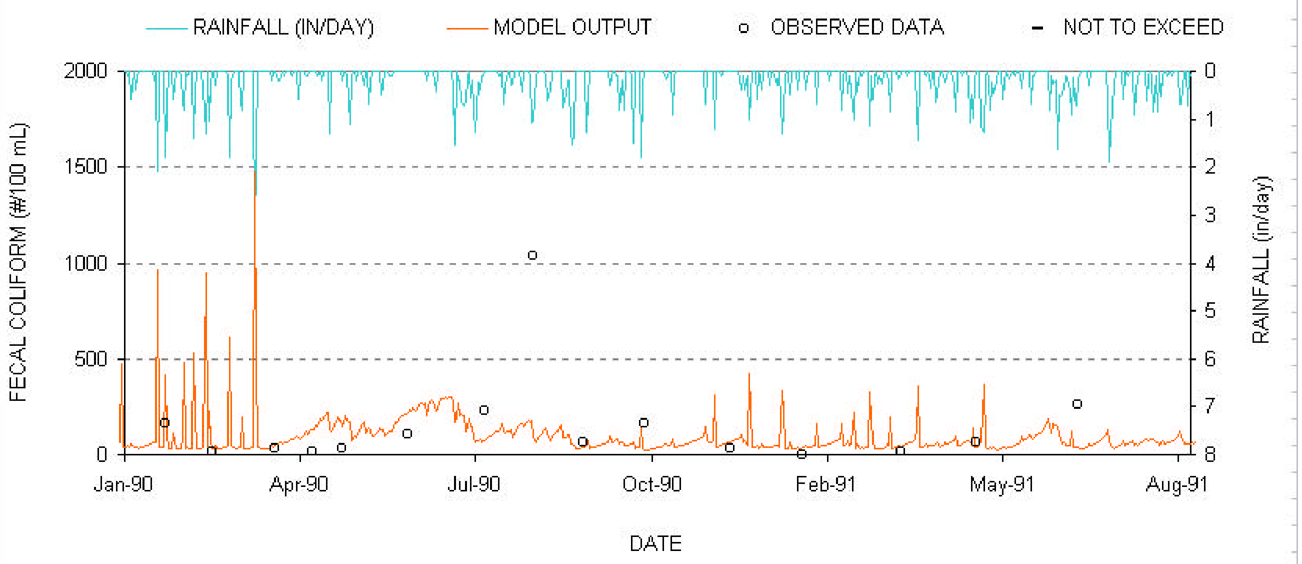


FIGURE - E6

WATER QUALITY CALIBRATION
NORTH WALNUT CREEK (GAINESVILLE U/S HALL COUNTY CAMP)



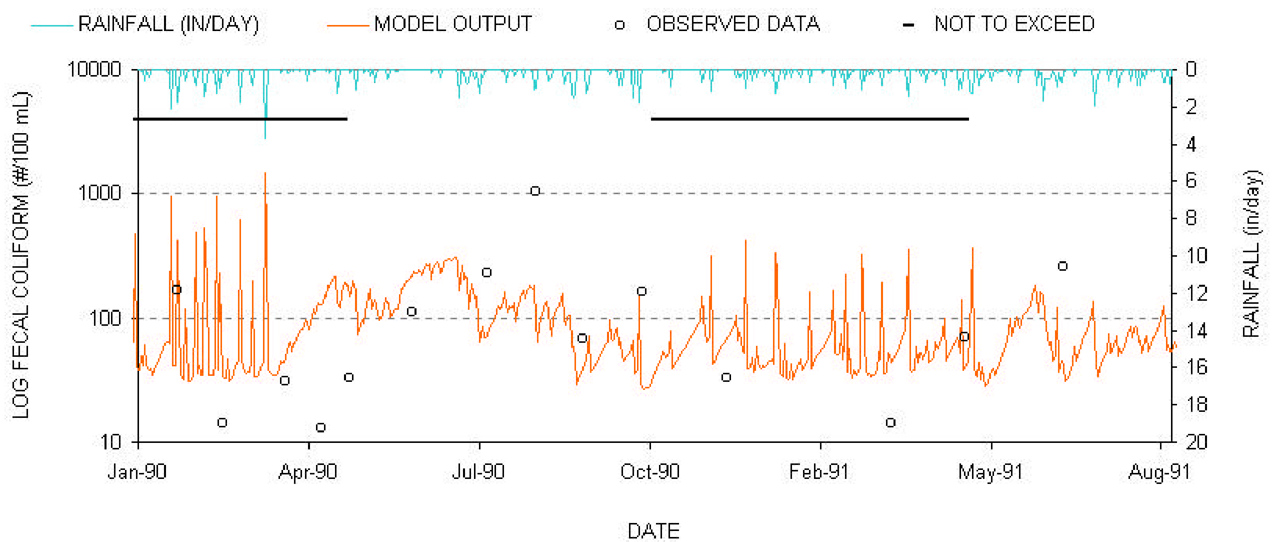
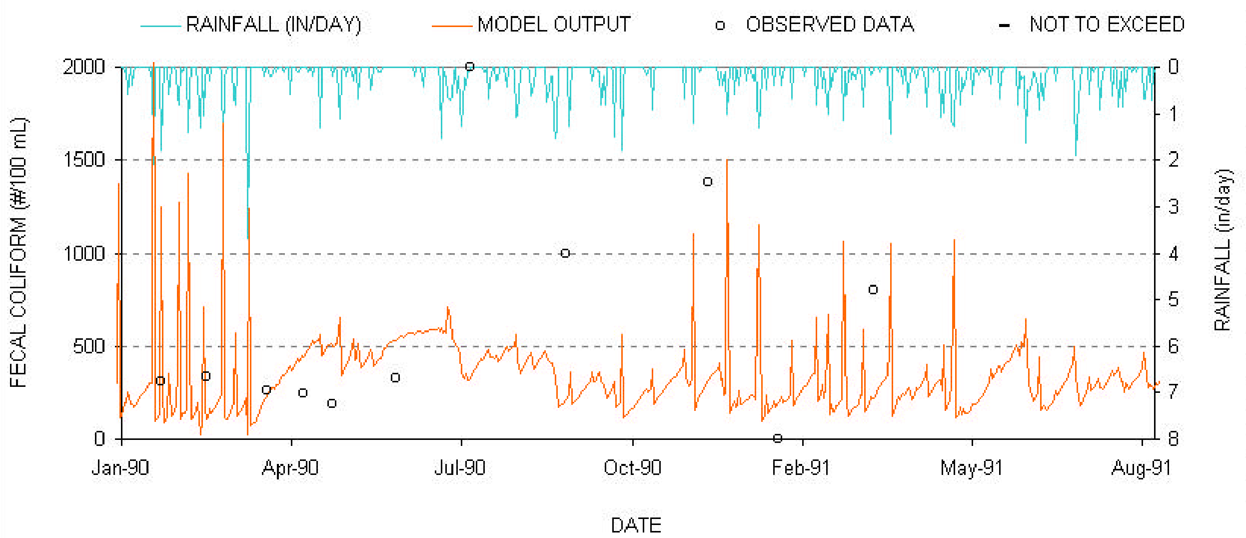


FIGURE E-7

WATER QUALITY CALIBRATION
TRIBUTARY TO N. WALNUT CREEK - (GAINESVILLE)



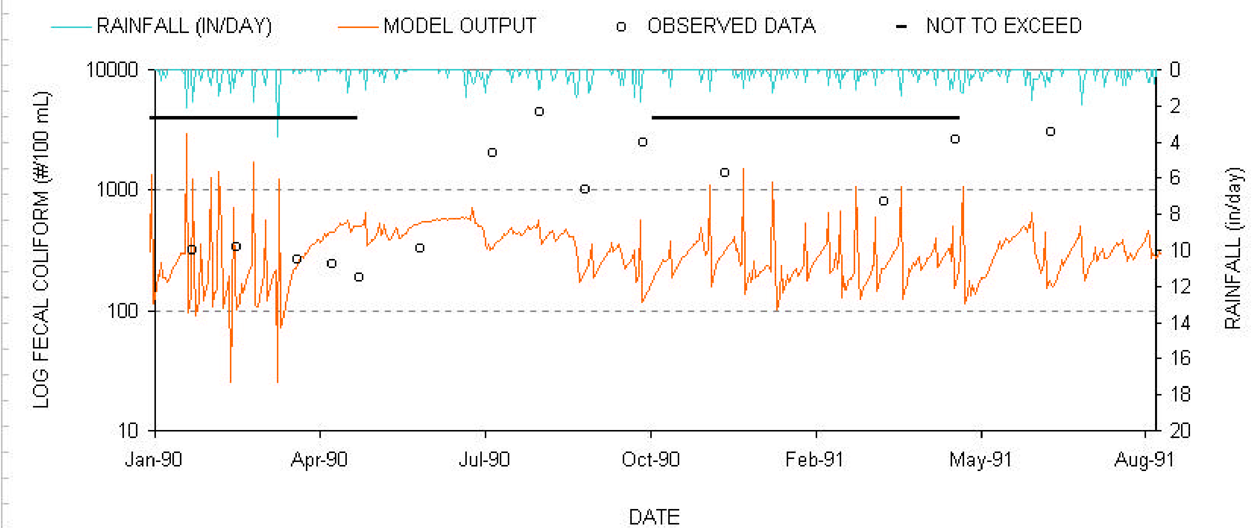


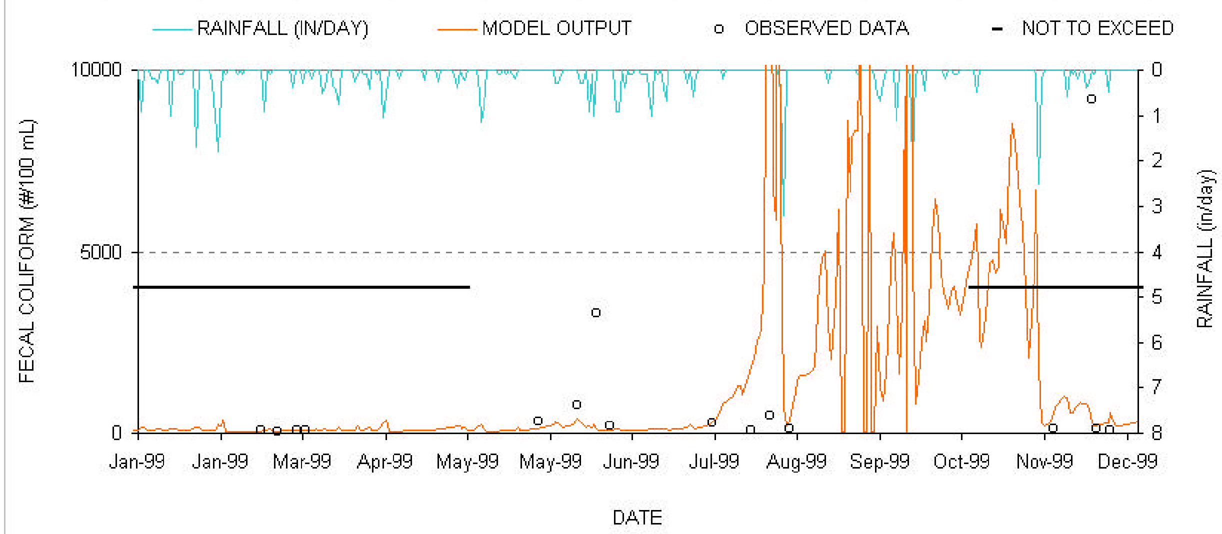
FIGURE E-8

WATER QUALITY CALIBRATION
NORTH WALNUT CREEK - (GAINESVILLE D/S HALL COUNTY CAMP)

FIGURE E-9

WALNUT CREEK - (CANEY FORK TO MIDDLE OCONEE RIVER)

STATION:	MODEL RUN: 1	*1 = EXISTING*	**WALNUT CREEK**
Walnut Creek Near Pendergrass		*2 = ALLOCATION 1*	
		3 = ALLOCATION 2	



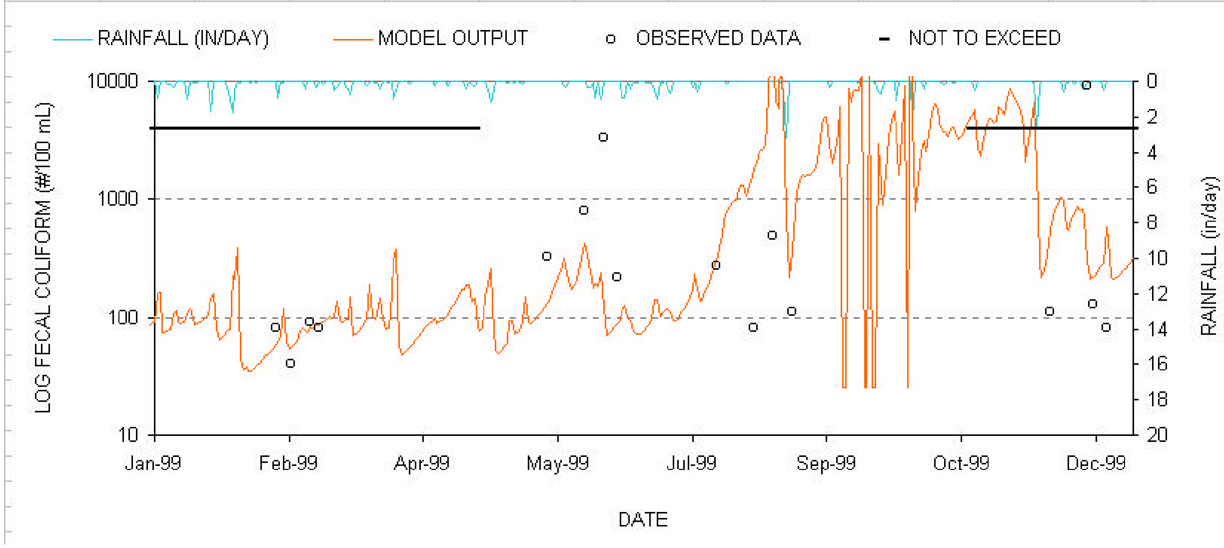


FIGURE E-38

WATER QUALITY CALIBRATION
TOWN CREEK (Peavy Branch to Oconee River)

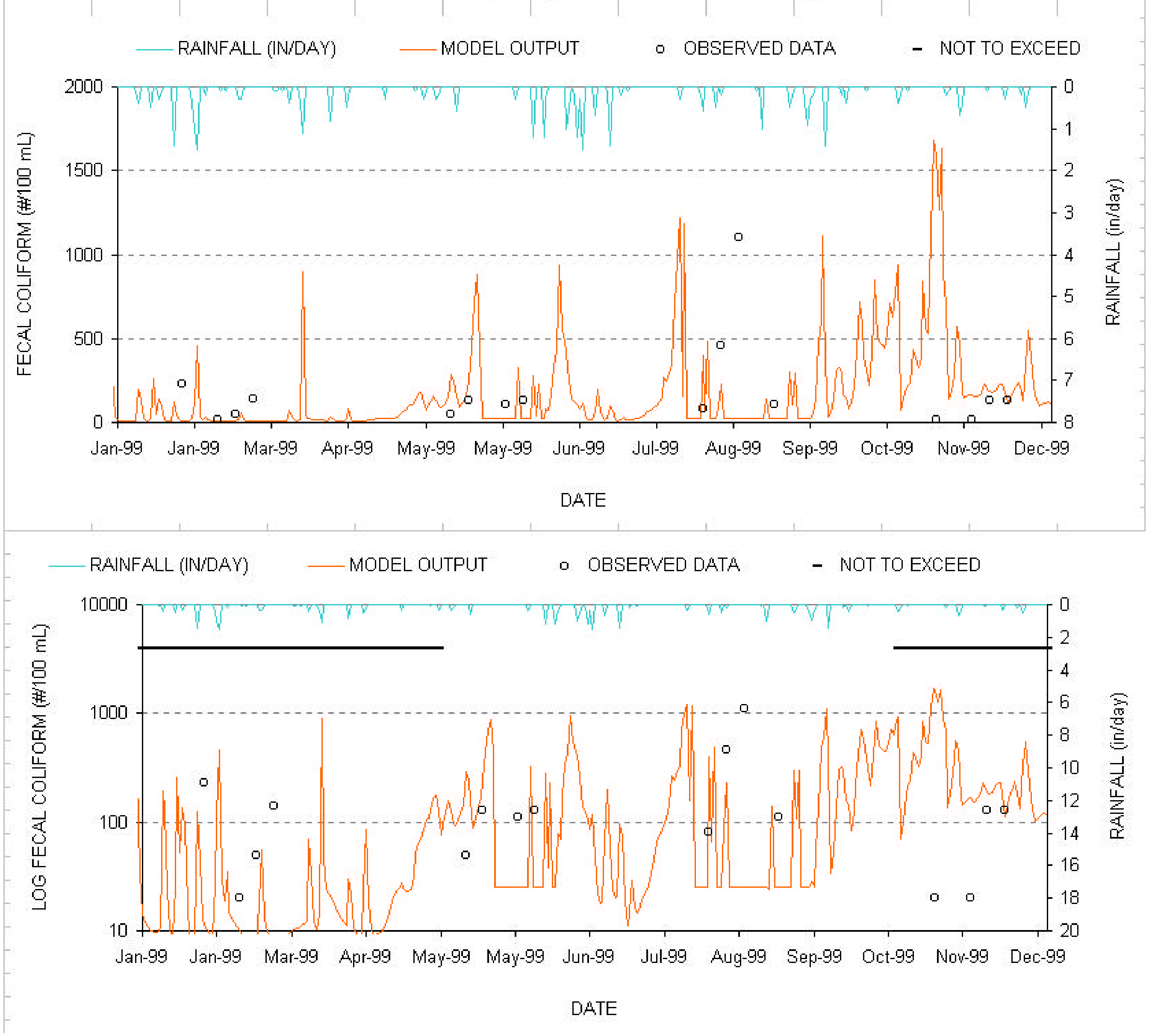
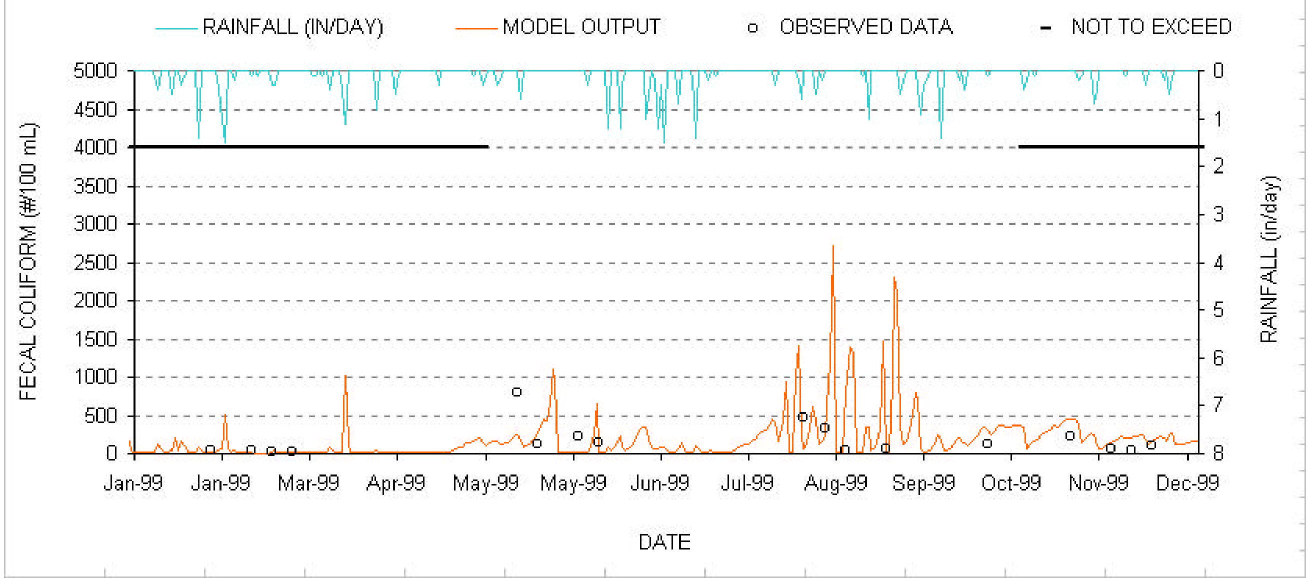
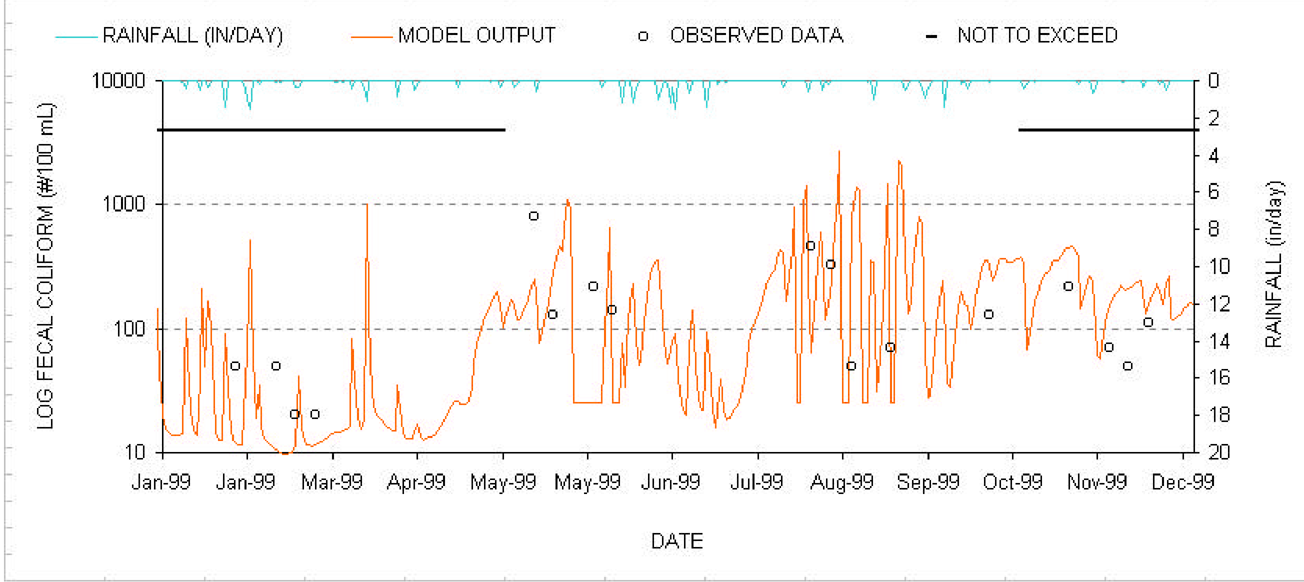


FIGURE - E39

WATER QUALITY CALIBRATION
LITTLE COMMISSIONER CREEK (Ga HWY 18 to Commissioner Creek)





APPENDIX F:

SIMULATED FECAL COLIFORM

30-DAY GEOMETRIC MEANS

FOR EXISTING AND TMDL CONDITIONS

FIGURE F-1

SIMULATED FECAL COLIFORM 30-DAY GEOMETRIC MEAN
ALLEN CREEK (Monroe Dr. To GA.HWY 11)

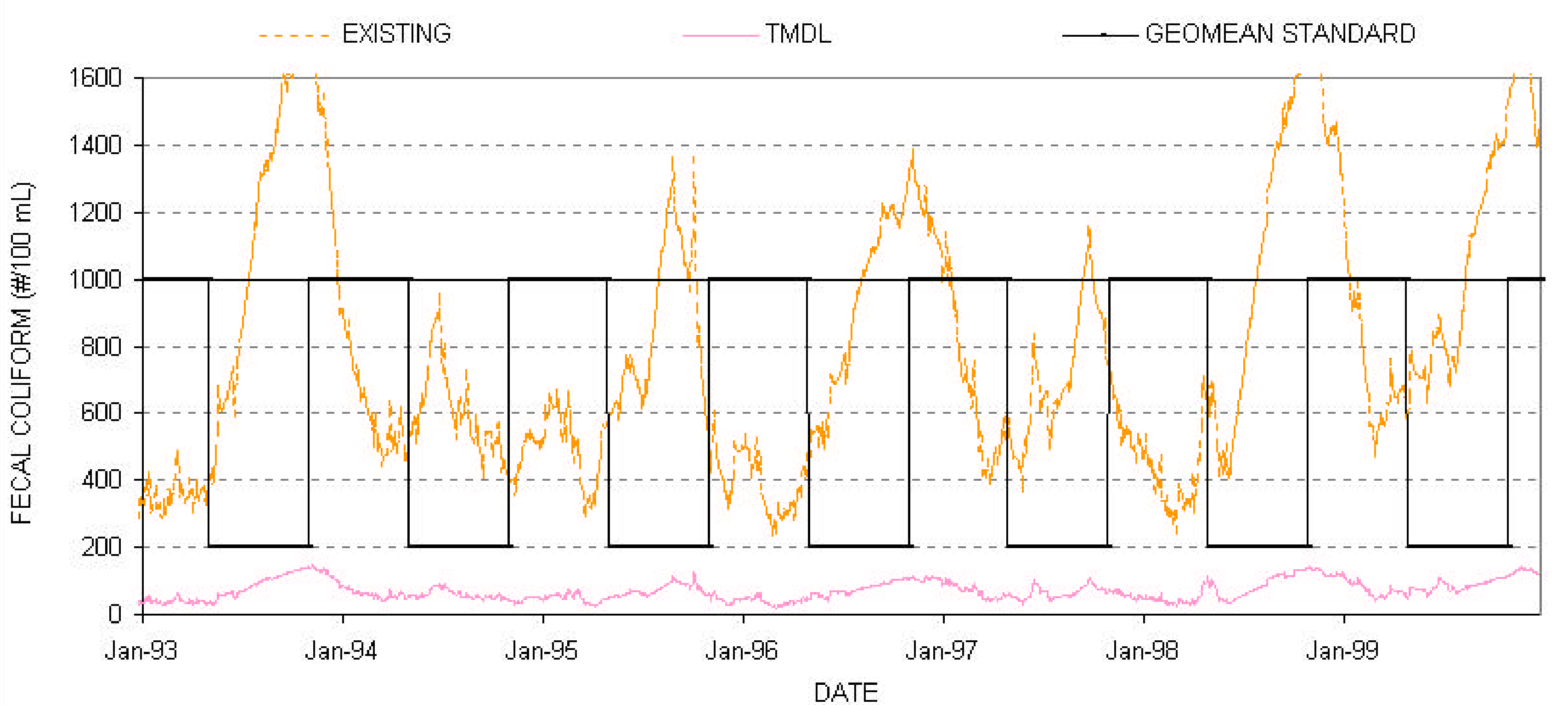


FIGURE F-2

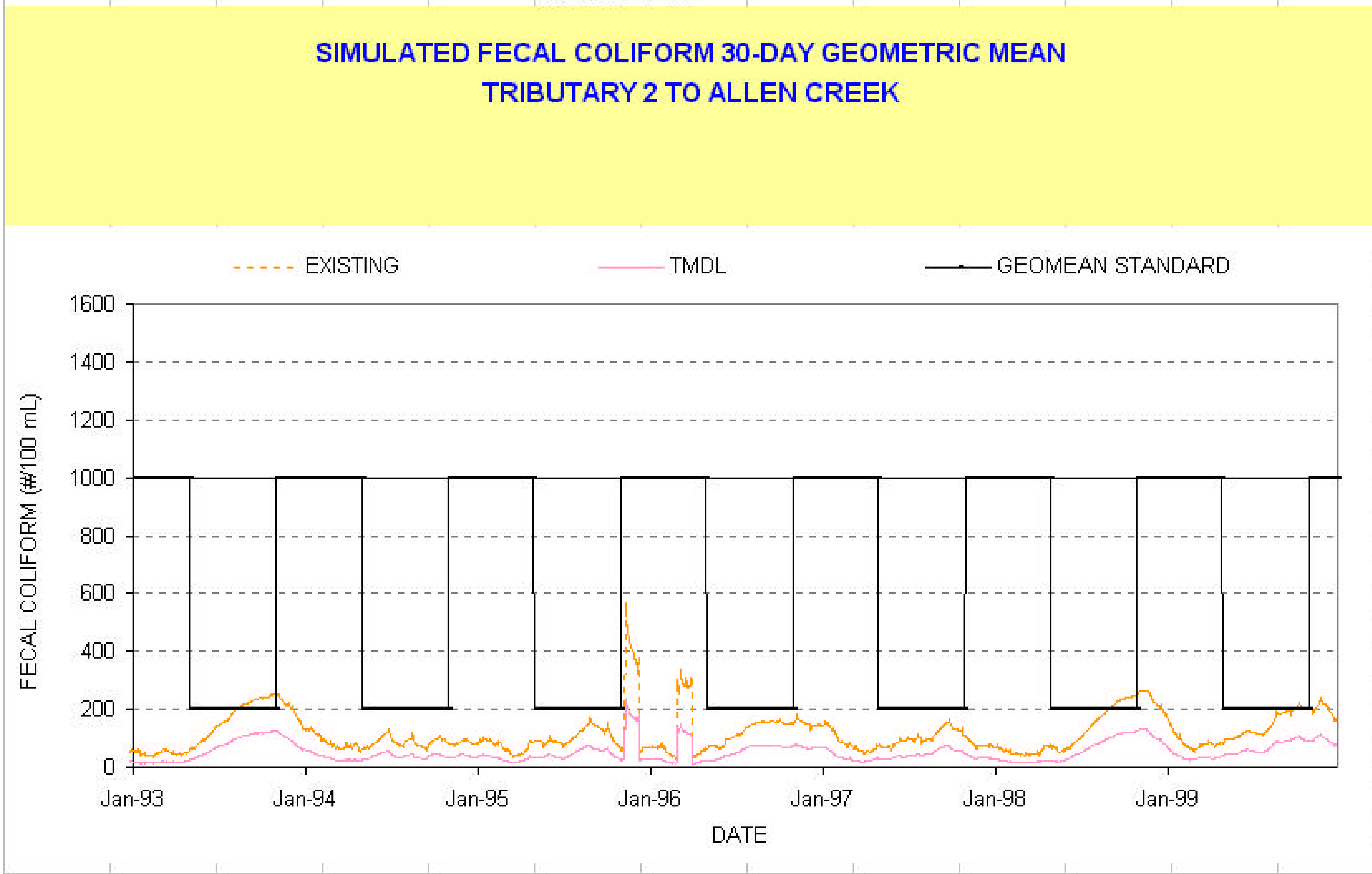

SIMULATED FECAL COLIFORM 30-DAY GEOMETRIC MEAN
TRIBUTARY 2 TO ALLEN CREEK
EXISTING
TMDL
GEOMEAN STANDARD
FECAL COLIFORM (#/100 mL)
1600
1400
1200
1000
800
600
400
200
0
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
DATE

FIGURE F-3

SIMULATIVE FECAL COLIFORM 30-DAY GEOMETRIC MEAN
TRIBUTARY 5 TO ALLEN CREEK

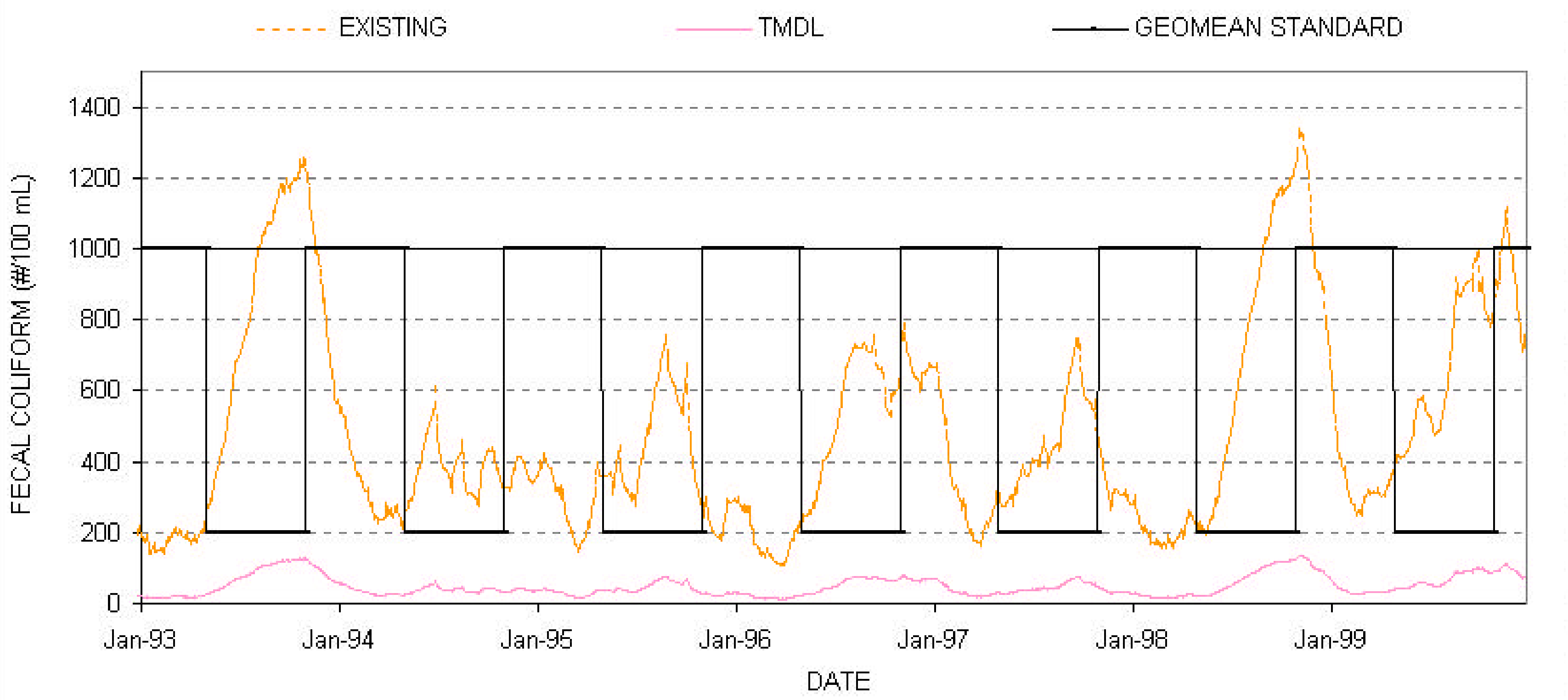


FIGURE F-4

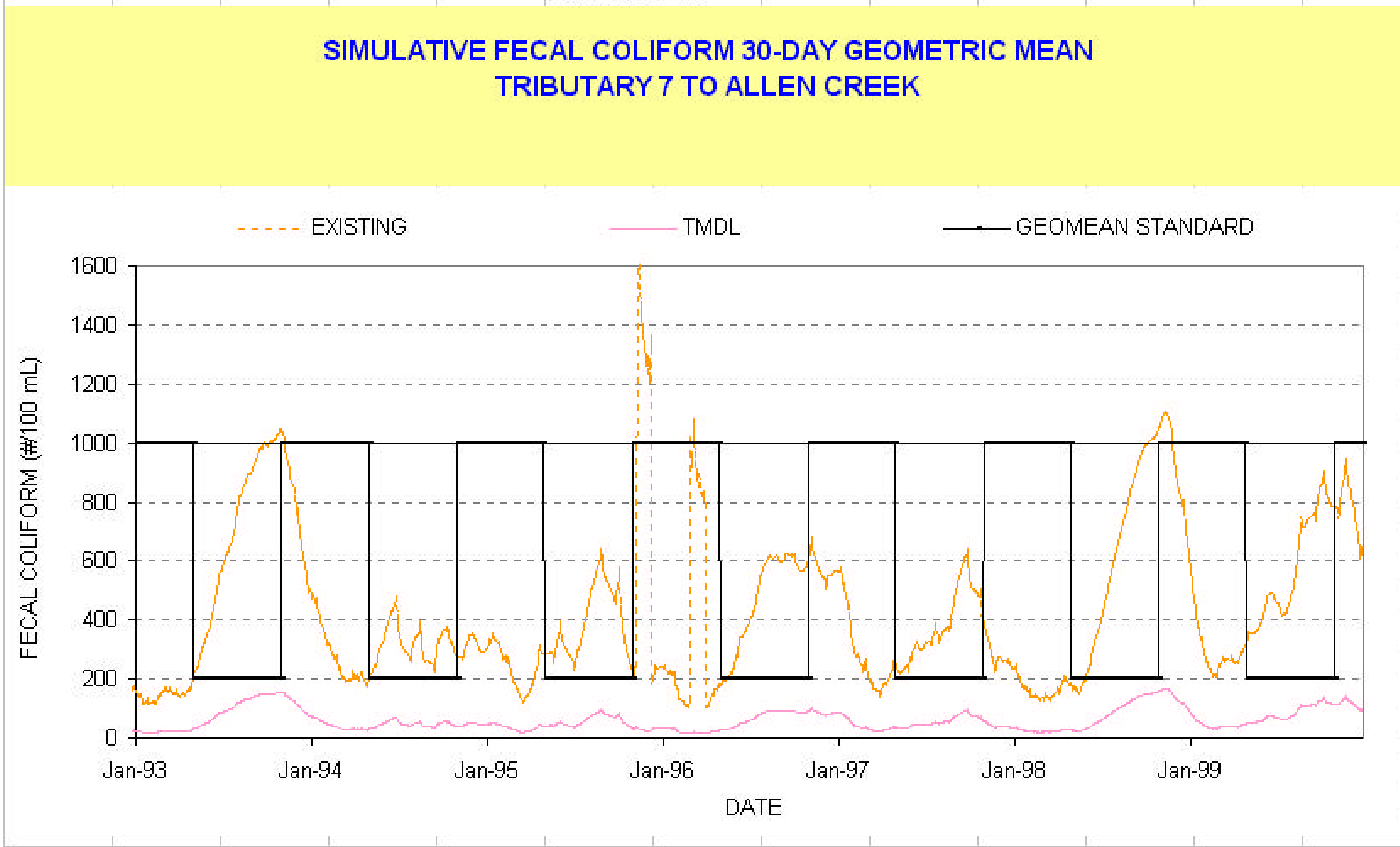

SIMULATIVE FECAL COLIFORM 30-DAY GEOMETRIC MEAN
TRIBUTARY 7 TO ALLEN CREEK
EXISTING
TMDL
GEOMEAN STANDARD
FECAL COLIFORM (#/100 mL)
1600
1400
1200
1000
800
600
400
200
0
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
DATE

FIGURE F-5

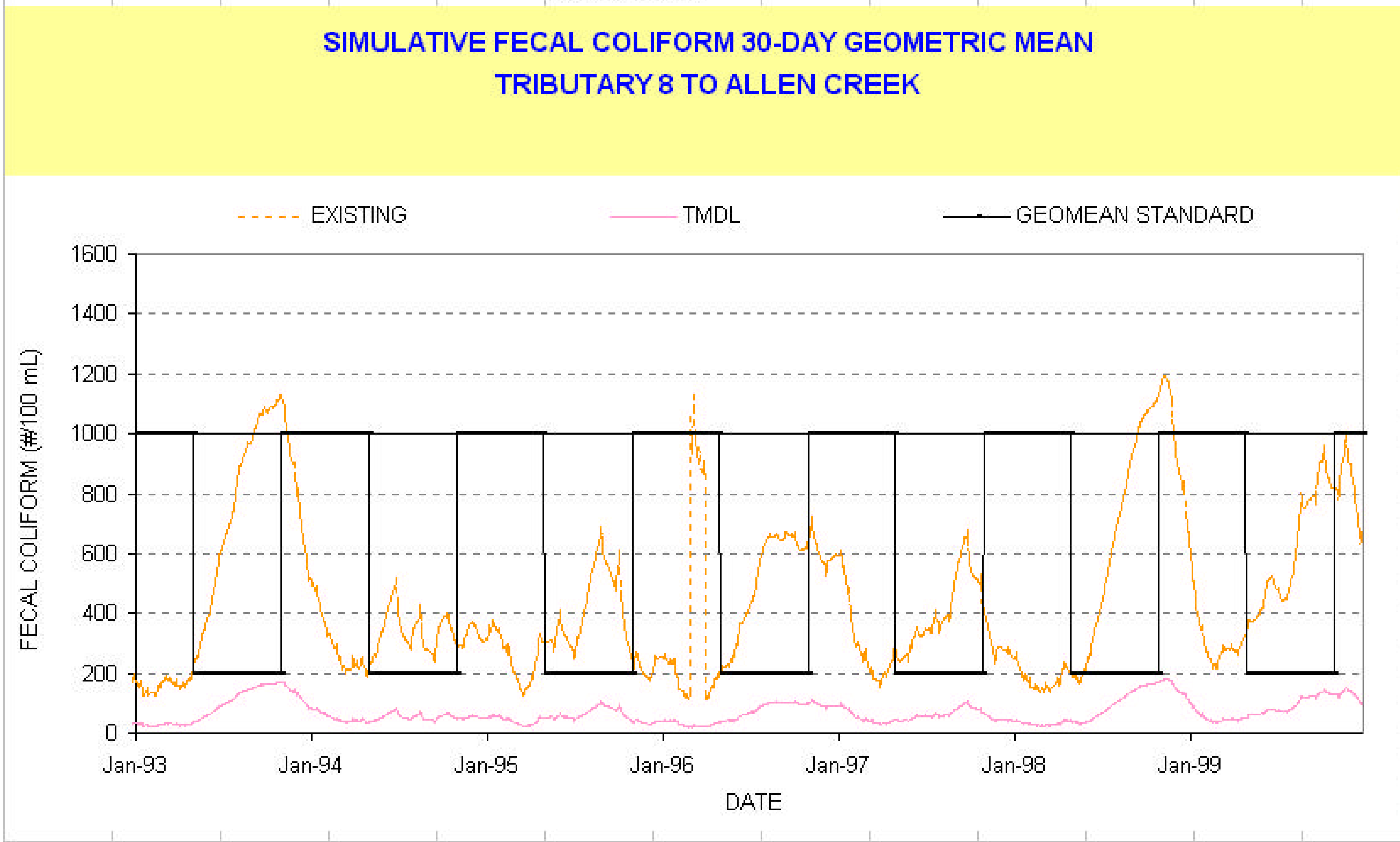
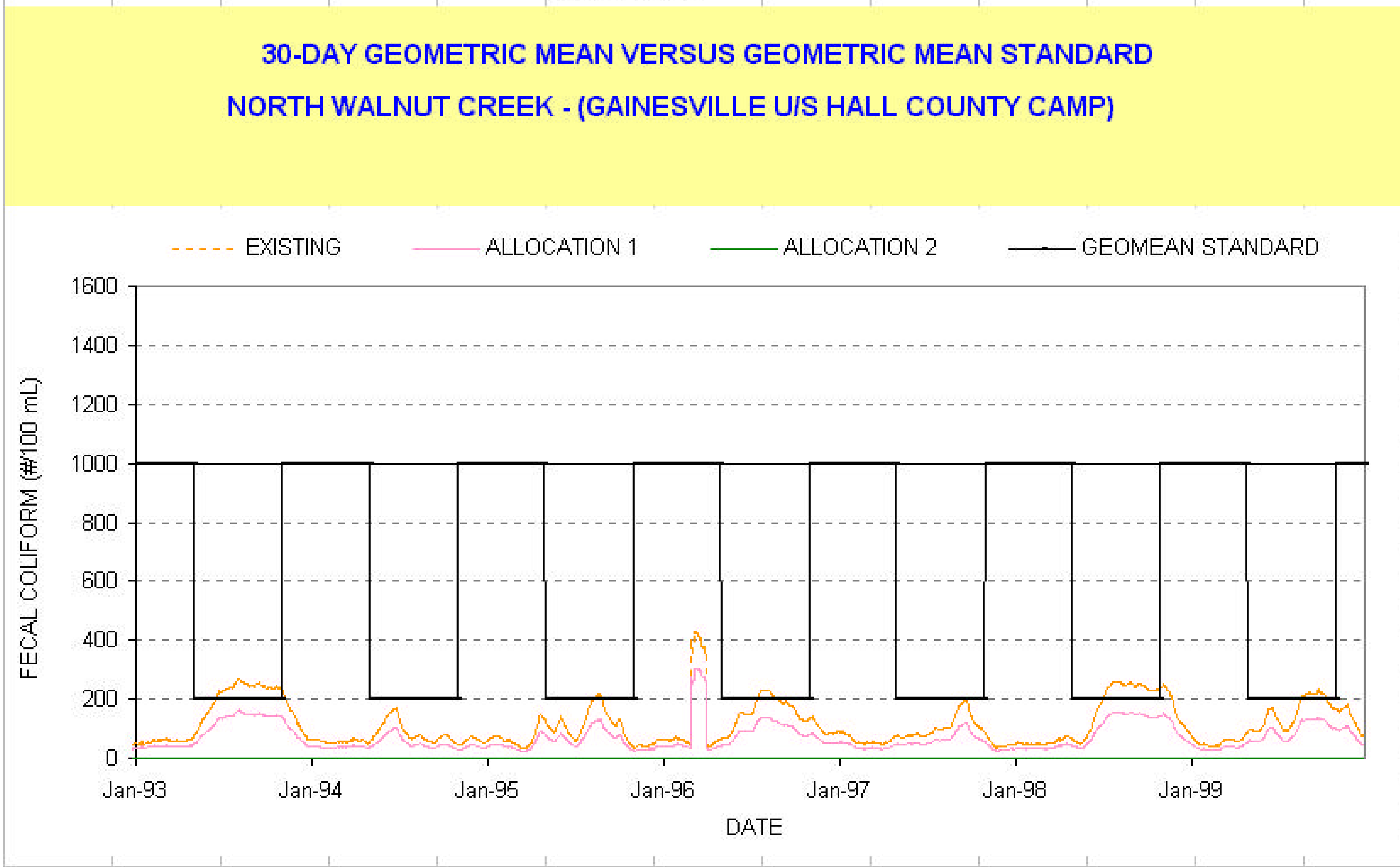

SIMULATIVE FECAL COLIFORM 30-DAY GEOMETRIC MEAN
TRIBUTARY 8 TO ALLEN CREEK
EXISTING
TMDL
GEOMEAN STANDARD
FECAL COLIFORM (#/100 mL)
1600
1400
1200
1000
800
600
400
200
0
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
DATE

FIGURE F-6


30-DAY GEOMETRIC MEAN VERSUS GEOMETRIC MEAN STANDARD
NORTH WALNUT CREEK - (GAINESVILLE U/S HALL COUNTY CAMP)
EXISTING
ALLOCATION 1
ALLOCATION 2
GEOMEAN STANDARD
FECAL COLIFORM (#/100 mL)
1600
1400
1200
1000
800
600
400
200
0
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
DATE

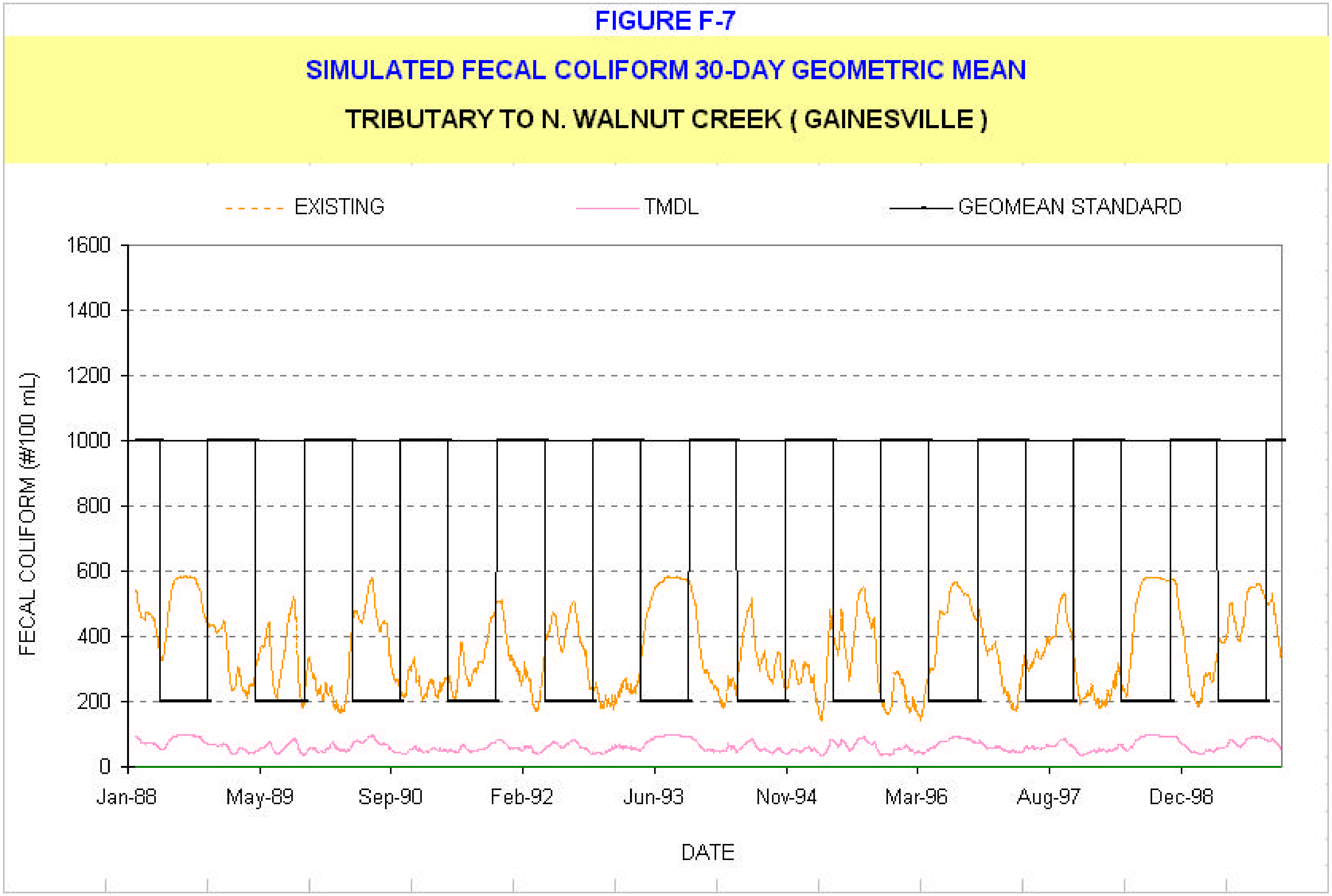


FIGURE F-7
SIMULATED FECAL COLIFORM 30-DAY GEOMETRIC MEAN
TRIBUTARY TO N. WALNUT CREEK (GAINESVILLE)
EXISTING
TMDL
GEOMEAN STANDARD
1600
1400
1200
1000
800
600
400
200
0
FECAL COLIFORM (#/100 mL)
Jan-88
May-89
Sep-90
Feb-92
Jun-93
Nov-94
Mar-96
Aug-97
Dec-98
DATE

FIGURE F-8

SIMULATED FECAL COLIFORM 30-DAY GEOMETRIC MEAN

NORTH WALNUT CREEK - (GAINESVILLE D/S HALL COUNTY CAMP)

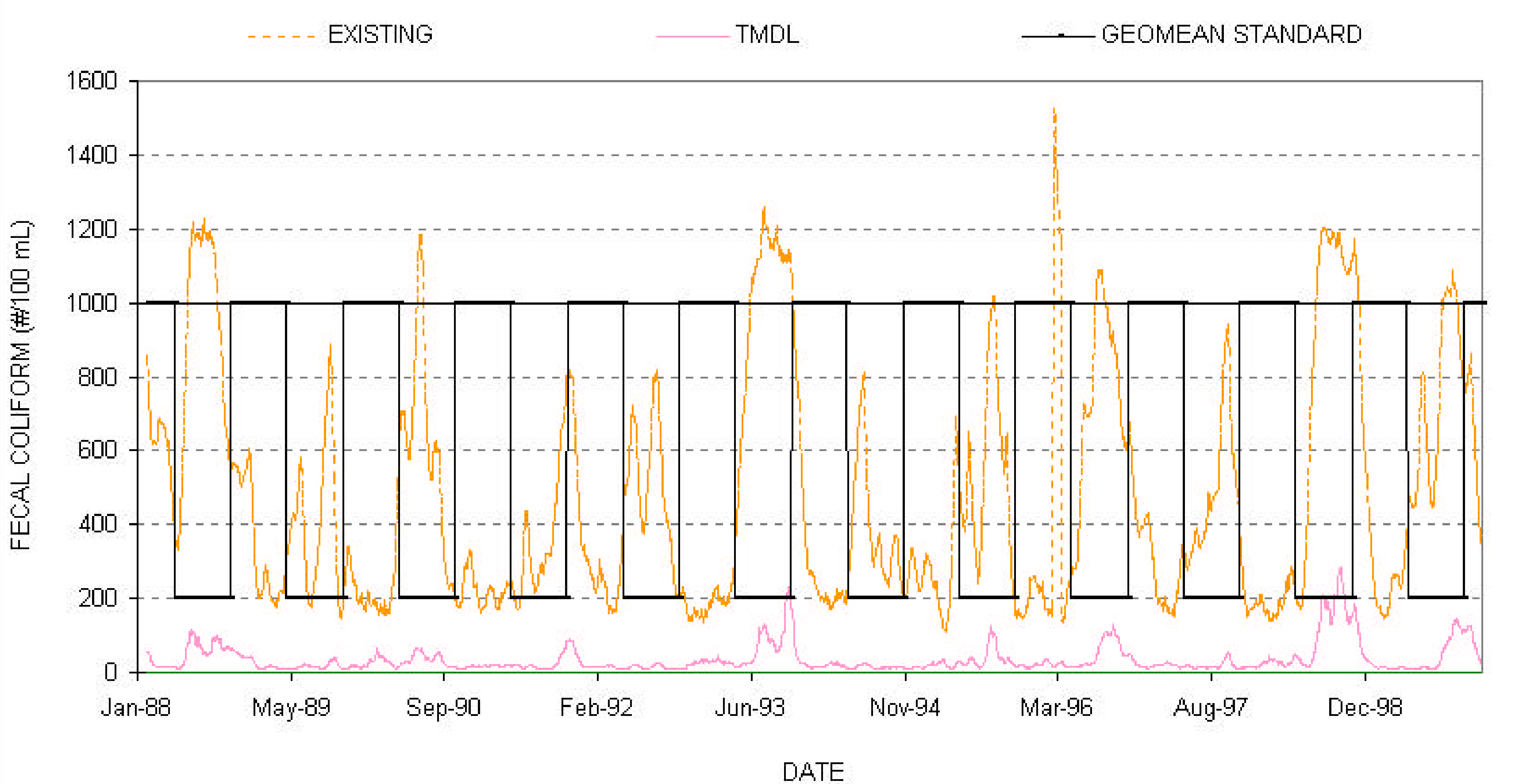


FIGURE F-9

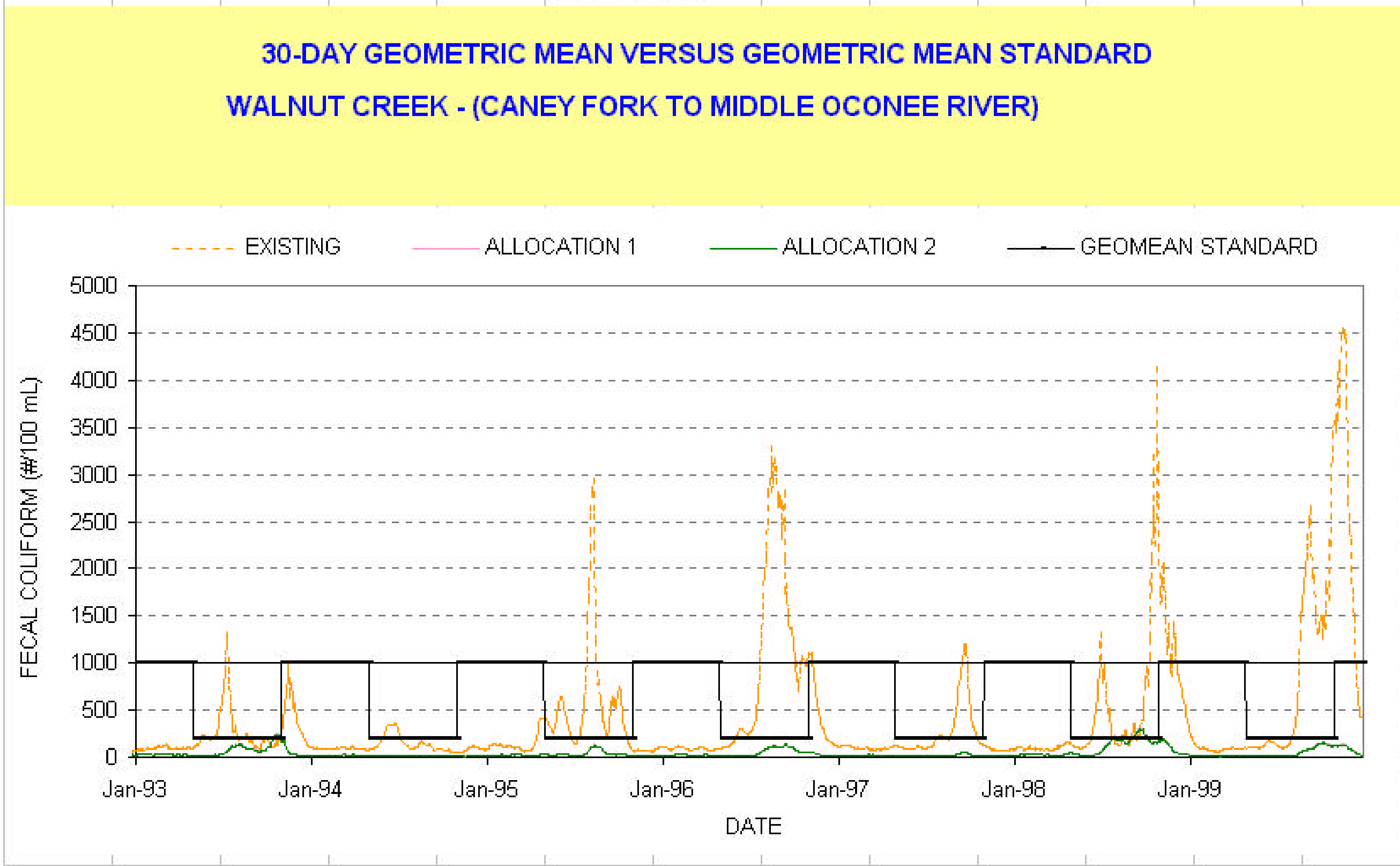

30-DAY GEOMETRIC MEAN VERSUS GEOMETRIC MEAN STANDARD
WALNUT CREEK - (CANEY FORK TO MIDDLE OCONEE RIVER)
EXISTING
ALLOCATION 1
ALLOCATION 2
GEOMEAN STANDARD
FECAL COLIFORM (#/100 mL)
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
DATE

FIGURE F-38

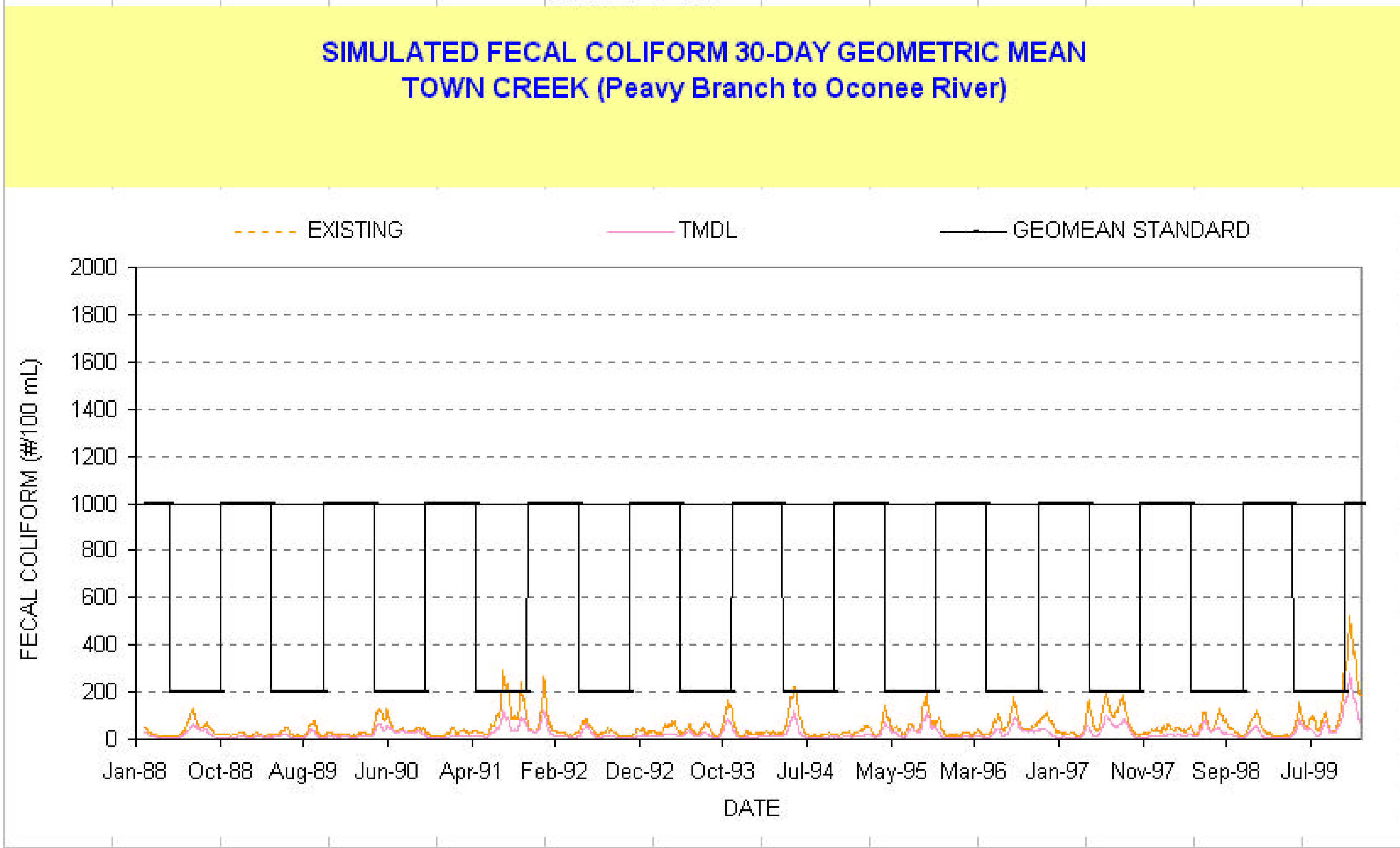
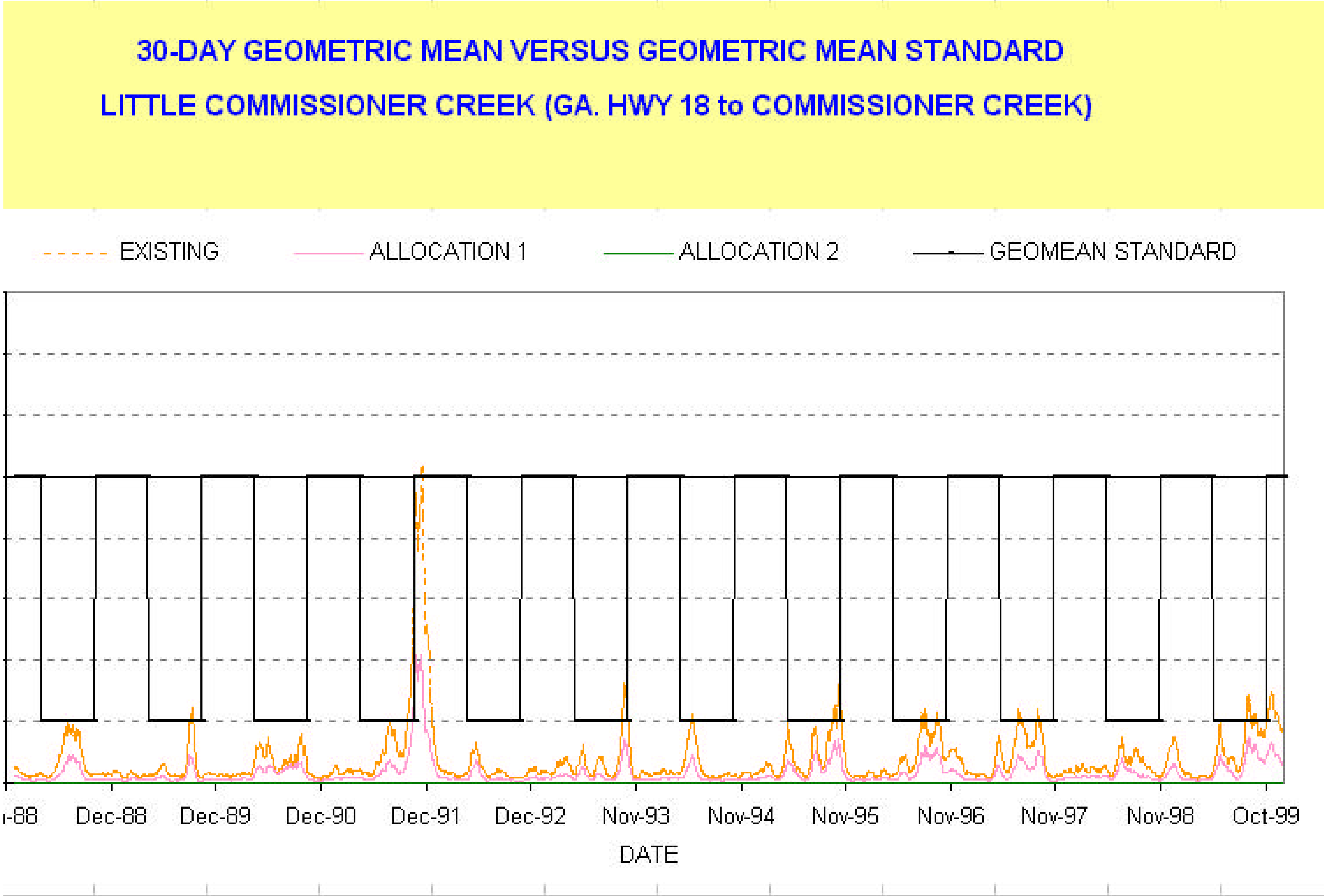

SIMULATED FECAL COLIFORM 30-DAY GEOMETRIC MEAN
TOWN CREEK (Peavy Branch to Oconee River)
EXISTING
TMDL
GEOMEAN STANDARD
FECAL COLIFORM (#/100 mL)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
Jan-88
Oct-88
Aug-89
Jun-90
Apr-91
Feb-92
Dec-92
Oct-93
Jul-94
May-95
Mar-96
Jan-97
Nov-97
Sep-98
Jul-99
DATE

FIGURE F-39


30-DAY GEOMETRIC MEAN VERSUS GEOMETRIC MEAN STANDARD
LITTLE COMMISSIONER CREEK (GA. HWY 18 to COMMISSIONER CREEK)
EXISTING
ALLOCATION 1
ALLOCATION 2
GEOMEAN STANDARD
Dec-88
Dec-89
Dec-90
Dec-91
Dec-92
Nov-93
Nov-94
Nov-95
Nov-96
Nov-97
Nov-98
Oct-99
DATE

APPENDIX G:

PROJECT INFORMATION

For WATERSHED MODELS

UPPER OCONEE RIVER BASIN (03070101)

Georgia Middle 3 Basins TMDL Development

303(d) Listed Impaired Segments for Fecal Coliform

Upper Oconee Basin

Not Supporting Designated Use

STREAM	1999 MONITORING STATION	PROJECT NAME	SUBWATERSHED ID	12 DIGIT HUC ID
APALACHEE RIVER	02218700	UPOCN08	1270, 1276	030701010804, 030701010802
BEAVERDAM CREEK	02220395	UPOCN12	1189, 1195	030701011103, 030701011102
CEDAR CREEK	02217299	UPOCN03	1408	030701010204
CEDAR CREEK	02217996	UPOCN06	1348, 1354	030701010601 030701010601
LITTLE RIVER	02220783	UPOCN14	1114	030701011401
LITTLE RIVER	02220800	UPOCN14	1093, 1102	030701011404, 030701011402
LITTLE SUGAR CREEK	02220100	UPOCN11	1204	030701011003
MARBURG CREEK	02218805	UPOCN08	1273	030701010803
MIDDLE OCONEE RIVER	02217475	UPOCN03	1393	030701010301
NORTH OCONEE RIVER	02217610	UPOCN05	1525, 1528, 1531	030701010406, 030701010404, 030701010402
NORTH OCONEE RIVER	02217646	UPOCN05	1525	030701010406
NORTH OCONEE RIVER	02217740	UPOCN05	1501	030701010505
OCONEE RIVER	02218000	UPOCN06	1333, 1348, 1351	030701010601, 030701010601, 030701010601
RICHLAND CREEK	NA	UPOCN12	1177	030701011104
ROOTY CREEK	02220735	UPOCN17	1120, 1123	030701011804, 030701011803
TANYARD CREEK	02217906	UPOCN06	1495	030701010505
TOWN CREEK	02220368	UPOCN12	1186	030701011101
TRIBUTARY 7 TO ALLEN CREEK	NA	UPOCN01	1474	030701010103
TRIBUTARY 8 TO ALLEN CREEK	NA	UPOCN01	1468	030701010103

Georgia Middle 3 Basins TMDL Development

303(d) Listed Impaired Segments for Fecal Coliform

Upper Oconee Basin

Partially Supporting Designated Use

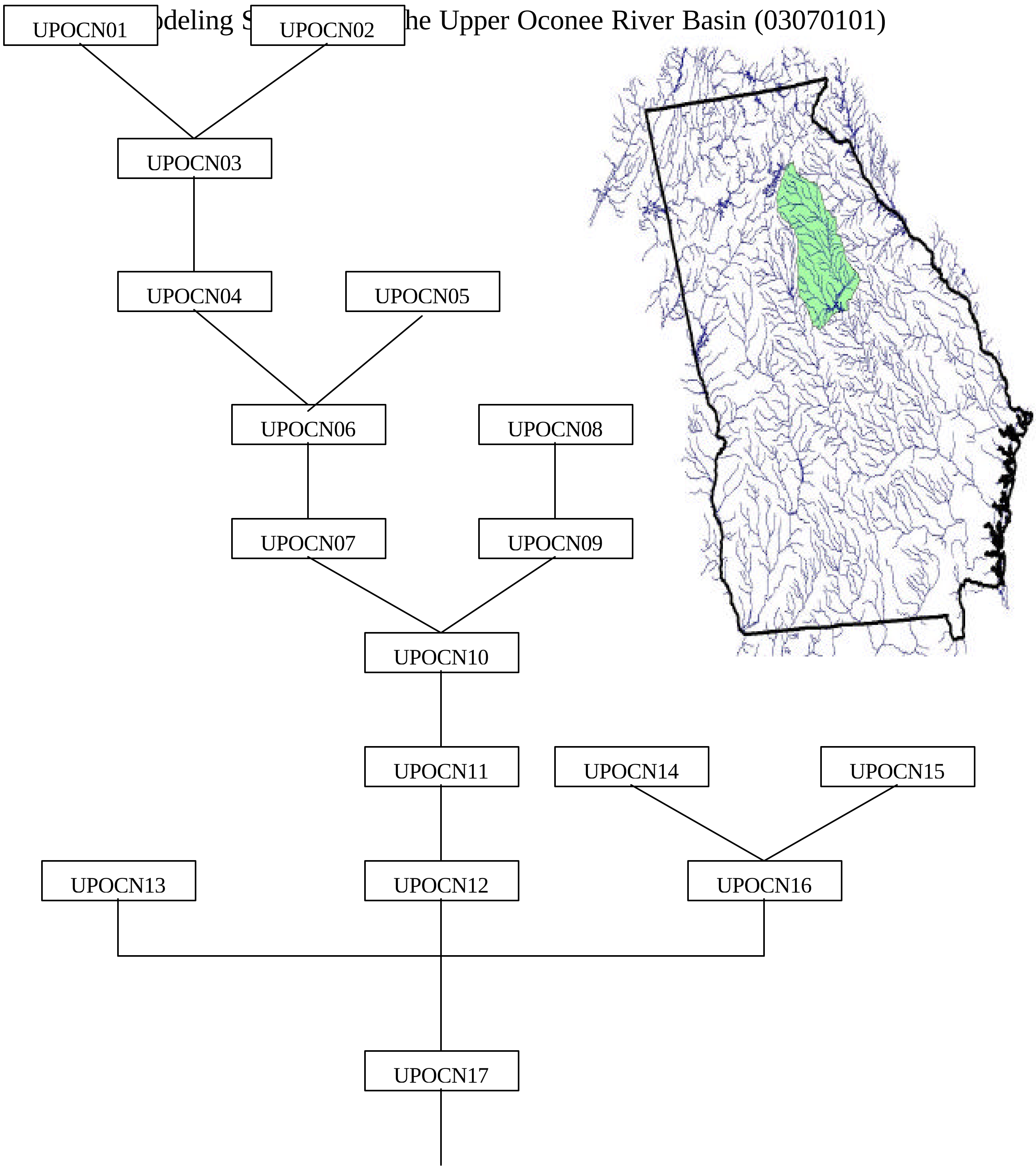
STREAM	1999 MONITORING STATION	PROJECT NAME	SUBWATERSHED ID	12 DIGIT HUC ID
ALLEN CREEK	02216969	UPOCN01	1459, 1465, 1471, 1477, 1486	030701010103, 030701010103, 030701010103, 030701010103, 030701010103
APALACHEE RIVER	02219000, 02219148	UPOCN08	1258, 1243, 1228, 1267	030701010901, 030701010905, 030701010906, 030701010805
BIG CEDAR CREEK	02221900	UPOCN16	1018	030701011704
BIG INDIAN CREEK	02220850	UPOCN14	1096, 1105	030701011406 030701011405
CARR CREEK	02217915	UPOCN06	1492	030701010505
E FK TRAIL CR	02217866	UPOCN06	1506	030701010505
HUNNICUTT CREEK	02217496	UPOCN04	1387	030701010307
LITTLE RIVER	02220900	UPOCN16	1036, 1069, 1075	030701011503, 030701011503, 030701011501
MIDDLE OCONEE RIVER	02217515	UPOCN03, UPOCN04	1366, 1375, 1384	030701010307, 030701010307, 030701010307
MULBERRY RIVER	02217380	UPOCN03	1399, 1402, 1411	030701010205 030701010205, 030701010204
NORTH OCONEE RIVER	NA	UPOCN05	1507	030701010501
NORTH OCONEE RIVER	02217950	UPOCN06	1360, 1489, 1498	030701010505, 030701010505, 030701010505
NORTH WALNUT CREEK D/S	NA	UPOCN02	1435, 1444	030701010104, 030701010104
NORTH WALNUT CREEK U/S	NA	UPOCN02	1450	030701010104

Georgia Middle 3 Basins TMDL Development
303(d) Listed Impaired Segments for Fecal Coliform
Upper Oconee Basin

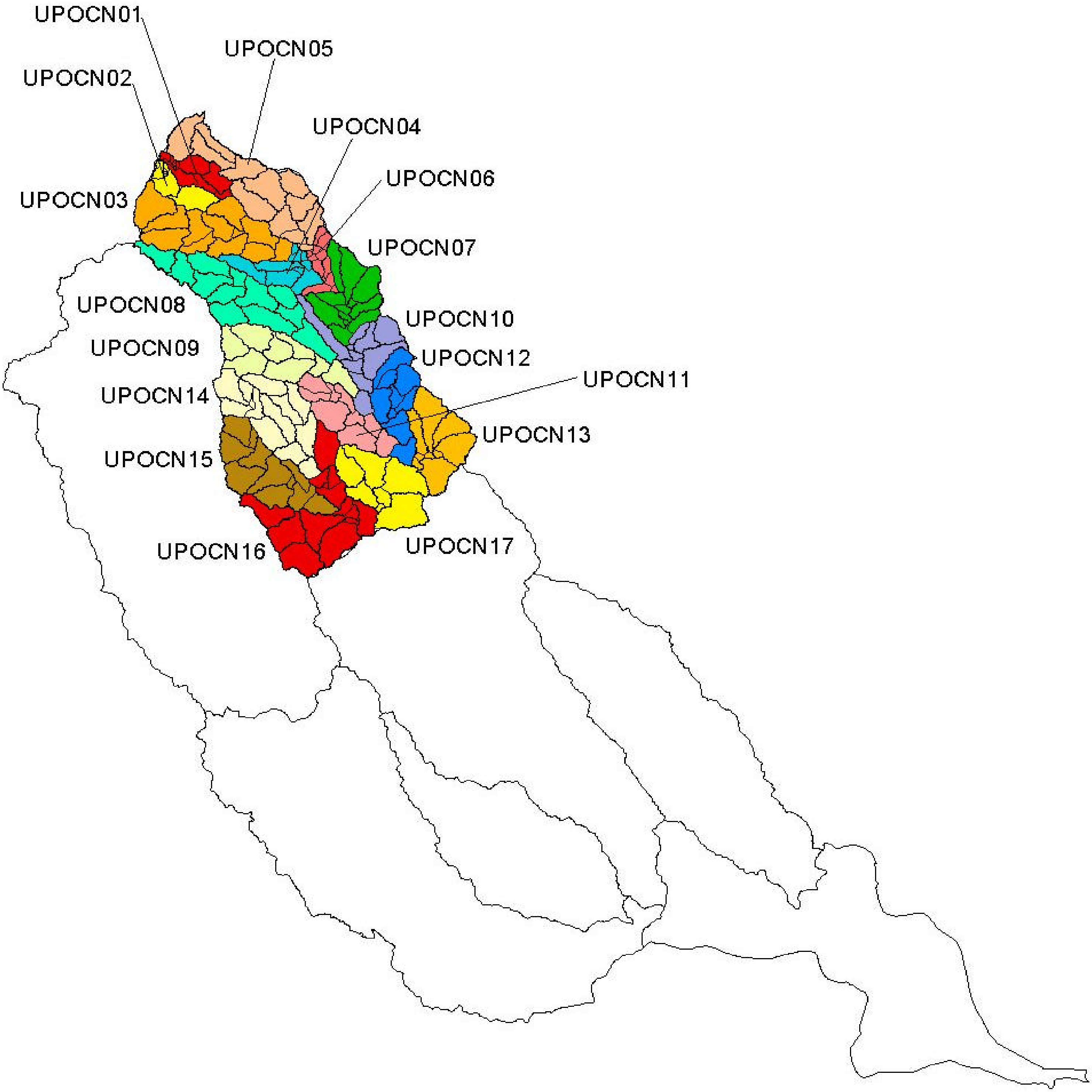
Partially Supporting Designated Use

STREAM	1999 MONITORING STATION	PROJECT NAME	SUBWATERSHED ID	12 DIGIT HUC ID
OCONEE RIVER	02218300	UPOCN07, UPOCN10	1294, 1300, 1309 1318, 1321, 1327	030701010701, 030701010701, 030701010606, 030701010606, 030701010606, 030701010606
TRIBUTARY 2 TO ALLEN CREEK	NA	UPOCN01	1480	030701010103
TRIBUTARY 5 TO ALLEN CREEK	NA	UPOCN01	1483	030701010103
TRIBUTARY TO N. WALNUT CREEK	NA	UPOCN02	1447	030701010104
WALNUT CREEK	2217170	UPOCN02	1414	030701010105

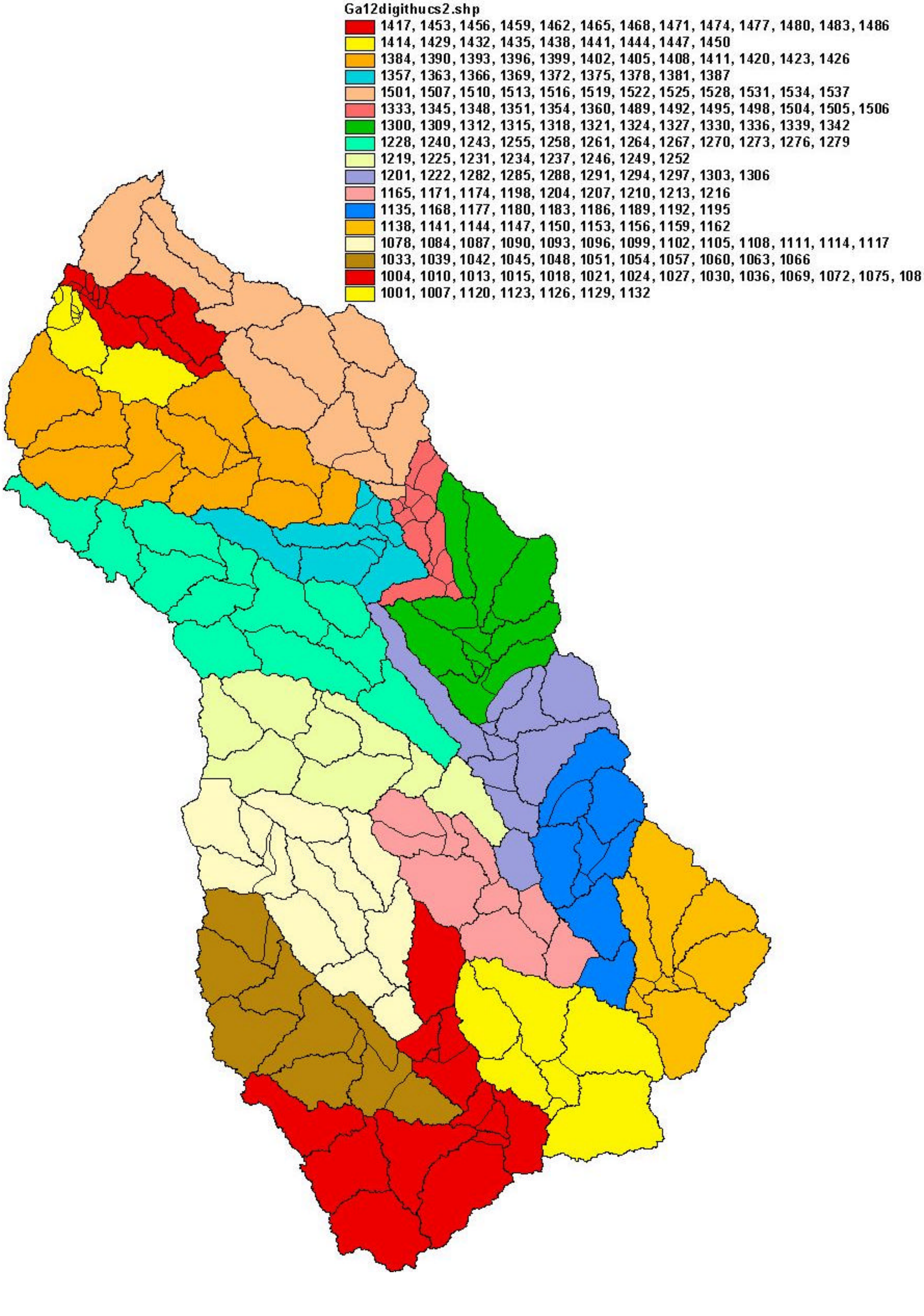
...deling S... he Upper Oconee River Basin (03070101)



Upper Oconee River Basin Projects


UPOCN01
UPOCN05
UPOCN02
UPOCN04
UPOCN06
UPOCN03
UPOCN07
UPOCN08
UPOCN10
UPOCN09
UPOCN12
UPOCN11
UPOCN14
UPOCN13
UPOCN15
UPOCN16
UPOCN17

Upper Oconee River Basin
Delineated Subwatersheds for Modeling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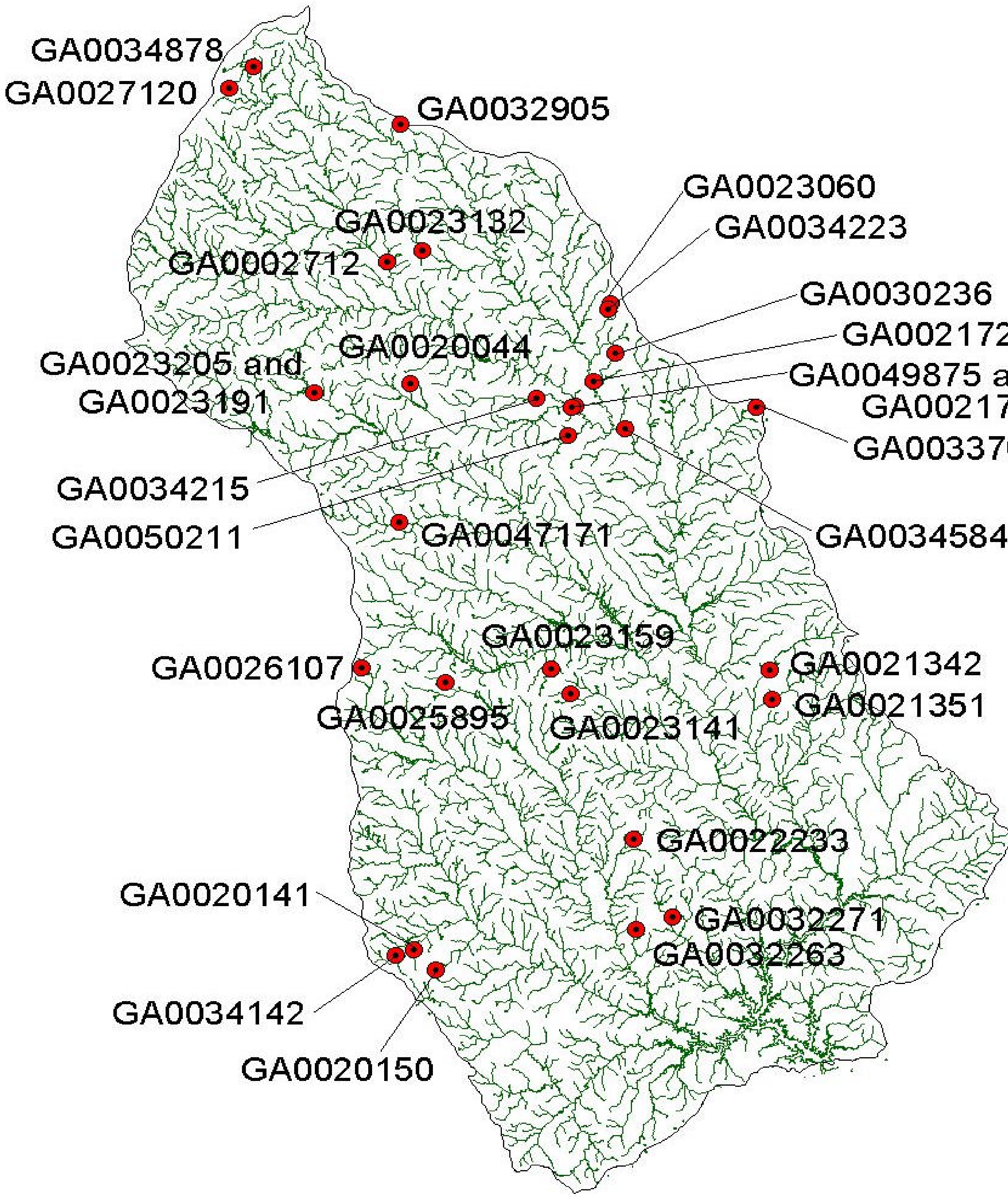
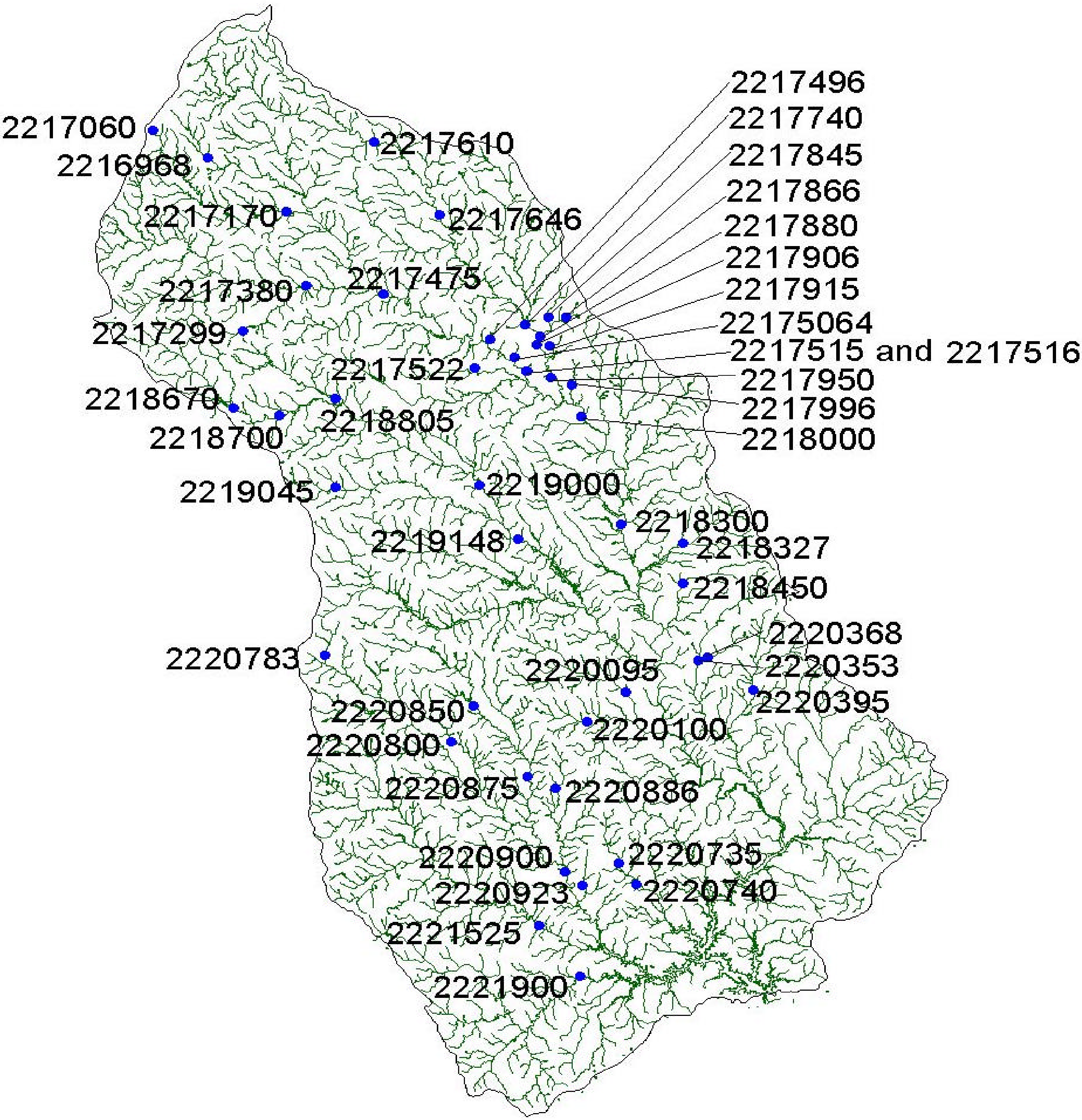
1417, 1453, 1456, 1459, 1462, 1465, 1468, 1471, 1474, 1477, 1480, 1483, 1486
1414, 1429, 1432, 1435, 1438, 1441, 1444, 1447, 1450
1384, 1390, 1393, 1396, 1399, 1402, 1405, 1408, 1411, 1420, 1423, 1426
1357, 1363, 1366, 1369, 1372, 1375, 1378, 1381, 1387
1501, 1507, 1510, 1513, 1516, 1519, 1522, 1525, 1528, 1531, 1534, 1537
1333, 1345, 1348, 1351, 1354, 1360, 1489, 1492, 1495, 1498, 1504, 1505, 1506
1300, 1309, 1312, 1315, 1318, 1321, 1324, 1327, 1330, 1336, 1339, 1342
1228, 1240, 1243, 1255, 1258, 1261, 1264, 1267, 1270, 1273, 1276, 1279
1219, 1225, 1231, 1234, 1237, 1246, 1249, 1252
1201, 1222, 1282, 1285, 1288, 1291, 1294, 1297, 1303, 1306
1165, 1171, 1174, 1198, 1204, 1207, 1210, 1213, 1216
1135, 1168, 1177, 1180, 1183, 1186, 1189, 1192, 1195
1138, 1141, 1144, 1147, 1150, 1153, 1156, 1159, 1162
1078, 1084, 1087, 1090, 1093, 1096, 1099, 1102, 1105, 1108, 1111, 1114, 1117
1033, 1039, 1042, 1045, 1048, 1051, 1054, 1057, 1060, 1063, 1066
1004, 1010, 1013, 1015, 1018, 1021, 1024, 1027, 1030, 1036, 1069, 1072, 1075, 1081
1001, 1007, 1120, 1123, 1126, 1129, 1132

Upper Oconee River Basin
Active Permitted Point Sources for Modeling



Upper Oconee River Basin
1999 Water Quality Monitoring Stations


2217496
2217740
2217845
2217866
2217880
2217906
2217915
22175064
2217515 and 2217516
2217950
2217996
2218000
2217060
2216968
2217610
2217170
2217646
2217380
2217475
2217299
2217522
2218670
2218805
2218700
2219045
2219000
2218300
2219148
2218327
2218450
2220368
2220353
2220783
2220095
2220395
2220850
2220100
2220800
2220875
2220886
2220900
2220735
2220923
2220740
2221525
2221900

Project Name: UPOCN01

Listed Segments in Project

Subwatershed ID	Listed Segment
1417	NA
1453	NA
1456	NA
1459	Allen Creek (FC)
1462	NA
1465	Allen Creek (FC)
1468	Trib 8 to Allen Creek (FC)
1471	Allen Creek (FC)
1474	Trib 7 to Allen Creek (FC)
1477	Allen Creek (FC)
1480	Trib 2 to Allen Creek (FC)
1483	Trib 5 to Allen Creek (FC)
1486	Allen Creek (FC)

Notes:
DO = Dissolved Oxygen
FC = Fecal Coliform

Point Sources in Project

Subwatershed ID	NPDES ID and Name	Receiving Stream	Permitted Flow (cfs)
1417			
1453			
1456			
1459			
1462			
1465			
1468			
1471			
1474			
1477			
1480			
1483			
1486			

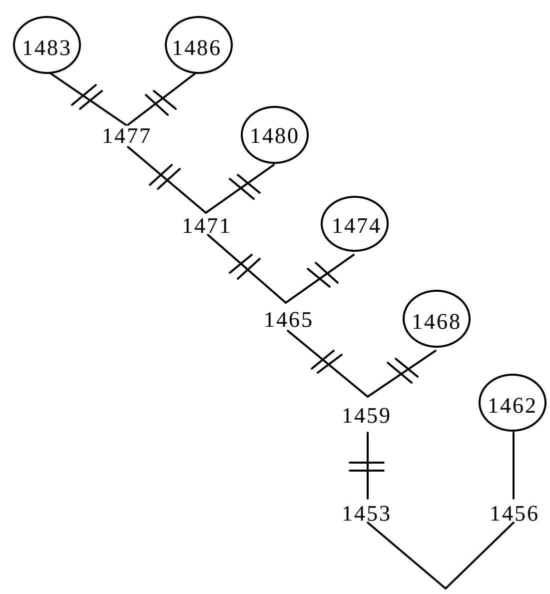
Projects Entered as Point Sources

Subwatershed ID	Project Name
NA	NA

WDM Stations Assigned in Project

Subwatershed ID	WDM Station
1417	Jefferson
1453	Jefferson
1456	Jefferson
1459	Jefferson
1462	Jefferson
1465	Clermont
1468	Clermont
1471	Clermont
1474	Clermont
1477	Clermont
1480	Clermont
1483	Clermont
1486	Clermont

Schematic of Project Subwatersheds (Modeling Framework)



Batch Files to Run for Project

None

GA Middle 3 Basins TMDL Development – HSPF Project Summary Sheet

Project Name: UPOCN02

Listed Segments in Project

Subwatershed ID	Listed Segment
1414	Walnut Creek (FC)
1429	NA
1432	NA
1435	North Walnut Creek, D/S (FC)
1438	NA
1441	Bottoms Branch (DO)
1444	North Walnut Creek, D/S (FC)
1447	Trib to North Walnut Creek (FC)
1450	North Walnut Creek, U/S (FC)

Notes:
DO = Dissolved Oxygen
FC = Fecal Coliform

Point Sources in Project

Subwatershed ID	NPDES ID and Name	Receiving Stream	Permitted Flow (cfs)
1414			
1429			
1432			
1435			
1438			
1441			
1444			
1447			
1450			

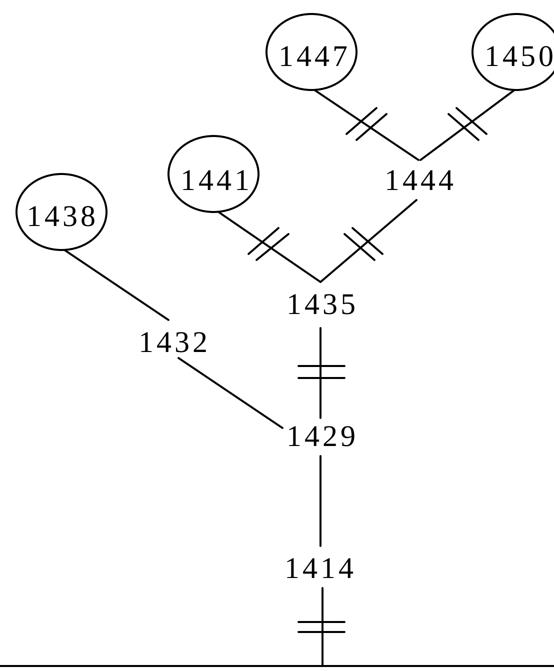
Projects Entered as Point Sources

Subwatershed ID	Project Name
NA	NA

WDM Stations Assigned in Project

Subwatershed ID	WDM Station
1414	Jefferson
1429	Jefferson
1432	Clermont
1435	Clermont
1438	Clermont
1441	Clermont
1444	Clermont
1447	Clermont
1450	Clermont

Schematic of Project Subwatersheds
(Modeling Framework)



Batch Files to Run for Project
None

Project Name: UPOCN03

Listed Segments in Project

Subwatershed ID	Listed Segment
1384	Middle Oconee River (FC)
1390	NA
1393	Middle Oconee River (FC)
1396	NA
1399	Mulberry River (FC)
1402	Mulberry River (FC)
1405	NA
1408	Cedar Creek (FC)
1411	Mulberry River (FC)
1420	NA
1423	NA
1426	NA

Notes:
DO = Dissolved Oxygen
FC = Fecal Coliform

Point Sources in Project

Subwatershed ID	NPDES ID and Name	Receiving Stream	Permitted Flow (cfs)
1384			
1390			
1393			
1396			
1399			
1402			
1405	GA0002712 Jackson County BD of Comm	Middle Oconee River	0.155
1408			
1411			
1420			
1423			
1426			

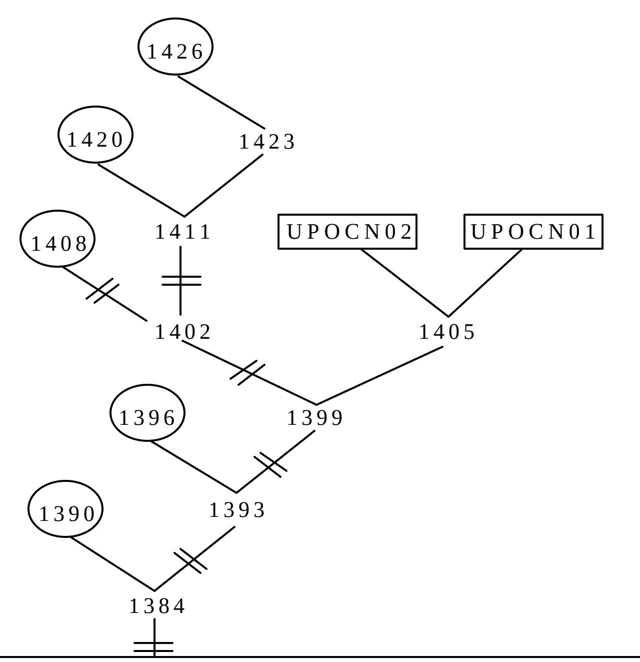
Projects Entered as Point Sources

Subwatershed ID	Project Name
1405	UPOCN01
1405	UPOCN02

WDM Stations Assigned in Project

Subwatershed ID	WDM Station
1384	Jefferson
1390	Jefferson
1393	Jefferson
1396	Jefferson
1399	Jefferson
1402	Jefferson
1405	Jefferson
1408	Jefferson
1411	Jefferson
1420	Jefferson
1423	Jefferson
1426	Jefferson

Schematic of Project Subwatersheds (Modeling Framework)



Batch Files to Run for Project
LinkUpocn01and02toUpocn03.bat

GA Middle 3 Basins TMDL Development – HSPF Project Summary Sheet

Project Name: UPOCN04

Listed Segments in Project

Subwatershed ID	Listed Segment
1357	NA
1363	NA
1366	Middle Oconee River (FC)
1369	NA
1372	NA
1375	Middle Oconee River (FC)
1378	NA
1381	NA
1387	Hunnicutt Creek (FC)

Notes:
DO = Dissolved Oxygen
FC = Fecal Coliform

Point Sources in Project

Sub ID	NPDES ID and Name	Receiving Stream	Permitted Flow (cfs)
1357	GA0050211 Oconee Co/Calls Cr GA0049875 Heartwood MHP	Calls Cr-Oconee Rv McNutt Cr	0.620 0.140
1363			
1366	GA0021733 Athens Middle Oconee	Middle Oconee River	9.300
1369			
1372	GA0034215 Pinewood So. MHP	McNutt Creek	0.040
1375			
1378			
1381	GA0020044 Statham WPCP	Barber Cr	0.233
1387			

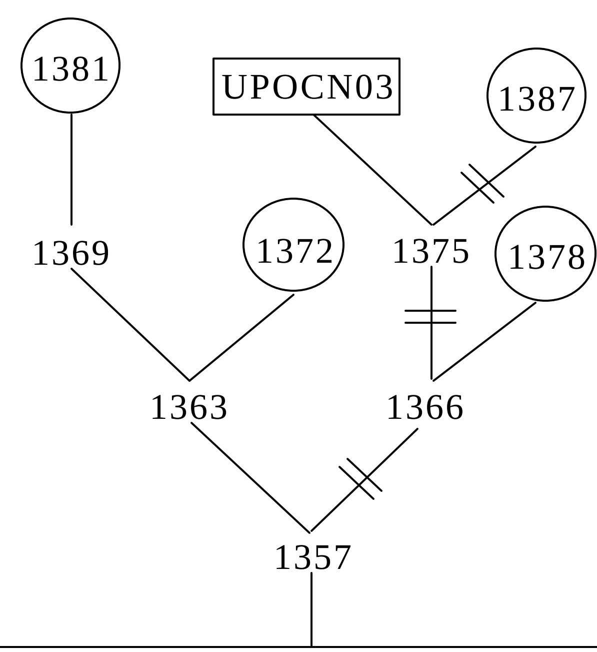
Projects Entered as Point Sources

Subwatershed ID	Project Name

WDM Stations Assigned in Project

Subwatershed ID	WDM Station
1357	Lexington
1363	Lexington
1366	Lexington
1369	Monroe
1372	Monroe
1375	Jefferson
1378	Jefferson
1381	Monroe
1387	Jefferson

Schematic of Project Subwatersheds (Modeling Framework)



Batch Files to Run for Project
LinkUpocn03toUpocn04.bat

GA Middle 3 Basins TMDL Development – HSPF Project Summary Sheet

Listed Segments in Project

Subwatershed ID	Listed Segment
1501	North Oconee River (FC)
1507	North Oconee River (FC)
1510	NA
1513	NA
1516	NA
1519	NA
1522	NA
1525	North Oconee River (FC)
1528	North Oconee River (FC)
1531	North Oconee River (FC)
1534	NA
1537	NA

Notes:
DO = Dissolved Oxygen
FC = Fecal Coliform

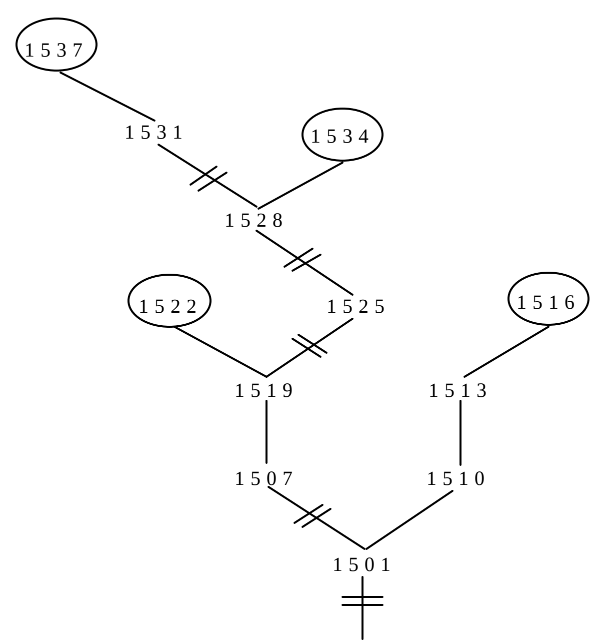
Point Sources in Project

Sub ID	NPDES ID and Name	Receiving Stream	Permitted Flow (cfs)
1501			
1507			
1510			
1513			
1516			
1519			
1522	GA0023132 Jefferson Pond	Curry Cr	0.450
1525			
1528	GA0032905 Maysville Pond	Unnamed Trib to North Oconee	0.093
1531			
1534			

WDM Stations Assigned in Project

Subwatershed ID	WDM Station
1501	Jefferson
1507	Jefferson
1510	Jefferson
1513	Jefferson
1516	Jefferson
1519	Jefferson
1522	Jefferson
1525	Jefferson
1528	Jefferson
1531	Jefferson
1534	Jefferson
1537	Clermont

Schematic of Project Subwatersheds (Modeling Framework)



Batch Files to Run for Project

None

GA Middle 3 Basins TMDL Development – HSPF Project Summary Sheet

Project Name: UPOCN06

Listed Segments in Project

Subwatershed ID	Listed Segment
1333	Oconee River (FC)
1345	NA
1348	Oconee River (FC)
1351	Oconee River (FC)
1354	Cedar Creek (FC)
1360	North Oconee River (FC)
1489	North Oconee River (FC)
1492	Carr Creek (FC)
1495	Tanyard Creek (FC)
1498	North Oconee River (FC)
1504	NA
1505	NA
1506	East FK Trail Creek (FC)

Notes:
DO = Dissolved Oxygen
FC = Fecal Coliform

Point Sources in Project

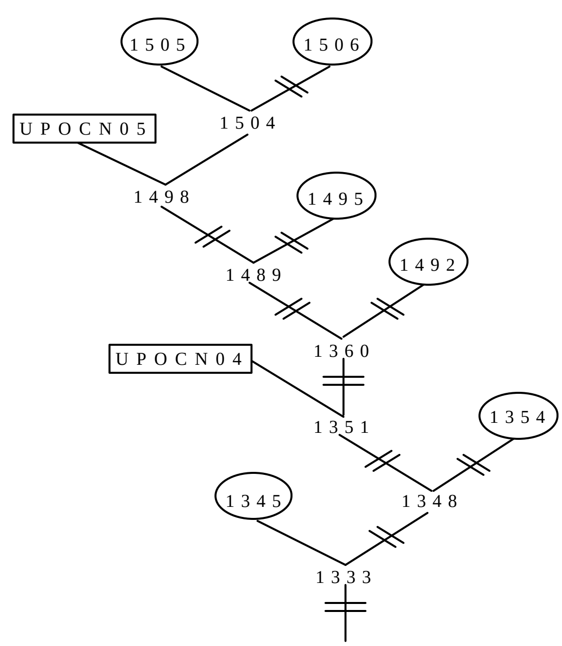
Sub ID	NPDES ID and Name	Receiving Stream	Permitted Flow (cfs)
1333			
1345			
1348			
1351			
1354	GA0034584 Athens Cedar Cr	Oconee Rv	3.100
1360			
1489	GA0021725 Athens-North Oconee	North Oconee Rv	16.616
1492			
1495			
1498			
1504			
1505	GA0023060 Country Corners MHP GA0034223 Pinewood Estates	West Fork Trail Cr West Fork Trail Cr	0.090 0.068
1506	GA0030236 Hallmark Mobil Home	East Fork Trail Cr	0.090

Projects Entered as Point Sources

WDM Stations Assigned in Project

Subwatershed ID	WDM Station
1333	Lexington
1345	Lexington
1348	Lexington
1351	Lexington
1354	Lexington
1360	Lexington
1489	Lexington
1492	Lexington
1495	Lexington
1498	Lexington
1504	Lexington
1505	Lexington
1506	Lexington

Schematic of Project Subwatersheds (Modeling Framework)



Batch Files to Run for Project

LinkUpocn04and05toUpocn06.bat

GA Middle 3 Basins TMDL Development – HSPF Project Summary Sheet

Project Name: UPOCN07

Listed Segments in Project

Subwatershed ID	Listed Segment
1300	Oconee River (FC)
1309	Oconee River (FC)
1312	NA
1315	NA
1318	Oconee River (FC)
1321	Oconee River (FC)
1324	NA
1327	Oconee River (FC)
1330	NA
1336	NA
1339	NA
1342	NA

Notes:
DO = Dissolved Oxygen
FC = Fecal Coliform

Point Sources in Project

Subwatershed ID	NPDES ID and Name	Receiving Stream	Permitted Flow (cfs)
1300			
1309			
1312			
1315			
1318			
1321			
1324			
1327			
1330			
1336			
1339			
1342	GA0033707 Crawford Westside WPCP	Barrow Cr	0.057

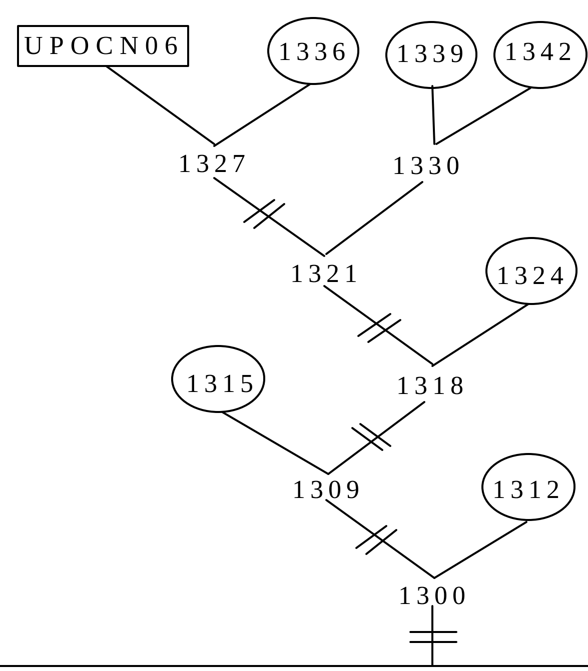
Projects Entered as Point Sources

Subwatershed ID	Project Name
1327	UPOCN06

WDM Stations Assigned in Project

Subwatershed ID	WDM Station
1300	Lexington
1309	Lexington
1312	Lexington
1315	Lexington
1318	Lexington
1321	Lexington
1324	Lexington
1327	Lexington
1330	Lexington
1336	Lexington
1339	Lexington
1342	Lexington

Schematic of Project Subwatersheds (Modeling Framework)



Batch Files to Run for Project
LinkUpocn06toUpocn07.bat

GA Middle 3 Basins TMDL Development – HSPF Project Summary Sheet

Project Name: UPOCN08

Listed Segments in Project

Subwatershed ID	Listed Segment
1228	Apalachee River (FC)
1240	NA
1243	Apalachee River (FC)
1255	NA
1258	Apalachee River (FC)
1261	NA
1264	NA
1267	Apalachee River (FC)
1270	Apalachee River (FC)
1273	Marburg Creek (FC)
1276	Apalachee River (FC)
1279	NA

Notes:
DO = Dissolved Oxygen
FC = Fecal Coliform

Point Sources in Project

Sub ID	NPDES ID and Name	Receiving Stream	Permitted Flow (cfs)
1228			
1240			
1243			
1255	GA0047171 Monroe Jacks Cr	Jacks Cr	5.270
1258			
1261			
1264			
1267			
1270			
1273	GA0023205 Winder Barber Cr GA0023191 Winder Marburg Cr	Barber Cr Marburg Cr	0.031 0.930
1276			
1279			

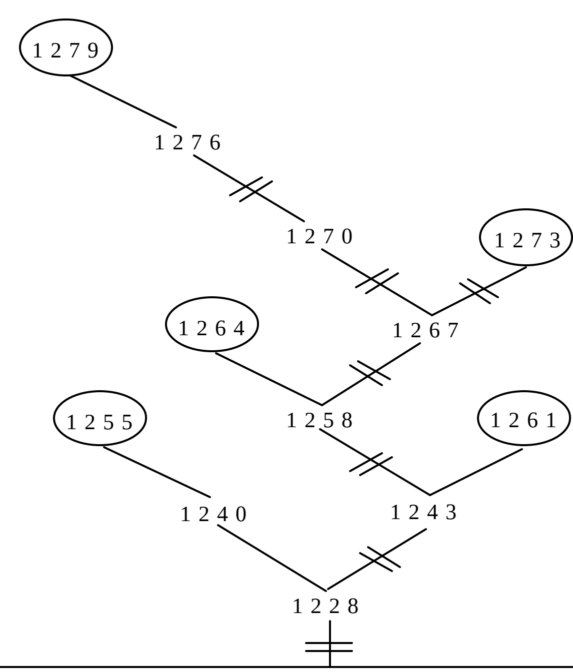
Projects Entered as Point Sources

Subwatershed ID	Project Name

WDM Stations Assigned in Project

Subwatershed ID	WDM Station
1228	Monroe
1240	Monroe
1243	Monroe
1255	Monroe
1258	Monroe
1261	Monroe
1264	Monroe
1267	Monroe
1270	Monroe
1273	Monroe
1276	Monroe
1279	Monroe

Schematic of Project Subwatersheds
(Modeling Framework)



Batch Files to Run for Project

None

GA Middle 3 Basins TMDL Development – HSPF Project Summary Sheet

Project Name: UPOCN09

Listed Segments in Project

Subwatershed ID	Listed Segment
1219	NA
1225	NA
1231	NA
1234	NA
1237	NA
1246	Lake Brantley (DO)
1249	NA
1252	NA

Notes:
DO = Dissolved Oxygen
FC = Fecal Coliform

Point Sources in Project

Subwatershed ID	NPDES ID and Name	Receiving Stream	Permitted Flow (cfs)
1219			
1225			
1231	GA0023159 Madison Northside	Mile Br to Hard Labor Cr	0.217
1234			
1237			
1246			
1249			
1252			

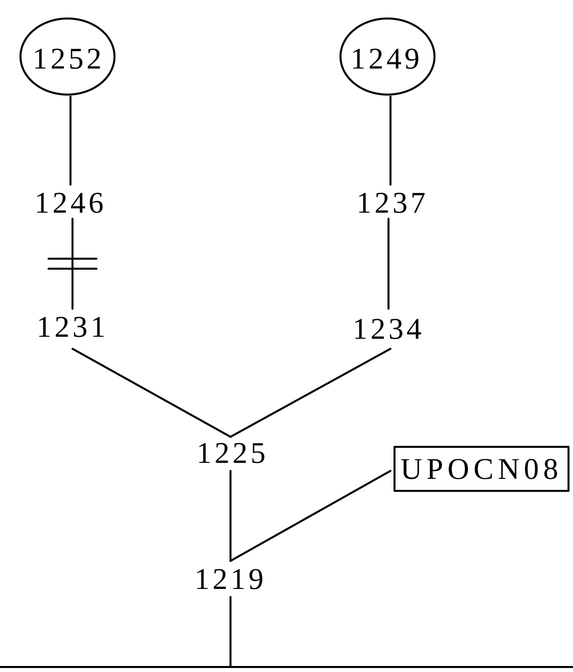
Projects Entered as Point Sources

Subwatershed ID	Project Name
1219	UPOCN08

WDM Stations Assigned in Project

Subwatershed ID	WDM Station
1219	Lexington
1225	Monroe
1231	Monroe
1234	Monroe
1237	Monroe
1246	Monroe
1249	Monroe
1252	Monroe

Schematic of Project Subwatersheds
(Modeling Framework)



Batch Files to Run for Project

LinkUpocn08toUpocn09.bat

GA Middle 3 Basins TMDL Development – HSPF Project Summary Sheet

Project Name: UPOCN10

Listed Segments in Project

Subwatershed ID	Listed Segment
1201	NA
1222	NA
1282	NA
1285	NA
1288	NA
1291	NA
1294	Oconee River (FC)
1297	NA
1303	NA
1306	NA

Notes:
DO = Dissolved Oxygen
FC = Fecal Coliform

Point Sources in Project

Subwatershed ID	NPDES ID and Name	Receiving Stream	Permitted Flow (cfs)
1201			
1222			
1282			
1285			
1288			
1291			
1294			
1297			
1303			
1306			

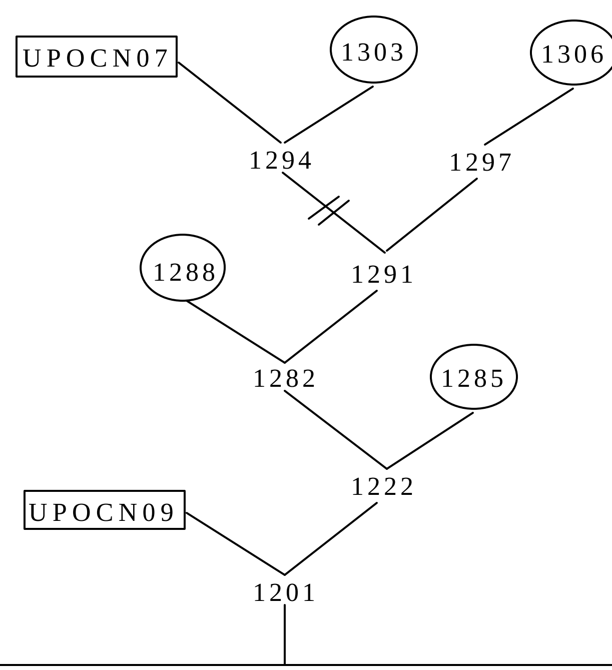
Projects Entered as Point Sources

Subwatershed ID	Project Name
1201	UPOCN09
1294	UPOCN07

WDM Stations Assigned in Project

Subwatershed ID	WDM Station
1201	Milledgeville
1222	Lexington
1282	Lexington
1285	Lexington
1288	Lexington
1291	Lexington
1294	Lexington
1297	Lexington
1303	Lexington
1306	Lexington

Schematic of Project Subwatersheds (Modeling Framework)



Batch Files to Run for Project

LinkUpocn07and09toUpocn10.bat

GA Middle 3 Basins TMDL Development – HSPF Project Summary Sheet

Project Name: UPOCN11

Listed Segments in Project

Subwatershed ID	Listed Segment
1165	NA
1171	NA
1174	NA
1198	NA
1204	Little Sugar Creek (FC)
1207	NA
1210	NA
1213	NA
1216	NA

Notes:
DO = Dissolved Oxygen
FC = Fecal Coliform

Point Sources in Project

Subwatershed ID	NPDES ID and Name	Receiving Stream	Permitted Flow (cfs)
1165			
1171			
1174			
1198			
1204			
1207			
1210			
1213			
1216	GA0023141 Madison Southside	Horse Br Trib to North Sugar	1.023

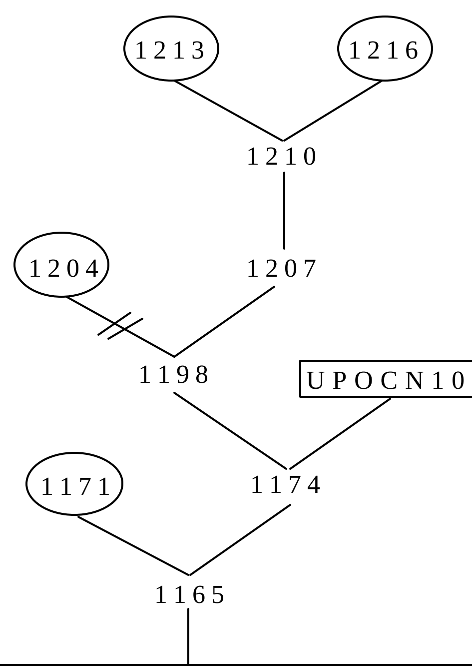
Projects Entered as Point Sources

Subwatershed ID	Project Name
1174	UPOCN10

WDM Stations Assigned in Project

Subwatershed ID	WDM Station
1165	Milledgeville
1171	Milledgeville
1174	Milledgeville
1198	Milledgeville
1204	Milledgeville
1207	Milledgeville
1210	Milledgeville
1213	Monroe
1216	Monroe

Schematic of Project Subwatersheds
(Modeling Framework)



Batch Files to Run for Project

LinkUpocn10toUpocn11.bat

GA Middle 3 Basins TMDL Development – HSPF Project Summary Sheet

Project Name: UPOCN12

Listed Segments in Project

Subwatershed ID	Listed Segment
1135	NA
1168	NA
1177	Richland Creek (FC)
1180	NA
1183	NA
1186	Town Creek (FC)
1189	Beaverdam Creek (FC)
1192	NA
1195	Beaverdam Creek (FC)

Notes:
DO = Dissolved Oxygen
FC = Fecal Coliform

Point Sources in Project

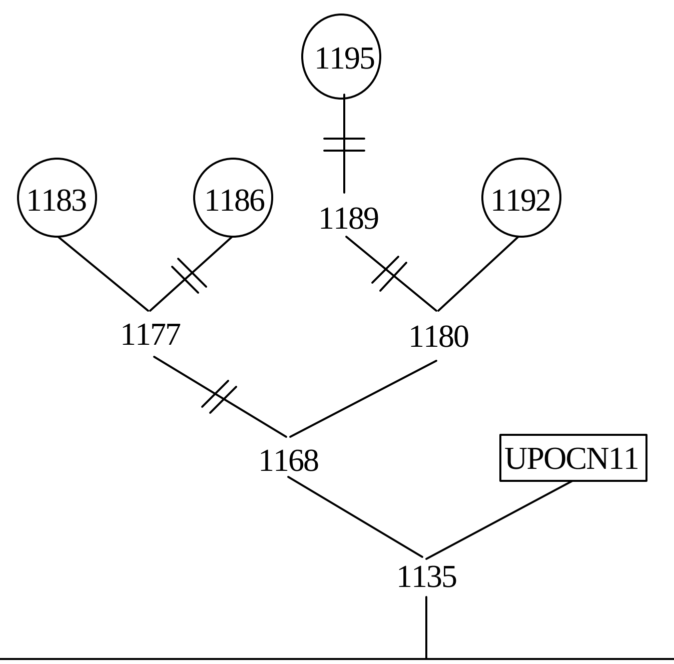
Subwatershed ID	NPDES ID and Name	Receiving Stream	Permitted Flow (cfs)
1135			
1168			
1177			
1180			
1183	GA0021342 Greensboro North Pond	Richland Cr Trib	0.155
1186	GA0021351 Greensboro South	Town Cr	1.547
1189			
1192			
1195			

Projects Entered as Point Sources

WDM Stations Assigned in Project

Subwatershed ID	WDM Station
1135	Milledgeville
1168	Milledgeville
1177	Milledgeville
1180	Milledgeville
1183	Lexington
1186	Milledgeville
1189	Milledgeville
1192	Milledgeville
1195	Milledgeville

Schematic of Project Subwatersheds
(Modeling Framework)



Batch Files to Run for Project

LinkUpocn11toUpocn12.bat

GA Middle 3 Basins TMDL Development – HSPF Project Summary Sheet

Project Name: UPOCN13

Listed Segments in Project

Subwatershed ID	Listed Segment
1138	NA
1141	NA
1144	NA
1147	NA
1150	NA
1153	NA
1156	NA
1159	NA
1162	NA

Notes:
DO = Dissolved Oxygen
FC = Fecal Coliform

Point Sources in Project

Subwatershed ID	NPDES ID and Name	Receiving Stream	Permitted Flow (cfs)
1138			
1141			
1144			
1147			
1150			
1153			
1156			
1159			
1162			

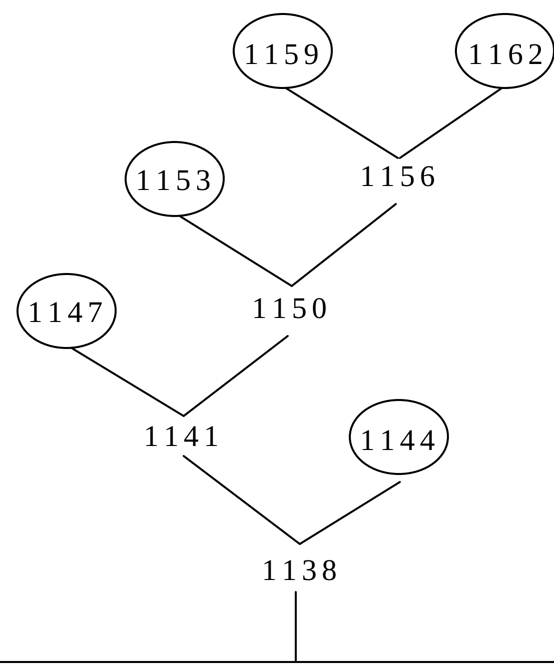
Projects Entered as Point Sources

Subwatershed ID	Project Name
NA	NA

WDM Stations Assigned in Project

Subwatershed ID	WDM Station
1138	Milledgeville
1141	Milledgeville
1144	Milledgeville
1147	Milledgeville
1150	Milledgeville
1153	Milledgeville
1156	Milledgeville
1159	Milledgeville
1162	Milledgeville

Schematic of Project Subwatersheds
(Modeling Framework)



Batch Files to Run for Project

None

GA Middle 3 Basins TMDL Development – HSPF Project Summary Sheet

Project Name: UPOCN14

Listed Segments in Project

Subwatershed ID	Listed Segment
1078	NA
1084	NA
1087	NA
1090	NA
1093	Little River (FC)
1096	Big Indian Creek (FC)
1099	NA
1102	Little River (FC)
1105	Big Indian Creek (FC)
1108	NA
1111	NA
1114	Little River (FC)
1117	NA

Notes:
DO = Dissolved Oxygen
FC = Fecal Coliform

Point Sources in Project

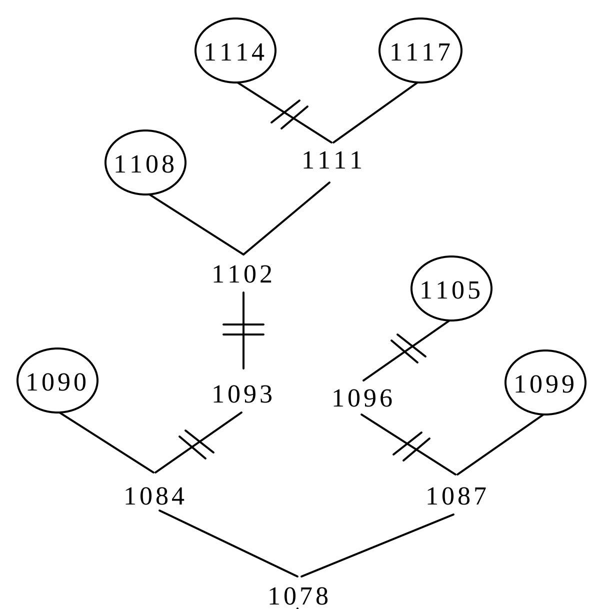
Subwatershed ID	NPDES ID and Name	Receiving Stream	Permitted Flow (cfs)
1078			
1084			
1087			
1090			
1093			
1096			
1099			
1102			
1105	GA0025895 Rutledge Pond	Indian Cr	0.078
1108			
1111			
1114	GA0026107 Social Circle	Little River Trib	0.698
1117			

Projects Entered as Point Sources

WDM Stations Assigned in Project

Subwatershed ID	WDM Station
1078	Milledgeville
1084	Milledgeville
1087	Milledgeville
1090	Milledgeville
1093	Milledgeville
1096	Monroe
1099	Monroe
1102	Monroe
1105	Monroe
1108	Milledgeville
1111	Monroe
1114	Monroe
1117	Monroe

Schematic of Project Subwatersheds
(Modeling Framework)



Batch Files to Run for Project

None

GA Middle 3 Basins TMDL Development – HSPF Project Summary Sheet

Project Name: UPOCN15

Listed Segments in Project

Subwatershed ID	Listed Segment
1033	NA
1039	NA
1042	NA
1045	NA
1048	NA
1051	NA
1054	NA
1057	NA
1060	NA
1063	NA
1066	NA

Notes:
DO = Dissolved Oxygen
FC = Fecal Coliform

Point Sources in Project

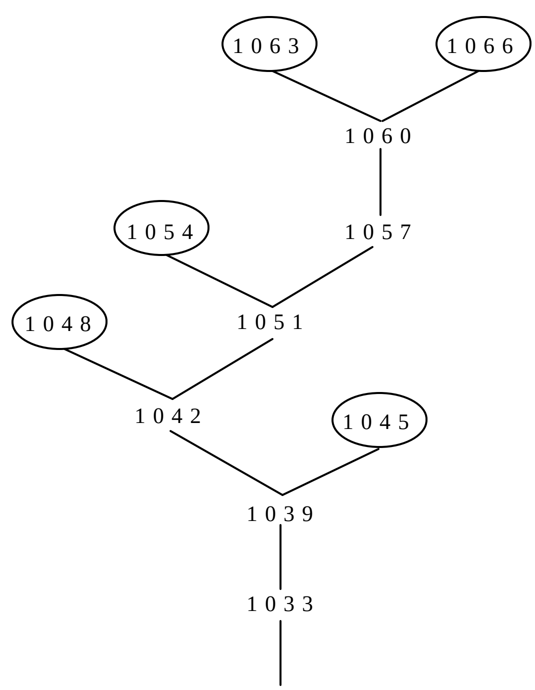
Sub ID	NPDES ID and Name	Receiving Stream	Permitted Flow (cfs)
1033			
1039			
1042			
1045			
1048			
1051	GA0020150 Monticello White Oak	White Oak Creek	0.178
1054	GA0020141 Monticello Pearson GA0034142 Jasper Co BD of Comm	Pearson Cr Pearson Cr	0.264 0.019
1057			
1060			
1063			
1066			

Projects Entered as Point Sources

WDM Stations Assigned in Project

Subwatershed ID	WDM Station
1033	Milledgeville
1039	Milledgeville
1042	Milledgeville
1045	Milledgeville
1048	Milledgeville
1051	Milledgeville
1054	Milledgeville
1057	Milledgeville
1060	Milledgeville
1063	Milledgeville
1066	Milledgeville

Schematic of Project Subwatersheds
(Modeling Framework)



Batch Files to Run for Project
None

GA Middle 3 Basins TMDL Development – HSPF Project Summary Sheet

Project Name: UPOCN16

Listed Segments in Project

Subwatershed ID	Listed Segment
1004	NA
1010	NA
1013	NA
1015	NA
1018	Big Cedar Creek (FC)
1021	NA
1024	NA
1027	NA
1030	NA
1036	Little River (FC)
1069	Little River (FC)
1072	NA
1075	Little River (FC)
1081	NA

Notes:
DO = Dissolved Oxygen
FC = Fecal Coliform

Point Sources in Project

Sub ID	NPDES ID and Name	Receiving Stream	Permitted Flow (cfs)
1004	GA0022438 H&H Mobile Home Village	Little River	0.014
1010			
1013			
1015			
1018			
1021			
1024			
1027			
1030			
1036			
1069			
1072	GA0032263 Eatonton West WPCP	Unnamed Trib	0.605
1075			
1081	GA0022233 Rock Eagle 4-H Cen	Glady Cr	0.240

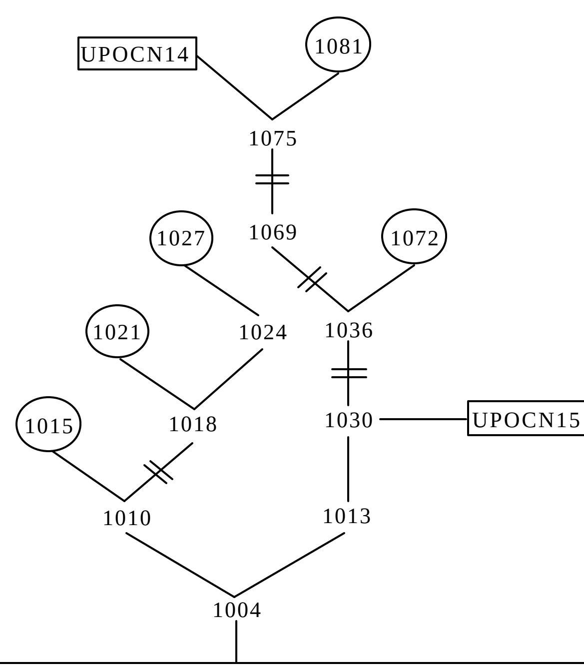
Projects Entered as Point Sources

Subwatershed ID	Project Name

WDM Stations Assigned in Project

Subwatershed ID	WDM Station
1004	Milledgeville
1010	Milledgeville
1013	Milledgeville
1015	Milledgeville
1018	Milledgeville
1021	Milledgeville
1024	Milledgeville
1027	Milledgeville
1030	Milledgeville
1036	Milledgeville
1069	Milledgeville
1072	Milledgeville
1075	Milledgeville
1081	Milledgeville

Schematic of Project Subwatersheds
(Modeling Framework)



Batch Files to Run for Project

LinkUpocn14and15toUpocn16.bat

GA Middle 3 Basins TMDL Development – HSPF Project Summary Sheet

Project Name: UPOCN17

Listed Segments in Project

Subwatershed ID	Listed Segment
1001	NA
1007	NA
1120	Rooty Creek (FC)
1123	Rooty Creek (FC)
1126	NA
1129	NA
1132	NA

Notes:
DO = Dissolved Oxygen
FC = Fecal Coliform

Point Sources in Project

Subwatershed ID	NPDES ID and Name	Receiving Stream	Permitted Flow (cfs)
1001			
1007			
1120			
1123	GA0032271 Eatonton East WPCP	Rooty Creek Trib	0.426
1126			
1129			
1132			

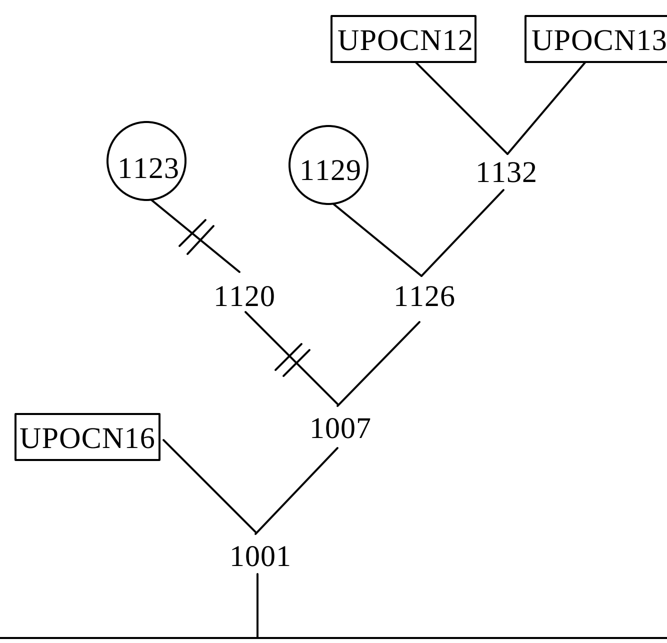
Projects Entered as Point Sources

Subwatershed ID	Project Name
1001	UPOCN16
1132	UPOCN12
1132	UPOCN13

WDM Stations Assigned in Project

Subwatershed ID	WDM Station
1001	Milledgeville
1007	Milledgeville
1120	Milledgeville
1123	Milledgeville
1126	Milledgeville
1129	Milledgeville
1132	Milledgeville

Schematic of Project Subwatersheds
(Modeling Framework)



Batch Files to Run for Project
LinkUpocn12and13and16toUpocn17.bat

LOWER OCONEE RIVER BASIN (03070102)

Georgia Middle 3 Basins TMDL Development

303(d) Listed Impaired Segments for Fecal Coliform

Lower Oconee Basin

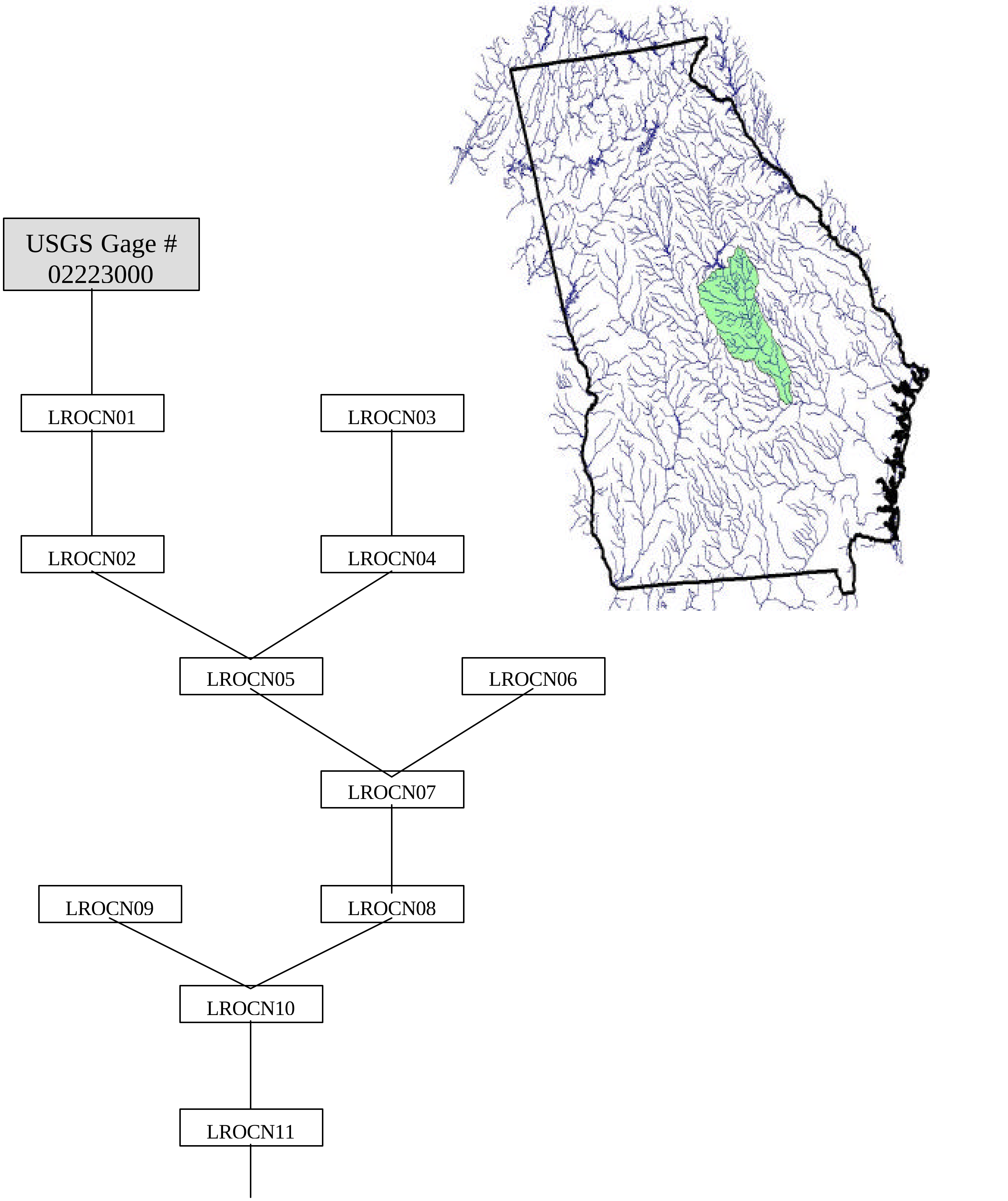
Not Supporting Designated Use

STREAM	1999 MONITORING STATION	PROJECT NAME	SUBWATERSHED ID	12 DIGIT HUC ID
BLUFF CREEK	02223065	LROCN02	2262	030701020206
BIG SANDY CREEK	02223368	LROCN06	2172, 2181, 2187	030701020705, 030701020705, 030701020701
TURKEY CREEK	02223940	LROCN09, LROCN10	2085	030701021103

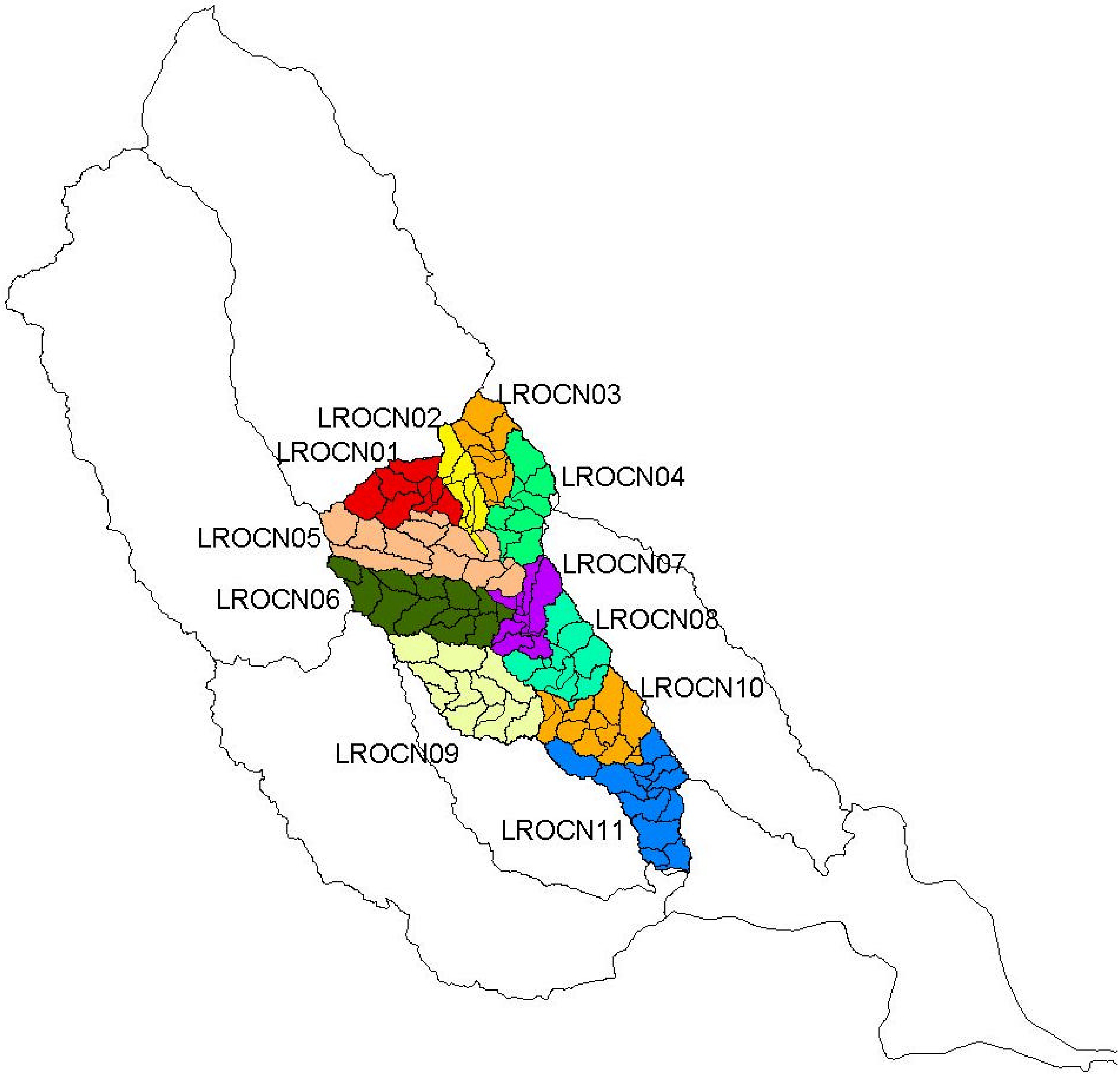
Partially Supporting Designated Use

STREAM	1999 MONITORING STATION	PROJECT NAME	SUBWATERSHED ID	12 DIGIT HUC ID
TOWN CREEK	02223050	LROCN02	2274, 2298, 2304	030701020205, 030701020205, 030701020204
LITTLE COMMISIONER CREEK	02223182	LROCN05	2229	030701020504
OCONEE RIVER	02223600	LROCN08	2112, 2115, 2124	030701020901, 030701020901, 030701020901
TURKEY CREEK	02224100	LROCN09, LROCN10	2070, 2076, 2079	030701021105, 030701021105, 030701021104

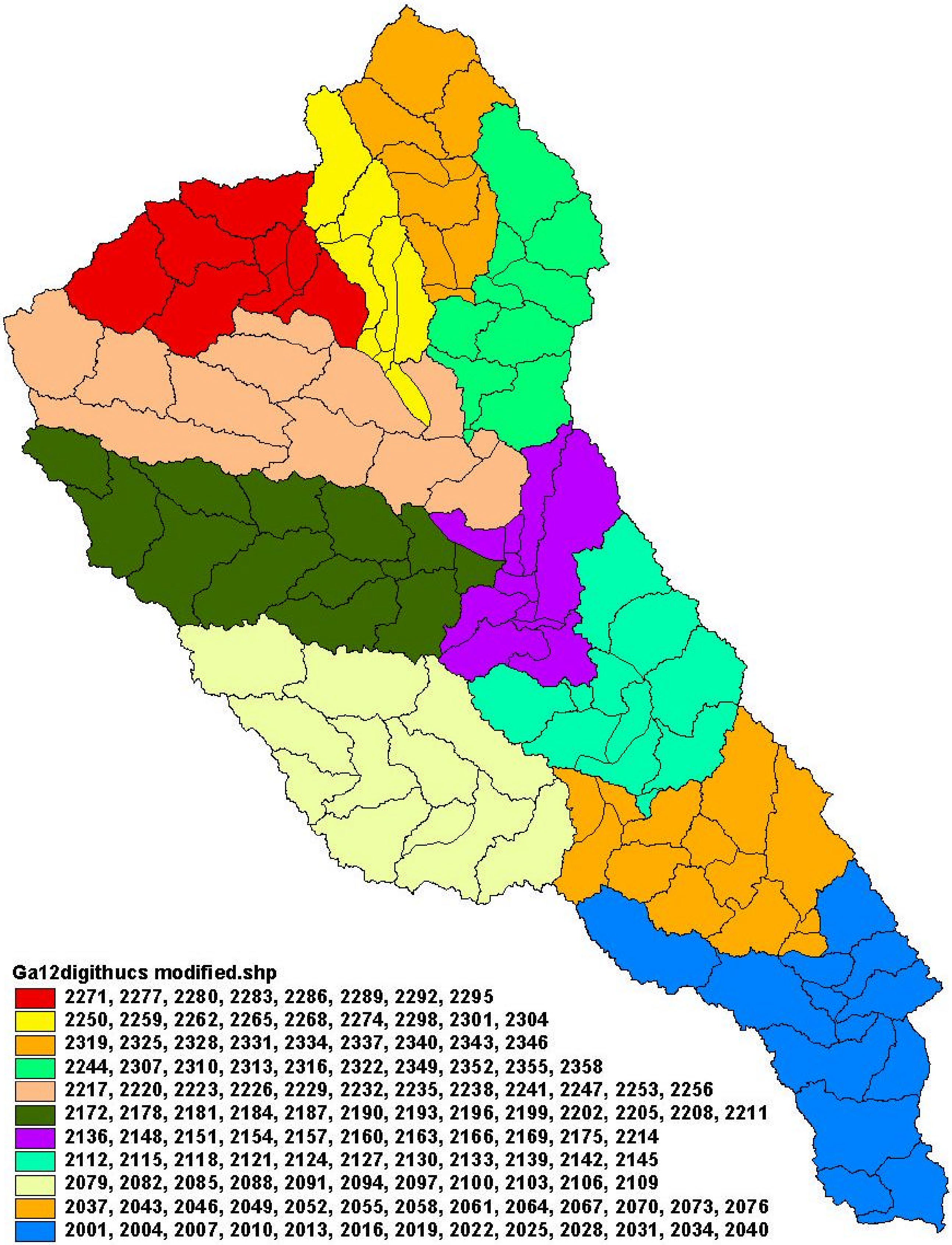
Modeling Schematic of the Lower Oconee River Basin (03070102)



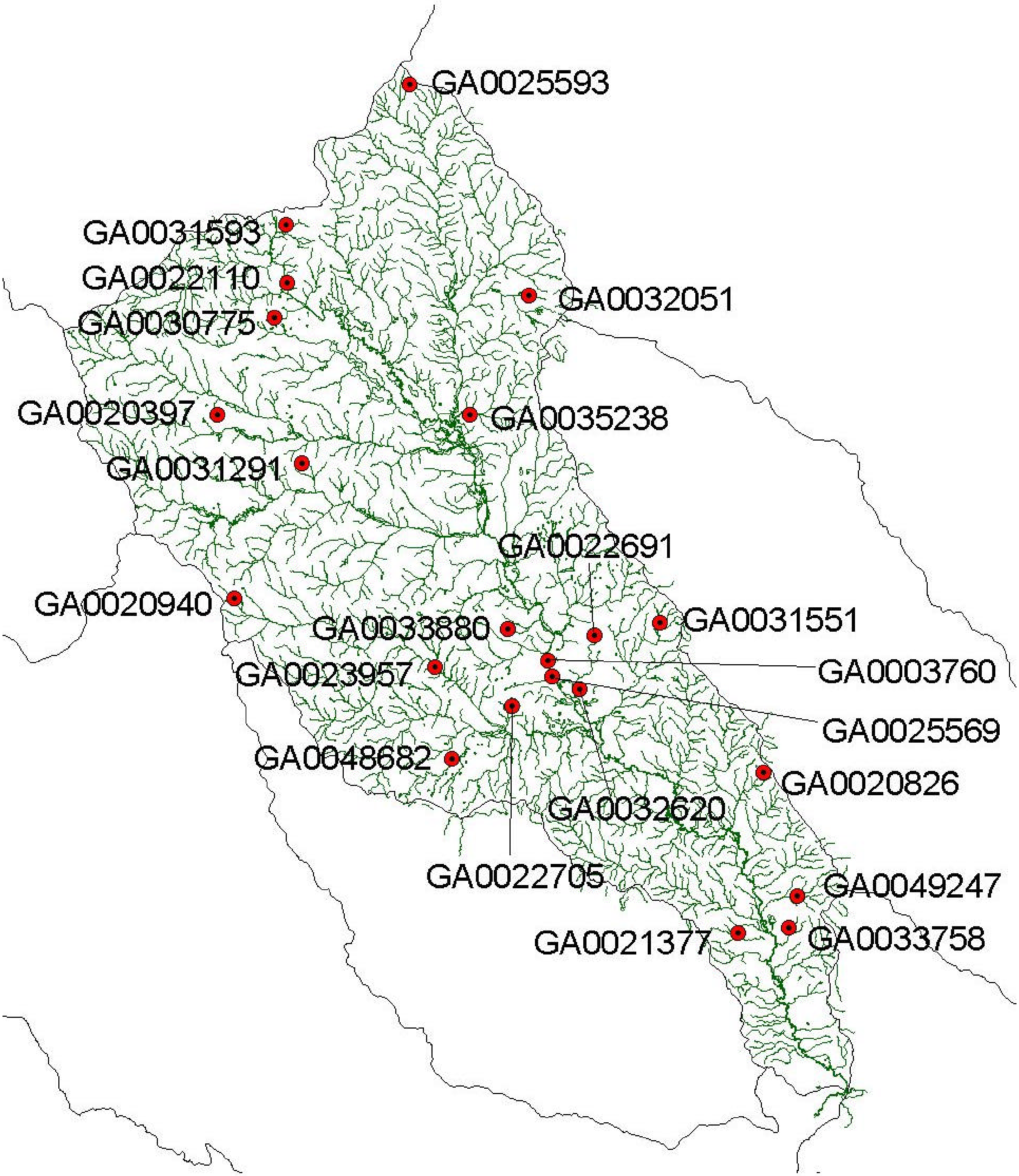
Lower Oconee River Basin Projects



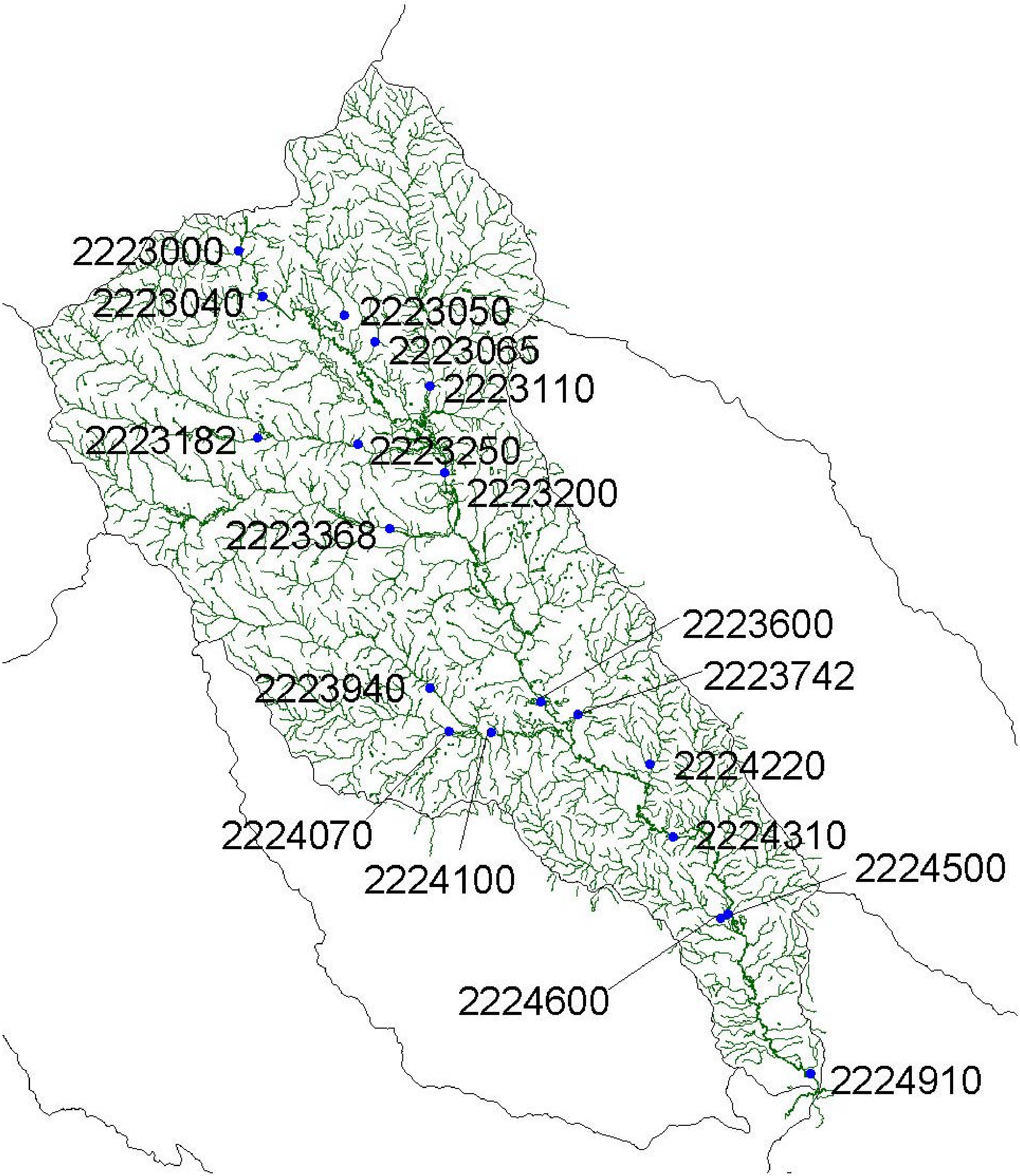
Lower Oconee River Basin
Delineated Subwatersheds for Modeling


Ga12digithucs modified.shp
2271, 2277, 2280, 2283, 2286, 2289, 2292, 2295
2250, 2259, 2262, 2265, 2268, 2274, 2298, 2301, 2304
2319, 2325, 2328, 2331, 2334, 2337, 2340, 2343, 2346
2244, 2307, 2310, 2313, 2316, 2322, 2349, 2352, 2355, 2358
2217, 2220, 2223, 2226, 2229, 2232, 2235, 2238, 2241, 2247, 2253, 2256
2172, 2178, 2181, 2184, 2187, 2190, 2193, 2196, 2199, 2202, 2205, 2208, 2211
2136, 2148, 2151, 2154, 2157, 2160, 2163, 2166, 2169, 2175, 2214
2112, 2115, 2118, 2121, 2124, 2127, 2130, 2133, 2139, 2142, 2145
2079, 2082, 2085, 2088, 2091, 2094, 2097, 2100, 2103, 2106, 2109
2037, 2043, 2046, 2049, 2052, 2055, 2058, 2061, 2064, 2067, 2070, 2073, 2076
2001, 2004, 2007, 2010, 2013, 2016, 2019, 2022, 2025, 2028, 2031, 2034, 2040

Lower Oconee River Basin
Active Permitted Point Sources for Modeling


GA0025593
GA0031593
GA0022110
GA0030775
GA0032051
GA0020397
GA0035238
GA0031291
GA0022691
GA0020940
GA0033880
GA0031551
GA0003760
GA0023957
GA0025569
GA0048682
GA0020826
GA0032620
GA0022705
GA0049247
GA0021377
GA0033758

Lower Oconee River Basin
1999 Water Quality Monitoring Stations


2223000
2223040
2223050
2223065
2223110
2223182
2223250
2223200
2223368
2223600
2223742
2223940
2224220
2224070
2224310
2224100
2224500
2224600
2224910

GA Middle 3 Basins TMDL Development – HSPF Project Summary Sheet

Project Name: LROCN01

Listed Segments in Project

Subwatershed ID	Listed Segment
2271	NA
2277	NA
2280	NA
2283	NA
2286	NA
2289	NA
2292	NA
2295	NA

Notes:
DO = Dissolved Oxygen
FC = Fecal Coliform

Point Sources in Project

Sub. ID	NPDES ID and Name	Receiving Stream	Permitted Flow (cfs)
2271			
2277	GA0022110 Mid. GA Correction	Oconee River	0.046
2280			
2283			
2286	GA0030775 Milledgeville WPCP	Oconee River	10.850
2289			
2292	GA0031593 GA College L Laurel	Champion Creek	0.003
2295			

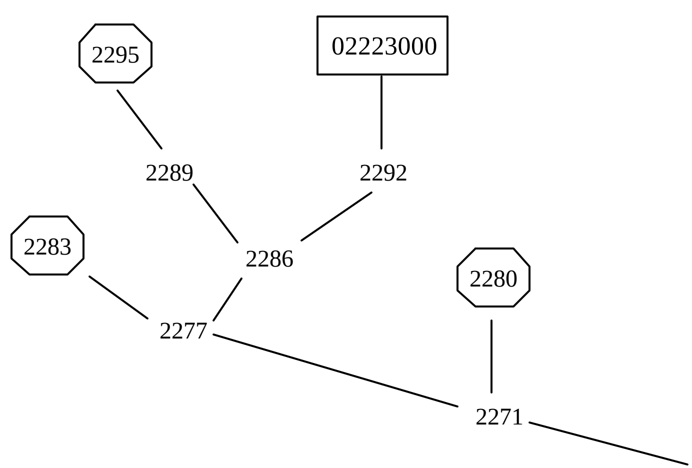
Projects Entered as Point Sources

Subwatershed	Project Name

WDM Stations Assigned in Project

Subwatershed ID	WDM Station
2271	Milledgeville
2277	Milledgeville
2280	Milledgeville
2283	Milledgeville
2286	Milledgeville
2289	Milledgeville
2292	Milledgeville
2295	Milledgeville

Schematic of Project Subwatersheds (Modeling Framework)



Batch Files to Run for Project

Link02223000toLrocn01.bat

GA Middle 3 Basins TMDL Development – HSPF Project Summary Sheet

Project Name: LROCN02

Listed Segments in Project

Subwatershed ID	Listed Segment
2250	NA
2259	NA
2262	Bluff Creek (DO and FC)
2265	Town Creek (FC)
2268	NA
2274	Town Creek (FC)
2298	Town Creek (FC)
2301	NA
2304	Town Creek (FC)

Notes:
DO = Dissolved Oxygen
FC = Fecal Coliform

Point Sources in Project

Sub. ID	NPDES ID and Name	Receiving Stream	Permitted Flow (cfs)
2250			
2259			
2262			
2265			
2268			
2274			
2298			
2301			
2304			

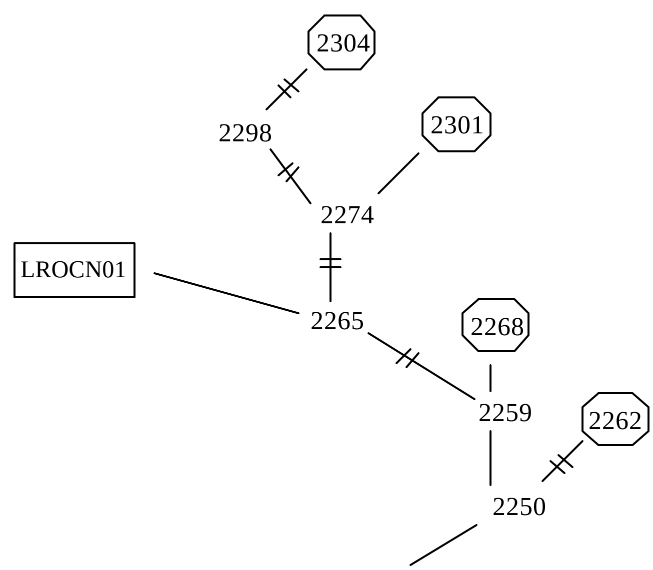
Projects Entered as Point Sources

Subwatershed ID	Project Name
2265	LROCN01

WDM Stations Assigned in Project

Subwatershed ID	WDM Station
2250	Milledgeville
2259	Milledgeville
2262	Milledgeville
2265	Milledgeville
2268	Milledgeville
2274	Milledgeville
2298	Milledgeville
2301	Milledgeville
2304	Milledgeville

Schematic of Project Subwatersheds
(Modeling Framework)



Batch Files to Run for Project
LinkLrocn01toLrocn02.bat

GA Middle 3 Basins TMDL Development – HSPF Project Summary Sheet

Project Name: LROCN03

Listed Segments in Project

Subwatershed ID	Listed Segment
2319	NA
2325	NA
2328	NA
2331	NA
2334	NA
2337	NA
2340	NA
2343	NA
2346	NA

Notes:
DO = Dissolved Oxygen
FC = Fecal Coliform

Point Sources in Project

Sub. ID	NPDES ID and Name	Receiving Stream	Permitted Flow (cfs)
2319			
2325			
2328			
2331			
2334			
2337			
2340			
2343			
2346	GA0025593 Sparta Pond	Unnamed Trib. to Buffalo Creek	0.124

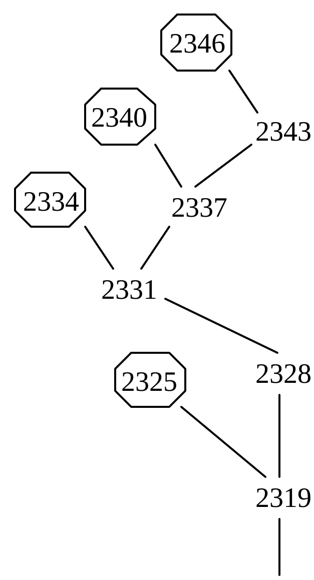
Projects Entered as Point Sources

Subwatershed ID	Project Name
	[illegible]

WDM Stations Assigned in Project

Subwatershed ID	WDM Station
2319	Milledgeville
2325	Milledgeville
2328	Milledgeville
2331	Sparta
2334	Sparta
2337	Sparta
2340	Sparta
2343	Sparta
2346	Sparta

Schematic of Project Subwatersheds (Modeling Framework)



Batch Files to Run for Project

None

GA Middle 3 Basins TMDL Development – HSPF Project Summary Sheet

Project Name: LROCN04

Listed Segments in Project

Subwatershed ID	Listed Segment
2244	NA
2307	NA
2310	NA
2313	NA
2316	NA
2322	NA
2349	NA
2352	NA
2355	NA
2358	NA

Notes:
DO = Dissolved Oxygen
FC = Fecal Coliform

Point Sources in Project

Sub. ID	NPDES ID and Name	Receiving Stream	Permitted Flow (cfs)
2244			
2307			
2310	GA0035238 Oconee Health Care Center	Oconee River Tributary	0.009
2313			
2316			
2322			
2349			
2352	GA0032051 Sandersville WPCP	Tanyand Creek Trib.	2.635
2355			
2358			

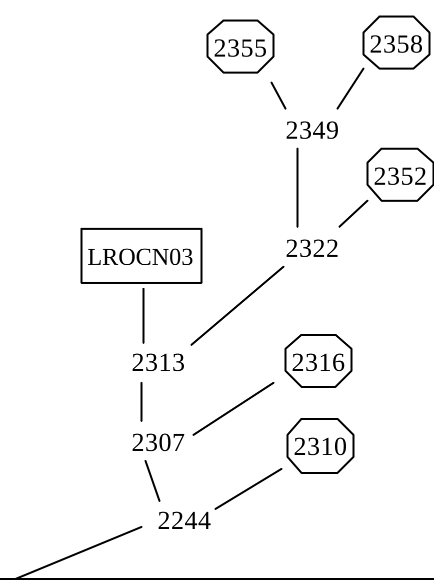
Projects Entered as Point Sources

Subwatershed ID	Project Name

WDM Stations Assigned in Project

Subwatershed ID	WDM Station
2244	Milledgeville
2307	Milledgeville
2310	Milledgeville
2313	Milledgeville
2316	Milledgeville
2322	Milledgeville
2349	Sparta
2352	Sparta
2355	Sparta
2358	Sparta

Schematic of Project Subwatersheds
(Modeling Framework)



Batch Files to Run for Project

LinkLrocn03toLrocn04.bat

GA Middle 3 Basins TMDL Development – HSPF Project Summary Sheet

Project Name: LROCN05

Listed Segments in Project

Subwatershed ID	Listed Segment
2217	NA
2220	NA
2223	NA
2226	NA
2229	Little Commissioner Creek (FC)
2232	NA
2235	NA
2238	NA
2241	NA
2247	NA
2253	NA
2256	NA

Notes:
DO = Dissolved Oxygen
FC = Fecal Coliform

Point Sources in Project

Sub. ID	NPDES ID and Name	Receiving Stream	Permitted Flow (cfs)
2217			
2220			
2223			
2226			
2229	GA0020397 Gordon WPCP	Little Commissioner Creek	1.162
2232			
2235			
2238			
2241			
2247			
2253			
2256			

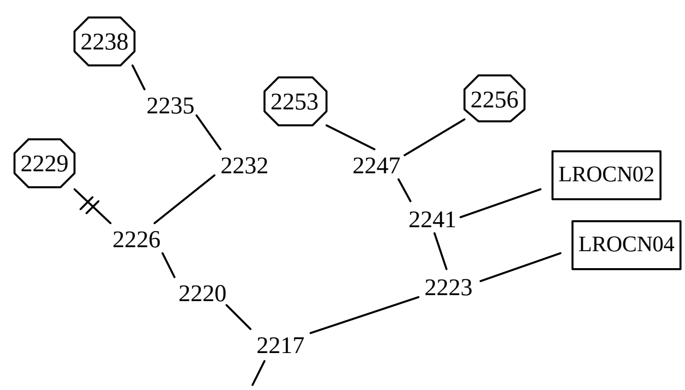
Projects Entered as Point Sources

Subwatershed ID	Project Name

WDM Stations Assigned in Project

Subwatershed ID	WDM Station
2217	Dublin 2
2220	Dublin 2
2223	Dublin 2
2226	Milledgeville
2229	Milledgeville
2232	Milledgeville
2235	Milledgeville
2238	Milledgeville
2241	Milledgeville
2247	Milledgeville
2253	Milledgeville
2256	Milledgeville

Schematic of Project Subwatersheds
(Modeling Framework)



Batch Files to Run for Project

LinkLrocn02and04toLrocn05.bat

GA Middle 3 Basins TMDL Development – HSPF Project Summary Sheet

Project Name: LROCN06

Listed Segments in Project

Subwatershed ID	Listed Segment
2172	Big Sandy Creek (FC)
2178	NA
2181	Big Sandy Creek (FC)
2184	NA
2187	Big Sandy Creek (FC)
2190	NA
2193	NA
2196	NA
2199	NA
2202	NA
2205	NA
2208	NA
2211	NA

Notes:
DO = Dissolved Oxygen
FC = Fecal Coliform

Point Sources in Project

Sub. ID	NPDES ID and Name	Receiving Stream	Permitted Flow (cfs)
2172			
2178			
2181			
2184			
2187			
2190			
2193			
2196			
2199	GA0031291 Wilkinson Co, HS	Big Sandy Creek	0.034
2202			
2205			
2208			
2211			

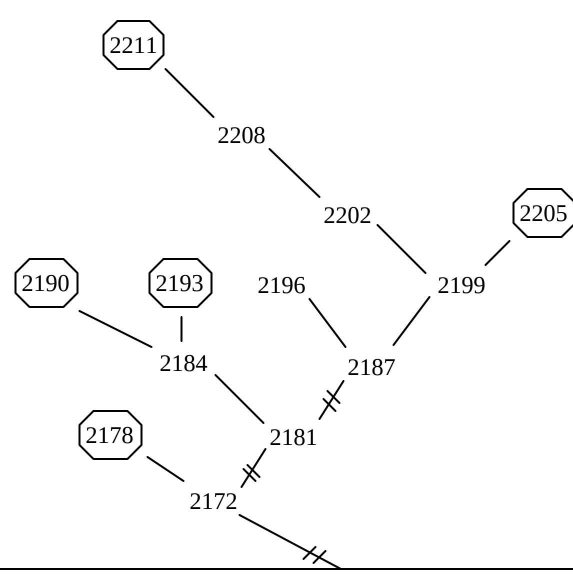
Projects Entered as Point Sources

Subwatershed	Project Name

WDM Stations Assigned in Project

Subwatershed ID	WDM Station
2172	Dublin 2
2178	Dublin 2
2181	Dublin 2
2184	Dublin 2
2187	Dublin 2
2190	Dublin 2
2193	Dublin 2
2196	Macon Lewis
2199	Milledgeville
2202	Macon
2205	Milledgeville
2208	Macon
2211	Macon

Schematic of Project Subwatersheds (Modeling Framework)



Batch Files to Run for Project

None

GA Middle 3 Basins TMDL Development – HSPF Project Summary Sheet

Project Name: LROCN07

Listed Segments in Project

Subwatershed ID	Listed Segment
2136	NA
2148	NA
2151	NA
2154	NA
2157	NA
2160	NA
2163	NA
2166	NA
2169	NA
2175	NA
2214	NA

Notes:
DO = Dissolved Oxygen
FC = Fecal Coliform

Point Sources in Project

Sub. ID	NPDES ID and Name	Receiving Stream	Permitted Flow (cfs)
2136			
2148			
2151			
2154			
2157			
2160			
2163			
2166			
2169			
2175			
2214			

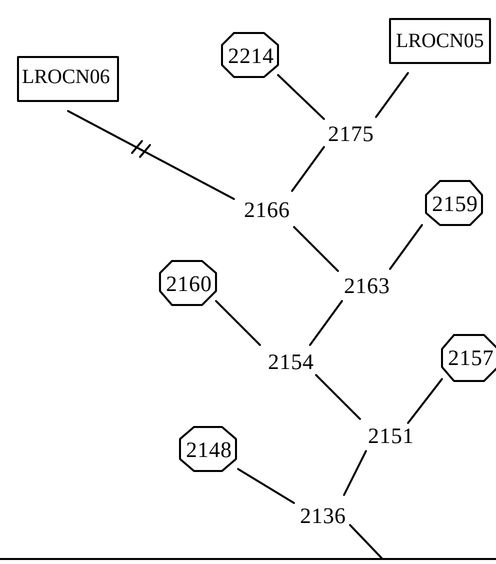
Projects Entered as Point Sources

Subwatershed ID	Project Name
2166	LROCN06
2175	LROCN05

WDM Stations Assigned in Project

Subwatershed ID	WDM Station
2136	Dublin 2
2148	Dublin 2
2151	Dublin 2
2154	Dublin 2
2157	Dublin 2
2160	Dublin 2
2163	Dublin 2
2166	Dublin 2
2169	Dublin 2
2175	Dublin 2
2214	Dublin 2

Schematic of Project Subwatersheds (Modeling Framework)



Batch Files to Run for Project

LinkLrocn05and06toLrocn07.bat

GA Middle 3 Basins TMDL Development – HSPF Project Summary Sheet

Project Name: LROCN08

Listed Segments in Project

Subwatershed ID	Listed Segment
2112	Oconee River (FC)
2115	Oconee River (FC)
2118	Pughes Creek (DO)
2121	Pughes Creek (DO)
2124	Oconee River (FC)
2127	NA
2130	NA
2133	NA
2139	NA
2142	NA
2145	NA

Notes:
DO = Dissolved Oxygen
FC = Fecal Coliform

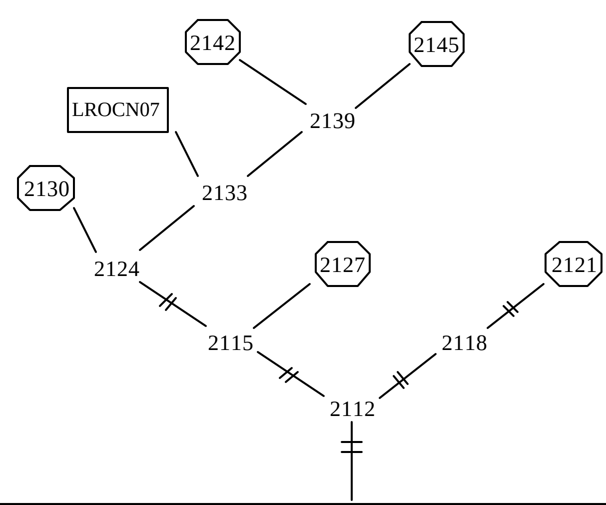
Point Sources in Project

Sub. ID	NPDES ID and Name	Receiving Stream	Permitted Flow (cfs)
2112			
2115			
2118			
2121	GA0031551 Johnson C. Nursing Home	Pughes Creek	0.011
2124	GA0003760 Forstmann Co. GA0025569 Dublin WPCP	Oconee River	5.425 6.200
2127	GA0022691 E. Laurens E. Sch. GA0032620 SE Paper MFG	Shaddock Creek Shaddock Creek	0.053 23.250
2130	GA0033880 Wood. T. MHP	Strawberry Creek	0.019
2133			
2139			

WDM Stations Assigned in Project

Subwatershed ID	WDM Station
2112	Dublin 2
2115	Dublin 2
2118	Dublin 2
2121	Dublin 2
2124	Dublin 2
2127	Dublin 2
2130	Dublin 2
2133	Dublin 2
2139	Dublin 2
2142	Dublin 2
2145	Dublin 2

Schematic of Project Subwatersheds (Modeling Framework)



Batch Files to Run for Project

LinkLrocn07toLrocn08.bat

GA Middle 3 Basins TMDL Development – HSPF Project Summary Sheet

Project Name: LROCN09

Listed Segments in Project

Subwatershed ID	Listed Segment
2079	Turkey Creek (FC)
2082	NA
2085	Turkey Creek (FC)
2088	NA
2091	NA
2094	NA
2097	NA
2100	NA
2103	NA
2106	NA
2109	NA

Notes:
DO = Dissolved Oxygen
FC = Fecal Coliform

Point Sources in Project

Sub. ID	NPDES ID and Name	Receiving Stream	Permitted Flow (cfs)
2079			
2082	GA0048682 Dexter WPCP	Stitchihatchee Creek	0.115
2085	GA0023957 Dudley WPCP GA0022705 W. Laurens HS	Turkey Cr. Spring Creek	0.178 0.080
2088			
2091			
2094			
2097			
2100			
2103			
2106			
2109	GA0020940 Jefferson WPCP	Turkey Creek	0.387

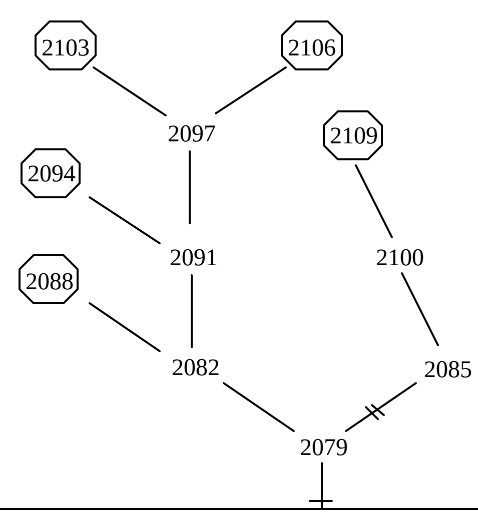
Projects Entered as Point Sources

Subwatershed	Project Name

WDM Stations Assigned in Project

Subwatershed ID	WDM Station
2079	Dublin 2
2082	Dublin 2
2085	Dublin 2
2088	Dublin 2
2091	Dublin 2
2094	Dublin 2
2097	Dublin 2
2100	Dublin 2
2103	Dublin 2
2106	Dublin 2
2109	Macon Lewis

Schematic of Project Subwatersheds
(Modeling Framework)



Batch Files to Run for Project

None

Project Name: LROCN10

Listed Segments in Project

Subwatershed ID	Listed Segment
2037	NA
2043	NA
2046	NA
2049	NA
2052	NA
2055	NA
2058	NA
2061	NA
2064	NA
2067	NA
2070	Turkey Creek (FC)
2073	NA
2076	Turkey Creek (FC)

Notes:
DO = Dissolved Oxygen
FC = Fecal Coliform

Point Sources in Project

Sub. ID	NPDES ID and Name	Receiving Stream	Permitted Flow (cfs)
2037			
2043			
2046			
2049	GA0020826 Soperton WPCP	Little Red Bluff Creek	0.620
2052			
2055			
2058			
2061			
2064			
2067			
2070			
2073			
2076			

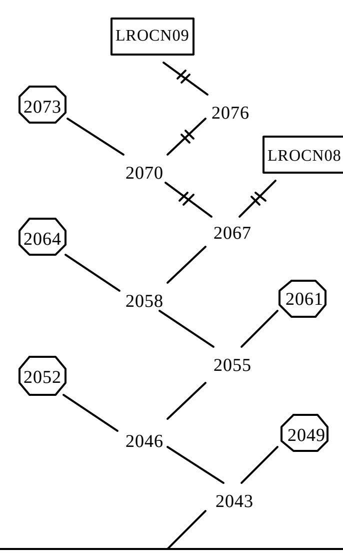
Projects Entered as Point Sources

Subwatershed ID	Project Name
[illegible]	[illegible]

WDM Stations Assigned in Project

Subwatershed ID	WDM Station
2037	Dublin 2
2043	Dublin 2
2046	Dublin 2
2049	Dublin 2
2052	Dublin 2
2055	Dublin 2
2058	Dublin 2
2061	Dublin 2
2064	Dublin 2
2067	Dublin 2
2070	Dublin 2
2073	Dublin 2
2076	Dublin 2

Schematic of Project Subwatersheds (Modeling Framework)



Batch Files to Run for Project

LinkLrocn08and09toLrocn10.bat

GA Middle 3 Basins TMDL Development – HSPF Project Summary Sheet

Project Name: LROCN11

Listed Segments in Project

Subwatershed ID	Listed Segment
2001	NA
2004	NA
2007	NA
2010	NA
2013	NA
2016	Ochwalkee Creek (DO)
2019	Ochwalkee Creek (DO)
2022	NA
2025	NA
2028	NA
2031	NA
2034	NA
2040	NA

Notes:
DO = Dissolved Oxygen
FC = Fecal Coliform

Point Sources in Project

Sub. ID	NPDES ID and Name	Receiving Stream	Permitted Flow (cfs)
2001			
2004			
2007			
2010			
2013	GA0021377 Glenword WPCP GA0033758 Mt. Vernon WPCP	Peterson Creek Trib. Limestone Creek	0.170 0.270
2016			
2019			
2022			
2025			
2028	GA0049247 Ailey WPCP	Flat Creek	0.080
2031			
2034			
2040			

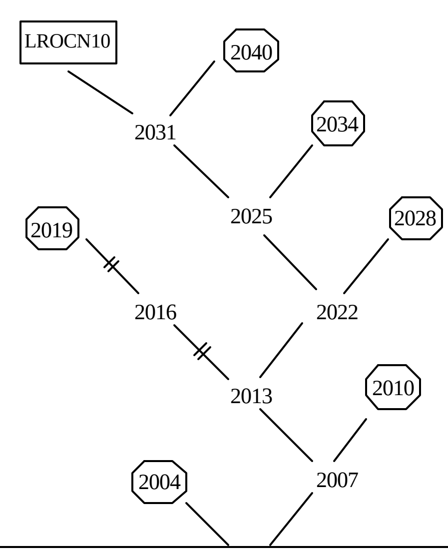
Projects Entered as Point Sources

Subwatershed	Project Name

WDM Stations Assigned in Project

Subwatershed ID	WDM Station
2001	Hazel
2004	Hazel
2007	Hazel
2010	Hazel
2013	Hazel
2016	Hazel
2019	Dublin 2
2022	Hazel
2025	Hazel
2028	Hazel
2031	Hazel
2034	Hazel
2040	Dublin 2

Schematic of Project Subwatersheds (Modeling Framework)



Batch Files to Run for Project

LinkLrocn10toLrocn11.bat