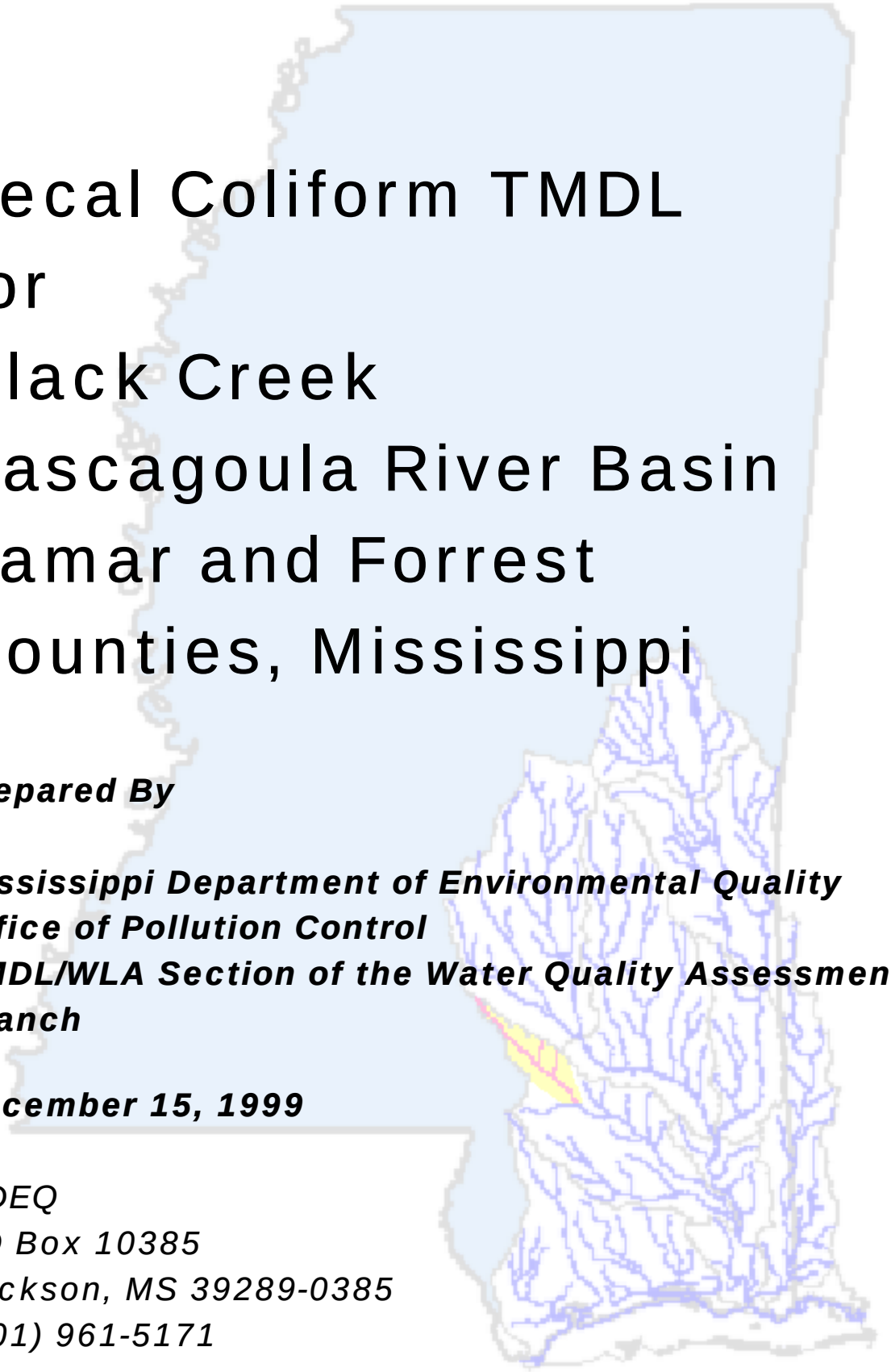
Fecal Coliform TMDL for Black Creek Pascagoula River Basin Lamar and Forrest Counties, Mississippi



Prepared By

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CONTENTS

MONITORED SEGMENT IDENTIFICATION

Name:	Black Creek, Segment 1
Waterbody ID:	MS099B2M1
Location:	Near Purvis, from I-59 to the Confluence with Little Black Creek
County:	Lamar and Forrest Counties, Mississippi
USGS HUC Code:	03170007
NRCS Watershed:	010
Length:	Nine miles
Use Impairment:	Contact Recreation
Cause Noted:	Fecal Coliform, an Indicator for the Presence of Pathogenic Bacteria
Priority Rank:	31
NPDES Permits:	There are 19 NPDES Permits issued for facilities that discharge discharge fecal coliform in the watershed (Table 3.1.1).
Pollutant Standard:	Fecal coliform colony counts shall not exceed a geometric mean of 200 per 100 ml, nor shall more than 10% of the samples examined during any month exceed a colony count of 400 per 100 ml.
Waste Load Allocation:	1.09E+12 (counts/30 days) All dischargers must meet water quality standards for disinfection.
Load Allocation:	1.25E+13 (counts/30 days)
Margin of Safety:	Implicit in conservative modeling assumptions.
Total Maximum Daily Load (TMDL):	1.36E+13 (counts/30 days) The TMDL is a combination of point and nonpoint sources of fecal coliform bacteria due to NPDES permitted dischargers, cows with access to streams, failing septic tanks, and fecal coliform applied to land available for surface runoff.

EVALUATED SEGMENT IDENTIFICATION

Name:	Black Creek
Waterbody ID:	MS099B1M4
Location:	Near Purvis, from Highway 589 to I-59
County:	Lamar County, Mississippi
USGS HUC Code:	03170007
NRCS Watershed:	010
Length:	15 miles
Use Impairment:	Contact Recreation
Cause Noted:	Fecal Coliform, an Indicator for the Presence of Pathogenic Bacteria
Priority Rank:	Low
NPDES Permits:	There are 19 NPDES Permits issued for facilities that discharge fecal coliform in the watershed (Table 3.1.1).
Pollutant Standard:	Fecal coliform colony counts shall not exceed a geometric mean of 200 per 100 ml, nor shall more than 10% of the samples examined during any month exceed a colony count of 400 per 100 ml.
Waste Load Allocation:	1.09E+12 (counts/30 days) All dischargers must meet water quality standards for disinfection.
Load Allocation:	1.25E+13 (counts/30 days)
Margin of Safety:	Implicit in conservative modeling assumptions.
Total Maximum Daily Load (TMDL):	1.36E+13 (counts/30 days) The TMDL is a combination of point and nonpoint sources of fecal coliform bacteria due to NPDES permitted dischargers, cows with access to streams, failing septic tanks, and fecal coliform applied to land available for surface runoff.

EVALUATED DRAINAGE AREA IDENTIFICATION

Name:	Upper Black Creek and Little Black Creek Drainage Areas
Waterbody ID:	MS099B2E
Location:	Drainage Area Near Rock Hill
County:	Lamar and Forrest Counties, Mississippi
USGS HUC Code:	03170007
NRCS Watershed:	010
Area:	86,396 Acres
Use Impairment:	Secondary Contact Recreation
Cause Noted:	Fecal Coliform, an Indicator for the Presence of Pathogenic Bacteria
Priority Rank:	Low
NPDES Permits:	There are 19 NPDES Permits issued for facilities that discharge fecal coliform in the watershed (Table 3.1.1).
Pollutant Standard:	May through October - Fecal coliform colony counts shall not exceed a geometric mean of 200 per 100 ml, Less than 10% of the samples may exceed 400 per 100 ml. November through April - Fecal coliform colony counts shall not exceed a geometric mean of 2,000 per 100 ml, Less than 10% of the samples may exceed 4,000 per 100 ml.
Waste Load Allocation:	2.75E+11 (counts/30 days) All dischargers must meet water quality standards for disinfection.
Load Allocation:	1.86E+12 (counts/30 days)
Margin of Safety:	Implicit in conservative modeling assumptions.
Total Maximum Daily Load (TMDL):	2.14E+12 (counts/30 days) The TMDL is a combination of point and nonpoint sources of fecal coliform bacteria due to NPDES permitted dischargers, cows with access to streams, failing septic tanks, and fecal coliform applied to land available for surface runoff.

EXECUTIVE SUMMARY

A segment of Black Creek has been placed on the Mississippi 1998 Section 303(d) List of Waterbodies as an impaired waterbody, due to fecal coliform bacteria. Another segment of Black Creek has been placed on the list as an evaluated waterbody, due to fecal coliform bacteria. The drainage area of Black Creek and Little Black Creek near Rock Hill is listed as an evaluated waterbody, due to fecal coliform bacteria. For the waterbody segments, the applicable state standard specifies that the maximum allowable level of fecal coliform shall not exceed a geometric mean of 200 per 100 ml, nor shall more than 10% of the samples examined during any month exceed a colony count of 400 per 100 ml. This standard also applies to the drainage area during the months of May through October. For the months of November through April, the state standard for the drainage area specifies that the maximum allowable level of fecal coliform stall not exceed a geometric mean of 2,000 per 100 ml, nor shall more than 10% of the samples examined during any month exceed a colony count of 4,000 per 100 ml. A review of the available monitoring data for the watershed indicates that there is a violation of the standard for the impaired waterbody.

Black Creek is a major waterbody in the Pascagoula Basin. It flows approximately 90 miles in a south-eastern direction from its headwaters in the southeast corner of Jefferson Davis County to its confluence with the Pascagoula River in Jackson County. This TMDL, however, has been developed for the two segments and drainage area of Black Creek found on the 1998 303(d) List. The nine mile long impaired section of the creek begins in Lamar County near Purvis at I-59 and ends at the confluence of Little Black Creek in Forrest County. The 14 mile long evaluated section of the creek begins in Lamar County at Highway 598 and ends in Lamar County at I-59. The 86,369 acre drainage area is located in Lamar and Forrest Counties and includes all of the areas draining into Little Black Creek and the most downstream segment of the modeled section of Black Creek.

The BASINS Nonpoint Source Model (NPSM) was selected as the modeling framework for performing the TMDL allocations for this study. Daily flow values from the USGS gage on Black Creek near Brooklyn were used to calibrate the hydrologic flow for the watershed. The weather data used for this model were collected at Saucier Experimental Forest Station. The representative hydrologic period used for this TMDL was January 1, 1985, through December 31, 1995.

Fecal coliform loadings from nonpoint sources in the watershed were calculated based upon wildlife populations; numbers of cattle, hogs, and chickens; information on livestock and manure management practices for the Pascagoula Basin; and urban development. The estimated fecal coliform production and accumulation rates due to nonpoint sources for the watershed were incorporated into the model. Also represented in the model were the nonpoint sources such as failing septic systems and cattle which have direct access to Black Creek or a tributary of Black Creek. There are 19 NPDES permitted discharges located in the watershed that are included as point sources in the model. Under existing conditions, output from the model indicates violation of the fecal coliform standard in the stream. After applying a load reduction scenario there were no violations of the standard according to the model.

The scenario used to reduce the fecal coliform load involves a cooperative effort between all fecal coliform contributors in the Black Creek Watershed. First, all NPDES facilities will be required to treat their discharge so that the fecal coliform concentrations do not exceed water quality standards.

Careful monitoring of all permitted facilities in the Black Creek watershed should be continued to ensure that compliance with permit limits is consistently attained. Second is the removal of 70% of cattle's direct access to tributaries. This could be accomplished by fencing streams in cattle pastures. Education on best management practices is a vital part of achieving this goal. Finally, a 50% reduction in the fecal coliform contribution from failing septic tanks is required. The model assumed there is a 40% failure rate of septic tanks in the Black Creek drainage area. A reduction could be accomplished by education on best management practices for septic tank owners. Additionally, users of individual onsite wastewater treatment plants could be educated on the importance of disinfection of the effluent from their treatment plant.

The model accounted for seasonal variations in hydrology, climatic conditions, and watershed activities. The use of the continuous simulation model allowed for consideration of the seasonal aspects of rainfall and temperature patterns within the watershed. Calculation of the fecal coliform accumulation parameters and source contributions on a monthly basis accounted for seasonal variations in watershed activities such as livestock grazing and land application of manure.

1.0 INTRODUCTION

1.1 Background

The identification of waterbodies not meeting their designated use and the development of total maximum daily loads (TMDL) for those waterbodies are required by Section 303(d) of the Clean Water Act and the Environmental Protection Agency's (EPA) Water Quality Planning and Management Regulations (40 CFR part 130). The TMDL process is designed to restore and maintain the quality of those impaired waterbodies through the establishment of pollutant specific allowable loads. The pollutant of concern for these TMDLs is fecal coliform. Fecal coliform bacteria are used as indicator organisms. They are readily identifiable and indicate the possible presence of other pathogenic bacteria in the waterbody. The TMDL process can be used to establish water quality based controls to reduce pollution from both point and nonpoint sources, and restore and maintain the quality of water resources.

The Mississippi Department of Environmental Quality (MDEQ) has identified a segment of Black Creek as being impaired by fecal coliform bacteria for a length of nine miles as reported in the Mississippi 1998 Section 303(d) List of Waterbodies. This segment is listed as impaired because sufficient monitoring data is available to show that there is an impairment in this segment. The impaired segment begins near Purvis, at the I-59 Bridge, and ends at the confluence with Little Black Creek.

MDEQ has identified another segment of Black Creek as being evaluated for the presence of fecal coliform bacteria for a length of 14 miles as reported in the 1998 Section 303(d) List of Waterbodies. The evaluated segment begins at the Highway 598 bridge and ends at the I-59 bridge. This segment is listed as evaluated because the data available for this segment are insufficient to show a definite impairment caused by fecal coliform bacteria in this segment. The drainage area of Black Creek and Little Black Creek near Rock Hill is also listed as evaluated for the presence of fecal coliform bacteria. The monitored and evaluated sections are shown in Figure 1.1. The evaluated drainage area is also highlighted in Figure 1.1.

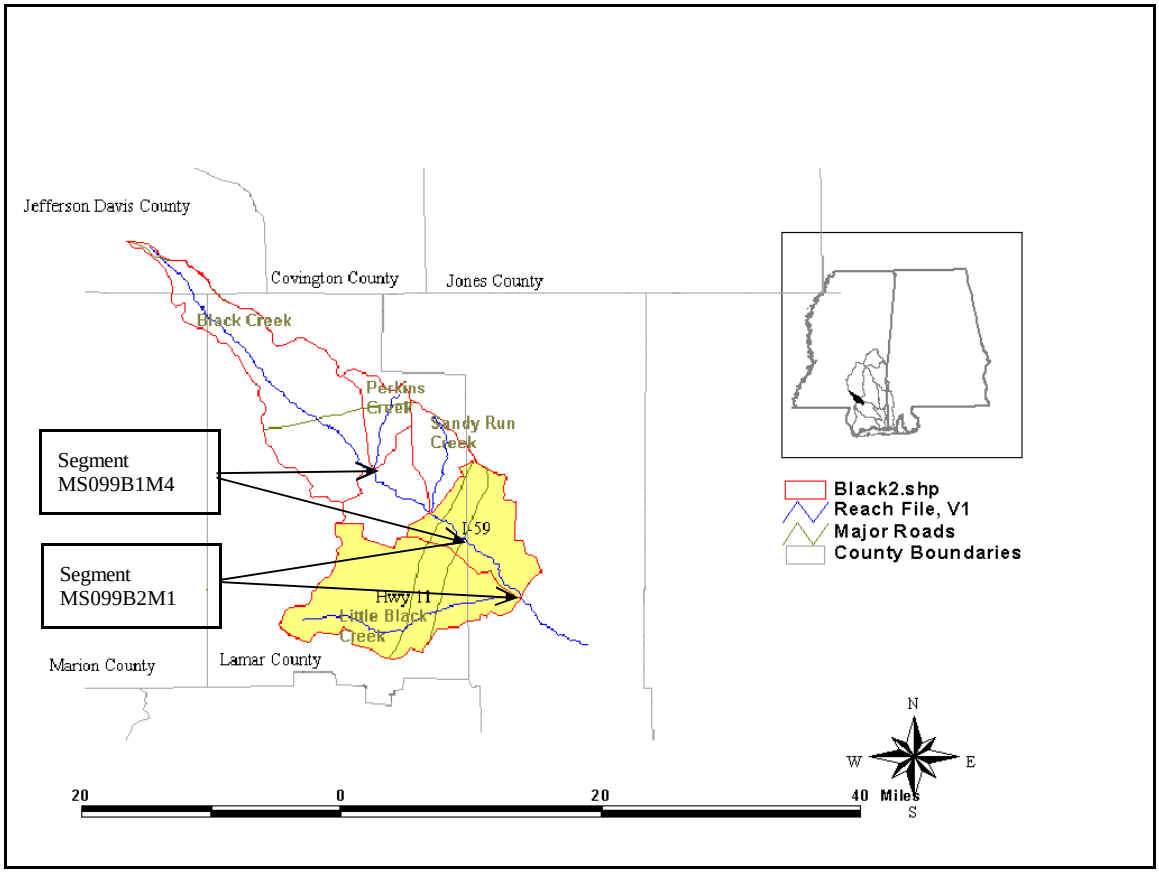

Figure 1.1 Location of the Monitored and Evaluated Segments and Drainage Area of Black Creek

Both segments of Black Creek and the impaired drainage area lie within the Pascagoula River Basin Hydrologic Unit Code (HUC) 03170007 in southeastern Mississippi. The watershed of the monitored segment, from its headwaters to the end of the impaired section, is approximately 129,094 acres; and lies within portions of Jefferson Davis, Marion, Lamar, and Forrest Counties. The watershed is sparsely populated with small urban areas including the town of Purvis.

As shown in Figure 1.1, the evaluated segment (MS099B1M4) is directly upstream of the monitored segment (MS099B2M1). Thus, much of the watershed of the monitored section also drains into the evaluated section. The watershed for the evaluated section begins at the headwaters of Black Creek and ends at the I-59 Bridge. The watershed for the evaluated section is slightly smaller than the watershed of the monitored section. It is approximately 115,094 acres and lies within portions of Jefferson Davis, Marion, and Lamar Counties. Forest is the dominant landuse within both watersheds. Figure 1.2 shows the landuse distribution within the Black Creek Watershed.

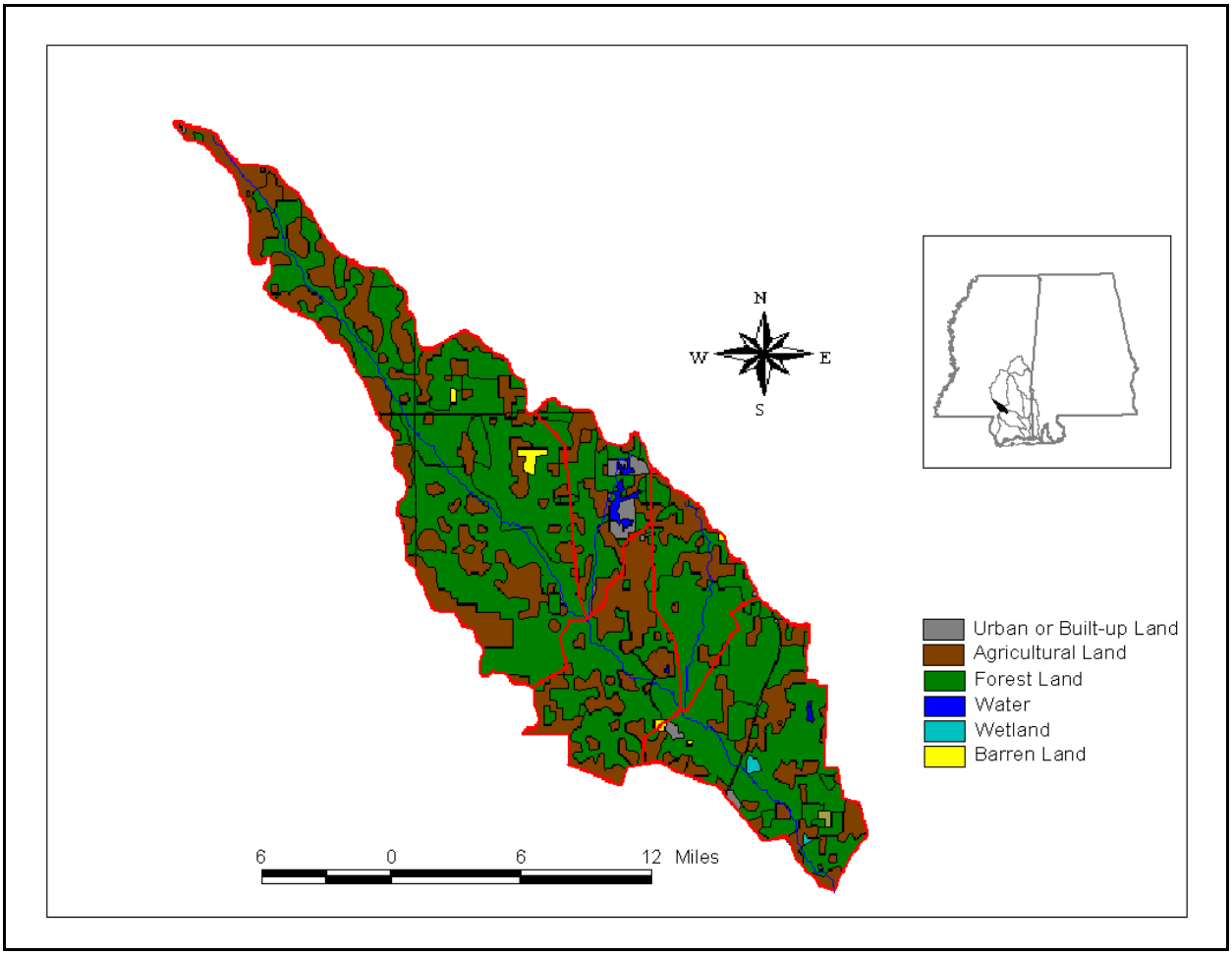

Figure 1.2 Black Creek Landuse Distribution

In order to analyze the sources of fecal coliform bacteria in the Black Creek watershed, the entire area was divided into five separate subwatersheds. The monitored segment is contained entirely within the lower watershed, 03170007014. The evaluated segment lies within two of the subwatersheds. The upper portion of the evaluated segment is the watershed 03170007016, while the lower portion of the evaluated segment is in the watershed 03170007014. The evaluated drainage area is contained within the subwatersheds 03170007014 and 01370007016. Because the entire monitored segment, the lower part of the evaluated segment, and part of the evaluated drainage area are contained within the watershed 03170007014, the load and waste load allocations required in this TMDL are based on water quality in the most downstream watershed, 03170007014.

Black Creek was generally divided into a new reach at the confluence of each major tributary. The watershed delineations were based primarily on an analysis of the Reach File 3 (RF3) stream network in the basin as well as a topographic analysis of the watershed. Figure 1.3 shows a map of the drainage area of the impaired section of Black Creek and its division into subwatersheds. The map also shows an 11-digit identification number for each of the subwatersheds.

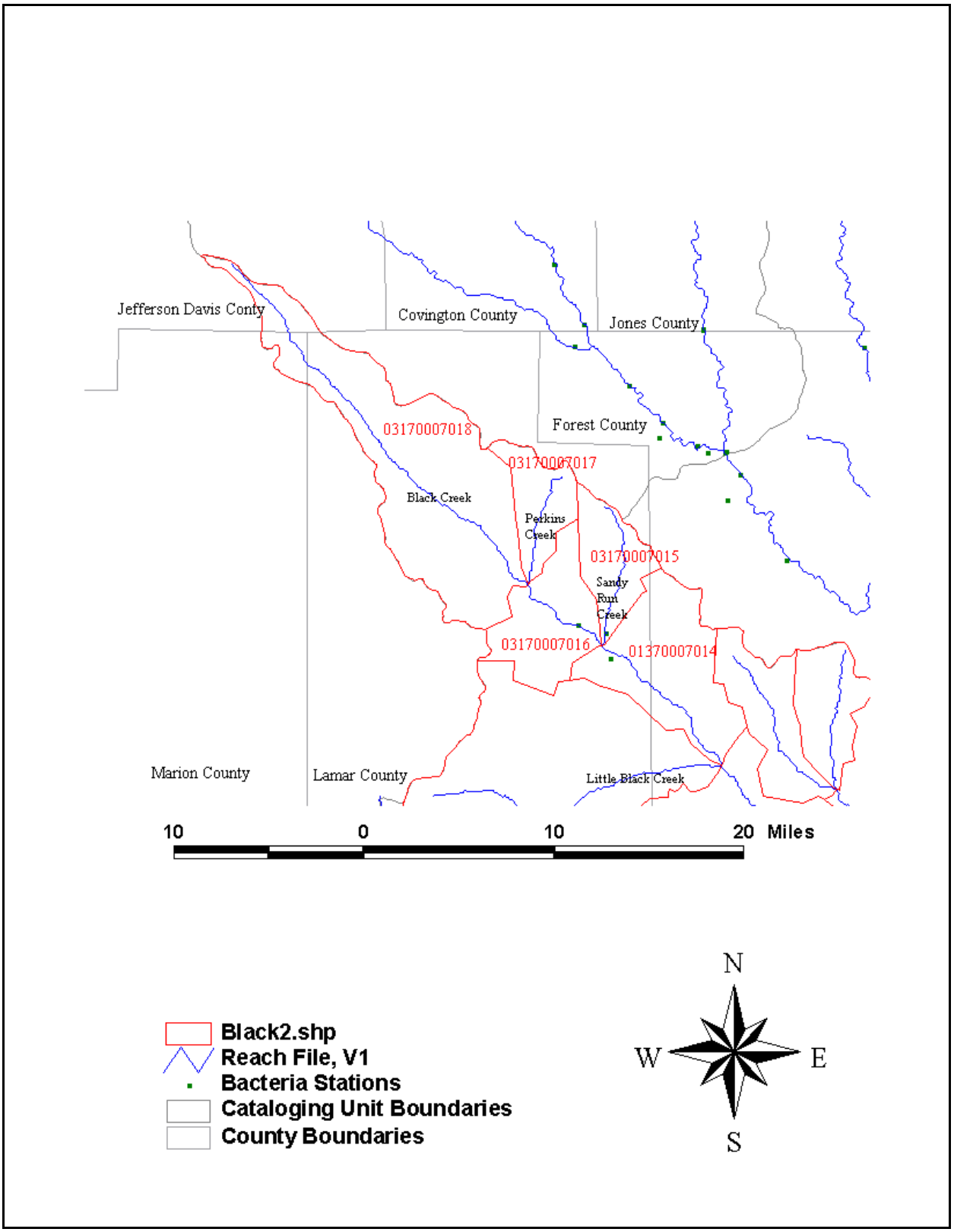

Figure 1.3 Black Creek Subwatersheds

1.2 Applicable Waterbody Segment Use

Designated beneficial uses and water quality standards are established by the *State of Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters* regulations. The designated uses for Black Creek as defined by the regulations are Contact Recreation (from Highway 11 to the Pascagoula River), and Fish and Wildlife Support. The monitored section of Black Creek has the designated use of Contact Recreation. The evaluated section of Black Creek has two designated uses. The portion above the Highway 11 bridge has the designated use of Fish and Wildlife Support. The remainder of the evaluated section is designated for Contact Recreation. The drainage area is designated for use as Secondary Contact Recreation. Secondary Contact Recreation is defined as incidental contact with water, including wading and occasional swimming.

1.3 Applicable Waterbody Segment Standard

The water quality standard applicable to the use of the waterbody and the pollutant of concern is defined in the *State of Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters* regulations. For segments designated for use as contact recreation, the standard states that the fecal coliform colony counts shall not exceed a geometric mean of 200 per 100 ml, nor shall more than 10% of the samples examined during any month exceed a colony count of 400 per 100 ml. This water quality standard will be used as targeted endpoints to evaluate impairments and establish this TMDL for both segments and the drainage area, because it is the most stringent standard.

For segments and drainage areas designated for use as Secondary Contact Recreation, the standard states that from May through October the fecal coliform colony counts shall not exceed a geometric mean of 200 per 100 ml, nor shall more than 10% of the samples examined during any month exceed a colony count of 400 per 100 ml. From November through April the fecal coliform colony counts shall not exceed a geometric mean of 2,000 per 100 ml, nor shall more than 10% of the samples examined during any month exceed a colony count of 4,000 per 100 ml.

2.0 TMDL ENDPOINT AND WATER QUALITY ASSESSMENT

2.1 Selection of a TMDL Endpoint and Critical Condition

One of the major components of a TMDL is the establishment of instream numeric endpoints, which are used to evaluate the attainment of acceptable water quality. Instream numeric endpoints, therefore, represent the water quality goals that are to be achieved by implementing the load and waste load reductions specified in the TMDL. The endpoints allow for a comparison between observed instream conditions and conditions that are expected to restore designated uses. The instream fecal coliform target for this TMDL is a 30-day geometric mean of 200 colony counts per 100 ml.

Because fecal coliform may be attributed to both nonpoint and point sources, the critical condition used for the modeling and evaluation of stream response was represented by a multi-year period. Critical conditions for waters impaired by nonpoint sources generally occur during periods of wet-weather and high surface runoff. But, critical conditions for point source dominated systems generally occur during low-flow, low-dilution conditions. The 1985-1995 period represents both low-flow conditions as well as wet-weather conditions and encompasses a range of wet and dry seasons. Therefore, the 11-year period was selected as representing critical conditions associated with all potential sources of fecal coliform bacteria within the watershed.

2.2 Discussion of Instream Water Quality

Water quality data available for the monitored segment of Black Creek show that the stream is frequently impaired by high levels of fecal coliform bacteria. There are two ambient stations operated by MDEQ which collected fecal coliform monitoring data during the 11-year modeling period. Monitoring for flow and fecal coliform continued on a bimonthly basis at station 02479102 beginning in January 1993 and ending in September 1996. At station 02479100, MDEQ collected bimonthly fecal coliform samples and flow measurements between March 1989 and September 1990. Both stations are located on Black Creek east of Purvis, MS. The data indicate that high instream fecal coliform concentrations occurred during both periods of high-flow and dry, low-flow conditions.

2.2.1 Inventory of Available Water Quality Monitoring Data

The State's 1998 Section 305(b) Water Quality Assessment Report was reviewed to assess water quality conditions and data available for the watershed. According to the report, Black Creek is not supporting the use of contact recreation due to the presence of fecal coliform bacteria. This conclusion was based on instantaneous data collected at station 02479102. Data collected at this station and another historical monitoring station 02479100 are listed below in Tables 2.2.1 and 2.2.2.

Table 2.2.1 Fecal Coliform Data reported in Black Creek, Station 20479102

Date	Flow (cfs)	Fecal Coliform (counts/100 ml)
01/13/93	970	8,000
03/09/93	380	40
05/03/93	440	800
07/13/93	580	170
09/13/93	90	80
11/01/93	620	5,000
01/12/94	190	40
03/09/94	243	40
05/05/94	400	500
06/20/94	88	20
08/23/94	76	20
11/07/94	400	1,600
01/09/95	400	1,700
03/06/95	550	2,400
04/17/95	160	40
07/10/95	43	20
09/11/95	35	170
11/08/95	170	230
01/19/96	125	80
03/04/96	220	130
05/06/96	100	40
07/09/96	30	80
09/10/96	125	20

Table 2.2.2 Fecal Coliform Data reported in Black Creek, Station 02479100

Date	Flow (cfs)	Fecal Coliform (counts/100 ml)
03/06/89	970	1,600
05/01/89	938	2,400
07/10/89	983	2,200
09/05/89	194	940
11/09/89	948	1,300
01/08/90	266	90
03/05/90	122	220
05/02/90	370	11
07/09/90	234	20
09/10/90	108	20
11/06/90	124	500

2.2.2 Analysis of Instream Water Quality Monitoring Data

Statistical summaries of the water quality data reported above are presented in Table 2.2.3. The number of exceedances listed in the table is the number of times that the instantaneous fecal coliform concentration exceeded the standard of 200 counts per 100 ml. The percent instantaneous exceedance was calculated for each station by dividing the number of exceedances by the total number of samples. The correlation between instantaneous flow and instream fecal coliform concentrations was also evaluated. In Figures 2.1 and 2.2, the instantaneous fecal coliform concentrations generally increased when the flow increased. The regression coefficients (R^2) and the linear regression lines are shown on the graphs. The regression coefficient values are high enough to show a reasonably good correlation between stream flow and instantaneous fecal coliform concentration. The highest fecal coliform concentration recorded for Black Creek, 8,000 counts per 100 ml, was recorded during a flow of 970 cfs, which is significantly higher than the 7Q10 for this section of Black Creek, 57 cfs. All fecal coliform violations for station 02479102 occurred when the flow was at least three times greater than the 7Q10.

Table 2.2.3 Statistical Summaries

Station Number	Number of Samples	Minimum Value (counts/100ml)	Maximum Value (counts/100ml)	Average Value (counts/100ml)	Number of Exceedances	Percent Instantaneous Exceedance
02479100	11	11	2,400	846	7	64%
02479102	23	20	16,000	922	8	35%

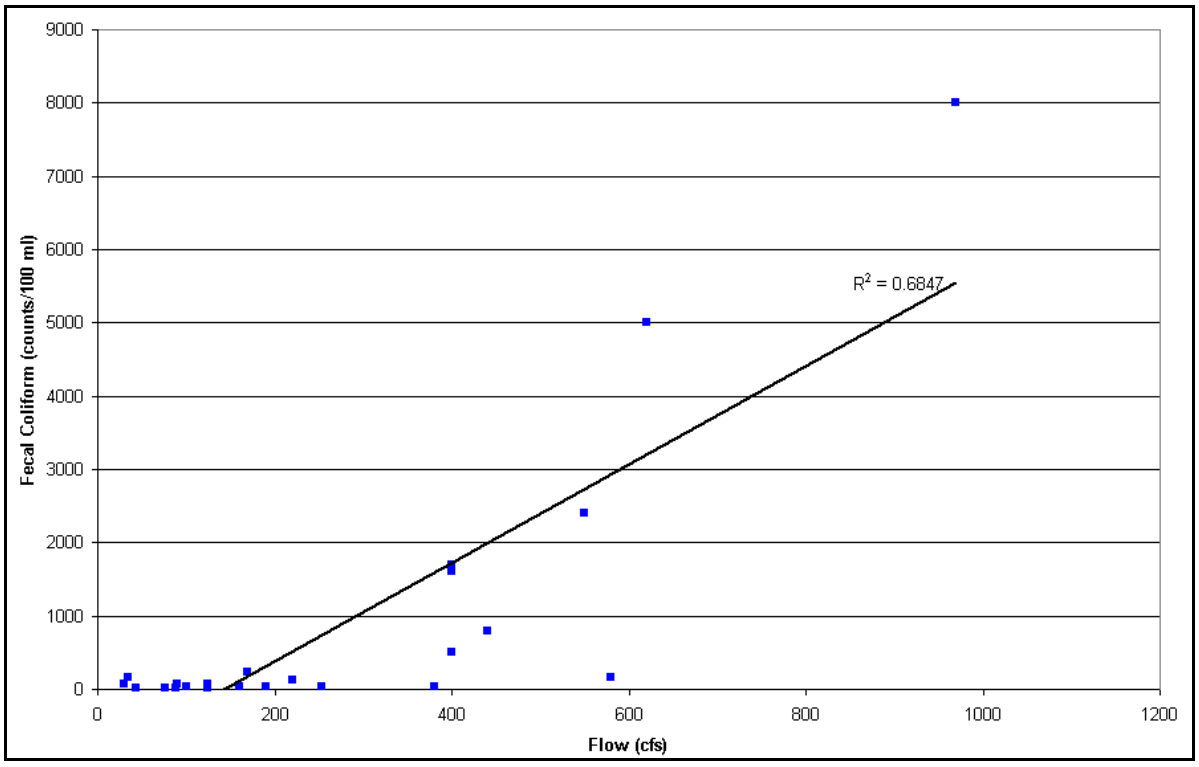

Figure 2.1 Station 02479102

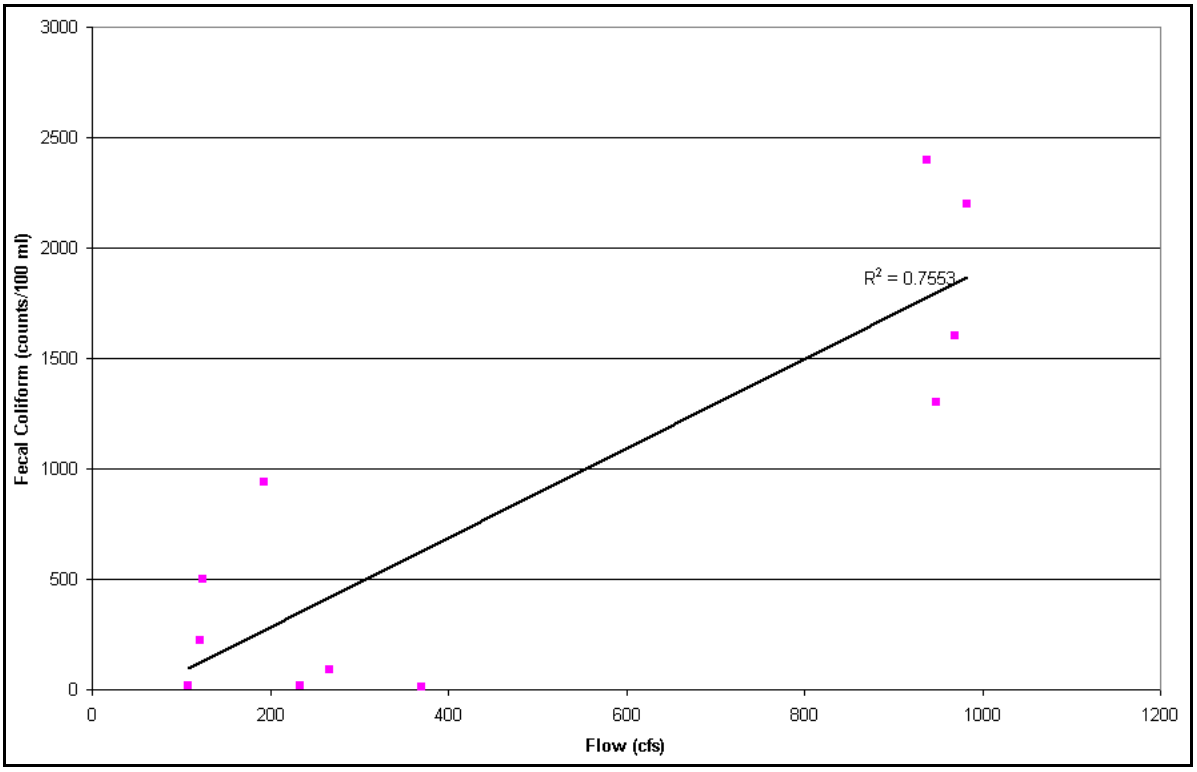

Figure 2.2 Station 02470100

3.0 SOURCE ASSESSMENT

The TMDL evaluation summarized in this report examined all known potential fecal coliform sources in the Black Creek watershed. The source assessment was used as the basis of development for the model and ultimate analysis of the TMDL allocation options. In evaluation of the sources, loads were characterized by the best available information, monitoring data, literature values, and local management activities. This section documents the available information and interpretation for the analysis. The representation of the following sources in the model is discussed in Section 4.0.

3.1 Assessment of Point Sources

Point sources of fecal coliform bacteria have their greatest potential impact on water quality during periods of low flow. Thus, a careful evaluation of point sources that discharge fecal coliform bacteria was necessary in order to quantify the degree of impairment present during the low-flow, critical condition period. The 19 wastewater treatment plants in the Black Creek Watershed serve a variety of activities including residential subdivisions, schools, recreational areas, and other businesses. The majority of the 19 wastewater treatment plants serve residential subdivisions.

A point source assessment was completed for each subwatershed in the Black Creek drainage area, given in Figure 1.3. Table 3.1.1 lists all of the fecal coliform dischargers according to subwatershed, along with the NPDES Permit number and the receiving waterbody.

Once the permitted dischargers were located, the effluent from each source was characterized based on all available monitoring data including permit limits, discharge monitoring reports, and information on treatment types. Discharge monitoring reports (DMR) were the best data source for characterizing effluent because they report measurements of flow and fecal coliform present in effluent samples. Of the facilities for which they were available, the DMRs for the past five years, 1993 through 1998, were analyzed. When data were available, the fecal coliform concentrations used in the model were calculated by taking an average of fecal coliform concentrations reported in the discharge monitoring reports. If the discharge monitoring data were inadequate, permit limits were used to represent fecal coliform concentrations in the model. If evidence of insufficient treatment existed, best professional judgement was used to estimate a fecal coliform loading rate in the model. The permit limits of each facility included in the model are given in Table 3.1.1.

Table 3.1.1 Inventory of Point Source Dischargers

Facility Name	Subwatershed	NPDES	Fecal Coliform (counts/100ml)	Receiving Waterbody
Little Black Creek Waterpark	03170007014	MS0033677	200	Little Black Creek
Purvis POTW	03170007014	MS0036536	200	Meyers Bay Creek
Oak Grove SD and Oak Hill Townhouses	03170007015	MS0034908	200	Boggy Branch
Forest Hills Subdivision	03170007015	MS0033171	200	Sandy Run
Oak Grove Mobile Home Park	03170007015	MS0047155	200	Sandy Run
Tubb Equipment and Rental	03170007015	MS0053520	200	Tributary to Sandy Run Creek
Woods Phase II	03170007015	MS0053511	200	Boggy Branch
Windridge Subdivision	03170007015	MS0050695	200	Boggy Branch
A-1 Trailer Park	03170007016	MS0039331	200	Tributary to Mixon Creek
Adventist Health Center	03170007016	MS0037401	200	Tributary to Beaverdam Creek
Bass Memorial Academy	03170007016	MS0036064	200	Beaverdam Creek
Lamar Villa Apartments	03170007016	MS0035874	200	Mixon Creek
Canebrake Subdivision	03170007017	MS0042064	200	Perkins Creek
Fieldstone and Bentcreek Subdivisions	03170007017	MS0052868	200	Perkins Creek
Oak Forest Utility Company	03170007017	MS0029416	200	Perkins Creek
Sandstone Subdivision	03170007017	MS0054500	200	Perkins Creek
Belle Terre Subdivision	03170007018	MS0052426	200	Black Creek
Blue Woods West Mobile Home Park	03170007018	MS0051926	200	Colters Creek
Bridgefield Subdivision	03170007018	MS0052141	200	Parkers Creek

3.2 Assessment of Nonpoint Sources

There are many potential nonpoint sources of fecal coliform bacteria for Black Creek, including:

- Failing septic systems
- Wildlife
- Land application of hog and cattle manure
- Grazing beef and dairy cattle
- Land application of poultry litter
- Cattle contributions directly deposited instream
- Urban development

The 129,094 acre watershed of the monitored segment of Black Creek contains many different landuse types, including urban, forest, cropland, pasture, barren, and wetlands. The landuse information is based on data collected by the State of Mississippi's Automated Information System (MARIS), 1997. This data set is based on Landsat Thematic Mapper digital images taken between 1992 and 1993. This classification is based on a modified Anderson level one and two system with additional level two wetland classifications. The contributions of each of these land types to the fecal coliform loading of Black Creek was considered on a subwatershed basis. Table 3.2.1 shows the landuse distribution within each subwatershed in number of acres.

Table 3.2.1 Landuse Distribution in Number of Acres

Subwatershed	Forest	Croplands	Pasture	Urban	Barren	Wetlands	Total
03170007014	19,989	384	6,280	565	320	667	**28,204**
03170007015	9,252	176	2,599	28	102	18	**12,175**
03170007016	12,444	418	5,709	8	196	20	**18,794**
03170007017	7,304	298	2,189	169	85	0	**10,046**
03170007018	42,103	1,459	15,978	49	212	73	**59,875**
All Watersheds	**91,093**	**2,735**	**32,755**	**819**	**915**	**777**	**129,094**

The nonpoint fecal coliform contribution from each landuse was estimated using the latest information available. The MARIS landuse data for Mississippi was utilized by the BASINS model to extract landuse sizes, populations, agriculture census data, and other information. MDEQ contacted several agencies to refine the assumptions made in determining the fecal coliform loading. The Mississippi Department of Wildlife, Fisheries, and Parks provided information on wildlife density in the Black Creek Watershed. The Mississippi State Department of Health was contacted regarding the failure rate of septic tank systems in this portion of the state. Mississippi State University researchers provided information on manure application practices and loading rates for hog farms and cattle operations. The Natural Resources Conservation Service also gave MDEQ information on manure treatment practices and land application of manure.

3.2.1 Failing Septic Systems

Septic systems have a potential to deliver fecal coliform bacteria loads to surface waters due to malfunctions, failures, and direct pipe discharges. Properly operating septic systems treat wastewater and dispose of the water through a series of underground field lines. The water is applied through these lines into a rock substrate, thence into underground absorption. The systems can fail when the field lines are broken, or the underground substrate is clogged or flooded. A failing septic system's discharge can reach the surface, where it becomes available for wash-off into the stream. Another potential problem is a direct bypass from the system to a stream. In an effort to keep the water off the land, pipes are occasionally placed from the septic tank or the field lines directly to the creek.

Another consideration is the use of individual onsite wastewater treatment plants. These treatment systems are in wide use in Mississippi. They can adequately treat wastewater when properly maintained. However, these systems do not typically receive the maintenance needed for proper, long-term operation. These systems require some sort of disinfection to properly operate. When this expense is ignored, the water does not receive adequate disinfection prior to release.

3.2.2 Wildlife

Wildlife present in the Black Creek watershed contribute to fecal coliform bacteria on the land surface. In the Black Creek model, all wildlife was accounted for by considering contributions from deer. Estimates of deer population were designed to account for the deer combined with all of the other wildlife contributing to the area. It was assumed that the wildlife population remained constant throughout the year, and that wildlife were present on all land classified as pastureland, cropland, and forest. It was also assumed that the wildlife and the manure produced by the wildlife were evenly distributed throughout these land types.

3.2.3 Land Application of Hog and Cattle Manure

In the Pascagoula Basin, processed manure from confined hog and dairy cattle operations is collected in lagoons and routinely applied to pastureland during the months of April through October. This manure is a potential contributor of bacteria to receiving waterbodies due to runoff produced during a rain event. Hog farms in the Pascagoula Basin operate by either keeping the animals confined or by allowing hogs to graze in a small pasture or pen. For this model, it was assumed that all of the hog manure produced by either farming method was applied evenly to the available pastureland.

The dairy farms that are currently operating in the Black Creek watershed only confine the animals for a limited time during the day. The model assumed a confinement time of four hours per day, during which time the cattle are milked and fed. During all other times, dairy cattle are allowed to graze on pasturelands. The manure collected during confinement is applied to the available pastureland in the watershed. Like the hog farms, manure produced by confined dairy cattle is applied to pastureland during the months of April through October.

3.2.4 Grazing Beef and Dairy Cattle

Grazing cattle deposit manure on pastureland where it is available for wash-off and delivery to receiving waterbodies. Beef cattle have access to pastureland for grazing all of the time. However, dairy cattle can spend four hours per day confined in milking barns, and the remainder of their time grazing on pastureland. Manure produced by grazing beef and dairy cows is directly deposited onto pastureland.

3.2.5 Land Application of Poultry Litter

There is a considerable number of chickens produced in Jefferson Davis, Lamar, Marion, and Forest Counties each year. In these counties, poultry farming operations use houses in which chickens are confined all of the time. The litter produced by the chickens is collected and is routinely applied as a fertilizer to pastureland in the watershed in the months of April to October.

Predominantly, two kinds of chickens are raised on farms in the Pascagoula Basin, broilers and layers. For the broiler chickens, the amount of growth time from when the chicken is born to when it is sold off the farm is approximately 48 days or 1.6 months. Layer chickens remain on farms for 10 months or longer. More than 93% of the chickens raised in this area are broilers. For the model, a weighted average of growth time was determined to account for both types of chickens. An average growth time of 52 days, or one-seventh of a year, was used. To determine the number of chickens on farms on any given day, the yearly population of chickens sold was divided by seven.

3.2.6 Cattle Contributions Directly Deposited Instream

Cattle often have direct access to flowing and intermittent streams which run through pastureland. These small streams are tributaries of larger streams. Fecal coliform bacteria deposited in these streams by grazing cattle are modeled as a direct input of bacteria to the stream. Due to the general topography in the Black Creek watershed, it was assumed that all land slopes in the watershed are such that cattle are able to access the intermittent streams in all pastures. In order to determine the amount of bacteria introduced into streams from cattle, it was assumed that all grazing cattle spent five percent of their time standing in the streams. Thus, the model assumes that five percent of the manure produced by grazing beef and dairy cows is deposited directly in the stream.

3.2.7 Urban Development

Even though only a small percentage of the watershed is classified as urban, the contribution of the urban areas to fecal coliform loading in Black Creek was considered. Fecal coliform contributions from urban areas come from storm water runoff, runoff from construction sites, and runoff contribution from improper disposal of materials such as household toxic materials and litter.

4.0 MODELING PROCEDURE: LINKING THE SOURCES TO THE ENDPOINT

Establishing the relationship between the instream water quality target and the source loadings is a critical component of TMDL development. It allows for the evaluation of management options that will achieve the desired source load reductions. The link can be established though a range of techniques, from qualitative assumptions based on sound scientific principles to sophisticated modeling techniques. Ideally, the linkage will be supported by monitoring data that allow the TMDL developer to associate certain waterbody responses to flow and loading conditions. In this section, the selection of the modeling tools, setup, and model application are discussed.

4.1 Modeling Framework Selection

The BASINS model platform and the NPSM model were used to predict the significance of fecal coliform sources to fecal coliform levels in the Black Creek watershed. BASINS is a multipurpose environmental analysis system for use in performing watershed and water quality-based studies. A geographic information system (GIS) provides the integrating framework for BASINS and allows for the display and analysis of a wide variety of landscape information such as landuses, monitoring stations, point source discharges, and stream descriptions. The NPSM model simulates nonpoint source runoff from selected watersheds, as well as the transport and flow of the pollutants through stream reaches. A key reason for using BASINS as the modeling framework is its ability to integrate both point and nonpoint sources in the simulation, as well as its ability to assess instream water quality response.

4.2 Model Setup

The Black Creek TMDL model includes the listed sections and drainage area of the creek as well as all the watersheds which are upstream of the segments. Thus, all upstream contributors of bacteria are accounted for in the model. To obtain a spatial variation of the concentration of bacteria along Black Creek, the watershed was divided into five subwatersheds in an effort to isolate the major stream reaches of Black Creek. This allowed the relative contribution of point and nonpoint sources to be addressed within each subwatershed.

4.3 Source Representation

Both point and nonpoint sources were represented in this model. Due to die-off rates and overland transportation assumptions, the fecal coliform loadings from point and nonpoint sources must be addressed separately. There are 19 NPDES permitted facilities in the watershed which discharge fecal coliform bacteria. The discharge was added as a direct input into the appropriate reach of the waterbody. Fecal coliform loading rates for point sources are input to the model as flow in cubic feet per second and fecal coliform contribution in counts per hour. The nonpoint sources are represented

in the model with two different methods. The first of these methods is a direct fecal coliform loading to Black Creek. Other sources are represented as an application rate to the land in the Black Creek watershed. For these sources, fecal coliform accumulation rates in counts per acre per day were calculated for each subwatershed on a monthly basis and input to the model for each landuse. Fecal coliform contributions from forests and wetlands were considered at the same time, and all forest and wetland contributions were combined for model input. Urban and barren areas were combined and input into the model in the same manner.

Appendix A contains the Fecal Coliform Spreadsheet developed for quantifying point and nonpoint sources of bacteria for the Black Creek model. The model inputs for fecal coliform loading due to point and nonpoint sources are calculated using assumptions about land management, septic systems, farming practices, and permitted point source contributions. Each of the potential bacteria sources is covered in the fecal coliform spreadsheet. The spreadsheet also contains a reference page which lists the literature references used to generate the fecal coliform loading rates.

4.3.1 Failing Septic Systems

The number of failing septic systems used in the model was derived from the watershed area normalized population of Jefferson Davis, Marion, Lamar, and Forrest Counties. The percentage of the population on septic systems, which was determined from 1990 United States Census Data, is given in Table 4.3.1. Based on the best available information, a failure rate of 40% was assumed. This information was used to calculate the estimated number of failing septic tanks per watershed. The number of failing septic tanks also incorporates an estimate for the failing onsite wastewater treatment systems in the area.

Table 4.3.1 Percent of Population on Septic Systems, by County

County	Forrest	Jefferson Davis	Lamar	Marion
Percent On Septic Systems	24%	80%	53%	67%

Discharges from failing septic systems were quantified based on several factors including the estimated population served by the septic systems, an average daily discharge of 100 gallons per person per day, and a septic system effluent fecal coliform concentration of 10^4 counts per 100 ml. The model inputs for flow and fecal coliform concentration from failing septic tanks are shown in Appendix A.

4.3.2 Wildlife

Based on information provided by the Mississippi Department of Wildlife, Fisheries, and Parks, the deer population throughout the Black Creek watershed was estimated to be 30 to 45 animals per square mile. For the model, the upper limit of 45 deer per square mile was used to account for the deer and all other wildlife contributing to fecal coliform accumulation in the area. The wildlife contribution in counts per acre per day is calculated by multiplying a loading rate by the number of animals. The loading rate used in the model was estimated to be 5.00E+08 counts per day per animal. The loading rates for each subwatershed are available in Appendix A.

4.3.3 Land Application of Hog and Cattle Manure

The fecal coliform spreadsheet was used to estimate the amount of waste and the concentration of fecal coliform bacteria contained in hog and dairy cattle manure produced by confined animal feeding operations. The livestock count per county is based upon the 1997 Census of Agriculture data. The county livestock count is used to estimate the number of livestock on a subwatershed scale. This is calculated by multiplying the county livestock figures with the area of the county within the subwatershed boundaries. This estimate is made with the assumption that the livestock are uniformly distributed throughout the county. A fecal coliform production rate in counts per day per animal was multiplied by the number of confined animals to quantify the amount of bacteria produced. The manure produced by these operations is collected in lagoons and applied evenly to all pastureland. Manure application rates to pastureland vary on a monthly basis. This monthly variation is incorporated into the model by using monthly loading rates. The fecal coliform loading rates for land application of hog and liquid dairy manure are shown in Appendix A.

4.3.4 Grazing Beef and Dairy Cattle

The model assumes that the manure produced by grazing beef and dairy cattle is evenly spread on pastureland throughout the year. The fecal coliform content of manure produced by grazing cattle is estimated by multiplying the number of grazing cattle by a fecal coliform production of 5.40E+09 counts per day per animal (Metcalf and Eddy, 1991). The resulting fecal coliform loads are in the units of counts per acre per day. The fecal coliform loading rates due to grazing cattle are shown in the spreadsheet in Appendix A.

4.3.5 Land Application of Poultry Litter

The concentration of bacteria which accumulates in the dry litter where poultry waste is collected is estimated with the fecal coliform spreadsheet. This is done by multiplying the daily number of chickens on farms by a fecal coliform production rate in counts per day per animal given in Metcalf & Eddy, 1991. The model assumed a watershed area normalized chicken population. The chicken population was determined from the 1997 Census of Agriculture Data for the number of chickens sold from each county per year. Litter application to pastureland varies monthly, and is modeled with a monthly loading rate. The fecal coliform loading rates from poultry litter application are shown in Appendix A.

4.3.6 Cattle Contributions Deposited Directly Instream

The contribution of fecal coliform from cattle to a stream is represented as a direct input into the stream by the model. In order to estimate the point source loading produced by grazing beef and dairy cattle with access to streams, it is assumed that five percent of the number of grazing cattle in each subwatershed are standing in a stream at any given time. When cattle are standing in a stream, their fecal coliform production is estimated as flow in cubic feet per second and a concentration in counts per hour. As shown in Appendix A, the fecal coliform concentration is calculated using the number of cows in the stream and a bacteria production rate of 5.40E+09 counts per animal per day (Metcalf and Eddy, 1991).

4.3.7 Urban Development

The MARIS landuse data divide urban land into several categories. For the Black Creek watershed, the urban land is divided into three different categories: high density, low density, and transportation. For the model, fecal coliform buildup rates for each category were determined by using literature values from Horner, 1992. The literature value accounts for all of the potential fecal coliform sources in each urban category. The literature values for each urban landuse category are given in Table 4.3.3. Table 4.3.4 shows the urban landuse distribution within each subwatershed. In the model, fecal coliform loading rates on urban land are input as counts per acre per day. These loading rates for each watershed are shown in Appendix A.

Table 4.3.3 Urban Loading Rates, by Landuse

High Density Area	Low Density Area	Transportation Area
1.54E+07	1.03E+07	2.00E+05

Table 4.3.4 Urban Landuse Distribution

Subwatershed	High Density Area (acres)	Low Density Area (acres)	Transportation Area (acres)	Total
03170007014	142	398	345	**885**
03170007015	20	59	51	**130**
03170007016	32	92	80	**204**
03170007017	41	114	99	**254**
03170007018	41	118	102	**261**
Total	**276**	**781**	**677**	**1,734**

4.4 Stream Characteristics

The stream characteristics given below describe the entire modeled section of Black Creek. This section begins at the headwaters and ends at the end of the monitored reach, with the confluence of Little Black Creek. The channel geometry and lengths for Black Creek are based on data available within the BASINS modeling system. The 7Q10 flow was determined from USGS data. The characteristics of the modeled section of Black Creek are as follows.

- Length 38 miles
- Average Depth 0.0823 ft
- Average Width 51.40 ft
- Mean Flow 403.51 cubic ft per second
- Mean Velocity 1.4 ft per second
- 7Q10 Flow 57 cubic ft per second
- Slope 0.0090 ft per ft

4.5 Selection of Representative Modeling Period

The model was run for 12 years, from January 1, 1984, through December 31, 1995. The first year of data were used to stabilize the model. Results from the model were evaluated for the time period from January 1, 1985, until December 31, 1995. Because the 11-year time span is used, a margin of safety is implicitly applied. Seasonality and critical conditions are accounted for during the extended time frame of the simulation.

The critical condition for fecal coliform impairment from nonpoint source contributors occurs after a heavy rainfall which is preceded by several days of dry weather. The dry weather allows a build up of fecal coliform bacteria which is then washed off the ground by a heavy rainfall. By using the 11-year time period, many such occurrences are captured in the model results. Critical conditions for point sources, which occur during low flow and low dilution conditions, are simulated as well.

4.6 Model Calibration Process

The hydrological model had a continuous USGS gage available on Black Creek near Brooklyn for comparison with the modeled flow in reach 03170007014 of Black Creek. A set of input values for hydrologic parameters was established for the Pascagoula Basin as a means of calibration and validation of the hydrology. Samples of these results are included in Appendix B, Graphs B-1a and B-1b. Modeled output and actual gage data are shown on the same graph for selected years. There is a good correlation between the two data sets.

Several assumptions were made to determine the fecal coliform loading rates from the nonpoint source contributors. Many of these assumptions were incorporated into the fecal coliform spreadsheet. MDEQ contacted researchers and agricultural experts to give as much validity as possible to the assumptions made within the BASINS model.

4.7 Existing Loadings

Appendix B includes two graphs of the model results showing the instream fecal coliform concentrations for reach 03170007014 of Black Creek. Graph B-2 shows the fecal coliform levels in the stream during the 11-year modeling period. The graph shows a 30-day geometric mean of the data. There have been 33 standards violations in 11 years according to the model. The straight line at 200 counts per 100 ml indicates the water quality standard for the stream.

Graph B-3 shows the 30-day geometric mean of the fecal coliform levels after the reduction scenario has been modeled. The scale matches the previous graph for comparison purposes. The graph indicates that there are no violations of the water quality standard for both the monitored and evaluated segments after the reduction scenario is applied.

5.0 ALLOCATION

The allocation for this TMDL involves a wasteload allocation for point sources and a load allocation for nonpoint sources necessary for attainment of water quality standards in segments MS099B1M4 and MS099B2M1 and the drainage area MS099B2E. Point and nonpoint source fecal coliform contributions enter the stream in the appropriate reach. The fecal coliform sources used in the model have two different transportation methods. NPDES Permitted dischargers, cows in the stream, and failing septic tanks were modeled as direct inputs to the stream. The other nonpoint source contributions were applied to land area on a counts per day per acre basis. The fecal coliform bacteria applied to land are subject to a die-off rate and an absorption rate before entering the stream. The TMDL was calculated based on modeling estimates which are referenced in Appendix B.

5.1 Wasteload Allocations

Point sources within the watershed discharging at their current level are subject to some reduction from their current level of fecal coliform contribution. The contribution of point sources was considered on a subwatershed basis for the model. Within each subwatershed, the modeled contribution of each discharger was based on the facility's discharge monitoring data and other records of past performance. In several cases, the fecal coliform contribution from a facility is much greater than the permitted limit of 200 counts per100 ml. As part of this TMDL, all facilities will be required to meet water quality standards at the end of pipe. All wastewater treatment facilities should take steps to comply with their current NPDES Permits. Table 5.1.1 lists the combined point source contributions, on a subwatershed basis, along with their existing load, allocated load, and percent reduction.

Table 5.1.1 NPDES Permitted Sources

Subwatershed	Existing Flow (cfs)	Existing Load (counts/hr)	Allocated Flow (cfs)	Allocated Load (counts/hr)	Percent Reduction
03170007014	0.56	1.03E+09	0.56	1.14E+08	**89%**
03170007015	0.40	9.23E+07	0.40	6.84E+07	**26%**
03170007016	0.05	1.10E+07	0.05	1.10E+07	**0%**
03170007017	0.19	5.15E+07	0.19	3.90E+07	**24%**
03170007018	0.26	5.29E+07	0.26	5.29E+07	**0%**
Total	**1.47**	**1.24E+09**	**1.47**	**2.85E+08**	**77%**

5.2 Load Allocations

Nonpoint sources which contribute to fecal coliform accumulation within the Black Creek watershed are subject to reduction from their current level of contribution. This TMDL involves reductions of two different types of nonpoint sources: cattle access to streams and septic tanks. Contributions from both of these sources are input directly into the modeled waterbodies with a flow and fecal coliform concentration in counts per hour. Table 5.2.1 lists the nonpoint source contributions due

to cattle access to streams, on a subwatershed basis, along with their existing load, allocated load, and percent reduction. Table 5.2.2 gives the same parameters for contributions due to septic tank failure. The septic tank failures in reality are both point and nonpoint source contributions and have been calculated as equal contributors to the WLA and the LA component of the TMDL calculation.

Table 5.2.1 Fecal Coliform loading rates for cattle access to streams

Subwatershed	Existing Flow (cfs)	Existing Load (counts/hr)	Allocated Flow (cfs)	Allocated Load (counts/hr)	Percent Reduction
03170007014	2.92E-04	7.70E+09	8.76E-05	2.31E+09	**70%**
03170007015	1.97E-04	5.18E+09	5.90E-05	1.55E+09	**70%**
03170007016	3.08E-04	8.12E+09	9.24E-05	2.44E+09	**70%**
03170007017	1.82E-04	4.80E+09	5.46E-05	1.44E+09	**70%**
03170007018	1.07E-03	2.82E+10	3.22E-04	8.47E+09	**70%**
Total	**2.05E-03**	**5.40E+10**	**6.15E-04**	**1.62E+10**	**70%**

Table 5.2.2 Fecal Coliform loading Rates for failing septic tanks

Subwatershed	Existing Flow (cfs)	Existing Load (counts/hr)	Allocated Flow (cfs)	Allocated Load (counts/hr)	Percent Reduction
03170007014	1.05E-01	1.07E+09	5.26E-02	5.35E+08	**50%**
03170007015	4.54E-02	4.62E+08	2.27E-02	2.31E+08	**50%**
03170007016	7.01E-02	7.13E+08	3.50E-02	3.56E+08	**50%**
03170007017	3.75E-02	3.81E+08	1.87E-02	1.91E+08	**50%**
03170007018	2.23E-01	2.27E+09	1.12E-01	1.14E+09	**50%**
Total	**4.81E-01**	**4.90E+09**	**2.41E-01**	**2.45E+09**	**50%**

Nonpoint fecal coliform loadings due to cattle grazing; land application of manure produced by confined dairy cattle, hogs, and poultry; wildlife; and urban development are also included in the load allocation. Currently, no reduction is required for these contributors in order for Black Creek to achieve water quality standards. Table 5.2.3 shows the number of fecal coliform bacteria applied to land, available for land surface runoff, in counts per day. The application rates in this table are given for each landuse type on a subwatershed basis.

The loading rates are constant throughout the year for forest, cropland, and urban land. The loading rates for pastureland vary for each month. However, in the table, the given rate is based on an average of the monthly application rates. Monthly accumulation rates for pastureland are shown in the fecal coliform spreadsheet in Appendix A.

Table 5.2.3 Number of Bacteria Applied to Land, Available for Surface Runoff, in Counts per Day

Subwatershed	Urban and Barren	Forest and Wetland	Cropland	Pastureland	Total
03170007014	6.35E+09	7.27E+11	1.35E+10	5.29E+12	**6.04E+12**
03170007015	9.33E+08	3.26E+11	6.20E+09	3.25E+12	**3.58E+12**
03170007016	1.46E+09	4.39E+11	1.47E+10	5.14E+12	**5.60E+12**
03170007017	1.82E+09	2.57E+11	1.05E+10	3.00E+12	**3.27E+12**
03170007018	1.88E+09	1.48E+12	5.14E+10	1.74E+13	**1.90E+13**
Total	**1.25E+10**	**3.23E+12**	**9.63E+10**	**3.41E+13**	**3.74E+13**

The scenario chosen for the load allocation in the Black Creek watershed is a 70% reduction in contributions from cows in the stream, and a 50% reduction from failing septic tanks. The scenario also requires all permitted dischargers to meet water quality standards for disinfection. This scenario could be achieved by supporting BMP projects that promote fencing around streams in pastures, and by supporting education projects that encourage homeowners to properly maintain their septic tanks by routinely pumping them out, repairing broken field lines, and disinfecting the effluent from individual onsite wastewater treatment plants.

5.3 Incorporation of a Margin of Safety

The two types of MOS development are to implicitly incorporate the MOS using conservative model assumptions or to explicitly specify a portion of the total TMDL as the MOS. The MOS selected for this model is implicit. The primary component of the MOS is provided by running the model for 11 years with no violations of the water quality standard. Ensuring compliance with the standard throughout all of the critical condition periods represented during the 11 years is a conservative practice. Another component of the MOS is the conservative assumption that in the model all of the fecal coliform bacteria discharged from failing septic tanks reaches the stream, while it is likely that only a portion of the bacteria will reach the stream due to filtration and die off during transport.

5.4 Seasonality

For many streams in the state, fecal coliform limits vary according to the seasons. The monitored segment of Black Creek, however, is designated for the use of contact recreation. For this use, the pollutant standard is constant throughout the year.

Because the model was established for an 11-year time span, it took into account all of the seasons within the calendar years from 1985 to 1995. The extended time period allowed the simulation of many different atmospheric conditions such as rainy and dry periods and high and low temperatures. It also allowed seasonal critical conditions to be simulated.

6.0 IMPLEMENTATION

6.1 Follow-Up Monitoring

MDEQ has adopted the Basin Approach to Water Quality Management, a plan which divides Mississippi's major drainage basins into five groups. During each year-long cycle, MDEQ resources for water quality monitoring will be focused on one of the basin groups. During the next monitoring phase in the Pascagoula Basin, Black Creek may receive follow-up monitoring to identify the improvement in water quality from the implementation of the strategies in this TMDL.

6.2 Reasonable Assurance

The fecal coliform reduction scenario used in this TMDL includes requiring all NPDES permitted dischargers of fecal coliform to meet water quality standards for disinfection. For nonpoint sources, the TMDL recommends a 70% reduction of the cattle access to streams and a 50% reduction of the failing septic tanks in the watershed. Reasonable assurance for the implementation of the TMDL has been considered for both point and nonpoint source contributors. The TMDL will not impact existing or future NPDES permits as long as the effluent is disinfected to meet water quality standards for fecal coliform bacteria. Permits for constructing wastewater treatment plants without the proper disinfection equipment are not recommended for approval by this TMDL. Also, this TMDL should not effect the growth of animal operations or the continued installation of septic tanks in the Black Creek watershed as long as they are both properly maintained. Education projects which teach best management practices should be used as a tool for reducing nonpoint source contributions. These projects may be funded by CWA Section 319 Nonpoint Source (NPS) Grants.

6.3 Public Participation

This TMDL will be published for a 30-day public notice. During this time, the public will be notified by publication in the statewide newspaper and a newspaper in Forrest County. The public will be given an opportunity to review the TMDL and submit comments. At the end of the 30-day period, MDEQ will determine the level of interest in the TMDL and make a decision on the necessity of holding a public hearing.

If a public hearing is deemed appropriate, the public will be given a 30-day notice of the hearing to be held at a location near the watershed. That public hearing would be an official hearing of the Mississippi Commission on Environmental Quality, and would be transcribed.

All comments received during the public notice period and at any public hearings become a part of the record of this TMDL. All comments will be considered in the ultimate approval of this TMDL by the Commission on Environmental Quality and for submission of this TMDL to EPA Region Four for final approval.

DEFINITIONS

Ambient stations: a network of fixed monitoring stations established for systematic water quality sampling at regular intervals, and for uniform parametric coverage over a long-term period.

Assimilative capacity: the capacity of a body of water or soil-plant system to receive wastewater effluents or sludge without violating the provisions of the State of Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters and Water Quality regulations.

Background: the condition of waters in the absence of man-induced alterations based on the best scientific information available to MDEQ. The establishment of natural background for an altered waterbody may be based upon a similar, unaltered or least impaired, waterbody or on historical pre-alteration data.

Calibrated model: a model in which reaction rates and inputs are significantly based on actual measurements using data from surveys on the receiving waterbody.

Critical Condition: hydrologic and atmospheric conditions in which the pollutants causing impairment of a waterbody have their greatest potential for adverse effects.

Daily discharge: the "discharge of a pollutant" measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the "daily average" is calculated as the average.

Designated Use: use specified in water quality standards for each waterbody or segment regardless of actual attainment.

Discharge monitoring report: report of effluent characteristics submitted by a NPDES Permitted facility.

Effluent standards and limitations: all State or Federal effluent standards and limitations on quantities, rates, and concentrations of chemical, physical, biological, and other constituents to which a waste or wastewater discharge may be subject under the Federal Act or the State law. This includes, but is not limited to, effluent limitations, standards of performance, toxic effluent standards and prohibitions, pretreatment standards, and schedules of compliance.

Effluent: treated wastewater flowing out of the treatment facilities.

Fecal coliform bacteria: a group of bacteria that normally live within the intestines of mammals, including humans. Fecal coliform bacteria are used as an indicator of the presence of pathogenic organisms in natural water.

Geometric mean: the *n*th root of the product of *n* numbers. A 30-day geometric mean is the 30^{th} root of the product of 30 numbers.

Impaired Waterbody: any waterbody that does not attain water quality standards due to an individual pollutant, multiple pollutants, pollution, or a unknown cause of impairment.

Land Surface Runoff: water that flows into the receiving stream after application by rainfall or irrigation. It is a transport method for nonpoint source pollution from the land surface to the receiving stream.

Load allocation (LA): the portion of a receiving water's loading capacity attributed to or assigned to nonpoint sources (NPS) or background sources of a pollutant. The load allocation is the value assigned to the summation of all cattle and land applied fecal coliform that enter a receiving waterbody. It also contains a portion of the contribution from septic tanks.

Loading: the total amount of pollutants entering a stream from one or multiple sources.

Nonpoint Source: pollution that is in runoff from the land. Rainfall, snowmelt, and other water that does not evaporate becomes surface runoff and either drains into surface waters or soaks into the soil and finds its way into ground water. This surface water may contain pollutants that come from land use activities such as: agriculture; construction; silviculture; surface mining; disposal of wastewater; hydrologic modifications; and urban development.

NPDES permit: an individual or general permit issued by the Mississippi Environmental Quality Permit Board pursuant to regulations adopted by the Mississippi Commission on Environmental Quality under Mississippi Code Annotated (as amended) §§ 49-17-17 and 49-17-29 for discharges into State waters.

Point Source: pollution loads discharged at a specific location from pipes, outfalls, and conveyance channels from either wastewater treatment plants or industrial waste treatment facilities. Point sources can also include pollutant loads contributed by tributaries to the main receiving stream.

Pollution: contamination, or other alteration of the physical, chemical, or biological properties, of any waters of the State, including change in temperature, taste, color, turbidity, or odor of the waters, or such discharge of any liquid, gaseous, solid, radioactive, or other substance, or leak into any waters of the State, unless in compliance with a valid permit issued by the Permit Board.

Publicly Owned Treatment Works (POTW) : a waste treatment facility owned and/or operated by a public body or a privately owned treatment works which accepts discharges which would otherwise be subject to Federal Pretreatment Requirements.

Scientific Notation (Exponential Notation): mathematical method in which very large numbers or very small numbers are expressed in a more concise form. The notation is based on powers of ten. Numbers in scientific notation are expressed as the following: *4.16 x 10^(+b)* and *4.16 x 10^(-b) [same as 4.16E4 or4.16E-4]*. In this case, *b* is always a positive, real number. The *10^(+b)* tells us that the decimal point is *b* places to the right of where it is shown. The *10^(-b)* tells us that the decimal point is *b* places to the left of where it is shown.
For example: $2.7X10^4 = 2.7E+4 = 27000$ and $2.7X10^{-4} = 2.7E-4 = 0.00027$.

Sigma (S): shorthand way to express taking the sum of a series of numbers. For example, the sum or total of three amounts 24, 123, 16, ($\mathbf{d}_1$, $\mathbf{d}_2$, $\mathbf{d}_3$) respectively could be shown as:

$$\sum_{i=1}^{3} d_i = d_1+d_2+d_3 = 24+123+16 = 163$$

Total Maximum Daily Load or TMDL: the calculated maximum permissible pollutant loading to a waterbody at which water quality standards can be maintained.

Regression Coefficient: an expression of the functional relationship between two correlated variables that is often empirically determined from data, and is used to predict values of one variable when given values of the other variable.
Waste: sewage, industrial wastes, oil field wastes, and all other liquid, gaseous, solid, radioactive, or other substances which may pollute or tend to pollute any waters of the State.

Wasteload allocation (WLA): the portion of a receiving water's loading capacity attributed to or assigned to point sources of a pollutant. It also contains a portion of the contribution from septic tanks

Water Quality Standards: the criteria and requirements set forth in *State of Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters*. Water quality standards are standards composed of designated present and future most beneficial uses (classification of waters), the numerical and narrative criteria applied to the specific water uses or classification, and the Mississippi antidegradation policy.

Water quality criteria: elements of State water quality standards, expressed as constituent concentrations, levels, or narrative statements, representing a quality of water that supports the present and future most beneficial uses.

Waters of the State: all waters within the jurisdiction of this State, including all streams, lakes, ponds, wetlands, impounding reservoirs, marshes, watercourses, waterways, wells, springs, irrigation systems, drainage systems, and all other bodies or accumulations of water, surface and underground, natural or artificial, situated wholly or partly within or bordering upon the State, and such coastal waters as are within the jurisdiction of the State, except lakes, ponds, or other surface waters which are wholly landlocked and privately owned, and which are not regulated under the Federal Clean Water Act (33 U.S.C.1251 et seq.).

Watershed: the area of land draining into a stream at a given location.

ABBREVIATIONS

7Q10 . . . . . Seven-Day Average Low Stream Flow With a Ten-Year Occurrence Period

BASINS . . . . . Better Assessment Science Integrating Point and Nonpoint Sources

BMP . . . . . Best Management Practice

CWA . . . . . Clean Water Act

DMR . . . . . Discharge Monitoring Report

EPA . . . . . Environmental Protection Agency

GIS . . . . . Geographic Information System

HUC . . . . . Hydrologic Unit Code

LA . . . . . Load Allocation

MARIS . . . . . State of Mississippi Automated Information System

MDEQ . . . . . Mississippi Department of Environmental Quality

MOS . . . . . Margin of Safety

NRCS . . . . . National Resource Conservation Service

NPDES . . . . . National Pollution Discharge Elimination System

NPSM . . . . . Nonpoint Source Model

RF3 . . . . . Reach File, Version 3

USGS . . . . . United States Geological Survey

WLA . . . . . Waste Load Allocation

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APPENDIX A

The following documents comprise the spreadsheet used to estimate all of the fecal coliform loadings used in the model. The spreadsheet consists of several sheets, each dealing with a different aspect of the estimation. The final sheet brings all of the inputs into one format for model input.

THIS SPREADSHEET QUANTIFIES THE FECAL COLIFORM BACTERIA CONTRIBUTION FROM MULTIPLE SOURCES.

It is based on a modeling study of 9 subwatersheds, composed of four landuses (Cropland, Forest, Built-up, and Pastureland).

BLUE text found throughout the spreadsheet presents valuable information and assumptions.

GREEN text designates values specific to the Pascagoula Basin.

RED text designates values which should be specified by the user.

BLACK text generally presents information which is calculated by the spreadsheet or that should not be changed.

There are 9 subwatersheds in this study.

The modeled landuses were derived from the original landuses.

Modeled landuses

Areas are listed in acres.

SUBSHED	CROPLAND	FOREST	URBAN	PASTURELAND	TOTAL
03170007015	176	9270	130	2599	12175
03170007016	418	12464	204	5709	18794
03170007017	298	7305	254	2189	10046
03170007018	1459	42176	262	15978	59875
03170007014	384	20656	884	6280	28204
P6	0	0	0	0	0
P7	0	0	0	0	0
P8	0	0	0	0	0
P9	0	0	0	0	0
TOTAL	2735	91870	1735	32755	129094

Original landuses

Areas are listed in acres.

Modeled land use category	Original Land use category	03170007015	03170007016	03170007017	03170007018	03170007014	P6	P7	P8	P9	Total acres
CROPLAND	CROPLAND	0	0	0	0	0	0	0	0	0	0
FOREST	DECIDUOUS FOREST LAND	0	0	0	0	0	0	0	0	0	0
LAKES	LAKES	0	0	0	0	0	0	0	0	0	0
BUILT-UP	HIGH DENSITY	21	33	41	42	141	0	0	0	0	278
BUILT-UP	NOTHING	0	0	0	0	0	0	0	0	0	0
BUILT-UP	LOW DENSITY	59	92	114	118	398	0	0	0	0	781
BUILT-UP	TRANSPORTATION	51	80	99	102	345	0	0	0	0	677
PASTURELAND	PASTURELAND	0	0	0	0	0	0	0	0	0	0
											1735

Black Creek Fecal Coliform Spreadsheet
Animals

The total number of animals in the 9 subwatersheds are as follows.

Fecal contributions from these animals are used to derive loading estimates for all landuses except for Built-up.
The number input for Poultry should be "Chickens Sold" from tbl_lstock2.dbf divided by 7.

Agricultural Animals

SUBSHED	BEEF COWS	SWINE (HOGS)	DAIRY COWS	POULTRY	CATTLE	BEEF FOR RATIO	MILK FOR RATIO	Check
03170007015	432	4	34	31012	466	205	16	466
03170007016	679	6	51	48430	730	320	24	730
03170007017	401	4	30	28567	431	189	14	431
03170007018	2346	62	196	143796	2542	1150	96	2542
03170007014	634	38	60	53158	694	346	33	694
P6	#DIV/0!	0	#DIV/0!	0	0	0	0	#DIV/0!
P7	#DIV/0!	0	#DIV/0!	0	0	0	0	#DIV/0!
P8	#DIV/0!	0	#DIV/0!	0	0	0	0	#DIV/0!
P9	#DIV/0!	0	#DIV/0!	0	0	0	0	#DIV/0!
TOTAL	#DIV/0!	114	372	304961	4863	2210	183	#DIV/0!

Wildlife

The deer population is the only major wildlife source considered. The same deer density is assumed for all subwatersheds.

Deer/sq mile	45
Deer/acre	0.0703125

This sheet contains information relevant to land application of waste produced by agricultural animals in the study area.
Application of hog manure, cattle manure, and poultry litter are considered.
The information is presented based on monthly variability of waste application.
It is assumed that cattle manure is applied to both Cropland and Pastureland using the same method.

Hog Manure Available for Wash-off

This is the percentage of manure applied by month.

	January	February	March	April	May	June	July	August	September	October	November	December	
% of annual manure applied in month	0.05	0.05	0.05	0.14	0.14	0.08	0.08	0.08	0.12	0.12	0.05	0.04	1

The percent of manure available for runoff is dependent on the method of manure application. The percent available is computed below based on incorporation into soil. These are assumed values.

% available for runoff = (1 - % incorporated) + (% incorporated * 0.5)	0.6	% Applied to Cropland:	0.00	% Applied to Pastureland:	1.00

The following is the resulting manure application based on the monthly percentage applied and incorporation into the so

Subwatershed	January	February	March	April	May	June	July	August	September	October	November	December
03170007015	0.03	0.03	0.03	0.084	0.084	0.048	0.048	0.048	0.072	0.072	0.03	0.024
03170007016	0.03	0.03	0.03	0.084	0.084	0.048	0.048	0.048	0.072	0.072	0.03	0.024
03170007017	0.03	0.03	0.03	0.084	0.084	0.048	0.048	0.048	0.072	0.072	0.03	0.024
03170007018	0.03	0.03	0.03	0.084	0.084	0.048	0.048	0.048	0.072	0.072	0.03	0.024
03170007014	0.03	0.03	0.03	0.084	0.084	0.048	0.048	0.048	0.072	0.072	0.03	0.024
P6	0.03	0.03	0.03	0.084	0.084	0.048	0.048	0.048	0.072	0.072	0.03	0.024
P7	0.03	0.03	0.03	0.084	0.084	0.048	0.048	0.048	0.072	0.072	0.03	0.024
P8	0.03	0.03	0.03	0.084	0.084	0.048	0.048	0.048	0.072	0.072	0.03	0.024
P9	0.03	0.03	0.03	0.084	0.084	0.048	0.048	0.048	0.072	0.072	0.03	0.024

Cattle Manure Available for Wash-off

This is the percentage of manure applied by month.

	January	February	March	April	May	June	July	August	September	October	November	December	
% of annual manure applied in month	0	0	0	0.2	0.2	0.0666	0.0667	0.0667	0.2	0.2	0	0	1

The percent of manure available for runoff is dependent on the method of manure application. The percent available is computed below based on incorporation into soil. These are assumed values.

% available for runoff = (1 - % incorporated) + (% incorporated * 0.5)	0.625	% Applied to Cropland:	0.00	% Applied to Pastureland:	1.00

The following is the resulting manure application based on the monthly percentage applied and incorporation into the soil.

Subwatershed	January	February	March	April	May	June	July	August	September	October	November	December
03170007015	0	0	0	0.125	0.125	0.041625	0.041688	0.041688	0.125	0.125	0	0
03170007016	0	0	0	0.125	0.125	0.041625	0.041688	0.041688	0.125	0.125	0	0
03170007017	0	0	0	0.125	0.125	0.041625	0.041688	0.041688	0.125	0.125	0	0
03170007018	0	0	0	0.125	0.125	0.041625	0.041688	0.041688	0.125	0.125	0	0
03170007014	0	0	0	0.125	0.125	0.041625	0.041688	0.041688	0.125	0.125	0	0
P6	0	0	0	0.125	0.125	0.041625	0.041688	0.041688	0.125	0.125	0	0
P7	0	0	0	0.125	0.125	0.041625	0.041688	0.041688	0.125	0.125	0	0
P8	0	0	0	0.125	0.125	0.041625	0.041688	0.041688	0.125	0.125	0	0
P9	0	0	0	0.125	0.125	0.041625	0.041688	0.041688	0.125	0.125	0	0

Black Creek Fecal Coliform Spreadsheet
Manure Application

Poultry Litter Available for Wash-off

This is the percentage of manure applied by month.

	January	February	March	April	May	June	July	August	September	October	November	December	
% of annual manure applied in month	0	0	0	0.143	0.143	0.143	0.143	0.143	0.143	0.142	0	0	1

The percent of manure available for runoff is dependent on the method of manure application. The percent available is computed below based on incorporation into soil. These are assumed values.

% available for runoff = (1 - % incorporated) + (% incorporated * 0.33)	0.36	% Applied to Cropland:	0.00	% Applied to Pastureland:	1.00

The following is the resulting manure application based on the monthly percentage applied and incorporation into the soil.

Subwatershed	January	February	March	April	May	June	July	August	September	October	November	December
03170007015	0	0	0	0.05148	0.05148	0.05148	0.05148	0.05148	0.05148	0.05112	0	0
03170007016	0	0	0	0.05148	0.05148	0.05148	0.05148	0.05148	0.05148	0.05112	0	0
03170007017	0	0	0	0.05148	0.05148	0.05148	0.05148	0.05148	0.05148	0.05112	0	0
03170007018	0	0	0	0.05148	0.05148	0.05148	0.05148	0.05148	0.05148	0.05112	0	0
03170007014	0	0	0	0.05148	0.05148	0.05148	0.05148	0.05148	0.05148	0.05112	0	0
P6	0	0	0	0.05148	0.05148	0.05148	0.05148	0.05148	0.05148	0.05112	0	0
P7	0	0	0	0.05148	0.05148	0.05148	0.05148	0.05148	0.05148	0.05112	0	0
P8	0	0	0	0.05148	0.05148	0.05148	0.05148	0.05148	0.05148	0.05112	0	0
P9	0	0	0	0.05148	0.05148	0.05148	0.05148	0.05148	0.05148	0.05112	0	0

Black Creek Fecal Coliform Spreadsheet
Cattle Farming

This sheet contains information relevant to cattle farming in the study area.

Dairy Cattle

Dairy cattle are assumed to be either kept in feedlots or allowed to graze (depending on the milking/feeding schedule, which is four hours per day). When grazing, a certain percentage are assumed to have direct access to str
Dairy cattle waste is therefore either applied as manure to Cropland and Pastureland, contributed directly to Pastureland, or contributed directly to streams (referred to as Cattle in Streams).

Beef Cattle

Beef cattle are assumed to be either kept in feedlots or allowed to graze (depending on the season). When grazing, a certain percentage are assumed to have direct access to streams.
Beef cattle waste is therefore either applied as manure to Cropland and Pastureland, contributed directly to Pastureland, or contributed directly to streams (referred to as Cattle in Streams).

	Beef Cattle Grazing	***Dairy Cattle Grazing***	***Assumed Cattle Access to Streams***
Month	**Percentage of Time not Confined (0.0 or 1.0)**	**Percentage of Time not Confined (0.0 or 1.0)**	**Percentage of Time (0.0 to 1.0)**
January	1.00	0.84	0.05
February	1.00	0.84	0.05
March	1.00	0.84	0.05
April	1.00	0.84	0.05
May	1.00	0.84	0.05
June	1.00	0.84	0.05
July	1.00	0.84	0.05
August	1.00	0.84	0.05
September	1.00	0.84	0.05
October	1.00	0.84	0.05
November	1.00	0.84	0.05
December	1.00	0.84	0.05

Month	**Total Beef Cattle Grazing Days**	**Total Dairy Cattle Grazing Days**
January	31	26.04
February	28	23.52
March	31	26.04
April	30	25.2
May	31	26.04
June	30	25.2
July	31	26.04
August	31	26.04
September	30	25.2
October	31	26.04
November	30	25.2
December	31	26.04
Total Grazing D	**365**	**306.6**

These data accessed from the following references are used in the remaining worksheets.

From ASAE

Animal	Total Manure prod (lb/day per 1,000 lb animal)	Typical Animal Mass (lb)	Manure prod per animal (lb/day)	Fecal Coliform (#/day E10 per 1,000 lb animal)	Fecal Coliform (#/day)	Manure prod (lb/yr)	Fecal Coliform (#/day)
Beef cow	58	794	46	7.2	5.71E+10	16802	5.71E+10
Dairy cow	86	1411	121	13	1.83E+11	44290	1.83E+11
Hog	84	134	11	8	1.08E+10	4123	1.08E+10
Sheep	40	60	2	20	1.19E+10	869	1.19E+10
Chicken	64	4	0	3.4	1.35E+08	93	1.35E+08
Broiler	85	2	0	3.4	6.75E+07	62	6.75E+07
Turkey	47	15	1	0.62	9.29E+07	257	9.29E+07
Duck	110	3	0	81	2.50E+09	124	2.50E+09

From Metcalf & Eddy

Estimated Fecal Coliform Production Rates by Animal

Animal	#/day	Reference
Cow	5.40E+09	Metcalf & Eddy, 1991
Hog	8.90E+09	Metcalf & Eddy, 1991
Sheep	1.80E+10	Metcalf & Eddy, 1991
Chicken	2.40E+08	Metcalf & Eddy, 1991
Turkey	1.30E+08	Metcalf & Eddy, 1991
Duck	1.10E+10	Metcalf & Eddy, 1991
Deer	5.00E+08	BPJ
Geese	4.90E+10	LIRPB, 1982

From: Horner, 1992

Fecal Coliform Loading Rates by Landuse

	median #/ha-y	#/acre/day
Road	1.80E+08	2.00E+05
Commercial	5.60E+09	6.21E+06
Single family low density	9.30E+09	1.03E+07
Single family high density	1.50E+10	1.66E+07
Multifamily residential	2.10E+10	2.33E+07

Sources of fecal coliform bacteria for the Cropland are wildlife and cattle manure application.

Note that all hog waste produced is applied to pastureland in the form of manure. Application varies by month.

Note that not all cattle waste is applied to the Cropland.
Dairy and beef cattle are assumed to be either kept in feedlots or allowed to graze (depending on the milking schedule and the season). When grazing, a certain percentage is assumed to have direct access to streams.
Dairy and beef cattle waste is therefore either applied as manure to Cropland and Pastureland, contributed directly to Pastureland, or contributed directly to streams (referred to as Cattle in Streams).
*The FC produced (as listed in the Cattle Manure Application section) does not consider the amount produced by grazing cattle or cattle in the streams.

Note that all poultry manure or litter is applied only to pastureland and is based on variable monthly application.

CROPLAND

January

		Wildlife			Hog Manure Application						Cattle Manure Application								Poultry Litter Application						TOTAL
			FC prod	FC accum		FC prod	FC prod	Available for	FC applied	FC accum			dairy FC prod	beef FC prod	FC prod*	Available for	FC applied	FC accum	# chickens	poultry FC prod	poultry FC prod	Available for	FC applied	FC accum	FC accum
	AREA (AC)	#deer	(#/day)	(#/acre/day)	# hogs	(#/day)	(#/year)	month	per day	(#/acre/day)	# dairy cattle	# beef cattle	(#/day)	(#/day)	(#/year)	month	per day	(#/acre/day)		(#/day)	(#/year)	month	per day	(#/acre/day)	(#/acre/day)
03170007015	176	12.35	6.18E+09	3.52E+07	4	4.30E+10	1.57E+13	0.00E+00	0.00E+00	0.00E+00	34	432	1.82E+11	2.33E+12	1.06E+13	0.00E+00	0.00E+00	0.00E+00	31012	2.09E+12	7.64E+14	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007016	418	29.37	1.47E+10	3.52E+07	6	6.46E+10	2.36E+13	0.00E+00	0.00E+00	0.00E+00	51	679	2.75E+11	3.67E+12	1.61E+13	0.00E+00	0.00E+00	0.00E+00	48430	3.27E+12	1.19E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007017	298	20.99	1.05E+10	3.52E+07	4	4.30E+10	1.57E+13	0.00E+00	0.00E+00	0.00E+00	30	401	1.61E+11	2.17E+12	9.37E+12	0.00E+00	0.00E+00	0.00E+00	28567	1.93E+12	7.03E+14	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007018	1459	102.6	5.13E+10	3.52E+07	62	6.67E+11	2.43E+14	0.00E+00	0.00E+00	0.00E+00	196	2346	1.06E+12	1.27E+13	6.18E+13	0.00E+00	0.00E+00	0.00E+00	143796	9.70E+12	3.54E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007014	384	27.02	1.35E+10	3.52E+07	38	4.09E+11	1.49E+14	0.00E+00	0.00E+00	0.00E+00	60	634	3.26E+11	3.42E+12	1.91E+13	0.00E+00	0.00E+00	0.00E+00	53158	3.59E+12	1.31E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
P6	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P7	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P8	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P9	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
Total	2735																								

February

		Wildlife			Hog Manure Application						Cattle Manure Application								Poultry Litter Application						TOTAL
			FC prod	FC accum		FC prod	FC prod	Available for	FC applied	FC accum			dairy FC prod	beef FC prod	FC prod	Available for	FC applied	FC accum	# chickens	poultry FC prod	poultry FC prod	Available for	FC applied	FC accum	FC accum
	AREA (AC)	#deer	(#/day)	(#/acre/day)	# hogs	(#/day)	(#/year)	month	per day	(#/acre/day)	# dairy cattle	# beef cattle	(#/day)	(#/day)	(#/year)	month	per day	(#/acre/day)		(#/day)	(#/year)	month	per day	(#/acre/day)	(#/acre/day)
03170007015	176	12.35	6.18E+09	3.52E+07	4	4.30E+10	1.57E+13	0.00E+00	0.00E+00	0.00E+00	34	432	1.82E+11	2.33E+12	1.06E+13	0.00E+00	0.00E+00	0.00E+00	31012	2.09E+12	7.64E+14	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007016	418	29.37	1.47E+10	3.52E+07	6	6.46E+10	2.36E+13	0.00E+00	0.00E+00	0.00E+00	51	679	2.75E+11	3.67E+12	1.61E+13	0.00E+00	0.00E+00	0.00E+00	48430	3.27E+12	1.19E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007017	298	20.99	1.05E+10	3.52E+07	4	4.30E+10	1.57E+13	0.00E+00	0.00E+00	0.00E+00	30	401	1.61E+11	2.17E+12	9.37E+12	0.00E+00	0.00E+00	0.00E+00	28567	1.93E+12	7.03E+14	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007018	1459	102.6	5.13E+10	3.52E+07	62	6.67E+11	2.43E+14	0.00E+00	0.00E+00	0.00E+00	196	2346	1.06E+12	1.27E+13	6.18E+13	0.00E+00	0.00E+00	0.00E+00	143796	9.70E+12	3.54E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007014	384	27.02	1.35E+10	3.52E+07	38	4.09E+11	1.49E+14	0.00E+00	0.00E+00	0.00E+00	60	634	3.26E+11	3.42E+12	1.91E+13	0.00E+00	0.00E+00	0.00E+00	53158	3.59E+12	1.31E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
P6	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P7	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P8	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P9	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!

March

		Wildlife			Hog Manure Application						Cattle Manure Application								Poultry Litter Application						TOTAL
			FC prod	FC accum		FC prod	FC prod	Available for	FC applied	FC accum			dairy FC prod	beef FC prod	FC prod	Available for	FC applied	FC accum	# chickens	poultry FC prod	poultry FC prod	Available for	FC applied	FC accum	FC accum
	AREA (AC)	#deer	(#/day)	(#/acre/day)	# hogs	(#/day)	(#/year)	month	per day	(#/acre/day)	# dairy cattle	# beef cattle	(#/day)	(#/day)	(#/year)	month	per day	(#/acre/day)		(#/day)	(#/year)	month	per day	(#/acre/day)	(#/acre/day)
03170007015	176	12.35	6.18E+09	3.52E+07	4	4.30E+10	1.57E+13	0.00E+00	0.00E+00	0.00E+00	34	432	1.82E+11	2.33E+12	1.06E+13	0.00E+00	0.00E+00	0.00E+00	31012	2.09E+12	7.64E+14	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007016	418	29.37	1.47E+10	3.52E+07	6	6.46E+10	2.36E+13	0.00E+00	0.00E+00	0.00E+00	51	679	2.75E+11	3.67E+12	1.61E+13	0.00E+00	0.00E+00	0.00E+00	48430	3.27E+12	1.19E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007017	298	20.99	1.05E+10	3.52E+07	4	4.30E+10	1.57E+13	0.00E+00	0.00E+00	0.00E+00	30	401	1.61E+11	2.17E+12	9.37E+12	0.00E+00	0.00E+00	0.00E+00	28567	1.93E+12	7.03E+14	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007018	1459	102.6	5.13E+10	3.52E+07	62	6.67E+11	2.43E+14	0.00E+00	0.00E+00	0.00E+00	196	2346	1.06E+12	1.27E+13	6.18E+13	0.00E+00	0.00E+00	0.00E+00	143796	9.70E+12	3.54E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007014	384	27.02	1.35E+10	3.52E+07	38	4.09E+11	1.49E+14	0.00E+00	0.00E+00	0.00E+00	60	634	3.26E+11	3.42E+12	1.91E+13	0.00E+00	0.00E+00	0.00E+00	53158	3.59E+12	1.31E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
P6	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P7	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P8	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P9	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!

April

		Wildlife			Hog Manure Application						Cattle Manure Application								Poultry Litter Application						TOTAL
			FC prod	FC accum		FC prod	FC prod	Available for	FC applied	FC accum			dairy FC prod	beef FC prod	FC prod	Available for	FC applied	FC accum	# chickens	poultry FC prod	poultry FC prod	Available for	FC applied	FC accum	FC accum
	AREA (AC)	#deer	(#/day)	(#/acre/day)	# hogs	(#/day)	(#/year)	month	per day	(#/acre/day)	# dairy cattle	# beef cattle	(#/day)	(#/day)	(#/year)	month	per day	(#/acre/day)		(#/day)	(#/year)	month	per day	(#/acre/day)	(#/acre/day)
03170007015	176	12.35	6.18E+09	3.52E+07	4	4.30E+10	1.57E+13	0.00E+00	0.00E+00	0.00E+00	34	432	1.82E+11	2.33E+12	1.06E+13	0.00E+00	0.00E+00	0.00E+00	31012	2.09E+12	7.64E+14	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007016	418	29.37	1.47E+10	3.52E+07	6	6.46E+10	2.36E+13	0.00E+00	0.00E+00	0.00E+00	51	679	2.75E+11	3.67E+12	1.61E+13	0.00E+00	0.00E+00	0.00E+00	48430	3.27E+12	1.19E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007017	298	20.99	1.05E+10	3.52E+07	4	4.30E+10	1.57E+13	0.00E+00	0.00E+00	0.00E+00	30	401	1.61E+11	2.17E+12	9.37E+12	0.00E+00	0.00E+00	0.00E+00	28567	1.93E+12	7.03E+14	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007018	1459	102.6	5.13E+10	3.52E+07	62	6.67E+11	2.43E+14	0.00E+00	0.00E+00	0.00E+00	196	2346	1.06E+12	1.27E+13	6.18E+13	0.00E+00	0.00E+00	0.00E+00	143796	9.70E+12	3.54E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007014	384	27.02	1.35E+10	3.52E+07	38	4.09E+11	1.49E+14	0.00E+00	0.00E+00	0.00E+00	60	634	3.26E+11	3.42E+12	1.91E+13	0.00E+00	0.00E+00	0.00E+00	53158	3.59E+12	1.31E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
P6	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P7	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P8	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P9	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!

May

		Wildlife			Hog Manure Application						Cattle Manure Application								Poultry Litter Application						TOTAL
			FC prod	FC accum		FC prod	FC prod	Available for	FC applied	FC accum			dairy FC prod	beef FC prod	FC prod	Available for	FC applied	FC accum	# chickens	poultry FC prod	poultry FC prod	Available for	FC applied	FC accum	FC accum
	AREA (AC)	#deer	(#/day)	(#/acre/day)	# hogs	(#/day)	(#/year)	month	per day	(#/acre/day)	# dairy cattle	# beef cattle	(#/day)	(#/day)	(#/year)	month	per day	(#/acre/day)		(#/day)	(#/year)	month	per day	(#/acre/day)	(#/acre/day)
03170007015	176	12.35	6.18E+09	3.52E+07	4	4.30E+10	1.57E+13	0.00E+00	0.00E+00	0.00E+00	34	432	1.82E+11	2.33E+12	1.06E+13	0.00E+00	0.00E+00	0.00E+00	31012	2.09E+12	7.64E+14	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007016	418	29.37	1.47E+10	3.52E+07	6	6.46E+10	2.36E+13	0.00E+00	0.00E+00	0.00E+00	51	679	2.75E+11	3.67E+12	1.61E+13	0.00E+00	0.00E+00	0.00E+00	48430	3.27E+12	1.19E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007017	298	20.99	1.05E+10	3.52E+07	4	4.30E+10	1.57E+13	0.00E+00	0.00E+00	0.00E+00	30	401	1.61E+11	2.17E+12	9.37E+12	0.00E+00	0.00E+00	0.00E+00	28567	1.93E+12	7.03E+14	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007018	1459	102.6	5.13E+10	3.52E+07	62	6.67E+11	2.43E+14	0.00E+00	0.00E+00	0.00E+00	196	2346	1.06E+12	1.27E+13	6.18E+13	0.00E+00	0.00E+00	0.00E+00	143796	9.70E+12	3.54E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007014	384	27.02	1.35E+10	3.52E+07	38	4.09E+11	1.49E+14	0.00E+00	0.00E+00	0.00E+00	60	634	3.26E+11	3.42E+12	1.91E+13	0.00E+00	0.00E+00	0.00E+00	53158	3.59E+12	1.31E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
P6	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P7	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P8	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P9	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!

June

		Wildlife			Hog Manure Application						Cattle Manure Application								Poultry Litter Application						TOTAL
			FC prod	FC accum		FC prod	FC prod	Available for	FC applied	FC accum			dairy FC prod	beef FC prod	FC prod	Available for	FC applied	FC accum	# chickens	poultry FC prod	poultry FC prod	Available for	FC applied	FC accum	FC accum
	AREA (AC)	#deer	(#/day)	(#/acre/day)	# hogs	(#/day)	(#/year)	month	per day	(#/acre/day)	# dairy cattle	# beef cattle	(#/day)	(#/day)	(#/year)	month	per day	(#/acre/day)		(#/day)	(#/year)	month	per day	(#/acre/day)	(#/acre/day)
03170007015	176	12.35	6.18E+09	3.52E+07	4	4.30E+10	1.57E+13	0.00E+00	0.00E+00	0.00E+00	34	432	1.82E+11	2.33E+12	1.06E+13	0.00E+00	0.00E+00	0.00E+00	31012	2.09E+12	7.64E+14	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007016	418	29.37	1.47E+10	3.52E+07	6	6.46E+10	2.36E+13	0.00E+00	0.00E+00	0.00E+00	51	679	2.75E+11	3.67E+12	1.61E+13	0.00E+00	0.00E+00	0.00E+00	48430	3.27E+12	1.19E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007017	298	20.99	1.05E+10	3.52E+07	4	4.30E+10	1.57E+13	0.00E+00	0.00E+00	0.00E+00	30	401	1.61E+11	2.17E+12	9.37E+12	0.00E+00	0.00E+00	0.00E+00	28567	1.93E+12	7.03E+14	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007018	1459	102.6	5.13E+10	3.52E+07	62	6.67E+11	2.43E+14	0.00E+00	0.00E+00	0.00E+00	196	2346	1.06E+12	1.27E+13	6.18E+13	0.00E+00	0.00E+00	0.00E+00	143796	9.70E+12	3.54E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007014	384	27.02	1.35E+10	3.52E+07	38	4.09E+11	1.49E+14	0.00E+00	0.00E+00	0.00E+00	60	634	3.26E+11	3.42E+12	1.91E+13	0.00E+00	0.00E+00	0.00E+00	53158	3.59E+12	1.31E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
P6	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P7	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P8	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P9	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!

		Wildlife			Hog Manure Application					Cattle Manure Application							Poultry Litter Application						TOTAL
July	AREA (AC)	#deer	FC prod (#/day)	FC accum (#/acre/day)	# hogs	FC prod (#/day)	FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	# dairy cattle	# beef cattle	dairy FC prod (#/day)	beef FC prod (#/day)	FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	# chickens	poultry FC prod (#/day)	poultry FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	FC accum (#/acre/day)
03170007015	176	12.35	6.18E+09	3.52E+07	4	4.30E+10	1.57E+13	0.00E+00	0.00E+00	0.00E+00	34	432	1.82E+11	2.33E+12	1.06E+13	0.00E+00	0.00E+00	0.00E+00	31012	2.09E+12	7.64E+14	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007016	418	29.37	1.47E+10	3.52E+07	6	6.46E+10	2.36E+13	0.00E+00	0.00E+00	0.00E+00	51	679	2.75E+11	3.67E+12	1.61E+13	0.00E+00	0.00E+00	0.00E+00	48430	3.27E+12	1.19E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007017	298	20.99	1.05E+10	3.52E+07	4	4.30E+10	1.57E+13	0.00E+00	0.00E+00	0.00E+00	30	401	1.61E+11	2.17E+12	9.37E+12	0.00E+00	0.00E+00	0.00E+00	28567	1.93E+12	7.03E+14	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007018	1459	102.6	5.13E+10	3.52E+07	62	6.67E+11	2.43E+14	0.00E+00	0.00E+00	0.00E+00	196	2346	1.06E+12	1.27E+13	6.18E+13	0.00E+00	0.00E+00	0.00E+00	143796	9.70E+12	3.54E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007014	384	27.02	1.35E+10	3.52E+07	38	4.09E+11	1.49E+14	0.00E+00	0.00E+00	0.00E+00	60	634	3.26E+11	3.42E+12	1.91E+13	0.00E+00	0.00E+00	0.00E+00	53158	3.59E+12	1.31E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
P6	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P7	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P8	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P9	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!

		Wildlife			Hog Manure Application					Cattle Manure Application							Poultry Litter Application						TOTAL
August	AREA (AC)	#deer	FC prod (#/day)	FC accum (#/acre/day)	# hogs	FC prod (#/day)	FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	# dairy cattle	# beef cattle	dairy FC prod (#/day)	beef FC prod (#/day)	FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	# chickens	poultry FC prod (#/day)	poultry FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	FC accum (#/acre/day)
03170007015	176	12.35	6.18E+09	3.52E+07	4	4.30E+10	1.57E+13	0.00E+00	0.00E+00	0.00E+00	34	432	1.82E+11	2.33E+12	1.06E+13	0.00E+00	0.00E+00	0.00E+00	31012	2.09E+12	7.64E+14	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007016	418	29.37	1.47E+10	3.52E+07	6	6.46E+10	2.36E+13	0.00E+00	0.00E+00	0.00E+00	51	679	2.75E+11	3.67E+12	1.61E+13	0.00E+00	0.00E+00	0.00E+00	48430	3.27E+12	1.19E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007017	298	20.99	1.05E+10	3.52E+07	4	4.30E+10	1.57E+13	0.00E+00	0.00E+00	0.00E+00	30	401	1.61E+11	2.17E+12	9.37E+12	0.00E+00	0.00E+00	0.00E+00	28567	1.93E+12	7.03E+14	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007018	1459	102.6	5.13E+10	3.52E+07	62	6.67E+11	2.43E+14	0.00E+00	0.00E+00	0.00E+00	196	2346	1.06E+12	1.27E+13	6.18E+13	0.00E+00	0.00E+00	0.00E+00	143796	9.70E+12	3.54E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007014	384	27.02	1.35E+10	3.52E+07	38	4.09E+11	1.49E+14	0.00E+00	0.00E+00	0.00E+00	60	634	3.26E+11	3.42E+12	1.91E+13	0.00E+00	0.00E+00	0.00E+00	53158	3.59E+12	1.31E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
P6	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P7	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P8	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P9	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!

		Wildlife			Hog Manure Application					Cattle Manure Application							Poultry Litter Application						TOTAL
September	AREA (AC)	#deer	FC prod (#/day)	FC accum (#/acre/day)	# hogs	FC prod (#/day)	FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	# dairy cattle	# beef cattle	dairy FC prod (#/day)	beef FC prod (#/day)	FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	# chickens	poultry FC prod (#/day)	poultry FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	FC accum (#/acre/day)
03170007015	176	12.35	6.18E+09	3.52E+07	4	4.30E+10	1.57E+13	0.00E+00	0.00E+00	0.00E+00	34	432	1.82E+11	2.33E+12	1.06E+13	0.00E+00	0.00E+00	0.00E+00	31012	2.09E+12	7.64E+14	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007016	418	29.37	1.47E+10	3.52E+07	6	6.46E+10	2.36E+13	0.00E+00	0.00E+00	0.00E+00	51	679	2.75E+11	3.67E+12	1.61E+13	0.00E+00	0.00E+00	0.00E+00	48430	3.27E+12	1.19E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007017	298	20.99	1.05E+10	3.52E+07	4	4.30E+10	1.57E+13	0.00E+00	0.00E+00	0.00E+00	30	401	1.61E+11	2.17E+12	9.37E+12	0.00E+00	0.00E+00	0.00E+00	28567	1.93E+12	7.03E+14	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007018	1459	102.6	5.13E+10	3.52E+07	62	6.67E+11	2.43E+14	0.00E+00	0.00E+00	0.00E+00	196	2346	1.06E+12	1.27E+13	6.18E+13	0.00E+00	0.00E+00	0.00E+00	143796	9.70E+12	3.54E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007014	384	27.02	1.35E+10	3.52E+07	38	4.09E+11	1.49E+14	0.00E+00	0.00E+00	0.00E+00	60	634	3.26E+11	3.42E+12	1.91E+13	0.00E+00	0.00E+00	0.00E+00	53158	3.59E+12	1.31E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
P6	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P7	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P8	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P9	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!

		Wildlife			Hog Manure Application					Cattle Manure Application							Poultry Litter Application						TOTAL
October	AREA (AC)	#deer	FC prod (#/day)	FC accum (#/acre/day)	# hogs	FC prod (#/day)	FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	# dairy cattle	# beef cattle	dairy FC prod (#/day)	beef FC prod (#/day)	FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	# chickens	poultry FC prod (#/day)	poultry FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	FC accum (#/acre/day)
03170007015	176	12.35	6.18E+09	3.52E+07	4	4.30E+10	1.57E+13	0.00E+00	0.00E+00	0.00E+00	34	432	1.82E+11	2.33E+12	1.06E+13	0.00E+00	0.00E+00	0.00E+00	31012	2.09E+12	7.64E+14	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007016	418	29.37	1.47E+10	3.52E+07	6	6.46E+10	2.36E+13	0.00E+00	0.00E+00	0.00E+00	51	679	2.75E+11	3.67E+12	1.61E+13	0.00E+00	0.00E+00	0.00E+00	48430	3.27E+12	1.19E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007017	298	20.99	1.05E+10	3.52E+07	4	4.30E+10	1.57E+13	0.00E+00	0.00E+00	0.00E+00	30	401	1.61E+11	2.17E+12	9.37E+12	0.00E+00	0.00E+00	0.00E+00	28567	1.93E+12	7.03E+14	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007018	1459	102.6	5.13E+10	3.52E+07	62	6.67E+11	2.43E+14	0.00E+00	0.00E+00	0.00E+00	196	2346	1.06E+12	1.27E+13	6.18E+13	0.00E+00	0.00E+00	0.00E+00	143796	9.70E+12	3.54E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007014	384	27.02	1.35E+10	3.52E+07	38	4.09E+11	1.49E+14	0.00E+00	0.00E+00	0.00E+00	60	634	3.26E+11	3.42E+12	1.91E+13	0.00E+00	0.00E+00	0.00E+00	53158	3.59E+12	1.31E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
P6	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P7	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P8	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P9	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!

		Wildlife			Hog Manure Application					Cattle Manure Application							Poultry Litter Application						TOTAL
November	AREA (AC)	#deer	FC prod (#/day)	FC accum (#/acre/day)	# hogs	FC prod (#/day)	FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	# dairy cattle	# beef cattle	dairy FC prod (#/day)	beef FC prod (#/day)	FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	# chickens	poultry FC prod (#/day)	poultry FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	FC accum (#/acre/day)
03170007015	176	12.35	6.18E+09	3.52E+07	4	4.30E+10	1.57E+13	0.00E+00	0.00E+00	0.00E+00	34	432	1.82E+11	2.33E+12	1.06E+13	0.00E+00	0.00E+00	0.00E+00	31012	2.09E+12	7.64E+14	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007016	418	29.37	1.47E+10	3.52E+07	6	6.46E+10	2.36E+13	0.00E+00	0.00E+00	0.00E+00	51	679	2.75E+11	3.67E+12	1.61E+13	0.00E+00	0.00E+00	0.00E+00	48430	3.27E+12	1.19E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007017	298	20.99	1.05E+10	3.52E+07	4	4.30E+10	1.57E+13	0.00E+00	0.00E+00	0.00E+00	30	401	1.61E+11	2.17E+12	9.37E+12	0.00E+00	0.00E+00	0.00E+00	28567	1.93E+12	7.03E+14	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007018	1459	102.6	5.13E+10	3.52E+07	62	6.67E+11	2.43E+14	0.00E+00	0.00E+00	0.00E+00	196	2346	1.06E+12	1.27E+13	6.18E+13	0.00E+00	0.00E+00	0.00E+00	143796	9.70E+12	3.54E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007014	384	27.02	1.35E+10	3.52E+07	38	4.09E+11	1.49E+14	0.00E+00	0.00E+00	0.00E+00	60	634	3.26E+11	3.42E+12	1.91E+13	0.00E+00	0.00E+00	0.00E+00	53158	3.59E+12	1.31E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
P6	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P7	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P8	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P9	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!

		Wildlife			Hog Manure Application					Cattle Manure Application							Poultry Litter Application						TOTAL
December	AREA (AC)	#deer	FC prod (#/day)	FC accum (#/acre/day)	# hogs	FC prod (#/day)	FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	# dairy cattle	# beef cattle	dairy FC prod (#/day)	beef FC prod (#/day)	FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	# chickens	poultry FC prod (#/day)	poultry FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	FC accum (#/acre/day)
03170007015	176	12.35	6.18E+09	3.52E+07	4	4.30E+10	1.57E+13	0.00E+00	0.00E+00	0.00E+00	34	432	1.82E+11	2.33E+12	1.06E+13	0.00E+00	0.00E+00	0.00E+00	31012	2.09E+12	7.64E+14	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007016	418	29.37	1.47E+10	3.52E+07	6	6.46E+10	2.36E+13	0.00E+00	0.00E+00	0.00E+00	51	679	2.75E+11	3.67E+12	1.61E+13	0.00E+00	0.00E+00	0.00E+00	48430	3.27E+12	1.19E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007017	298	20.99	1.05E+10	3.52E+07	4	4.30E+10	1.57E+13	0.00E+00	0.00E+00	0.00E+00	30	401	1.61E+11	2.17E+12	9.37E+12	0.00E+00	0.00E+00	0.00E+00	28567	1.93E+12	7.03E+14	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007018	1459	102.6	5.13E+10	3.52E+07	62	6.67E+11	2.43E+14	0.00E+00	0.00E+00	0.00E+00	196	2346	1.06E+12	1.27E+13	6.18E+13	0.00E+00	0.00E+00	0.00E+00	143796	9.70E+12	3.54E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
03170007014	384	27.02	1.35E+10	3.52E+07	38	4.09E+11	1.49E+14	0.00E+00	0.00E+00	0.00E+00	60	634	3.26E+11	3.42E+12	1.91E+13	0.00E+00	0.00E+00	0.00E+00	53158	3.59E+12	1.31E+15	0.00E+00	0.00E+00	0.00E+00	3.52E+07
P6	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P7	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P8	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P9	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!

Black Creek Fecal Coliform Spreadsheet
Forest

The deer population is the only wildlife considered as a fecal coliform contributor to the Forest.

FOREST LAND

			Wildlife		TOTAL
			FC prod	FC accum	FC accum
All Months	AREA (AC)	#deer	(#/day)	(#/acre/day)	(#/acre/day)
03170007015	9270	652	3.26E+11	35156250	3.52E+07
03170007016	12464	876	4.38E+11	35156250	3.52E+07
03170007017	7305	514	2.57E+11	35156250	3.52E+07
03170007018	42176	2965	1.48E+12	35156250	3.52E+07
03170007014	20656	1452	7.26E+11	35156250	3.52E+07
P6	0	0	0.00E+00	0	0.00E+00
P7	0	0	0.00E+00	0	0.00E+00
P8	0	0	0.00E+00	0	0.00E+00
P9	0	0	0.00E+00	0	0.00E+00
Total	91870				

Black Creek Fecal Coliform Spreadsheet
Built-up

Due to lack of animal counts, etc. for Built-up land, literature values are used.
A single, weighted Built-up loading value is quantified for each subwatershed based on individual built-up landuses present and their corresponding loading rates.

URBAN LAND

All Months	HIGH DENSITY AREA (AC)	FC accum (#/acre/day)	NOTHING AREA (AC)	FC accum (#/acre/day)	LOW DENSITY AREA (AC)	FC accum (#/acre/day)	TRANSPORTATION AREA (AC)	FC accum (#/acre/day)	TOTAL FC accum (#/acre/day)
03170007015	21	1.54E+07	0	0.00E+00	59	1.03E+07	51	2.00E+05	7.18E+06
03170007016	33	1.54E+07	0	0.00E+00	92	1.03E+07	80	2.00E+05	7.18E+06
03170007017	41	1.54E+07	0	0.00E+00	114	1.03E+07	99	2.00E+05	7.18E+06
03170007018	42	1.54E+07	0	0.00E+00	118	1.03E+07	102	2.00E+05	7.18E+06
03170007014	141	1.54E+07	0	0.00E+00	398	1.03E+07	345	2.00E+05	7.18E+06
P6	0	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0.00E+00
P7	0	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0.00E+00
P8	0	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0.00E+00
P9	0	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0.00E+00

Sources of fecal coliform bacteria for the Pastureland are wildlife, cattle manure application, beef cattle grazing, hog manure application, and poultry litter application.

Note that not all cattle waste is applied to the Cropland.
Assume that dairy cattle are only kept in feedlots. Therefore all of their waste is used for manure application (divided between Cropland and Pastureland).
Beef cattle are assumed to be either kept in feedlots or allowed to graze (depending on the season). When grazing, a certain percentage is assumed to have direct access to streams.
Beef cattle waste is therefore either applied as manure to Cropland and Pastureland, contributed directly to Pastureland, or contributed directly to streams (referred to as Cattle in Streams).
* The total FC produced (as listed in the Cattle Manure Application section) does not consider the amount produced by grazing cattle or cattle in the streams.
Beef cattle are assumed to graze throught out the year. During this period a specified percentage of these cattle also have direct access to streams.
* Note that the Beef Cattle Grazing section takes into account the number of cattle with access to rivers. See the Cattle in Streams worksheet.

PASTURELAND

		Wildlife			Hog Manure Application						Cattle Manure Application								Beef Cattle Grazing*					Dairy Cattle Grazing*					Poultry Litter Application						TOTAL
January	AREA (AC)	#deer	FC prod (#/day)	FC accum (#/acre/day)	# hogs	FC prod (#/day)	FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	# dairy cattle	# beef cattle	dairy FC prod (#/day)	beef FC prod (#/day)	FC prod* (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	# beef cattle	# grazing	% of time grazing	FC prod (#/day)	FC accum (#/acre/day)	# dairy cattle	# grazing	% of time grazing	FC prod (#/day)	FC accum (#/acre/day)	# chickens	poultry FC prod (#/day)	poultry FC prod (#/year)	Applied in month	FC applied per day	FC accum (#/acre/day)	FC accum (#/acre/day)
03170007015	2599	182.7356	9.14E+10	3.52E+07	4	4.30E+10	1.57E+13	4.71E+11	1.52E+10	5848862.835	34	432	1.82E+11	2.33E+12	1.06E+13	0.00E+00	0.00E+00	0	432	432	0.95	2.22E+12	8.53E+08	34	28	0.95	1.45E+11	5.59E+07	31012	2.09E+12	7.64E+14	0.00E+00	0.00E+00	0.00E+00	9.50E+08
03170007016	5709	401.3897	2.01E+11	3.52E+07	6	6.46E+10	2.36E+13	7.07E+11	2.28E+10	3994106.425	51	679	2.75E+11	3.67E+12	1.61E+13	0.00E+00	0.00E+00	0	679	679	0.95	3.48E+12	6.10E+08	51	43	0.95	2.19E+11	3.84E+07	48430	3.27E+12	1.19E+15	0.00E+00	0.00E+00	0.00E+00	6.88E+08
03170007017	2189	153.9163	7.70E+10	3.52E+07	4	4.30E+10	1.57E+13	4.71E+11	1.52E+10	6944001.92	30	401	1.61E+11	2.17E+12	9.37E+12	0.00E+00	0.00E+00	0	401	401	0.95	2.06E+12	9.40E+08	30	25	0.95	1.28E+11	5.85E+07	28567	1.93E+12	7.03E+14	0.00E+00	0.00E+00	0.00E+00	1.04E+09
03170007018	15978	1123.481	5.62E+11	3.52E+07	62	6.67E+11	2.43E+14	7.30E+12	2.36E+11	14745529.95	196	2346	1.06E+12	1.27E+13	6.18E+13	0.00E+00	0.00E+00	0	2346	2346	0.95	1.20E+13	7.53E+08	196	165	0.95	8.44E+11	5.28E+07	143796	9.70E+12	3.54E+15	0.00E+00	0.00E+00	0.00E+00	8.56E+08
03170007014	6280	441.5459	2.21E+11	3.52E+07	38	4.09E+11	1.49E+14	4.48E+12	1.44E+11	22995474.72	60	634	3.26E+11	3.42E+12	1.91E+13	0.00E+00	0.00E+00	0	634	634	0.95	3.25E+12	5.18E+08	60	51	0.95	2.60E+11	4.15E+07	53158	3.59E+12	1.31E+15	0.00E+00	0.00E+00	0.00E+00	6.17E+08
P6	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P7	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P8	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P9	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
	32755																																		

		Wildlife			Hog Manure Application						Cattle Manure Application								Beef Cattle Grazing					Dairy Cattle Grazing*					Poultry Litter Application						TOTAL
February	AREA (AC)	#deer	FC prod (#/day)	FC accum (#/acre/day)	# hogs	FC prod (#/day)	FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	# dairy cattle	# beef cattle	dairy FC prod (#/day)	beef FC prod (#/day)	FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	# beef cattle	# grazing	% of time grazing	FC prod (#/day)	FC accum (#/acre/day)	# beef cattle	# grazing	% of time grazing	FC prod (#/day)	FC accum (#/acre/day)	# chickens	poultry FC prod (#/day)	poultry FC prod (#/year)	Applied in month	FC applied per day	FC accum (#/acre/day)	FC accum (#/acre/day)
03170007015	2599	182.7356	9.14E+10	3.52E+07	4	4.30E+10	1.57E+13	4.71E+11	1.68E+10	6475526.71	34	432	1.82E+11	2.33E+12	1.06E+13	0.00E+00	0.00E+00	0	432	432	0.95	2.22E+12	8.53E+08	34	28	0.95	1.45E+11	5.59E+07	31012	2.09E+12	7.64E+14	0.00E+00	0.00E+00	0.00E+00	9.51E+08
03170007016	5709	401.3897	2.01E+11	3.52E+07	6	6.46E+10	2.36E+13	7.07E+11	2.52E+10	4422046.4	51	679	2.75E+11	3.67E+12	1.61E+13	0.00E+00	0.00E+00	0	679	679	0.95	3.48E+12	6.10E+08	51	43	0.95	2.19E+11	3.84E+07	48430	3.27E+12	1.19E+15	0.00E+00	0.00E+00	0.00E+00	6.88E+08
03170007017	2189	153.9163	7.70E+10	3.52E+07	4	4.30E+10	1.57E+13	4.71E+11	1.68E+10	7688002.126	30	401	1.61E+11	2.17E+12	9.37E+12	0.00E+00	0.00E+00	0	401	401	0.95	2.06E+12	9.40E+08	30	25	0.95	1.28E+11	5.85E+07	28567	1.93E+12	7.03E+14	0.00E+00	0.00E+00	0.00E+00	1.04E+09
03170007018	15978	1123.481	5.62E+11	3.52E+07	62	6.67E+11	2.43E+14	7.30E+12	2.61E+11	16325408.16	196	2346	1.06E+12	1.27E+13	6.18E+13	0.00E+00	0.00E+00	0	2346	2346	0.95	1.20E+13	7.53E+08	196	165	0.95	8.44E+11	5.28E+07	143796	9.70E+12	3.54E+15	0.00E+00	0.00E+00	0.00E+00	8.58E+08
03170007014	6280	441.5459	2.21E+11	3.52E+07	38	4.09E+11	1.49E+14	4.48E+12	1.60E+11	25459275.58	60	634	3.26E+11	3.42E+12	1.91E+13	0.00E+00	0.00E+00	0	634	634	0.95	3.25E+12	5.18E+08	60	51	0.95	2.60E+11	4.15E+07	53158	3.59E+12	1.31E+15	0.00E+00	0.00E+00	0.00E+00	6.20E+08
P6	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P7	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P8	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P9	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!

		Wildlife			Hog Manure Application						Cattle Manure Application								Beef Cattle Grazing					Dairy Cattle Grazing*					Poultry Litter Application						TOTAL
March	AREA (AC)	#deer	FC prod (#/day)	FC accum (#/acre/day)	# hogs	FC prod (#/day)	FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	# dairy cattle	# beef cattle	dairy FC prod (#/day)	beef FC prod (#/day)	FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	# beef cattle	# grazing	% of time grazing	FC prod (#/day)	FC accum (#/acre/day)	# beef cattle	# grazing	% of time grazing	FC prod (#/day)	FC accum (#/acre/day)	# chickens	poultry FC prod (#/day)	poultry FC prod (#/year)	Applied in month	FC applied per day	FC accum (#/acre/day)	FC accum (#/acre/day)
03170007015	2599	182.7356	9.14E+10	3.52E+07	4	4.30E+10	1.57E+13	4.71E+11	1.52E+10	5848862.835	34	432	1.82E+11	2.33E+12	1.06E+13	0.00E+00	0.00E+00	0	432	432	0.95	2.22E+12	8.53E+08	34	28	0.95	1.45E+11	5.59E+07	31012	2.09E+12	7.64E+14	0.00E+00	0.00E+00	0.00E+00	9.50E+08
03170007016	5709	401.3897	2.01E+11	3.52E+07	6	6.46E+10	2.36E+13	7.07E+11	2.28E+10	3994106.425	51	679	2.75E+11	3.67E+12	1.61E+13	0.00E+00	0.00E+00	0	679	679	0.95	3.48E+12	6.10E+08	51	43	0.95	2.19E+11	3.84E+07	48430	3.27E+12	1.19E+15	0.00E+00	0.00E+00	0.00E+00	6.88E+08
03170007017	2189	153.9163	7.70E+10	3.52E+07	4	4.30E+10	1.57E+13	4.71E+11	1.52E+10	6944001.92	30	401	1.61E+11	2.17E+12	9.37E+12	0.00E+00	0.00E+00	0	401	401	0.95	2.06E+12	9.40E+08	30	25	0.95	1.28E+11	5.85E+07	28567	1.93E+12	7.03E+14	0.00E+00	0.00E+00	0.00E+00	1.04E+09
03170007018	15978	1123.481	5.62E+11	3.52E+07	62	6.67E+11	2.43E+14	7.30E+12	2.36E+11	14745529.95	196	2346	1.06E+12	1.27E+13	6.18E+13	0.00E+00	0.00E+00	0	2346	2346	0.95	1.20E+13	7.53E+08	196	165	0.95	8.44E+11	5.28E+07	143796	9.70E+12	3.54E+15	0.00E+00	0.00E+00	0.00E+00	8.56E+08
03170007014	6280	441.5459	2.21E+11	3.52E+07	38	4.09E+11	1.49E+14	4.48E+12	1.44E+11	22995474.72	60	634	3.26E+11	3.42E+12	1.91E+13	0.00E+00	0.00E+00	0	634	634	0.95	3.25E+12	5.18E+08	60	51	0.95	2.60E+11	4.15E+07	53158	3.59E+12	1.31E+15	0.00E+00	0.00E+00	0.00E+00	6.17E+08
P6	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P7	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P8	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P9	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!

		Wildlife			Hog Manure Application						Cattle Manure Application								Beef Cattle Grazing					Dairy Cattle Grazing*					Poultry Litter Application						TOTAL
April	AREA (AC)	#deer	FC prod (#/day)	FC accum (#/acre/day)	# hogs	FC prod (#/day)	FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	# dairy cattle	# beef cattle	dairy FC prod (#/day)	beef FC prod (#/day)	FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	# beef cattle	# grazing	% of time grazing	FC prod (#/day)	FC accum (#/acre/day)	# beef cattle	# grazing	% of time grazing	FC prod (#/day)	FC accum (#/acre/day)	# chickens	poultry FC prod (#/day)	poultry FC prod (#/year)	Applied in month	FC applied per day	FC accum (#/acre/day)	FC accum (#/acre/day)
03170007015	2599	182.7356	9.14E+10	3.52E+07	4	4.30E+10	1.57E+13	1.32E+12	4.40E+10	16922709.8	34	432	1.82E+11	2.33E+12	1.06E+13	1.33E+12	4.43E+10	17057618.06	432	432	0.95	2.22E+12	8.53E+08	34	28	0.95	1.45E+11	5.59E+07	31012	2.09E+12	7.64E+14	3.93E+13	1.31E+12	5.04E+08	1.48E+09
03170007016	5709	401.3897	2.01E+11	3.52E+07	6	6.46E+10	2.36E+13	1.98E+12	6.60E+10	11556281.26	51	679	2.75E+11	3.67E+12	1.61E+13	2.01E+12	6.69E+10	11722961.98	679	679	0.95	3.48E+12	6.10E+08	51	43	0.95	2.19E+11	3.84E+07	48430	3.27E+12	1.19E+15	6.14E+13	2.05E+12	3.58E+08	1.07E+09
03170007017	2189	153.9163	7.70E+10	3.52E+07	4	4.30E+10	1.57E+13	1.32E+12	4.40E+10	20091312.22	30	401	1.61E+11	2.17E+12	9.37E+12	1.17E+12	3.91E+10	17842365.17	401	401	0.95	2.06E+12	9.40E+08	30	25	0.95	1.28E+11	5.85E+07	28567	1.93E+12	7.03E+14	3.62E+13	1.21E+12	5.51E+08	1.62E+09
03170007018	15978	1123.481	5.62E+11	3.52E+07	62	6.67E+11	2.43E+14	2.05E+13	6.82E+11	42663733.33	196	2346	1.06E+12	1.27E+13	6.18E+13	7.72E+12	2.57E+11	16106113.23	2346	2346	0.95	1.20E+13	7.53E+08	196	165	0.95	8.44E+11	5.28E+07	143796	9.70E+12	3.54E+15	1.82E+14	6.08E+12	3.80E+08	1.28E+09
03170007014	6280	441.5459	2.21E+11	3.52E+07	38	4.09E+11	1.49E+14	1.25E+13	4.18E+11	66533573.52	60	634	3.26E+11	3.42E+12	1.91E+13	2.38E+12	7.94E+10	12644052.72	634	634	0.95	3.25E+12	5.18E+08	60	51	0.95	2.60E+11	4.15E+07	53158	3.59E+12	1.31E+15	6.74E+13	2.25E+12	3.58E+08	1.03E+09
P6	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P7	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P8	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P9	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!

		Wildlife			Hog Manure Application						Cattle Manure Application								Beef Cattle Grazing					Dairy Cattle Grazing*					Poultry Litter Application						TOTAL
May	AREA (AC)	#deer	FC prod (#/day)	FC accum (#/acre/day)	# hogs	FC prod (#/day)	FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	# dairy cattle	# beef cattle	dairy FC prod (#/day)	beef FC prod (#/day)	FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	# beef cattle	# grazing	% of time grazing	FC prod (#/day)	FC accum (#/acre/day)	# beef cattle	# grazing	% of time grazing	FC prod (#/day)	FC accum (#/acre/day)	# chickens	poultry FC prod (#/day)	poultry FC prod (#/year)	Applied in month	FC applied per day	FC accum (#/acre/day)	FC accum (#/acre/day)
03170007015	2599	182.7356	9.14E+10	3.52E+07	4	4.30E+10	1.57E+13	1.32E+12	4.26E+10	16376815.94	34	432	1.82E+11	2.33E+12	1.06E+13	1.33E+12	4.29E+10	16507372.31	432	432	0.95	2.22E+12	8.53E+08	34	28	0.95	1.45E+11	5.59E+07	31012	2.09E+12	7.64E+14	3.93E+13	1.27E+12	4.88E+08	1.47E+09
03170007016	5709	401.3897	2.01E+11	3.52E+07	6	6.46E+10	2.36E+13	1.98E+12	6.38E+10	11183497.99	51	679	2.75E+11	3.67E+12	1.61E+13	2.01E+12	6.48E+10	11344801.91	679	679	0.95	3.48E+12	6.10E+08	51	43	0.95	2.19E+11	3.84E+07	48430	3.27E+12	1.19E+15	6.14E+13	1.98E+12	3.47E+08	1.05E+09
03170007017	2189	153.9163	7.70E+10	3.52E+07	4	4.30E+10	1.57E+13	1.32E+12	4.26E+10	19443205.38	30	401	1.61E+11	2.17E+12	9.37E+12	1.17E+12	3.78E+10	17266805.01	401	401	0.95	2.06E+12	9.40E+08	30	25	0.95	1.28E+11	5.85E+07	28567	1.93E+12	7.03E+14	3.62E+13	1.17E+12	5.34E+08	1.60E+09
03170007018	15978	1123.481	5.62E+11	3.52E+07	62	6.67E+11	2.43E+14	2.05E+13	6.60E+11	41287483.87	196	2346	1.06E+12	1.27E+13	6.18E+13	7.72E+12	2.49E+11	15586561.19	2346	2346	0.95	1.20E+13	7.53E+08	196	165	0.95	8.44E+11	5.28E+07	143796	9.70E+12	3.54E+15	1.82E+14	5.88E+12	3.68E+08	1.27E+09
03170007014	6280	441.5459	2.21E+11	3.52E+07	38	4.09E+11	1.49E+14	1.25E+13	4.04E+11	64387329.21	60	634	3.26E+11	3.42E+12	1.91E+13	2.38E+12	7.68E+10	12236180.06	634	634	0.95	3.25E+12	5.18E+08	60	51	0.95	2.60E+11	4.15E+07	53158	3.59E+12	1.31E+15	6.74E+13	2.17E+12	3.46E+08	1.02E+09
P6	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P7	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P8	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P9	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!

		Wildlife			Hog Manure Application						Cattle Manure Application								Beef Cattle Grazing					Dairy Cattle Grazing*					Poultry Litter Application						TOTAL
June	AREA (AC)	#deer	FC prod (#/day)	FC accum (#/acre/day)	# hogs	FC prod (#/day)	FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	# dairy cattle	# beef cattle	dairy FC prod (#/day)	beef FC prod (#/day)	FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	# beef cattle	# grazing	% of time grazing	FC prod (#/day)	FC accum (#/acre/day)	# beef cattle	# grazing	% of time grazing	FC prod (#/day)	FC accum (#/acre/day)	# chickens	poultry FC prod (#/day)	poultry FC prod (#/year)	Applied in month	FC applied per day	FC accum (#/acre/day)	FC accum (#/acre/day)
03170007015	2599	182.7356	9.14E+10	3.52E+07	4	4.30E+10	1.57E+13	7.54E+11	2.51E+10	9670119.887	34	432	1.82E+11	2.33E+12	1.06E+13	4.43E+11	1.48E+10	5680186.812	432	432	0.95	2.22E+12	8.53E+08	34	28	0.95	1.45E+11	5.59E+07	31012	2.09E+12	7.64E+14	3.93E+13	1.31E+12	5.04E+08	1.46E+09
03170007016	5709	401.3897	2.01E+11	3.52E+07	6	6.46E+10	2.36E+13	1.13E+12	3.77E+10	6603589.29	51	679	2.75E+11	3.67E+12	1.61E+13	6.69E+11	2.23E+10	3903746.339	679	679	0.95	3.48E+12	6.10E+08	51	43	0.95	2.19E+11	3.84E+07	48430	3.27E+12	1.19E+15	6.14E+13	2.05E+12	3.58E+08	1.05E+09
03170007017	2189	153.9163	7.70E+10	3.52E+07	4	4.30E+10	1.57E+13	7.54E+11	2.51E+10	11480749.84	30	401	1.61E+11	2.17E+12	9.37E+12	3.90E+11	1.30E+10	5941507.603	401	401	0.95	2.06E+12	9.40E+08	30	25	0.95	1.28E+11	5.85E+07	28567	1.93E+12	7.03E+14	3.62E+13	1.21E+12	5.51E+08	1.60E+09
03170007018	15978	1123.481	5.62E+11	3.52E+07	62	6.67E+11	2.43E+14	1.17E+13	3.90E+11	24379276.19	196	2346	1.06E+12	1.27E+13	6.18E+13	2.57E+12	8.57E+10	5363335.705	2346	2346	0.95	1.20E+13	7.53E+08	196	165	0.95	8.44E+11	5.28E+07	143796	9.70E+12	3.54E+15	1.82E+14	6.08E+12	3.80E+08	1.25E+09
03170007014	6280	441.5459	2.21E+11	3.52E+07	38	4.09E+11	1.49E+14	7.16E+12	2.39E+11	38019184.87	60	634	3.26E+11	3.42E+12	1.91E+13	7.93E+11	2.64E+10	4210469.557	634	634	0.95	3.25E+12	5.18E+08	60	51	0.95	2.60E+11	4.15E+07	53158	3.59E+12	1.31E+15	6.74E+13	2.25E+12	3.58E+08	9.94E+08
P6	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P7	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P8	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P9	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!

Black Creek Fecal Coliform Spreadsheet
Pastureland

July	AREA (AC)	Wildlife			Hog Manure Application						Cattle Manure Application							
		#deer	FC prod (#/day)	FC accum (#/acre/day)	# hogs	FC prod (#/day)	FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	# dairy cattle	# beef cattle	dairy FC prod (#/day)	beef FC prod (#/day)	FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)
03170007015	2599	182.7356	9.14E+10	3.52E+07	4	4.30E+10	1.57E+13	7.54E+11	2.43E+10	9358180.535	34	432	1.82E+11	2.33E+12	1.06E+13	4.44E+11	1.43E+10	5505208.666
03170007016	5709	401.3897	2.01E+11	3.52E+07	6	6.46E+10	2.36E+13	1.13E+12	3.65E+10	6390570.281	51	679	2.75E+11	3.67E+12	1.61E+13	6.70E+11	2.16E+10	3783491.438
03170007017	2189	153.9163	7.70E+10	3.52E+07	4	4.30E+10	1.57E+13	7.54E+11	2.43E+10	11110403.07	30	401	1.61E+11	2.17E+12	9.37E+12	3.91E+11	1.26E+10	5758479.47
03170007018	15978	1123.481	5.62E+11	3.52E+07	62	6.67E+11	2.43E+14	1.17E+13	3.77E+11	23592847.93	196	2346	1.06E+12	1.27E+13	6.18E+13	2.57E+12	8.31E+10	5198118.157
03170007014	6280	441.5459	2.21E+11	3.52E+07	38	4.09E+11	1.49E+14	7.16E+12	2.31E+11	36792759.55	60	634	3.26E+11	3.42E+12	1.91E+13	7.94E+11	2.56E+10	4080766.048
P6	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P7	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P8	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P9	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

July	Beef Cattle Grazing					Dairy Cattle Grazing*					Poultry Litter Application						TOTAL
	# beef cattle	# grazing	% of time grazing	FC prod (#/day)	FC accum (#/acre/day)	# beef cattle	# grazing	% of time grazing	FC prod (#/day)	FC accum (#/acre/day)	# chickens	poultry FC prod (#/day)	poultry FC prod (#/year)	Applied in month	FC applied per day	FC accum (#/acre/day)	FC accum (#/acre/day)
03170007015	432	432	0.95	2.22E+12	8.53E+08	34	28	0.95	1.45E+11	5.59E+07	31012	2.09E+12	7.64E+14	3.93E+13	1.27E+12	4.88E+08	1.45E+09
03170007016	679	679	0.95	3.48E+12	6.10E+08	51	43	0.95	2.19E+11	3.84E+07	48430	3.27E+12	1.19E+15	6.14E+13	1.98E+12	3.47E+08	1.04E+09
03170007017	401	401	0.95	2.06E+12	9.40E+08	30	25	0.95	1.28E+11	5.85E+07	28567	1.93E+12	7.03E+14	3.62E+13	1.17E+12	5.34E+08	1.58E+09
03170007018	2346	2346	0.95	1.20E+13	7.53E+08	196	165	0.95	8.44E+11	5.28E+07	143796	9.70E+12	3.54E+15	1.82E+14	5.88E+12	3.68E+08	1.24E+09
03170007014	634	634	0.95	3.25E+12	5.18E+08	60	51	0.95	2.60E+11	4.15E+07	53158	3.59E+12	1.31E+15	6.74E+13	2.17E+12	3.46E+08	9.81E+08
P6	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P7	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P8	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P9	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!

August	AREA (AC)	Wildlife			Hog Manure Application						Cattle Manure Application							
		#deer	FC prod (#/day)	FC accum (#/acre/day)	# hogs	FC prod (#/day)	FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	# dairy cattle	# beef cattle	dairy FC prod (#/day)	beef FC prod (#/day)	FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)
03170007015	2599	182.7356	9.14E+10	3.52E+07	4	4.30E+10	1.57E+13	7.54E+11	2.43E+10	9358180.535	34	432	1.82E+11	2.33E+12	1.06E+13	4.44E+11	1.43E+10	5505208.666
03170007016	5709	401.3897	2.01E+11	3.52E+07	6	6.46E+10	2.36E+13	1.13E+12	3.65E+10	6390570.281	51	679	2.75E+11	3.67E+12	1.61E+13	6.70E+11	2.16E+10	3783491.438
03170007017	2189	153.9163	7.70E+10	3.52E+07	4	4.30E+10	1.57E+13	7.54E+11	2.43E+10	11110403.07	30	401	1.61E+11	2.17E+12	9.37E+12	3.91E+11	1.26E+10	5758479.47
03170007018	15978	1123.481	5.62E+11	3.52E+07	62	6.67E+11	2.43E+14	1.17E+13	3.77E+11	23592847.93	196	2346	1.06E+12	1.27E+13	6.18E+13	2.57E+12	8.31E+10	5198118.157
03170007014	6280	441.5459	2.21E+11	3.52E+07	38	4.09E+11	1.49E+14	7.16E+12	2.31E+11	36792759.55	60	634	3.26E+11	3.42E+12	1.91E+13	7.94E+11	2.56E+10	4080766.048
P6	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P7	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P8	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P9	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

August	Beef Cattle Grazing					Dairy Cattle Grazing*					Poultry Litter Application						TOTAL
	# beef cattle	# grazing	% of time grazing	FC prod (#/day)	FC accum (#/acre/day)	# beef cattle	# grazing	% of time grazing	FC prod (#/day)	FC accum (#/acre/day)	# chickens	poultry FC prod (#/day)	poultry FC prod (#/year)	Applied in month	FC applied per day	FC accum (#/acre/day)	FC accum (#/acre/day)
03170007015	432	432	0.95	2.22E+12	8.53E+08	34	28	0.95	1.45E+11	5.59E+07	31012	2.09E+12	7.64E+14	3.93E+13	1.27E+12	4.88E+08	1.45E+09
03170007016	679	679	0.95	3.48E+12	6.10E+08	51	43	0.95	2.19E+11	3.84E+07	48430	3.27E+12	1.19E+15	6.14E+13	1.98E+12	3.47E+08	1.04E+09
03170007017	401	401	0.95	2.06E+12	9.40E+08	30	25	0.95	1.28E+11	5.85E+07	28567	1.93E+12	7.03E+14	3.62E+13	1.17E+12	5.34E+08	1.58E+09
03170007018	2346	2346	0.95	1.20E+13	7.53E+08	196	165	0.95	8.44E+11	5.28E+07	143796	9.70E+12	3.54E+15	1.82E+14	5.88E+12	3.68E+08	1.24E+09
03170007014	634	634	0.95	3.25E+12	5.18E+08	60	51	0.95	2.60E+11	4.15E+07	53158	3.59E+12	1.31E+15	6.74E+13	2.17E+12	3.46E+08	9.81E+08
P6	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P7	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P8	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P9	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!

September	AREA (AC)	Wildlife			Hog Manure Application						Cattle Manure Application							
		#deer	FC prod (#/day)	FC accum (#/acre/day)	# hogs	FC prod (#/day)	FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	# dairy cattle	# beef cattle	dairy FC prod (#/day)	beef FC prod (#/day)	FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)
03170007015	2599	182.7356	9.14E+10	3.52E+07	4	4.30E+10	1.57E+13	1.13E+12	3.77E+10	14505179.83	34	432	1.82E+11	2.33E+12	1.06E+13	1.33E+12	4.43E+10	17057618.06
03170007016	5709	401.3897	2.01E+11	3.52E+07	6	6.46E+10	2.36E+13	1.70E+12	5.65E+10	9905383.935	51	679	2.75E+11	3.67E+12	1.61E+13	2.01E+12	6.69E+10	11722961.98
03170007017	2189	153.9163	7.70E+10	3.52E+07	4	4.30E+10	1.57E+13	1.13E+12	3.77E+10	17221124.76	30	401	1.61E+11	2.17E+12	9.37E+12	1.17E+12	3.91E+10	17842365.17
03170007018	15978	1123.481	5.62E+11	3.52E+07	62	6.67E+11	2.43E+14	1.75E+13	5.84E+11	36568914.28	196	2346	1.06E+12	1.27E+13	6.18E+13	7.72E+12	2.57E+11	16106113.23
03170007014	6280	441.5459	2.21E+11	3.52E+07	38	4.09E+11	1.49E+14	1.07E+13	3.58E+11	57028777.3	60	634	3.26E+11	3.42E+12	1.91E+13	2.38E+12	7.94E+10	12644052.72
P6	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P7	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P8	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P9	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

September	Beef Cattle Grazing					Dairy Cattle Grazing*					Poultry Litter Application						TOTAL
	# beef cattle	# grazing	% of time grazing	FC prod (#/day)	FC accum (#/acre/day)	# beef cattle	# grazing	% of time grazing	FC prod (#/day)	FC accum (#/acre/day)	# chickens	poultry FC prod (#/day)	poultry FC prod (#/year)	Applied in month	FC applied per day	FC accum (#/acre/day)	FC accum (#/acre/day)
03170007015	432	432	0.95	2.22E+12	8.53E+08	34	28	0.95	1.45E+11	5.59E+07	31012	2.09E+12	7.64E+14	3.93E+13	1.31E+12	5.04E+08	1.48E+09
03170007016	679	679	0.95	3.48E+12	6.10E+08	51	43	0.95	2.19E+11	3.84E+07	48430	3.27E+12	1.19E+15	6.14E+13	2.05E+12	3.58E+08	1.06E+09
03170007017	401	401	0.95	2.06E+12	9.40E+08	30	25	0.95	1.28E+11	5.85E+07	28567	1.93E+12	7.03E+14	3.62E+13	1.21E+12	5.51E+08	1.62E+09
03170007018	2346	2346	0.95	1.20E+13	7.53E+08	196	165	0.95	8.44E+11	5.28E+07	143796	9.70E+12	3.54E+15	1.82E+14	6.08E+12	3.80E+08	1.27E+09
03170007014	634	634	0.95	3.25E+12	5.18E+08	60	51	0.95	2.60E+11	4.15E+07	53158	3.59E+12	1.31E+15	6.74E+13	2.25E+12	3.58E+08	1.02E+09
P6	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P7	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P8	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P9	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!

October	AREA (AC)	Wildlife			Hog Manure Application						Cattle Manure Application							
		#deer	FC prod (#/day)	FC accum (#/acre/day)	# hogs	FC prod (#/day)	FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	# dairy cattle	# beef cattle	dairy FC prod (#/day)	beef FC prod (#/day)	FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)
03170007015	2599	182.7356	9.14E+10	3.52E+07	4	4.30E+10	1.57E+13	1.13E+12	3.65E+10	14037270.8	34	432	1.82E+11	2.33E+12	1.06E+13	1.33E+12	4.29E+10	16507372.31
03170007016	5709	401.3897	2.01E+11	3.52E+07	6	6.46E+10	2.36E+13	1.70E+12	5.47E+10	9585855.421	51	679	2.75E+11	3.67E+12	1.61E+13	2.01E+12	6.48E+10	11344801.91
03170007017	2189	153.9163	7.70E+10	3.52E+07	4	4.30E+10	1.57E+13	1.13E+12	3.65E+10	16665604.61	30	401	1.61E+11	2.17E+12	9.37E+12	1.17E+12	3.78E+10	17266805.01
03170007018	15978	1123.481	5.62E+11	3.52E+07	62	6.67E+11	2.43E+14	1.75E+13	5.65E+11	35389271.89	196	2346	1.06E+12	1.27E+13	6.18E+13	7.72E+12	2.49E+11	15586561.19
03170007014	6280	441.5459	2.21E+11	3.52E+07	38	4.09E+11	1.49E+14	1.07E+13	3.47E+11	55189139.32	60	634	3.26E+11	3.42E+12	1.91E+13	2.38E+12	7.68E+10	12236180.06
P6	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P7	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P8	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P9	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

October	Beef Cattle Grazing					Dairy Cattle Grazing*					Poultry Litter Application						TOTAL
	# beef cattle	# grazing	% of time grazing	FC prod (#/day)	FC accum (#/acre/day)	# beef cattle	# grazing	% of time grazing	FC prod (#/day)	FC accum (#/acre/day)	# chickens	poultry FC prod (#/day)	poultry FC prod (#/year)	Applied in month	FC applied per day	FC accum (#/acre/day)	FC accum (#/acre/day)
03170007015	432	432	0.95	2.22E+12	8.53E+08	34	28	0.95	1.45E+11	5.59E+07	31012	2.09E+12	7.64E+14	3.90E+13	1.26E+12	4.85E+08	1.46E+09
03170007016	679	679	0.95	3.48E+12	6.10E+08	51	43	0.95	2.19E+11	3.84E+07	48430	3.27E+12	1.19E+15	6.10E+13	1.97E+12	3.44E+08	1.05E+09
03170007017	401	401	0.95	2.06E+12	9.40E+08	30	25	0.95	1.28E+11	5.85E+07	28567	1.93E+12	7.03E+14	3.60E+13	1.16E+12	5.30E+08	1.60E+09
03170007018	2346	2346	0.95	1.20E+13	7.53E+08	196	165	0.95	8.44E+11	5.28E+07	143796	9.70E+12	3.54E+15	1.81E+14	5.84E+12	3.65E+08	1.26E+09
03170007014	634	634	0.95	3.25E+12	5.18E+08	60	51	0.95	2.60E+11	4.15E+07	53158	3.59E+12	1.31E+15	6.69E+13	2.16E+12	3.44E+08	1.01E+09
P6	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P7	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P8	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P9	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!

November	AREA (AC)	Wildlife			Hog Manure Application						Cattle Manure Application							
		#deer	FC prod (#/day)	FC accum (#/acre/day)	# hogs	FC prod (#/day)	FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	# dairy cattle	# beef cattle	dairy FC prod (#/day)	beef FC prod (#/day)	FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)
03170007015	2599	182.7356	9.14E+10	3.52E+07	4	4.30E+10	1.57E+13	4.71E+11	1.57E+10	6043824.929	34	432	1.82E+11	2.33E+12	1.06E+13	0.00E+00	0.00E+00	0
03170007016	5709	401.3897	2.01E+11	3.52E+07	6	6.46E+10	2.36E+13	7.07E+11	2.36E+10	4127243.306	51	679	2.75E+11	3.67E+12	1.61E+13	0.00E+00	0.00E+00	0
03170007017	2189	153.9163	7.70E+10	3.52E+07	4	4.30E+10	1.57E+13	4.71E+11	1.57E+10	7175468.651	30	401	1.61E+11	2.17E+12	9.37E+12	0.00E+00	0.00E+00	0
03170007018	15978	1123.481	5.62E+11	3.52E+07	62	6.67E+11	2.43E+14	7.30E+12	2.43E+11	15237047.62	196	2346	1.06E+12	1.27E+13	6.18E+13	0.00E+00	0.00E+00	0
03170007014	6280	441.5459	2.21E+11	3.52E+07	38	4.09E+11	1.49E+14	4.48E+12	1.49E+11	23761990.54	60	634	3.26E+11	3.42E+12	1.91E+13	0.00E+00	0.00E+00	0
P6	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P7	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P8	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P9	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

November	Beef Cattle Grazing					Dairy Cattle Grazing*					Poultry Litter Application						TOTAL
	# beef cattle	# grazing	% of time grazing	FC prod (#/day)	FC accum (#/acre/day)	# beef cattle	# grazing	% of time grazing	FC prod (#/day)	FC accum (#/acre/day)	# chickens	poultry FC prod (#/day)	poultry FC prod (#/year)	Applied in month	FC applied per day	FC accum (#/acre/day)	FC accum (#/acre/day)
03170007015	432	432	0.95	2.22E+12	8.53E+08	34	28	0.95	1.45E+11	5.59E+07	31012	2.09E+12	7.64E+14	0.00E+00	0.00E+00	0.00E+00	9.50E+08
03170007016	679	679	0.95	3.48E+12	6.10E+08	51	43	0.95	2.19E+11	3.84E+07	48430	3.27E+12	1.19E+15	0.00E+00	0.00E+00	0.00E+00	6.88E+08
03170007017	401	401	0.95	2.06E+12	9.40E+08	30	25	0.95	1.28E+11	5.85E+07	28567	1.93E+12	7.03E+14	0.00E+00	0.00E+00	0.00E+00	1.04E+09
03170007018	2346	2346	0.95	1.20E+13	7.53E+08	196	165	0.95	8.44E+11	5.28E+07	143796	9.70E+12	3.54E+15	0.00E+00	0.00E+00	0.00E+00	8.56E+08
03170007014	634	634	0.95	3.25E+12	5.18E+08	60	51	0.95	2.60E+11	4.15E+07	53158	3.59E+12	1.31E+15	0.00E+00	0.00E+00	0.00E+00	6.18E+08
P6	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P7	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P8	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P9	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!

December	AREA (AC)	Wildlife			Hog Manure Application						Cattle Manure Application							
		#deer	FC prod (#/day)	FC accum (#/acre/day)	# hogs	FC prod (#/day)	FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)	# dairy cattle	# beef cattle	dairy FC prod (#/day)	beef FC prod (#/day)	FC prod (#/year)	Available for month	FC applied per day	FC accum (#/acre/day)
03170007015	2599	182.7356	9.14E+10	3.52E+07	4	4.30E+10	1.57E+13	3.77E+11	1.22E+10	4679090.268	34	432	1.82E+11	2.33E+12	1.06E+13	0.00E+00	0.00E+00	0
03170007016	5709	401.3897	2.01E+11	3.52E+07	6	6.46E+10	2.36E+13	5.65E+11	1.82E+10	3195285.14	51	679	2.75E+11	3.67E+12	1.61E+13	0.00E+00	0.00E+00	0
03170007017	2189	153.9163	7.70E+10	3.52E+07	4	4.30E+10	1.57E+13	3.77E+11	1.22E+10	5555201.536	30	401	1.61E+11	2.17E+12	9.37E+12	0.00E+00	0.00E+00	0
03170007018	15978	1123.481	5.62E+11	3.52E+07	62	6.67E+11	2.43E+14	5.84E+12	1.88E+11	11796423.96	196	2346	1.06E+12	1.27E+13	6.18E+13	0.00E+00	0.00E+00	0
03170007014	6280	441.5459	2.21E+11	3.52E+07	38	4.09E+11	1.49E+14	3.58E+12	1.16E+11	18396379.77	60	634	3.26E+11	3.42E+12	1.91E+13	0.00E+00	0.00E+00	0
P6	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P7	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P8	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P9	0	0	0.00E+00	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

December	Beef Cattle Grazing					Dairy Cattle Grazing*					Poultry Litter Application						TOTAL
	# beef cattle	# grazing	% of time grazing	FC prod (#/day)	FC accum (#/acre/day)	# beef cattle	# grazing	% of time grazing	FC prod (#/day)	FC accum (#/acre/day)	# chickens	poultry FC prod (#/day)	poultry FC prod (#/year)	Applied in month	FC applied per day	FC accum (#/acre/day)	FC accum (#/acre/day)
03170007015	432	432	0.95	2.22E+12	8.53E+08	34	28	0.95	1.45E+11	5.59E+07	31012	2.09E+12	7.64E+14	0.00E+00	0.00E+00	0.00E+00	9.49E+08
03170007016	679	679	0.95	3.48E+12	6.10E+08	51	43	0.95	2.19E+11	3.84E+07	48430	3.27E+12	1.19E+15	0.00E+00	0.00E+00	0.00E+00	6.87E+08
03170007017	401	401	0.95	2.06E+12	9.40E+08	30	25	0.95	1.28E+11	5.85E+07	28567	1.93E+12	7.03E+14	0.00E+00	0.00E+00	0.00E+00	1.04E+09
03170007018	2346	2346	0.95	1.20E+13	7.53E+08	196	165	0.95	8.44E+11	5.28E+07	143796	9.70E+12	3.54E+15	0.00E+00	0.00E+00	0.00E+00	8.53E+08
03170007014	634	634	0.95	3.25E+12	5.18E+08	60	51	0.95	2.60E+11	4.15E+07	53158	3.59E+12	1.31E+15	0.00E+00	0.00E+00	0.00E+00	6.13E+08
P6	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P7	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P8	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!
P9	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	#DIV/0!	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#DIV/0!	#DIV/0!

This sheet contains information related to the direct contribution of beef cattle fecal coliform bacteria to streams.
The direct contribution of fecal coliform from cattle to a stream can be represented as a point source in the model. Required input for point sources in NPSM are flow (cfs) and loading rate (#/hr).

It is assumed that only beef cattle are grazing and therefore have access to streams. They have access to the stream based on information in the Cattle Farming worksheet.

Assume the following:

Beef Cattle Waste: 46 (lbs/animal/day)
The density of cattle manure (including urine) is approximately the density of water: 62.4 (lbs/cubic foot)

CATTLE AS A POINT SOURCE

January	# grazing dairy and beef cattle	# cattle in streams	FC rate (#/hr)	Waste Flow (cfs)
03170007015	461	23	5.18E+09	1.97E-04
03170007016	722	36	8.12E+09	3.08E-04
03170007017	426	21	4.80E+09	1.82E-04
03170007018	2511	126	2.82E+10	1.07E-03
03170007014	684	34	7.70E+09	2.92E-04
P6	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P7	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P8	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P9	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

February	# grazing dairy and beef cattle	# cattle in streams	FC rate (#/hr)	Waste Flow (cfs)
03170007015	461	23	5.18E+09	1.97E-04
03170007016	722	36	8.12E+09	3.08E-04
03170007017	426	21	4.80E+09	1.82E-04
03170007018	2511	126	2.82E+10	1.07E-03
03170007014	684	34	7.70E+09	2.92E-04
P6	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P7	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P8	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P9	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

March	# grazing dairy and beef cattle	# cattle in streams	FC rate (#/hr)	Waste Flow (cfs)
03170007015	461	23	5.18E+09	1.97E-04
03170007016	722	36	8.12E+09	3.08E-04
03170007017	426	21	4.80E+09	1.82E-04
03170007018	2511	126	2.82E+10	1.07E-03
03170007014	684	34	7.70E+09	2.92E-04
P6	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P7	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P8	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P9	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

April	# grazing dairy and beef cattle	# cattle in streams	FC rate (#/hr)	Waste Flow (cfs)
03170007015	461	23	5.18E+09	1.97E-04
03170007016	722	36	8.12E+09	3.08E-04
03170007017	426	21	4.80E+09	1.82E-04
03170007018	2511	126	2.82E+10	1.07E-03
03170007014	684	34	7.70E+09	2.92E-04
P6	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P7	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P8	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P9	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

May	# grazing dairy and beef cattle	# cattle in streams	FC rate (#/hr)	Waste Flow (cfs)
03170007015	461	23	5.18E+09	1.97E-04
03170007016	722	36	8.12E+09	3.08E-04
03170007017	426	21	4.80E+09	1.82E-04
03170007018	2511	126	2.82E+10	1.07E-03
03170007014	684	34	7.70E+09	2.92E-04
P6	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P7	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P8	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P9	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

June	# grazing dairy and beef cattle	# cattle in streams	FC rate (#/hr)	Waste Flow (cfs)
03170007015	461	23	5.18E+09	1.97E-04
03170007016	722	36	8.12E+09	3.08E-04
03170007017	426	21	4.80E+09	1.82E-04
03170007018	2511	126	2.82E+10	1.07E-03
03170007014	684	34	7.70E+09	2.92E-04
P6	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P7	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P8	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P9	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

July	# grazing dairy and beef cattle	# cattle in streams	FC rate (#/hr)	Waste Flow (cfs)
03170007015	461	23	5.18E+09	1.97E-04
03170007016	722	36	8.12E+09	3.08E-04
03170007017	426	21	4.80E+09	1.82E-04
03170007018	2511	126	2.82E+10	1.07E-03
03170007014	684	34	7.70E+09	2.92E-04
P6	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P7	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P8	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P9	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

August	# grazing dairy and beef cattle	# cattle in streams	FC rate (#/hr)	Waste Flow (cfs)
03170007015	461	23	5.18E+09	1.97E-04
03170007016	722	36	8.12E+09	3.08E-04
03170007017	426	21	4.80E+09	1.82E-04
03170007018	2511	126	2.82E+10	1.07E-03
03170007014	684	34	7.70E+09	2.92E-04
P6	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P7	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P8	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P9	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

September	# grazing dairy and beef cattle	# cattle in streams	FC rate (#/hr)	Waste Flow (cfs)
03170007015	461	23	5.18E+09	1.97E-04
03170007016	722	36	8.12E+09	3.08E-04
03170007017	426	21	4.80E+09	1.82E-04
03170007018	2511	126	2.82E+10	1.07E-03
03170007014	684	34	7.70E+09	2.92E-04
P6	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P7	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P8	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P9	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

October	# grazing dairy and beef cattle	# cattle in streams	FC rate (#/hr)	Waste Flow (cfs)
03170007015	461	23	5.18E+09	1.97E-04
03170007016	722	36	8.12E+09	3.08E-04
03170007017	426	21	4.80E+09	1.82E-04
03170007018	2511	126	2.82E+10	1.07E-03
03170007014	684	34	7.70E+09	2.92E-04
P6	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P7	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P8	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P9	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

November	# grazing dairy and beef cattle	# cattle in streams	FC rate (#/hr)	Waste Flow (cfs)
03170007015	461	23	5.18E+09	1.97E-04
03170007016	722	36	8.12E+09	3.08E-04
03170007017	426	21	4.80E+09	1.82E-04
03170007018	2511	126	2.82E+10	1.07E-03
03170007014	684	34	7.70E+09	2.92E-04
P6	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P7	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P8	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P9	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

December	# grazing dairy and beef cattle	# cattle in streams	FC rate (#/hr)	Waste Flow (cfs)
03170007015	461	23	5.18E+09	1.97E-04
03170007016	722	36	8.12E+09	3.08E-04
03170007017	426	21	4.80E+09	1.82E-04
03170007018	2511	126	2.82E+10	1.07E-03
03170007014	684	34	7.70E+09	2.92E-04
P6	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P7	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P8	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
P9	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Black Creek Fecal Coliform Spreadsheet
Septics

This sheet contains information related to the contribution of failing septic systems to streams.
The direct contribution of fecal coliform from septics to a stream can be represented as a point source in the model. Required input for point sources in NPSM are loading rate (#/hr) and flow (cfs).

The following assumptions are made for septic contributions.

People:	7762	
Estimated # septics:	2772	
Avg # people served per septic:	2.8	people/septic
Assume a failure rate for septics in t	40	%

Therefore the number of failing septics in the watershed is: 1108.857
Assume failing septics are distributed evenly across watershed based on land area. Therefore, density of failing septics is: 0.00859 septic/acre

Assume the average FC concentration reaching the stream (from septic overcharge) is: 1.00E+04 #/100 ml **(Horsely & Whitten, 1996)**
70 100 gal/day/person **(Horsely & Whitten, 1996)**

SEPTICS AS A POINT SOURCE

Subwatershed	Total area (acres)	# failing septics	Tot. # people served	Septic flow (gal/day)	Septic flow (mL/hr)	FC rate (#/hr)	Septic flow (cfs)
03170007015	12175	105	292.8115031	29281.15031	4617881.413	4.62E+08	4.54E-02
03170007016	18794	161	452.0114425	45201.14425	7128597.125	7.13E+08	7.01E-02
03170007017	10046	86	241.6133511	24161.33511	3810443.891	3.81E+08	3.75E-02
03170007018	59875	514	1440.041663	144004.1663	22710657.05	2.27E+09	2.23E-01
03170007014	28204	242	678.3220407	67832.20407	10697703.85	1.07E+09	1.05E-01
P6	0	0	0	0	0	0.00E+00	0.00E+00
P7	0	0	0	0	0	0.00E+00	0.00E+00
P8	0	0	0	0	0	0.00E+00	0.00E+00
P9	0	0	0	0	0	0.00E+00	0.00E+00
Total:	129094						

Black Creek Fecal Coliform Spreadsheet
Model Input

POINT SOURCES FOR EACH SUBWATERSHED (Point Sources\Loads)

Cattle in Streams, monthly averages

	Flow (cfs)	Fecal (#/hr)
03170007015	5.90E-05	1.55E+09
03170007016	9.24E-05	2.44E+09
03170007017	5.46E-05	1.44E+09
03170007018	3.22E-04	8.47E+09
03170007014	8.76E-05	2.31E+09
P6	#DIV/0!	#DIV/0!
P7	#DIV/0!	#DIV/0!
P8	#DIV/0!	#DIV/0!
P9	#DIV/0!	#DIV/0!

	Septic Tanks		**Point Sources**		**Total Point Sources**	
	Flow (cfs)	Fecal (#/hr)	Flow (cfs)	Fecal (#/hr)	Flow (cfs)	Fecal (#/hr)
03170007015	2.27E-02	2.31E+08	0.405	6.837E+07	0.428	1.85E+09
03170007016	3.50E-02	3.56E+08	0.054	1.102E+07	0.089	2.80E+09
03170007017	1.87E-02	1.91E+08	0.192	3.904E+07	0.211	1.67E+09
03170007018	1.12E-01	1.14E+09	0.260	5.290E+07	0.372	9.66E+09
03170007014	5.26E-02	5.35E+08	0.560	1.140E+08	0.613	2.96E+09
P6	0.00E+00	0.00E+00	0.000	0.000E+00	#DIV/0!	#DIV/0!
P7	0.00E+00	0.00E+00	0.000	0.000E+00	#DIV/0!	#DIV/0!
P8	0.00E+00	0.00E+00	0.000	0.000E+00	#DIV/0!	#DIV/0!
P9	0.00E+00	0.00E+00	0.000	0.000E+00	#DIV/0!	#DIV/0!
	2.41E-01	2.45E+09				

LANDUSE AREAS (Just to us as a check)

SUBSHED	CROPLAND	FOREST	URBAN	PASTURELAND	TOTAL
03170007015	176	9270	130	2599	**12175**
03170007016	418	12464	204	5709	**18794**
03170007017	298	7305	254	2189	**10046**
03170007018	1459	42176	262	15978	**59875**
03170007014	384	20656	884	6280	**28204**
P6	0	0	0	0	**0**
P7	0	0	0	0	**0**
P8	0	0	0	0	**0**
P9	0	0	0	0	**0**
TOTAL	**2735**	**91870**	**1735**	**32755**	**129094**

SCENARIOS

Source	% Reduced
Cattle Access	70
Septic Failure	50
Point Sources	0
Runoff	0

PASTURELAND AND CROPLAND - ACCUM (Data Editor\PERLND\PQAL\Monthly Input\MON-ACCUM)

Monthly Input - ACCUM

	03170007015		03170007016		03170007017		03170007018		03170007014	
	Pastureland	Cropland	Pastureland	Cropland	Pastureland	Cropland	Pastureland	Cropland	Pastureland	Cropland
January	9.50E+08	3.52E+07	6.88E+08	3.52E+07	1.04E+09	3.52E+07	8.56E+08	3.52E+07	6.17E+08	3.52E+07
February	9.51E+08	3.52E+07	6.88E+08	3.52E+07	1.04E+09	3.52E+07	8.58E+08	3.52E+07	6.20E+08	3.52E+07
March	9.50E+08	3.52E+07	6.88E+08	3.52E+07	1.04E+09	3.52E+07	8.56E+08	3.52E+07	6.17E+08	3.52E+07
April	1.48E+09	3.52E+07	1.07E+09	3.52E+07	1.62E+09	3.52E+07	1.28E+09	3.52E+07	1.03E+09	3.52E+07
May	1.47E+09	3.52E+07	1.05E+09	3.52E+07	1.60E+09	3.52E+07	1.27E+09	3.52E+07	1.02E+09	3.52E+07
June	1.46E+09	3.52E+07	1.05E+09	3.52E+07	1.60E+09	3.52E+07	1.25E+09	3.52E+07	9.94E+08	3.52E+07
July	1.45E+09	3.52E+07	1.04E+09	3.52E+07	1.58E+09	3.52E+07	1.24E+09	3.52E+07	9.81E+08	3.52E+07
August	1.45E+09	3.52E+07	1.04E+09	3.52E+07	1.58E+09	3.52E+07	1.24E+09	3.52E+07	9.81E+08	3.52E+07
September	1.48E+09	3.52E+07	1.06E+09	3.52E+07	1.62E+09	3.52E+07	1.27E+09	3.52E+07	1.02E+09	3.52E+07
October	1.46E+09	3.52E+07	1.05E+09	3.52E+07	1.60E+09	3.52E+07	1.26E+09	3.52E+07	1.01E+09	3.52E+07
November	9.50E+08	3.52E+07	6.88E+08	3.52E+07	1.04E+09	3.52E+07	8.56E+08	3.52E+07	6.18E+08	3.52E+07
December	9.49E+08	3.52E+07	6.87E+08	3.52E+07	1.04E+09	3.52E+07	8.53E+08	3.52E+07	6.13E+08	3.52E+07

	P6		P7		P8		P9	
	Pastureland	Cropland	Pastureland	Cropland	Pastureland	Cropland	Pastureland	Cropland
January	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
February	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
March	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
April	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
May	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
June	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
July	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
August	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
September	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
October	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
November	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
December	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

PASTURELAND AND CROPLAND - SQOLIM (Data Editor\PERLND\PQAL\Monthly Input\MON-SQOLIM)

Monthly Input - SQOLIM

	03170007015		03170007016		03170007017		03170007018		03170007014	
	Pastureland	Cropland	Pastureland	Cropland	Pastureland	Cropland	Pastureland	Cropland	Pastureland	Cropland
January	3.80E+09	1.41E+08	2.75E+09	1.41E+08	4.16E+09	1.41E+08	3.42E+09	1.41E+08	2.47E+09	1.41E+08
February	3.80E+09	1.41E+08	2.75E+09	1.41E+08	4.17E+09	1.41E+08	3.43E+09	1.41E+08	2.48E+09	1.41E+08
March	3.80E+09	1.41E+08	2.75E+09	1.41E+08	4.16E+09	1.41E+08	3.42E+09	1.41E+08	2.47E+09	1.41E+08
April	5.93E+09	1.41E+08	4.26E+09	1.41E+08	6.49E+09	1.41E+08	5.12E+09	1.41E+08	4.12E+09	1.41E+08
May	5.86E+09	1.41E+08	4.21E+09	1.41E+08	6.42E+09	1.41E+08	5.06E+09	1.41E+08	4.07E+09	1.41E+08
June	5.86E+09	1.41E+08	4.21E+09	1.41E+08	6.41E+09	1.41E+08	5.00E+09	1.41E+08	3.98E+09	1.41E+08
July	5.79E+09	1.41E+08	4.16E+09	1.41E+08	6.34E+09	1.41E+08	4.95E+09	1.41E+08	3.92E+09	1.41E+08
August	5.79E+09	1.41E+08	4.16E+09	1.41E+08	6.34E+09	1.41E+08	4.95E+09	1.41E+08	3.92E+09	1.41E+08
September	5.92E+09	1.41E+08	4.26E+09	1.41E+08	6.48E+09	1.41E+08	5.10E+09	1.41E+08	4.09E+09	1.41E+08
October	5.84E+09	1.41E+08	4.20E+09	1.41E+08	6.39E+09	1.41E+08	5.03E+09	1.41E+08	4.02E+09	1.41E+08
November	3.80E+09	1.41E+08	2.75E+09	1.41E+08	4.16E+09	1.41E+08	3.43E+09	1.41E+08	2.47E+09	1.41E+08
December	3.80E+09	1.41E+08	2.75E+09	1.41E+08	4.16E+09	1.41E+08	3.41E+09	1.41E+08	2.45E+09	1.41E+08

	P6		P7		P8		P9	
	Pastureland	Cropland	Pastureland	Cropland	Pastureland	Cropland	Pastureland	Cropland
January	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
February	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
March	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
April	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
May	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
June	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
July	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
August	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
September	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
October	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
November	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
December	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

URBAN AND FOREST - ACQOP & SQOLIM (Data Editor\PERLND\PQAL\QUAL-INPUT\ACQOP & SQOLIM)

ACQOP for all months

	Urban	Forest
03170007015	7.18E+06	3.52E+07
03170007016	7.18E+06	3.52E+07
03170007017	7.18E+06	3.52E+07
03170007018	7.18E+06	3.52E+07
03170007014	7.18E+06	3.52E+07
P6	0.00E+00	0.00E+00
P7	0.00E+00	0.00E+00
P8	0.00E+00	0.00E+00
P9	0.00E+00	0.00E+00

SQOLIM for all months

	Urban	Forest
03170007015	2.87E+07	1.41E+08
03170007016	2.87E+07	1.41E+08
03170007017	2.87E+07	1.41E+08
03170007018	2.87E+07	1.41E+08
03170007014	2.87E+07	1.41E+08
P6	0.00E+00	0.00E+00
P7	0.00E+00	0.00E+00
P8	0.00E+00	0.00E+00
P9	0.00E+00	0.00E+00

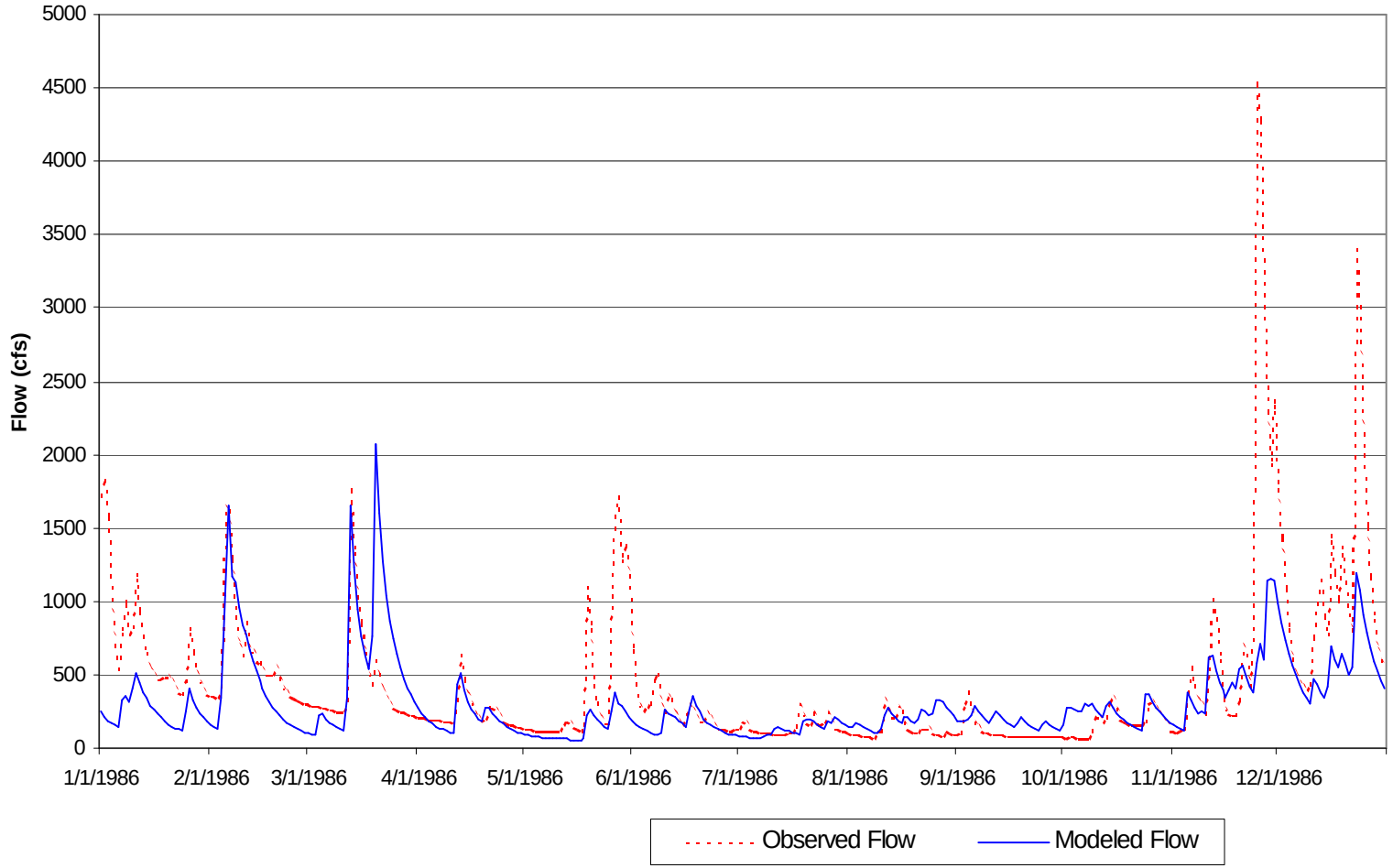
APPENDIX B

This appendix contains printouts of the various model run results. Graphs B-1a and B-1b show the modeled flow, in cfs, through reach 03170007014 compared to the actual USGS gage readings from Black Creek near Brooklyn, gage 02479130. The graphs show data from selected years of the modeled period, 01/01/1986-12/31/1986 and 01/01/1993-12/31/1993. The second set of graphs show the 30-day geometric mean for fecal coliform concentrations in counts per 100 ml in the impaired section of Black Creek, reach 03170007014. These graphs represent an 11-year time period, from 01/01/1985 to 12/31/1995. The graphs contain a reference line at 200 counts per 100 ml. Graph B-2 represents the existing conditions in Black Creek. There are 33 violations of the fecal coliform standard on this graph. Graph B-3 represents the conditions in Black Creek after the reduction scenario has been applied. Graphs B-2 and B-3 are shown with the same scale for comparison purposes.

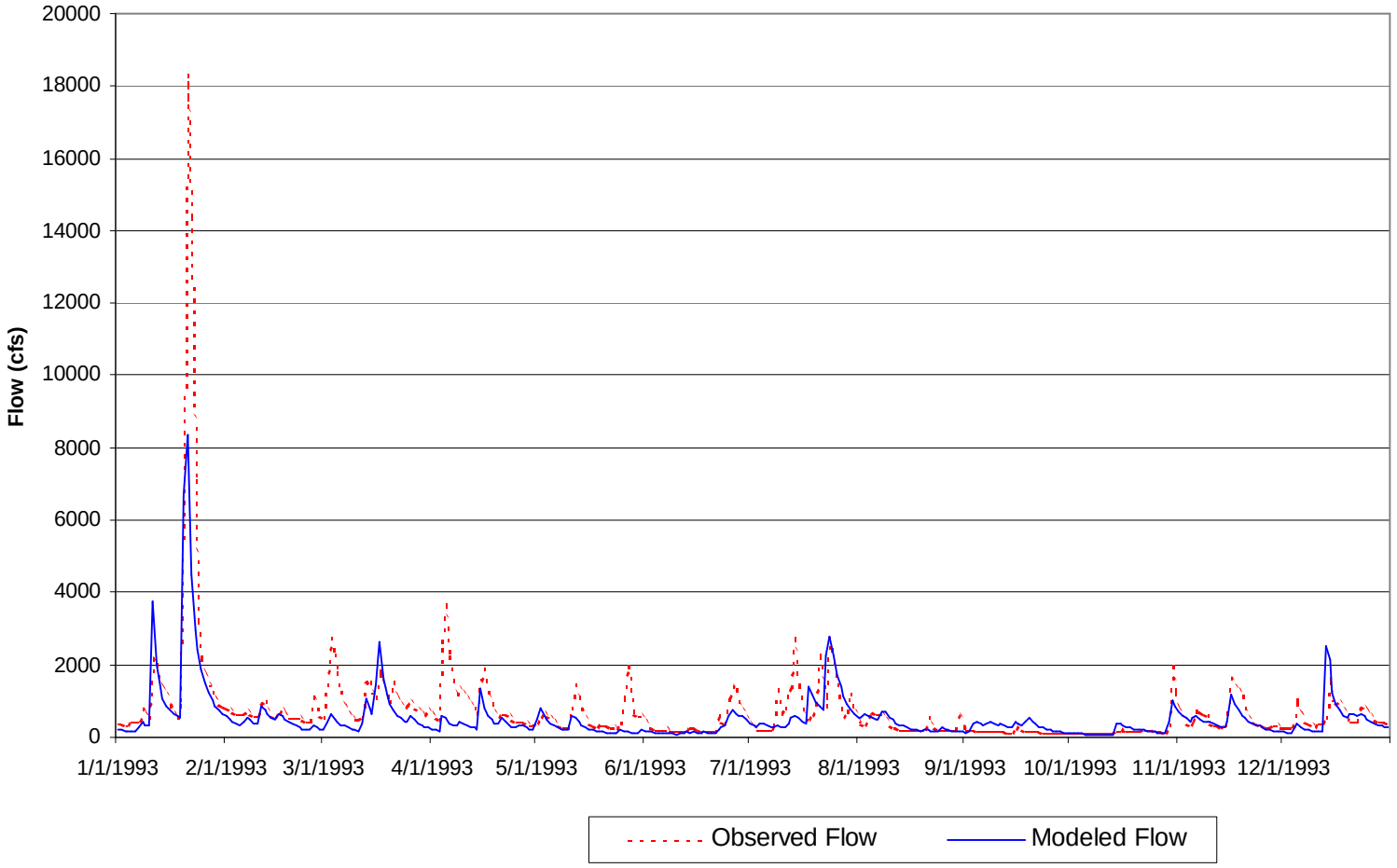
The TMDL calculated in this report represents the maximum fecal coliform load that can be assimilated by the waterbody segment during the critical 30-day period that will maintain water quality standards. The calculation of this TMDL is based on the critical hydrologic flow condition that occurred during the modeled time span. The graph showing the 30-day geometric mean of instream fecal coliform concentrations representing the allocated loading scenario (Graph B-3) was used to identify the critical condition. The TMDL calculation includes the sum of the loads from all identified point and nonpoint sources applied or discharged within the modeled watershed.

An individual TMDL calculation was prepared for each waterbody segment and drainage area included in this report. The numerical values for the wasteload allocation (point sources) and load allocation (nonpoint sources) for each waterbody segment or drainage area can be found on the waterbody segment identification pages at the beginning of this report.

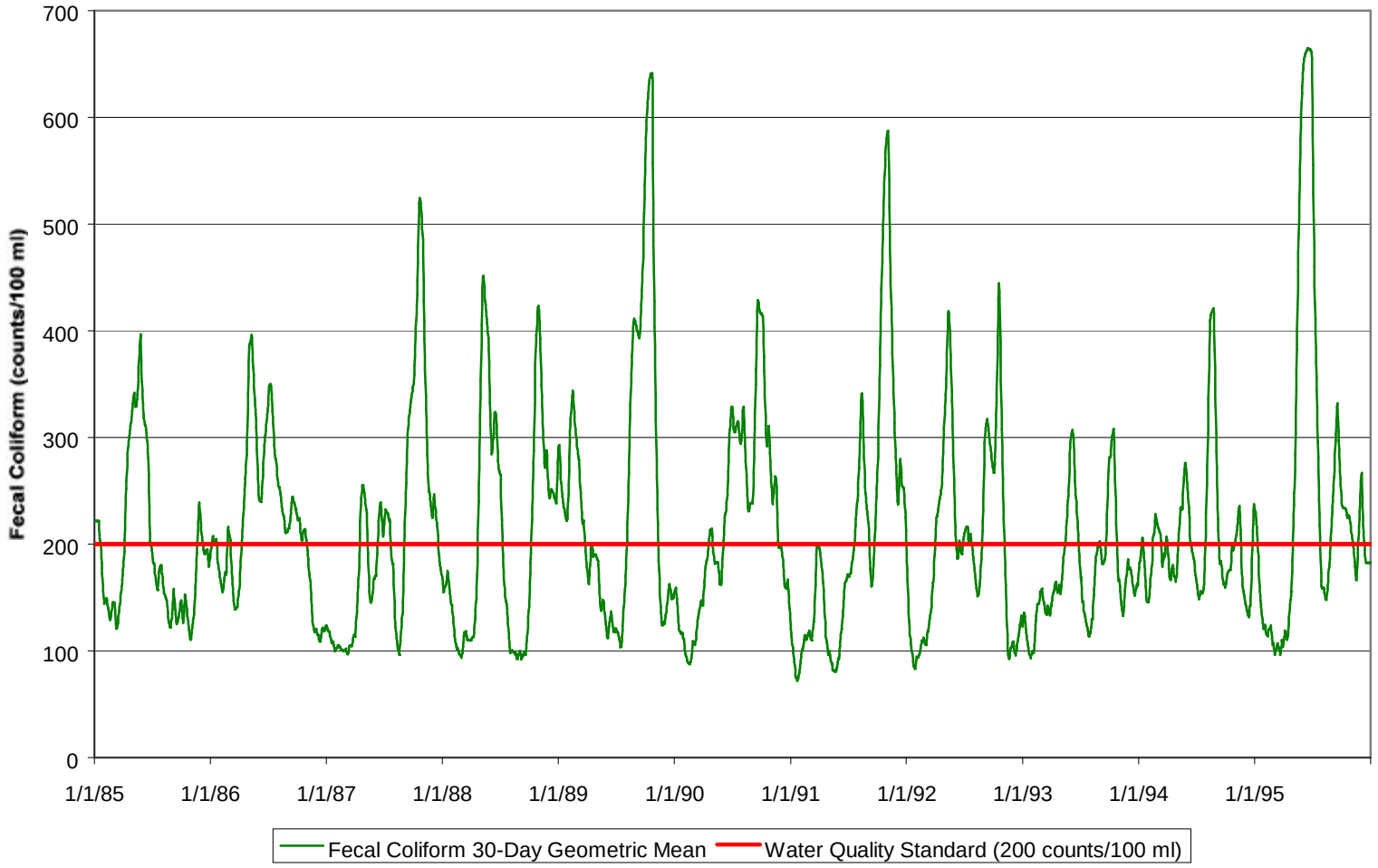
Graph B-1a Daily Flow Comparison between USGS Gage 02479130 and Reach 03170007014 for 01/01/86 - 12/31/86



Graph B-1b Daily Flow Comparison between USGS Gage 02479130 and Reach 03170007014 for 01/01/93 - 12/31/93



Graph B-2 Modeled Fecal Coliform Concentrations Under Existing Conditions



Graph B-3 Modeled Fecal Coliform Concentrations After Application of Reduction Scenario