# TOTAL MAXIMUM DAILY LOAD (TMDL) DEVELOPMENT

For FECAL COLIFORM in the

## ROCKY CREEK WATERSHED

**In the Savannah River Basin**

(HUC 03060106)

Richmond County, Rocky Creek Basin, Georgia

EPA United States Environmental Protection Agency

Region 4 serving the southeast

APPROVAL PAGE

for FECAL COLIFORM TMDL in

Rocky Creek, GA

Georgia=s final 1998 303(d) list identified Rocky Creek near Augusta, GA as not supporting its designated use, with the pollutant of concern being fecal coliform bacteria. This total maximum daily load (TMDL) is being established pursuant to the 1998 Georgia 303(d) list and the Consent Decree in the Georgia TMDL Lawsuit.

The TMDL calculation is based on the results of the Stormwater Management Model (SWMM) and the Water Quality Analysis Simulation Program (WASP5) model to determine the appropriate 30-day fecal coliform load that will achieve water quality standards.

The maximum load that caused a water quality standards violation was calculated for 1997 by analyzing the WASP model results. It was determined that the largest 30-day geometric fecal coliform concentration occurred in Segment 12 of Rocky Creek between 6/11/97 and 9/3/97 with a value of 1,016 counts/100 ml or 3.76E+14 counts/30 days. Using the WASP model it was determined that to achieve the water quality standard of 200 counts/100 ml as a 30-day geometric mean, the fecal load coming from the Rocky Creek watershed would have to be reduced by 80%.

For the Rocky Creek watershed, an 80% load reduction would have to occur to achieve the 200-counts/100 ml criterion or no more than 7.53E+13 counts/30 days.

APPROVED BY:

_____ _____

Robert F. McGhee, Director Date

Water Management Division

EPA-Region 4

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# Introduction

Section 303(d) of the Clean Water Act (CWA) as Amended by the Water Quality Act of 1987, Public Law 100-4, and the United States Environmental Protection Agency's (USEPA/EPA) Water Quality Planning and Management Regulations [Title 40 of the Code of Federal Regulation (40 CFR), Part 130] require each State to identify those waters within its boundaries not meeting water quality standards applicable to the water's designated uses. The identified waters are prioritized based on the severity of pollution with respect to designated use classifications. Total maximum daily loads (TMDLs) for all pollutants violating or causing violation of applicable water quality standards are established for each identified water. Such loads are established at levels necessary to implement the applicable water quality standards with seasonal variations and margins of safety. The TMDL process establishes the allowable loadings of pollutants or other quantifiable parameters for a water body, based on the relationship between pollution sources and in-stream water quality conditions, so that states can establish water-quality based controls to reduce pollution from both point and nonpoint sources and restore and maintain the quality of their water resources (USEPA, 1991).

# Problem Definition

Georgia's final 1998 Section 303(d) list identified Rocky Creek, a tributary to Butler Creek, which flows into the Savannah River just below the City of Augusta, Georgia as not supporting its designated use as fishing water, with the pollutant of concern was identified as Fecal Coliform. A limited dataset has been previously collected, analysis of the data shows water quality impairment due to Fecal Coliform, primarily due to stormwater discharge. The most likely cause of the elevated Fecal Coliform concentrations are due to leaky sewers and stormwater runoff. This TMDL will consider the effects of storm events on Fecal Coliforms and will calculate the percent reduction in Fecal Coliform runoff that will need to occur to meet the water quality standard. Rocky Creek has 103 stormwater outfalls draining stormwater from the

surrounding watershed. Urban landuse comprises most of the Rocky Creek watershed that is collected by the stormwater system. Because a large portion of the watershed is impervious to water infiltration, surface water and pollutant runoff is a major concern.

## Target Identification

The target level for the development of the Fecal Coliform TMDL in the Rocky Creek segment is the numeric criterion established in Georgia's Rules and Regulations for Water Quality Control, Chapter 391-3-6, Revised July 6, 1999. Georgia Regulation 391-3-6-.03(5)(e)(ii)(5)(a) establishes the freshwater criteria for Fecal Coliform expressed in terms of a geometric mean concentration of no more than 200 counts/ml.

## Background

The segment that is impaired is Rocky Creek, which is an urban area located in the City of Augusta. Rocky Creek drains into Butler Creek that runs into the Savannah River. The 12-mile segment of Rocky Creek is on the State of Georgia's §303 (d) list for violating the total Fecal Coliform standard for the State of Georgia.

## Numeric Targets and Sources - Model Development

Determining the causes of elevated fecal coliform concentrations within Rocky Creek will need further investigations in the future because current data is inconclusive in determining sources. Richmond County has just initiated a stormwater sampling program to better assess sources and quantities of fecal coliform draining into Rocky Creek during storm events. Initial data collected by Richmond County indicate dramatic increases in fecal coliform concentrations during storm events.

Assessing the impacts of storm runoff on stream water quality is a very difficult task, accounting for the dynamics of rapidly changing stream flows coupled with the washing of constituents off of the land surface

into the receiving waterbody. This requires the application of two separate models: 1) to predict the quantity and quality running off of the land surface, 2) a water quality model that combines the pollutagraph and hydrograph produced by the runoff model that transports and predicts in stream fecal concentrations. Richmond County, as part of its NPDES Stormwater Permit renewal, developed a dynamic model for evaluating the impacts of storm events in Rocky Creek. The Stormwater Management Model (SWMM) is a dynamic simulation model that utilizes rainfall data to predict the quantity and quality of water washing off the watershed. Richmond County has a limited dataset of sampled storm events in Rocky Creek. This limited data will be used to calibrate the SWMM model using best professional judgment. Richmond County has data starting in spring 1997 through the fall of 1997. SWMM will be calibrated and applied to the time period starting April 1, 1997 through October 1, 1997. The SWMM model will predict both flow and fecal coliform concentrations running off the watershed and entering Rocky Creek through the 103 outfalls. The SWMM model will provide a continuous time series (April 1 – October 1, 1999) of flow and fecal coliform concentration. This time series will be used in the water quality model to determine instream fecal coliforms concentrations and calculate the TMDL.

The Water Quality Analysis Simulation Program (WASP5) will be used to evaluate the impact of the stormwater loads on the in stream fecal concentrations. WASP5 is a dynamic model that is capable of reading time series of flows and concentrations as model boundary conditions. These time series outputs are combined with instream hydraulics and water quality to calculate fecal concentrations. The WASP5 model will be used to calculate the current fecal coliform load within a 30-day period that causes the largest violation within the modeling period. Once this is done WASP5 will be used to calculate the percent reduction in fecal coliform load that would have to occur for Rocky Creek to achieve water quality standards.

## Critical Condition Determination

Determining the most critical condition for stormwater impacted streams requires long-term historical data. This type of information is usually not available for smaller watersheds. Because Richmond County developed a stormwater model for 1997 and collected a limited dataset to support the model development, this time period was selected for the TMDL development. The quantity of fecal coliform that is washed off the watershed is a function of storm frequency and the period of time between the storms. This period of time includes both short and long term storms with varying periods of times between storms. 1997 provided an adequate time series of rainfall that was representative of an average season.

The base flow of Rocky Creek was set to a constant 7Q10 flow of 2 cubic feet per second (cfs), which represents the most critical condition of the creek that storms can impact.

# Total Maximum Daily Load (TMDL)

The TMDL is the total amount of pollutant that can be assimilated by the receiving water body while achieving water quality standards. Rocky Creek is currently not meeting water quality standards for coliform bacteria. There are no permitted point source discharges on Rocky Creek contributing to this water quality problem. The County of Richmond, Georgia does have an MS4/NPDES stormwater discharge permit for this area. The TMDL will be expressed as a percent reduction in fecal coliform load that will need to occur to meet water quality standards.

## *Margin of Safety*

The margin of safety (MOS) is part of the TMDL development process. There are two basic methods for incorporating the MOS (USEPA, 1991a):

1. Implicitly incorporating the MOS using conservative model assumptions to develop allocations, or
2. Explicitly specifying a portion of the total TMDL as the MOS; using the remainder for allocations.

The MOS is incorporated implicitly into this modeling process by the application of higher literature values for washoff rates.

## *Stormwater Model Results*

The Stormwater Management Model (SWMM) was first applied to the Rocky Creek watershed using the initial setup by Richmond County. The model was calibrated using literature values for fecal coliform wash off rates that have been used in previous modeling studies using SWMM. The SWMM model input divided the Rocky Creek watershed into five landuse categories:

1. Single Family
2. Multi-Family
3. Commercial
4. Industrial
5. Open

These landuses were parameterized in the model to provide a portion of the fecal coliform load coming from the watershed. Both the fecal coliform and the water flow were collected and left the system through the 103 outfalls located on Rocky Creek. Using the detailed information from the SWMM model, the 103 outfalls were combined into 5 major outfalls that would be input to the water quality model. Figure 1 illustrates a model schematic, which depicts where the SWMM runoff predictions are entered in the WASP model network.

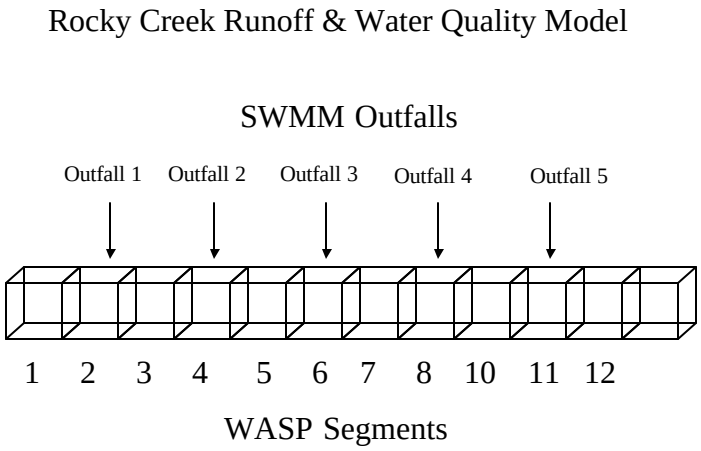


**Figure 1 SWMM and WASP Model Network**

The SWMM model results are presented first. The first 20 most upstream outfalls from the SWMM model were composited into one outfall that enters the WASP model at segment 2. When SWMM outfalls are composited, a flow-weighted fecal coliform concentration was calculated to best represent the individual outfalls to the water quality model. Only the fecal coliform concentrations were flow averaged for WASP, the flows were summed together from all of the SWMM outfalls.

Figure 2 illustrates the predicted runoff hydrograph for outfall 1.

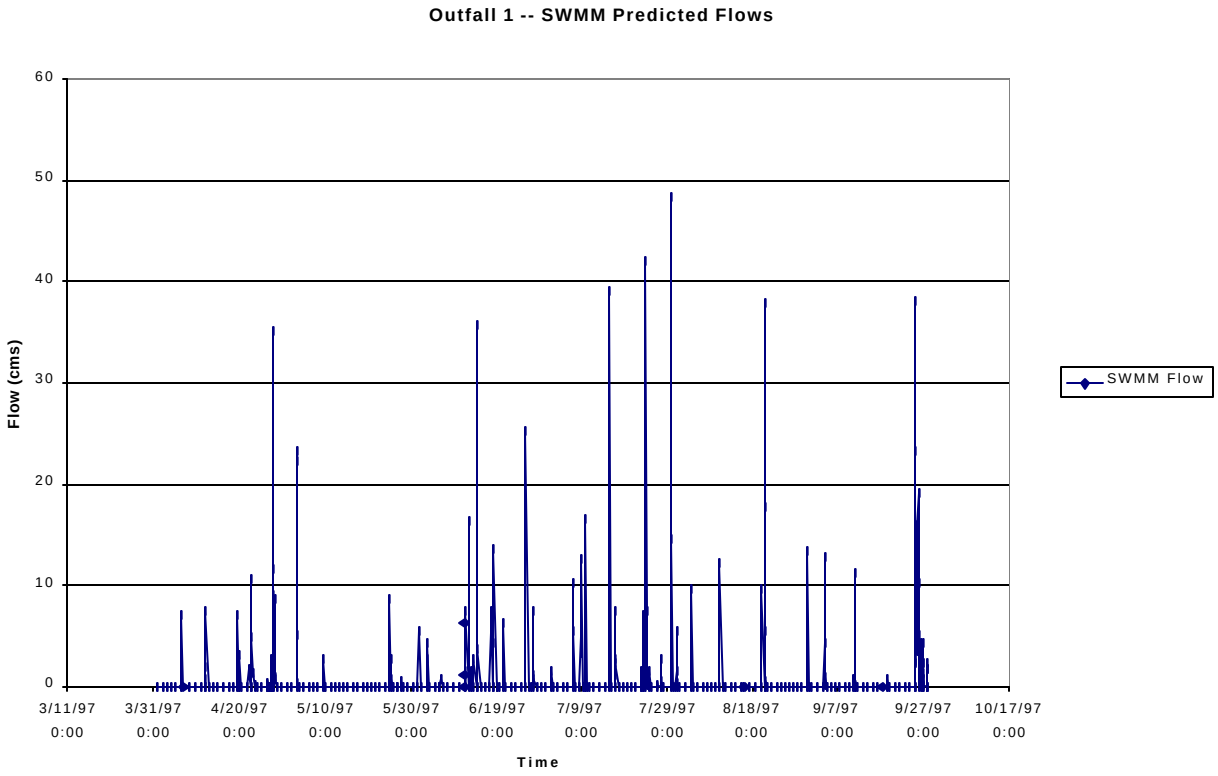


**Figure 2 SWMM Predicted Flows for Outfall 1**

Figure 3 illustrates the flow-weighted fecal coliform concentrations coming from the Rocky Creek watershed during storm events. Note that larger runoff concentrations occur as a function of larger storms and after long periods of time when no rain fell on the watershed.

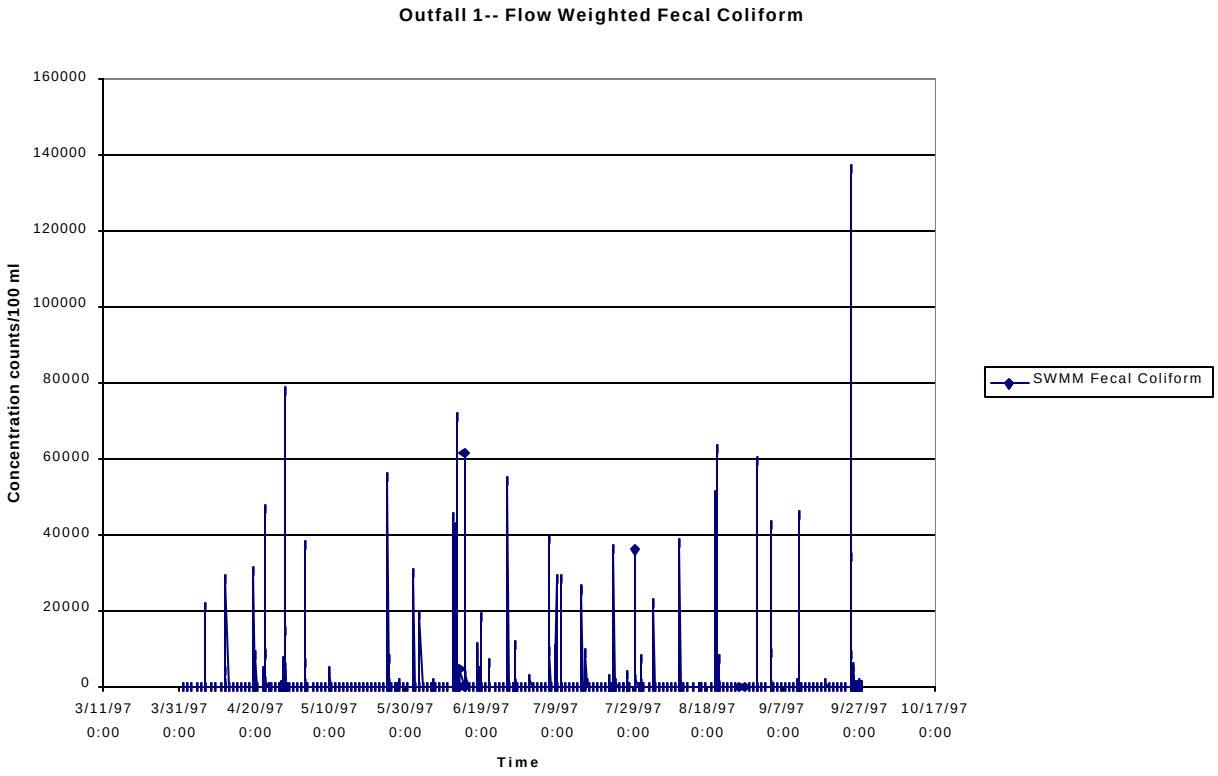


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**Figure 3 SWMM Flow Weighted Fecal Coliform Concentrations for Outfall 1**

Figure 4 and Figure 5 illustrate the stormwater flow and fecal coliform concentrations for outfall 2.

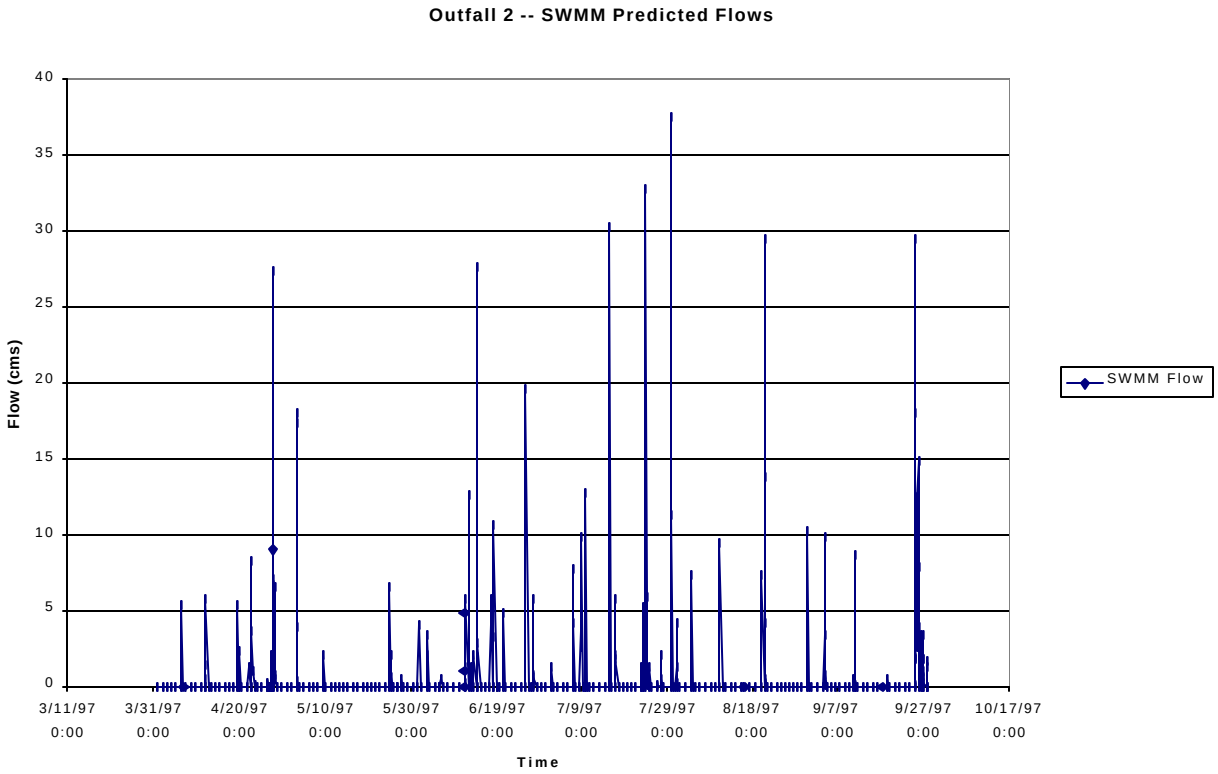



**Figure 4 SWMM Predicted Flows for Outfall 2**

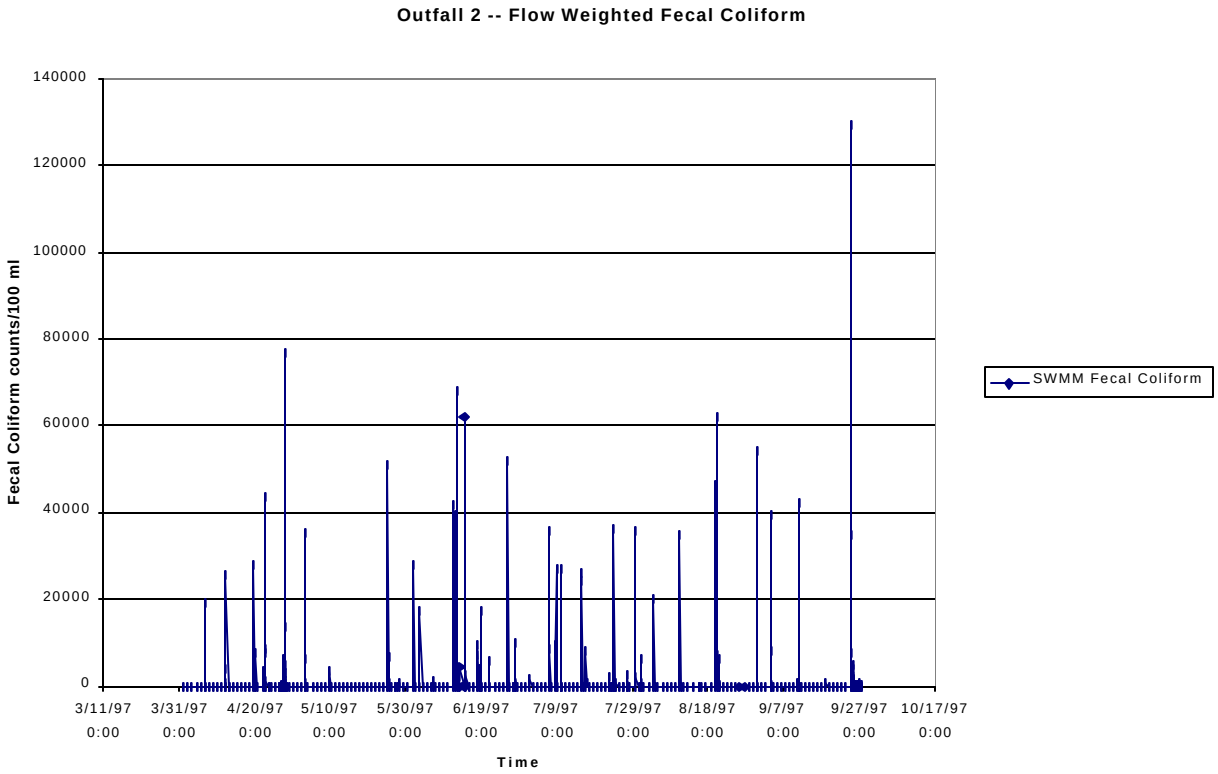



**Figure 5 SWMM Flow Weighted Fecal Coliform Concentrations for Outfall 2**

Figure 6 and Figure 7 illustrate the stormwater flow and fecal coliform concentrations for outfall 3.

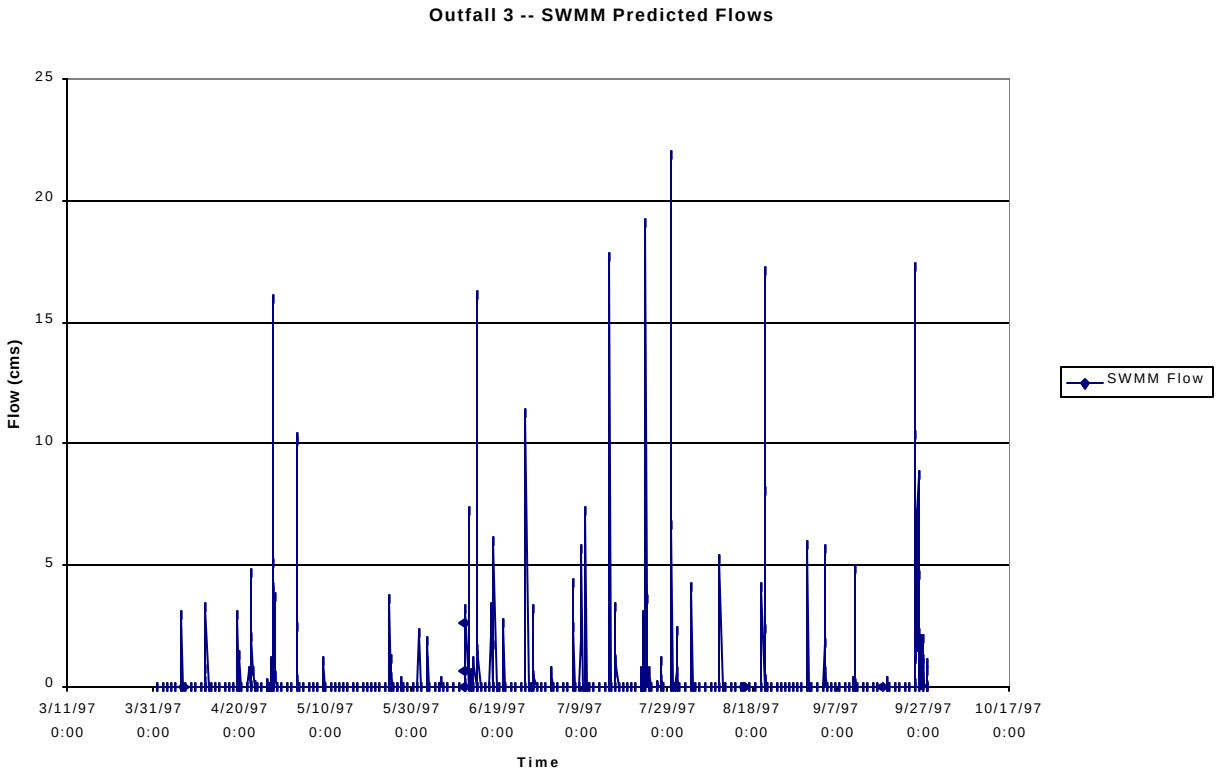



**Figure 6 SWMM Predicted Flows for Outfall 3**

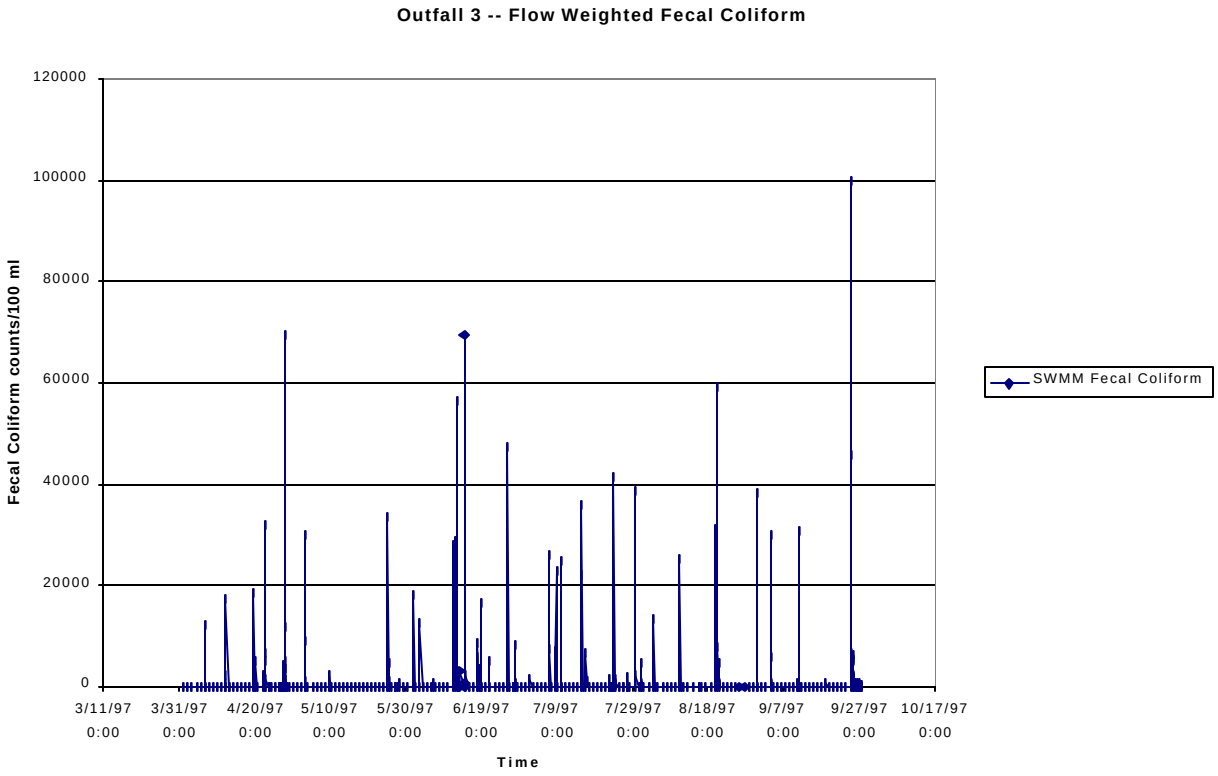



**Figure 7 SWMM Flow Weighted Fecal Coliform Concentrations for Outfall 3**

Figure 8 and Figure 9 illustrate the stormwater flow and fecal coliform concentrations for outfall 4.

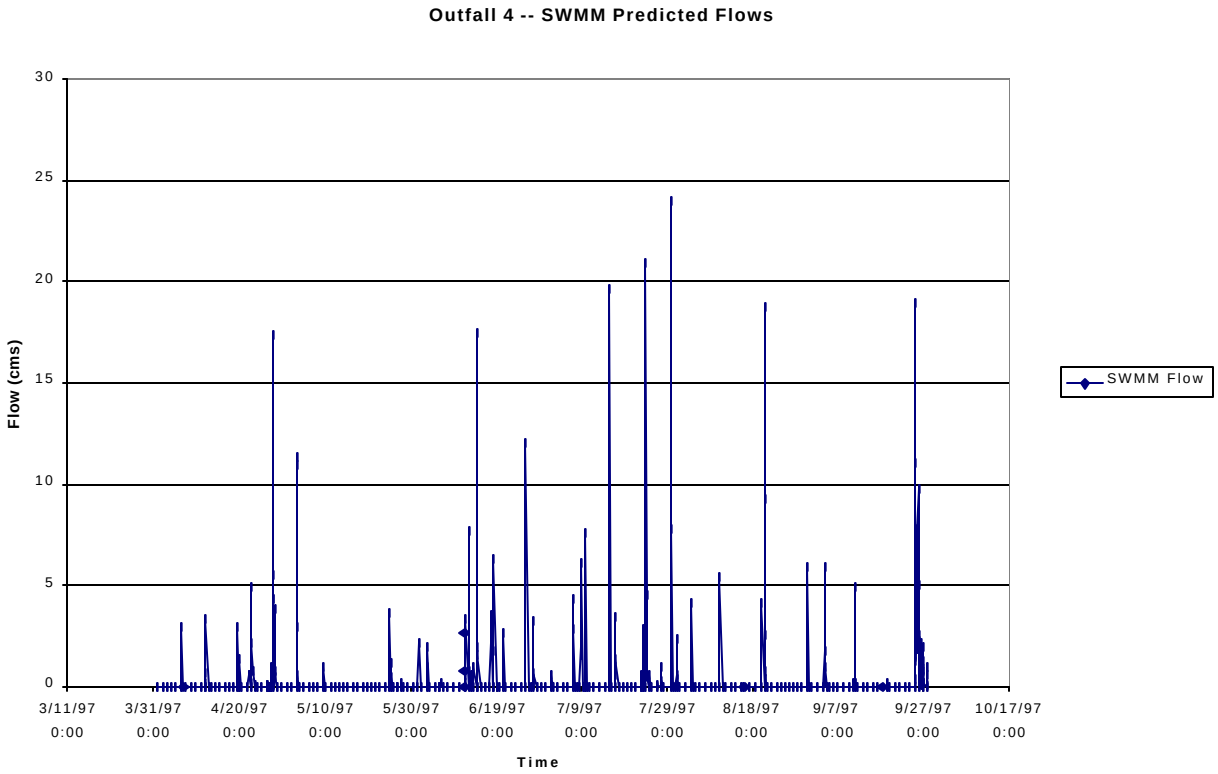



**Figure 8 SWMM Predicted Flows for Outfall 4**

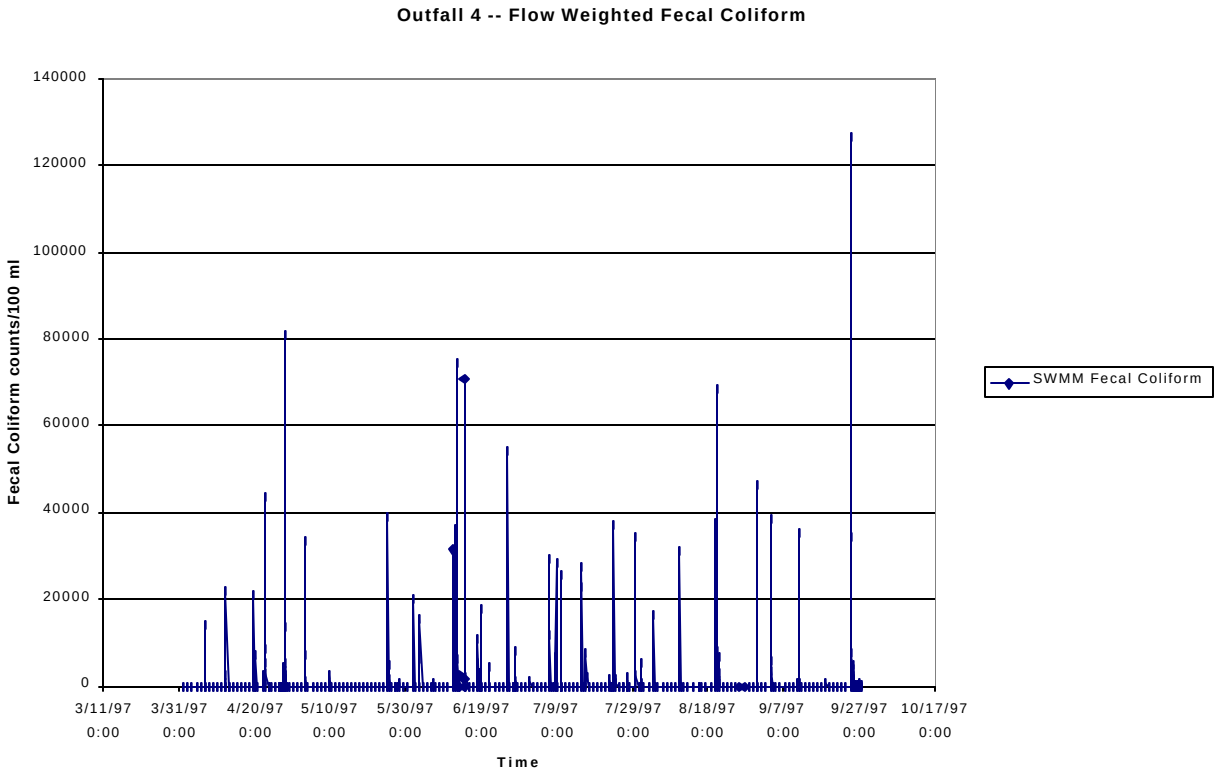



**Figure 9 SWMM Flow Weighted Fecal Coliform Concentrations for Outfall 4**

Figure 10 and Figure 11 illustrate the stormwater flow and fecal coliform concentrations for outfall 5.

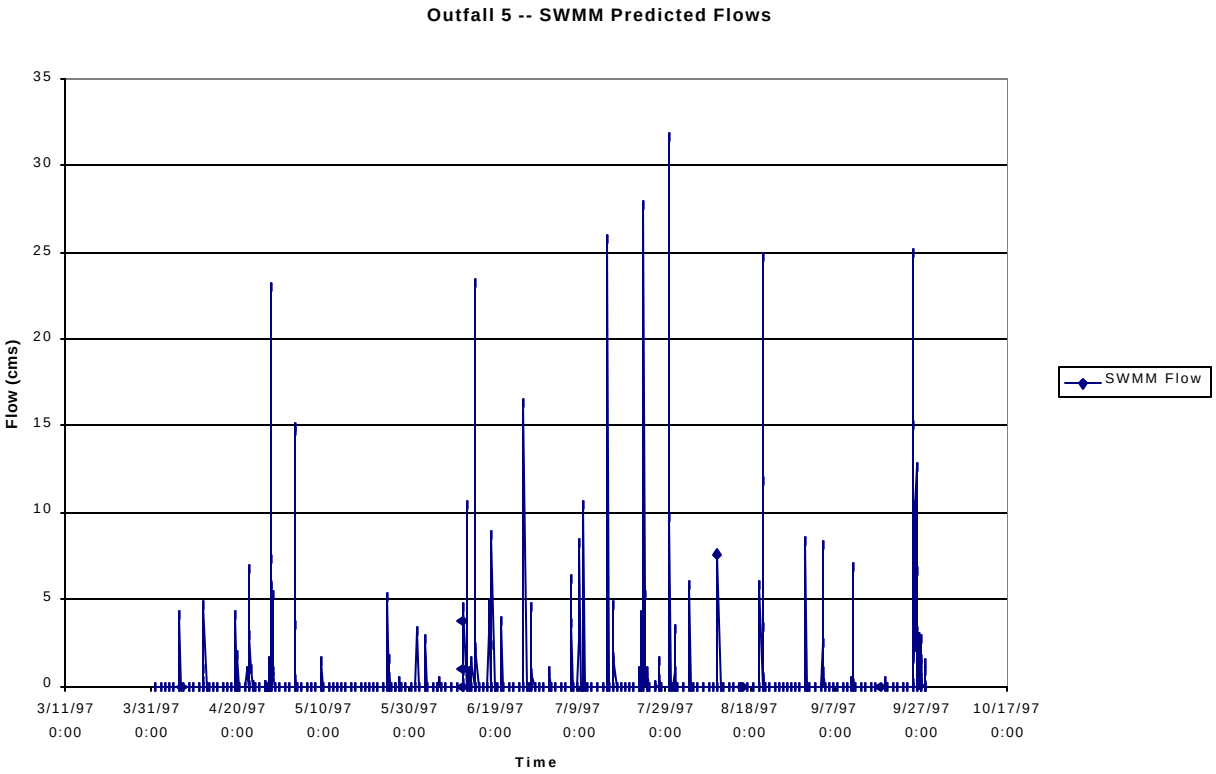



**Figure 10 SWMM Predicted Flows for Outfall 5**

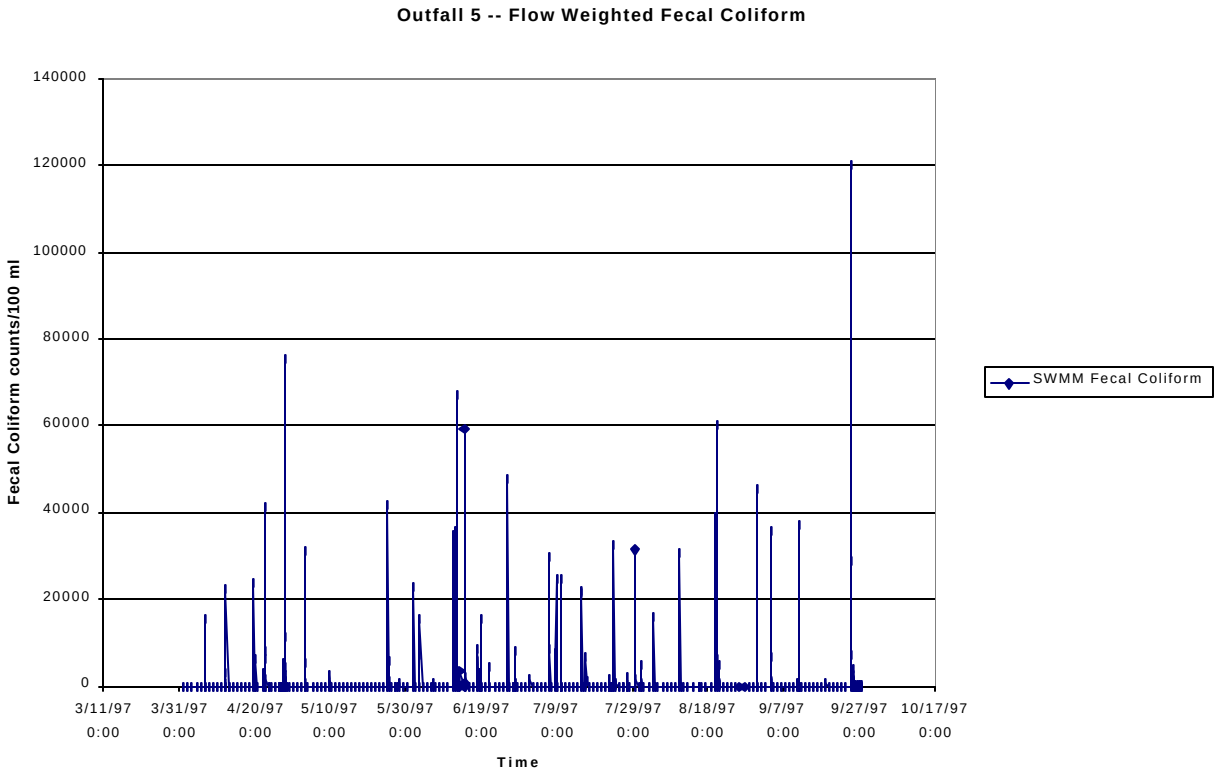



**Figure 11 SWMM Flow Weighted Fecal Coliform Concentrations for Outfall 5**

These predicted time series of flow and fecal coliform concentrations will be used as inputs into a water quality model where their impact will be combined and transported within Rocky Creek.

## *Water Quality Model*

The Water Quality Analysis Simulation Program (WASP5) will be used to predict the instream water quality as a function of changes in flow and load provided by SWMM. Rocky Creek was broken down into 12 segments (Figure 1), with 5 flows and load times series entering segments 2, 4, 6, 8, and 10. The model will combine these flows and loads to predict a fecal coliform concentration for each of the 12 segments.

Figure 12, Figure 13 and Figure 14 illustrate the flows within the segments over the model simulation period.

During storm events the flows increase as you move downstream due to the five outfall flows from SWMM.

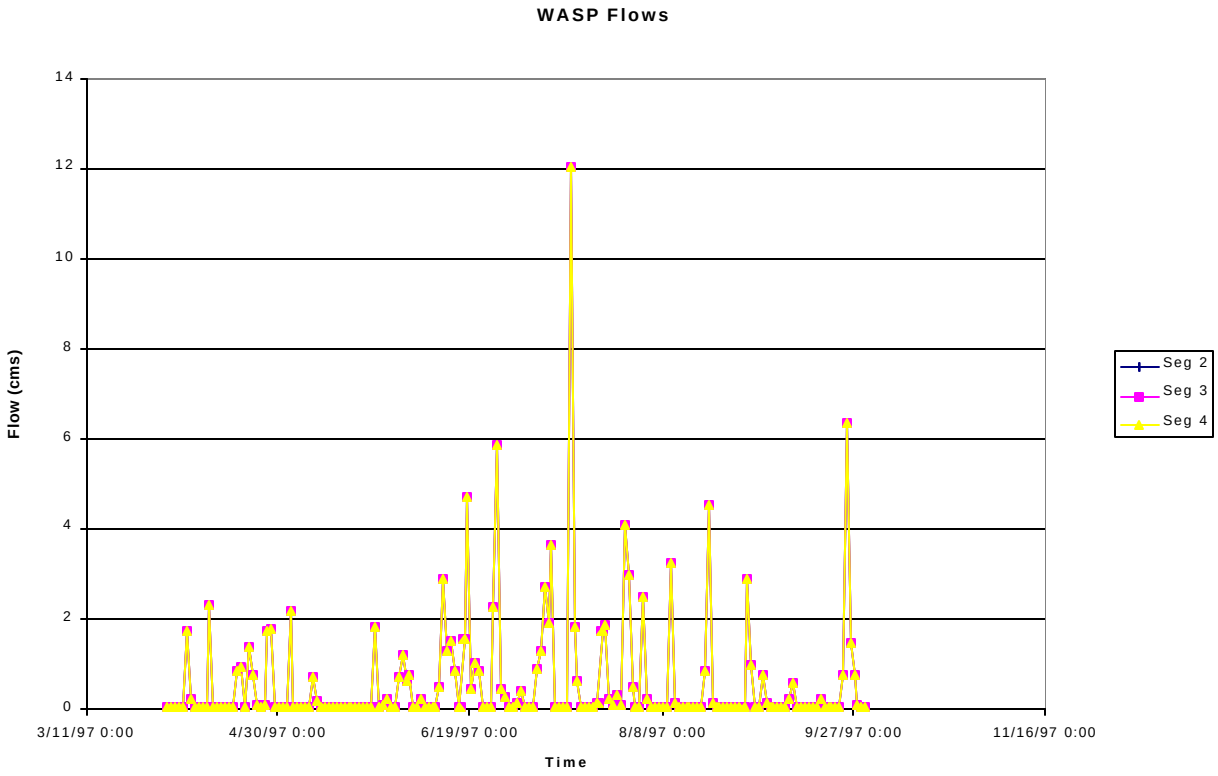



**Figure 12 WASP Flows Segment 2 - 4**

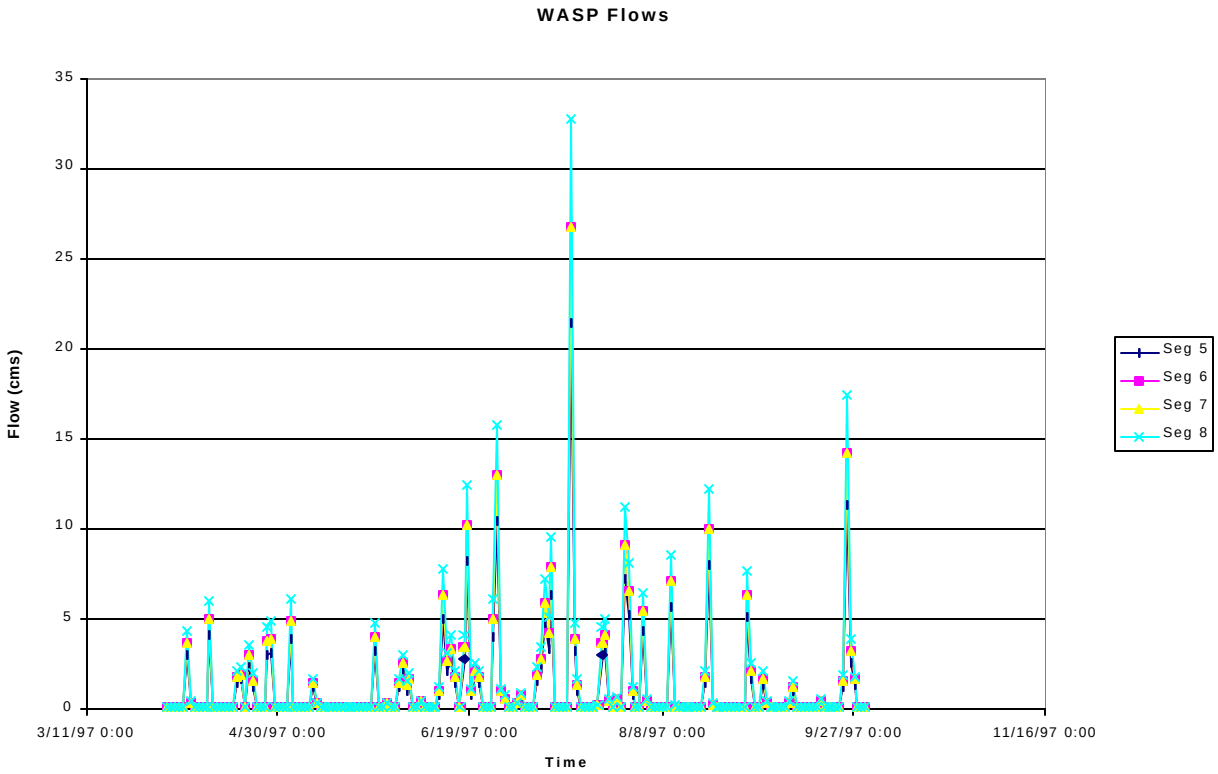



**Figure 13 WASP Flows Segment 6-8**

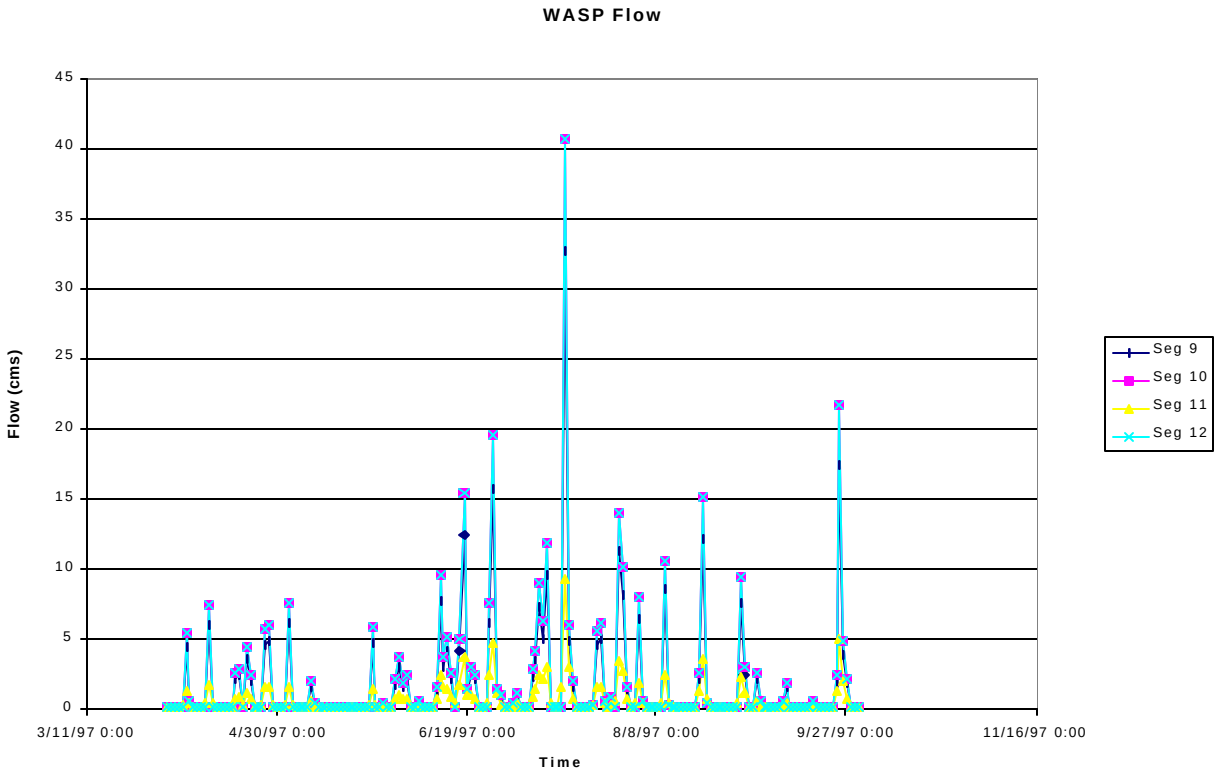



**Figure 14WASP Flows Segment 9 - 12**

Figure 15, Figure 16 and Figure 17 illustrate the predicted fecal coliform concentrations over the simulation period. The fecal coliform decay/die off constant was set to 1 per day, which represents a typical coliform die off rate.

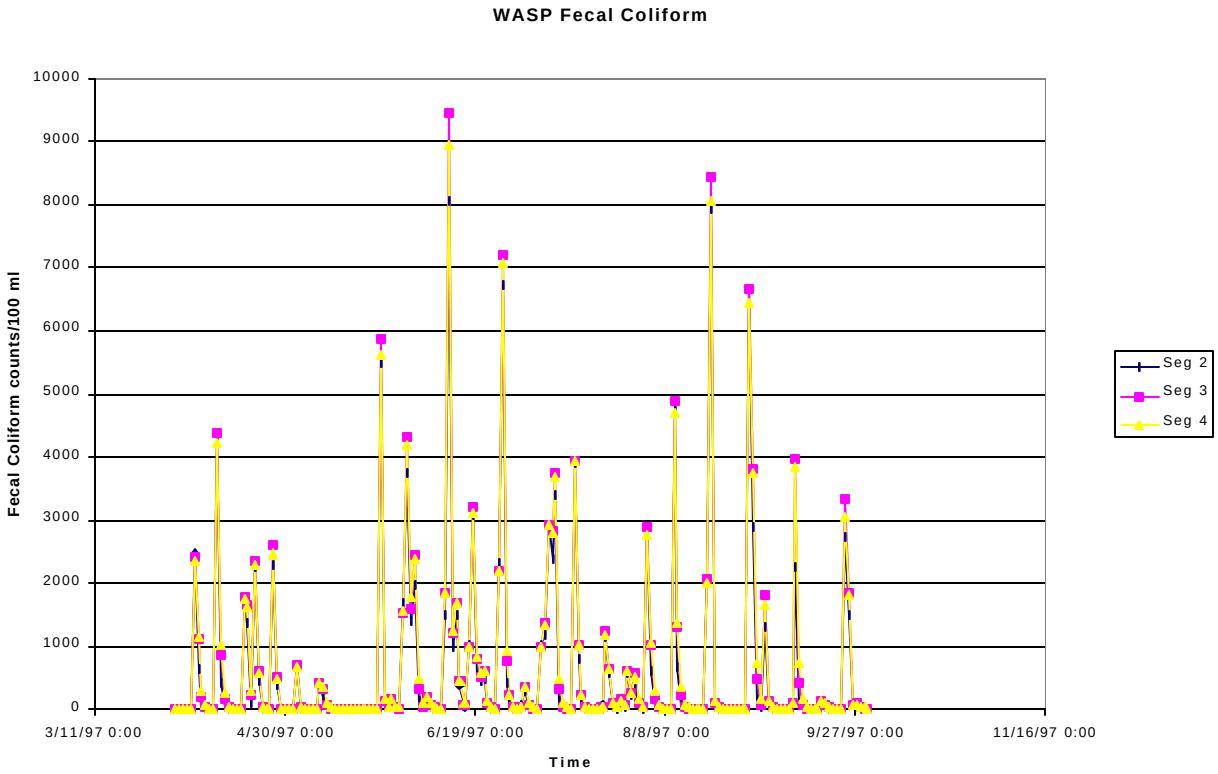



**Figure 15 WASP Predicted Fecal Coliform Concentrations Segment 2 -4**

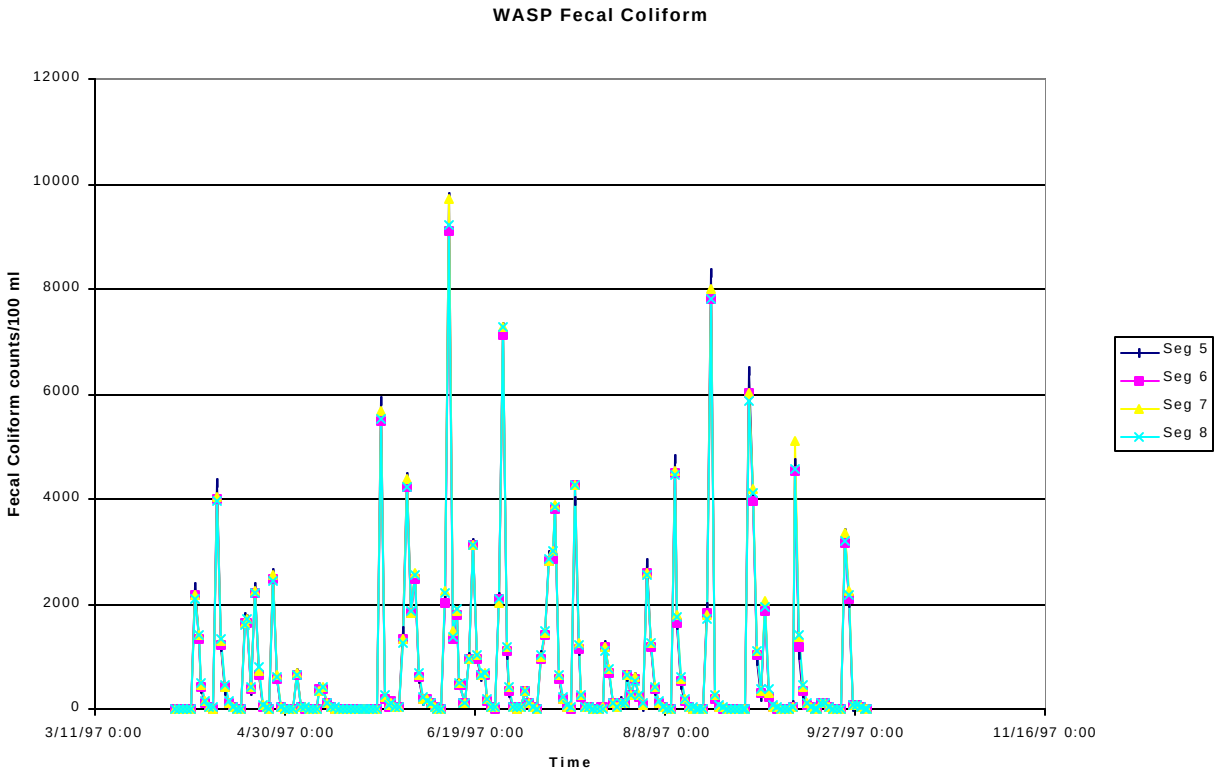



**Figure 16 WASP Predicted Fecal Coliform Concentrations Segment 5 - 8**

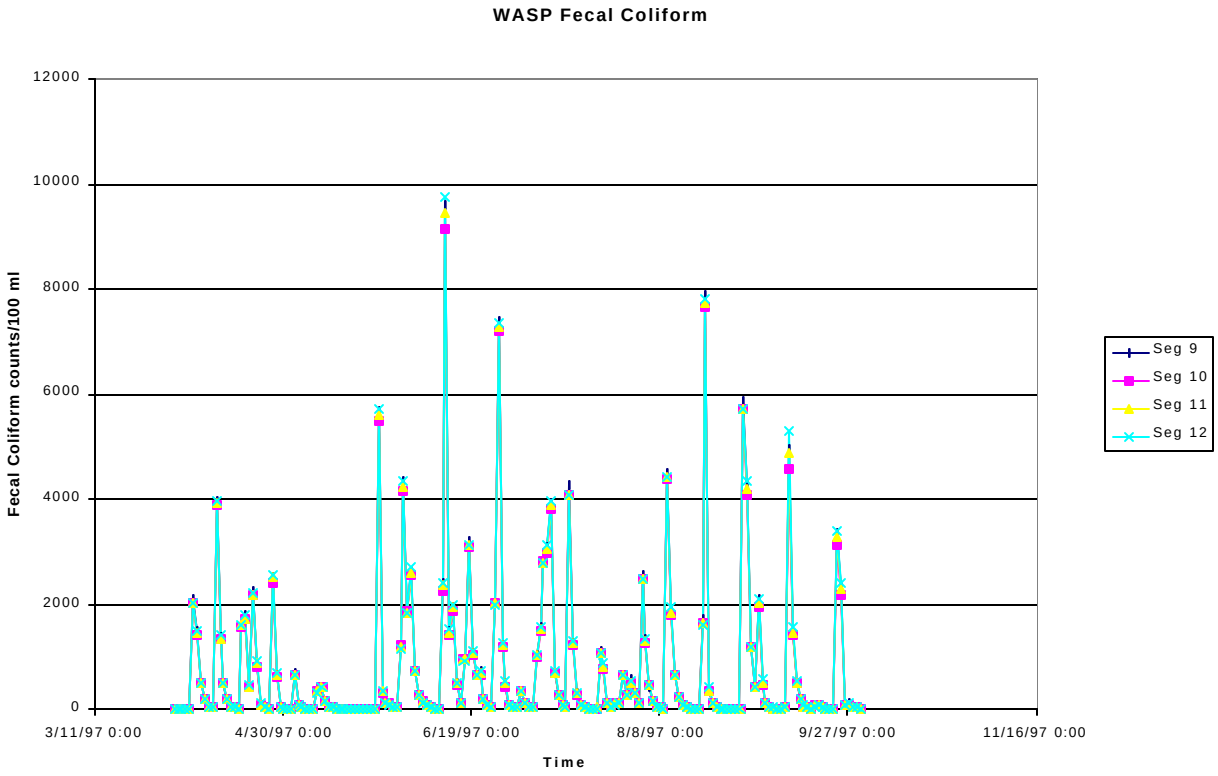



**Figure 17 WASP Predicted Fecal Coliform Concentrations Segment 9 - 12**

The WASP model predictions will be used to determine the current 30-day geometric mean that is causing the water quality violation and a subsequent percent load reduction will be calculated.

## *TMDL Calculation*

The TMDL calculation will utilize the results of the SWMM and WASP model to determine the appropriate 30-day fecal coliform load that will achieve water quality standards.

The maximum load that caused a water quality standard violation was calculated for 1997 by analyzing the WASP model results. It was determined that the largest 30-day geometric mean fecal coliform concentration occurred in Segment 12 between 6/11/97 to 9/3/97 with a value of 1016 counts/100 ml.

This equals to 3.76E+14 counts/30 days. Using the WASP model it was determined that to achieve the water quality standard of 200 counts/100 ml as a 30-day geometric the fecal load coming from the Rocky Creek watershed would have to be reduced by 80%.

**For Rocky Creek watershed an 80% load reduction would have to occur to achieve the 200-counts/100 ml or no more than 7.53E+13 counts/30 days.**

## *Seasonal Variation*

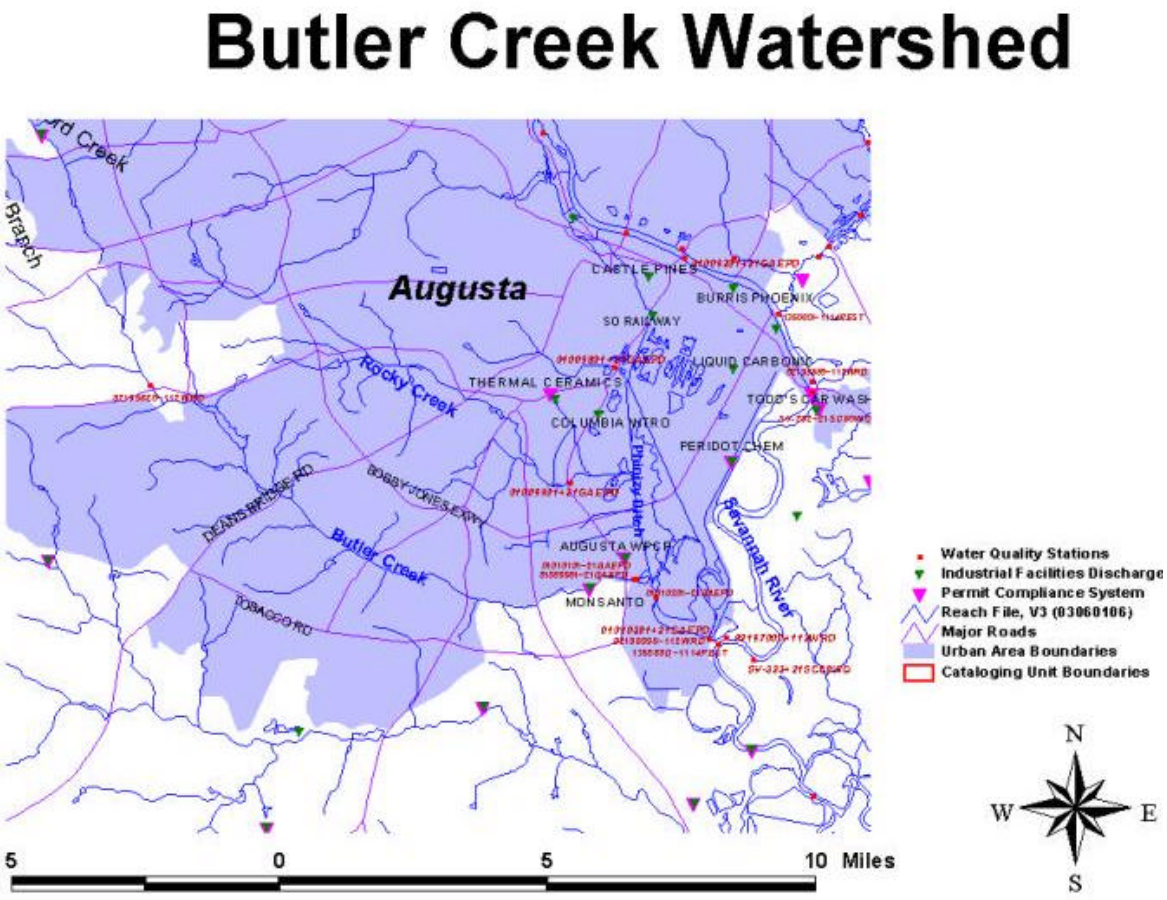
Seasonal variation is taken into the TMDL calculation by applying models for continuous periods that span several seasons. The models were applied to the spring, summer and early fall when fecal coliform concentrations are elevated due to stormwater runoff.

## *Allocation of Responsibility and Recommendations*

Because this waterbody already exceeds the maximum load for fecal coliform due to nonpoint sources, a percent reduction will be expressed for this TMDL. It has been determined that an 80% reduction in fecal coliform loads to Rocky Creek would have to occur to achieve the water quality standards. Efforts should be made to identify major sources of fecal coliform sources to Rocky Creek and the development of a detailed best management practices plan for reducing the loadings. Any point source discharges to Rocky Creek in the future should be permitted as criteria at end of pipe.

The stormwater permit should be modified to include a requirement for the development of stormwater management plan that will achieve the percent load reduction required by this TMDL.

# Appendix A -- Site Map



# Appendix B – Units Conversion Table

| From | To | Multiply by: |
|---|---|---|
| Million Gallons per Day (MGD) | Cubic Meters per Second (cms) | 0.04381 |
| Cubic Feet per Second (cfs) | Cubic Meters per Second (cms) | 0.02832 |
| Pounds (lbs) | Kilograms (Kg) | 0.4536 |
| Tons (Short) | Kilograms (Kg) | 907.1848 |
| Tons (Long) | Kilograms (Kg) | 1016.00 |

# Administrative Record

1. Ambrose Jr R.B., Wool, T.A., Connolly J.P. and Schanz R.W. (1988) *WASP4, A Hydrodynamic and Water Quality Model – Model Theory, User's Manual, and Programmer's Guide*. U.S. Environmental Protection Agency. Environmental Research Laboratory, Athens, Georgia. EPA/600/3-87/039. Model available from http://www.epa.gov

2. City of Hinesville-Fort Stewart Regional Water Pollution Control Plant, NPDES Permit No. GA0047180

3. Compilation of Georgia's Current Modeling Guidelines for the Development of Wasteload Allocations and NPDES Permit Limitations. January 1991

4. Rules and Regulations for Water Quality Control, Chapter 391-3-6-.03, Water Use Classifications and Water Quality Standards

5. STORET Water Quality Data

6. Georgia Environmental Protection Division Stream Monitoring Data

7. On Disk: WASP Input Datasets

8. On Disk: Excel Spreadsheet to calculate TMDL

# Response to Public Comment on the Proposed TMDL

***COMMENTS:***

EPA's definition of "critical condition" as the 7Q10 flow or as the low flow is mistaken. Storm events or high flow appear to be the problem.

Eric E. Huber, EarthJustice Legal Defense Fund, 400 Magazine Street, Suite 401, New Orleans, Louisiana 70130-2453, November 8, 1999

***RESPONSE:***

The 7Q10 flow was used as the baseflow condition for the TMDL evaluation. Rocky Creek's 7Q10 flow was used for the periods between storm events in which no runoff was occurring.

***COMMENT:***

The TMDL is questionable because the margin of safety equals "the most conservative fecal coliform wash off rates." Does that mean that the lowest wash off rate (and hence lowest nonpoint source contribution) is used or that the highest possible rate is used? Which is more protective of the waterbody, a "conservative" or "liberal" wash off rate?

Eric E. Huber, EarthJustice Legal Defense Fund, 400 Magazine Street, Suite 401, New Orleans, Louisiana 70130-2453, November 8, 1999

***RESPONSE:***

A conservative approach was taken which used "liberal" washoff rates that yield reasonable results compared to observed data in Rocky Creek.

***COMMENT:***

The TMDL is not a daily load.

Eric E. Huber, EarthJustice Legal Defense Fund, 400 Magazine Street, Suite 401, New Orleans, Louisiana 70130-2453, November 8, 1999

***RESPONSE:***

Commented noted. Because the standard requires a 30-day geometric mean, the most critical 30-day geometric mean was used to evaluate the percent reduction needed to achieve standards.

***COMMENT:***

The TMDL is written to indicate that all of the required pollution reduction will have to come from nonpoint source contributors and it is flawed in that there is no provision for controlling storm water outfalls draining storm water from the surrounding watershed through a storm water permit or other mechanism.

Eric E. Huber, EarthJustice Legal Defense Fund, 400 Magazine Street, Suite 401, New Orleans, Louisiana 70130-2453, November 8, 1999

***RESPONSE:***

Stormwater permits already exist in this basin. The TMDL was modified to include requirements be placed on the NPDES MS4 permit for this listed segment. The stormwater permit will be revised to have the permittee develop a management plan that will meet the fecal coliform reductions needed to achieve standards.

***COMMENT:***

In the Problem Definition section of the TMDL, it is stated that the non-support is for fishing water. During the summer of 1998, the commenter was assured that all waters in Georgia were protected and classified for swimming. It now appears that this was not correct, and that EPA is not aware of how Georgia has classified its waters. A reading of the State regulations shows that only a few of the waters are so classified, and the rest are set at a lower standard for fishing. This is in conflict with the Clean Water Act's fish/swim language, and what we were told. This is also different from other States such as Tennessee and South Carolina where all waters are correctly classified for protection for swimming.

This TMDL allows for more pollution by fecal coliform than is safe for swimming. Further, one would assume that a river of this size would be used for swimming at times. This issue goes beyond the scope of this TMDL, but does need to be addressed.

Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 10, 1999

***RESPONSE***

Comment noted.

***COMMENT:***

In the Target Identification section of the TMDL, the geometric mean criterion cited should be 200-counts/100 ml. It is also not clear that this covers and explains all aspects of the criteria such as single samples, number of samples per month, seasonal, etc. If this TMDL for a single criterion covers all, it should be explained.

Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 10, 1999

***RESPONSE:***

The protection of the 30-day geometric mean of 200 counts/100ml during wet weather events is the most critical standard to apply where stormwater outfalls influence the listed segment.

***COMMENT:***

In the Numeric Targets and Sources - Model Development section of the TMDL, it is stated that this does not address impacts of nonpoint loadings. Thus, this TMDL would be technically and legally deficient since nonpoint/runoff is generally considered a significant contribution of fecal, and a required component of a TMDL.

Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 10, 1999

***RESPONSE:***

This TMDL was developed to include the impacts of stormwater runoff and assigns a reduction to MS4 permits.

***COMMENT:***

The commenter encourages EPA to find a way to use an explicit MOS - such as a reserved percentage of the TMDL.

Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 10, 1999

***RESPONSE:***

Comment noted.

***COMMENT:***

In the Seasonal Variation section of the TMDL, it needs to be explained how other seasons are covered, especially since runoff is being ignored and that is potentially a significant source.

Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 10, 1999

***RESPONSE:***

Seasonal variation is included in the TMDL calculation. The critical wet weather months are included in the model simulations used to calculate the TMDL.

***COMMENT:***

In the Background section of the TMDL, is the load being averaged over the 12-mile segment? Is the TMDL being determined so that the standards are met at all times and locations without a mixing zone?

Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 10, 1999

***RESPONSE:***

The load is not being averaged over a 12-mile segment. This 12-mile section of Rocky Creek has 103 stormwater outfalls. A series of outfalls that enter a segment of the water quality model are composited into a single representation from the stormwater runoff into the model segment.

***COMMENT:***

In the Numeric Targets and Sources - Model Development section of the TMDL, there is a typo in the 3rd to last list "...with the washing (on) constituents off..."

Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 10, 1999

***RESPONSE:***

This correction has been made.

***COMMENT:***

In the Numeric Targets and Sources - Model Development section of the TMDL, how does a calculation for a 30-day period addresses the daily maximum standard and do they apply?

Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 10, 1999

***RESPONSE:***

The selection of the TMDL and assigned load reduction was done to protect against the instantaneous as well as the 30-day geometric mean requirement.

***COMMENT:***

In the Critical Condition Determination section of the TMDL, there is a typo in the first word at the top of page 4 - "develop(ment)".

Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 10, 1999

***RESPONSE:***

This correction has been made.

***COMMENT:***

In the Critical Condition Determination section of the TMDL, how was it determined that this is the most critical flow that storms can impact?

Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 10, 1999

***RESPONSE:***

The most critical series of storms was determined by analyzing the model results. The period that was identified as having the highest 30-day geometric mean was used to calculate the reductions needed.

***COMMENT:***

In the TMDL section of the TMDL, there is an expression as % reduction. This should also be expressed as total daily load and show conversion and relationship to standard.

Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 10, 1999

***RESPONSE:***

The TMDL is expressed as both a load and percent reduction.

***COMMENT:***

In the Margin of Safety section of the TMDL, why is runoff being considered here and not in other fecal TMDLs? Where does the washoff rate come from?

Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 10, 1999

***RESPONSE:***

The Georgia TMDL lawsuit Consent Decree required EPA to investigate all potential NPDES permitted facilities in the Savannah/Ogeechee basins during this portion of the TMDL development schedule. Runoff was considered here because of the NPDES Stormwater permit issued for the Rocky Creek area.

***COMMENT:***

In the Storm Water Model Results section of the TMDL, it is stated that the first 20 outfalls are considered as one. This would seem to not necessarily simulate the real situation in terms of where impacts would occur. If this addresses the issues of averaging the load over the entire reach, mixing zones, or is a conservative assumption, it needs further explanation. The intent should be to prevent excess loads, and thus violations of standards at all locations at all times. It is unclear what the statement means that the fecal coliform concentrations were flow averaged. It is also unclear if this would protect against all potential violations.

Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 10, 1999

***RESPONSE:***

The 20 outfalls were combined into a single water quality model segment with no mixing zone. The impacts of the outfalls are directly exhibited in the water segment in which they enter.

***COMMENT:***

In the Storm Water Model Results section of the TMDL, it is stated that the fecal concentration impacts are combined, again raising the issues stated above regarding mixing and averaging out violation. This needs to be explained.

Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 10, 1999

***RESPONSE:***

Each individual outfall was accurately represented in the water quality model. There was no averaging of the violations.

***COMMENT:***

In the Storm Water Model Results section of the TMDL, a die off rate of 1 per day is used, but no reference is given for this assumption. While it may be valid, some support is needed, and some reason given as to why this same rate is not used in other fecal TMDLs such as the one discussed above.

Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 10, 1999

***RESPONSE:***

A decay rate of 1 per day has been utilized in numerous studies. Certainly, it would be better to obtain site-specific data but at this point it does not exist.

***COMMENT:***

In the TMDL Calculations section of the TMDL, the calculation is described as addressing the maximum load for meeting the standard. It is unclear if this is actually for the maximum or geometric mean, and how the various components of the State's standard are addressed (mean, maximum, seasonal).

Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 10, 1999

***RESPONSE:***

The selection of the TMDL and assigned load reduction was done to protect against the instantaneous as well as the 30-day geometric mean requirement.

***COMMENT:***

In the TMDL calculation section of the TMDL, the TMDL is expressed as % reduction and as loads in counts/month. There is no TMDL given as a daily maximum load. Thus it is unclear if this would satisfy the requirements to qualify as a TMDL. Some standard protocols need to be developed for all fecal TMDLs to clarify this issue and assure that all aspects of the standards and TMDL components are covered.

Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 10, 1999

***RESPONSE:***

Comment noted. The most critical condition in this TMDL would be meeting the geometric mean.

***COMMENT:***

In the Seasonal Variation section of the TMDL, the State standard is written with different criteria for different seasons, and more than just a mean. In the winter season, along with a different standard, assumptions such as wash off rates, background concentrations, etc., would be different. If this TMDL is written to cover all these variables, it is not clear. Again, a standard protocol is needed for all such fecal TMDLs with similar issues.

Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 10, 1999

***RESPONSE:***

The most critical condition in this TMDL would be meeting the geometric mean during the highest rainfall period.

***COMMENT:***

In the Allocation of Responsibility and Recommendations section of the TMDL, it is stated that the load is already exceeded by nonpoint sources, thus there is no load available for allocation to storm water or other dischargers. There are no recommendations given for how the reduction will be achieved or standards met. It needs to be explained how the existing or future point sources, such as storm water outfalls, will be permitted to stay within the load. It is stated that permits should meet the criteria at the end of the pipe, but it is not stated if such limits have been, or will be put in the permits.

Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 10, 1999

***RESPONSE:***

All of the point source dischargers with NPDES permits have criteria at the end of the pipe. The TMDL has been modified to address load reductions that will be needed by the stormwater discharges.

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