South Carolina
Department of Health and Environmental Control

Total Maximum Daily Load Development for
Allison Creek: Station CW-171
Fecal Coliform Bacteria

September 19, 2003

Technical Report No. 011-03

Bureau of Water

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South Carolina Department of Health
and Environmental Control

Abstract

Allison Creek, in York County, SC, is a tributary of the Catawba River at Lake Wylie. The creek at water quality monitoring station CW-171 (Allison Creek at US-321 south of Clover) has been placed on South Carolina's 303(d) list of impaired waters for violations of the fecal coliform standard. During the assessment period for the 2002 303(d) list (1996-2000), 46 % of samples violated the standard. The watershed of Allison Creek has been mostly rural and agricultural, but is beginning to undergo development. In the early 1990's the watershed was 55 % forest, 21 % pasture/hay, and 18 % cropland. There is one point source in the watershed, but it does not discharge fecal coliform bacteria. The probable sources of fecal coliform bacteria in the creek are runoff from agricultural activities, cattle-in-streams, and failing septic systems.

The load-duration curve methodology was used to calculate the existing load and the TMDL load for Allison Creek at US-321. The existing load was estimated to be 3.1E+11 cfu/day. The TMDL load was determined to be 1.08E+11 cfu/day, consisting of the Load Allocation of 1.03E+11 cfu/day and margin of safety of 5.4E+09 cfu/day. In order to reach the target load, which is equal to the Load Allocation, a reduction in the existing load to the creek of 67 % will be necessary. Several TMDL implementation strategies to bring about these reductions are suggested.

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Tables and Figures

1.0 INTRODUCTION

1.1 Background

Levels of fecal coliform bacteria can be elevated in water bodies as the result of both point and nonpoint sources of pollution. Section 303(d) of the Clean Water Act and EPA's Water Quality Planning and Management Regulations (40 CFR Part 130) require states to develop total maximum daily loads (TMDLs) for water bodies that are not meeting designated uses under technology-based pollution controls. The TMDL process establishes the allowable loadings of pollutants or other quantifiable parameters for a water body based on the relationship between pollution sources and in stream water quality conditions so that states can establish water quality-based controls to reduce pollution and restore and maintain the quality of water resources (USEPA 1991).

1.2 Watershed Description

The watershed of Allison Creek (HUC 03050101-190-010) is in York County, in the upper Piedmont region of South Carolina (Figure 1). Allison Creek drains into the Lake Wylie (Catawba River) near the town of Tega Cay. A portion of the town of Clover is the watershed. Approximately 2500 people lived in the watershed in 2000 and of this number about 1700 did not have sewer service. Only the upper part of this watershed, upstream of US-321, is included in this TMDL. The area of the Allison Creek watershed is 39.5 km^2 (9763 acres).

South Carolina DHEC has three monitoring stations on Allison Creek; but only the uppermost one (CW-171) is impaired and on the 303(d) list. The water quality monitoring station is at US-321 south of Clover.

North Safety Products discharges process wastewater into a tributary of Allison Creek. This minor industrial plant discharges an average of 0.012 mgd (45,000 l/day) of wastewater.

The predominant land uses (MRLC) in the part of the Allison Creek watershed that drains to CW-171 are forest (55 %), pasture/hay (21 %), and cropland (18 %) (Table 1; Figure 2). At the time the MRLC data were collected the developed land was under 4 %. It is likely to be higher now due to the rapid growth in the Charlotte, NC region. Recently, the York County Council has enacted a buffer ordinance that will require a 50-foot buffer along Allison Creek for land that is sold or developed.

1.3 Water Quality Standard

The impaired stream segment, Allison Creek, is designated as Class Freshwater. Waters of this class are described as follows:

> "Freshwaters suitable for primary and secondary contact recreation and as a source for drinking water supply after conventional treatment in accordance with the requirements of the Department. Suitable for fishing and the survival and propagation of a balanced indigenous aquatic community of fauna and flora. Suitable also for industrial and agricultural uses." (R.61-68)

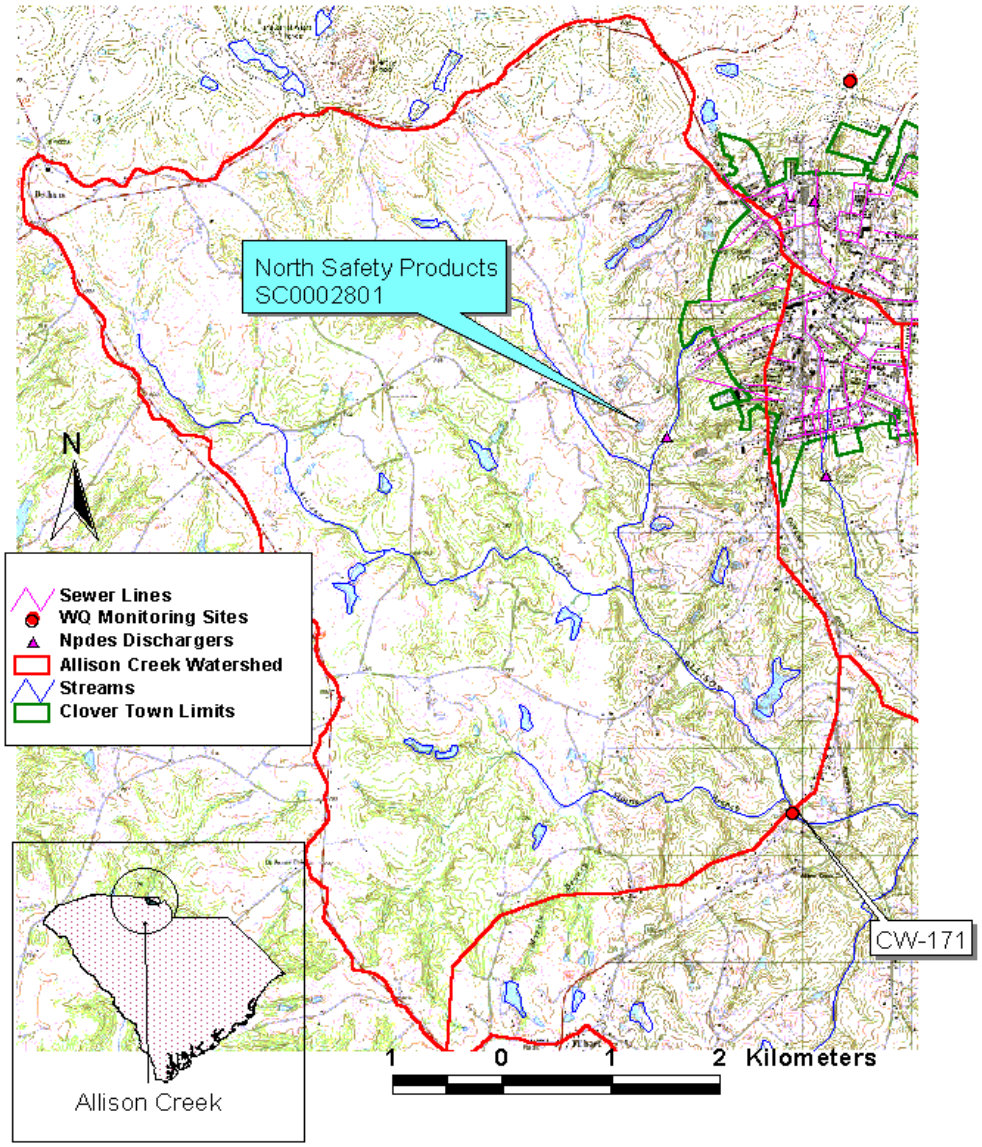

Figure 1. Map of the Allison Creek watershed above CW-171.

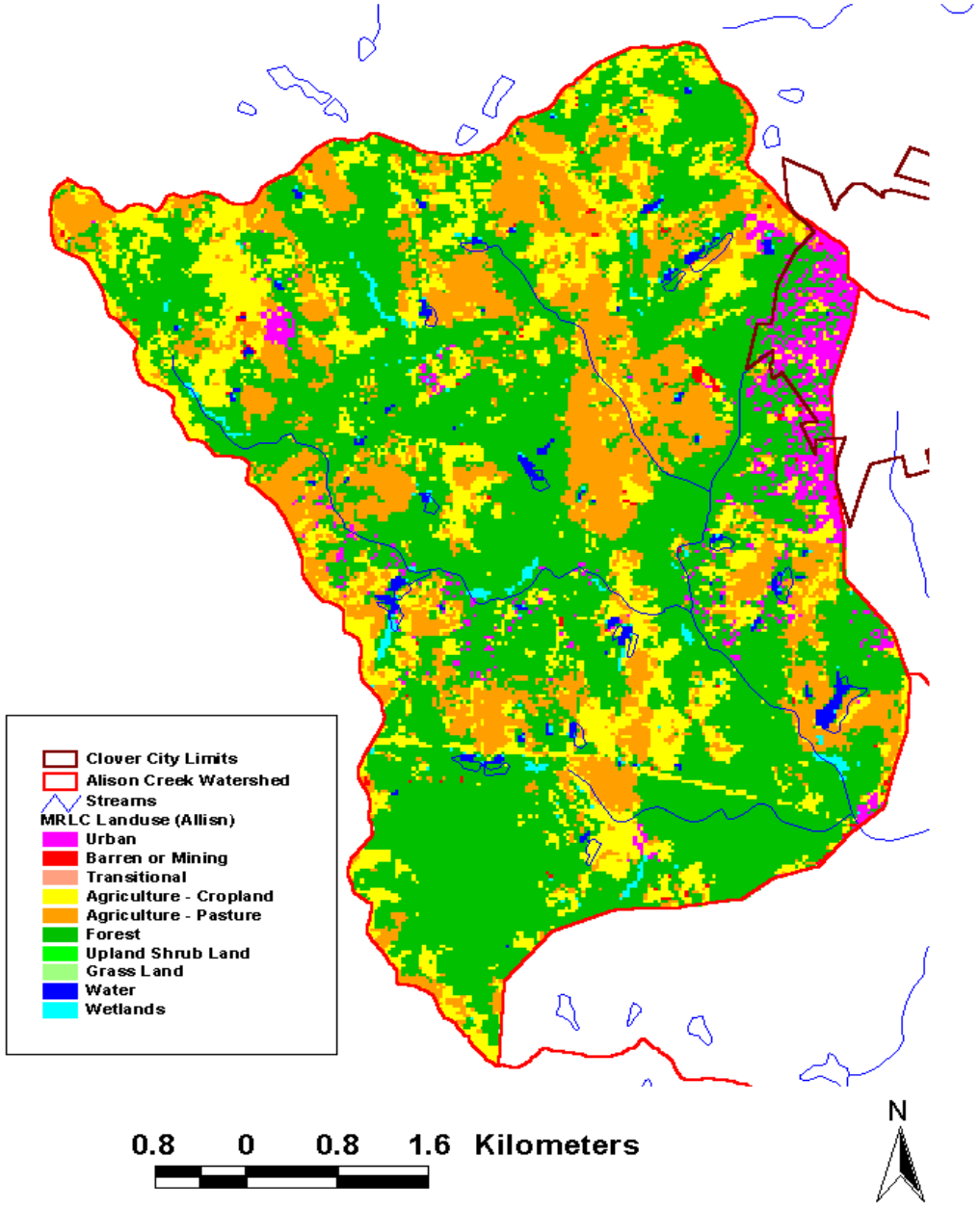

Figure 2. Map showing land uses in the Allison Creek watershed.

South Carolina's standard for fecal coliform in Freshwater is:

> "Not to exceed a geometric mean of 200/100 ml, based on five consecutive samples during any 30 day period; nor shall more than 10% of the total samples during any 30 day period exceed 400/100 ml."(R.61-68).

Table 1. Land uses in the Allison Creek watershed above CW-171.

Land Use		**Area (hectares)**		**Percent**
Water		37.2		0.9%
Residential LI		102.8		2.6%
Residential HI		5.0		0.1%
Commercial, Ind, Trans		32.3		0.8%
Developed Total			**140.1**	**3.5%**
Bare Rock, Sand,Clay		12.9		0.3%
Deciduous Forest		1,120.6		28.3%
Evergreen Forest		629.2		15.9%
Mixed Forest		425.2		10.8%
Forest - Total			**2,174.9**	**55.0%**
Pasture/Hay		**830.1**		**21.0%**
Row Crops		704.9		17.8%
Grass (Parks, lawns)		18.6		0.5%
Agriculture			**723.5**	**18.3%**
Woody Wetlands		29.9		0.8%
Emergent Herbaceous Wetlands		4.4		0.1%
Wetlands - Total			**34.3**	**0.9%**
Total Area		**3,953.0**		**100.0%**

2.0 WATER QUALITY ASSESSMENT

An assessment of water quality data collected in 1996 through 2000 at water quality monitoring station CW-171 indicated that Allison Creek at this location is impaired for recreational use. In addition to being listed on the 2002 303(d) list, Allison Creek was also on the 1998 and 2000 lists. Waters in which no more than 10% of the samples collected over a five year period are greater than 400 fecal coliform counts or cfu / 100 ml are considered to comply with the South Carolina water

quality standard for fecal coliform bacteria. Waters with more than 10 percent of samples greater than 400 cfu/ 100 ml are considered impaired and listed for fecal coliform bacteria on South Carolina's 303(d) list. During the assessment period (1996-2000), 46 % of the samples did not meet the fecal coliform criterion at CW-171. Allison Creek fecal coliform data are provided in Appendix A.

There is not a simple relationship between precipitation and fecal coliform concentrations in Allison Creek (Figure 3). Fecal coliform concentrations show some increase with rainfall, as measured as Lockhart; but the relationship is not clear. This pattern suggests that there are both continual sources of fecal coliform bacteria, such as cattle in the creeks or failing septic systems, and rainfall associated sources, such as runoff from litter applied fields.

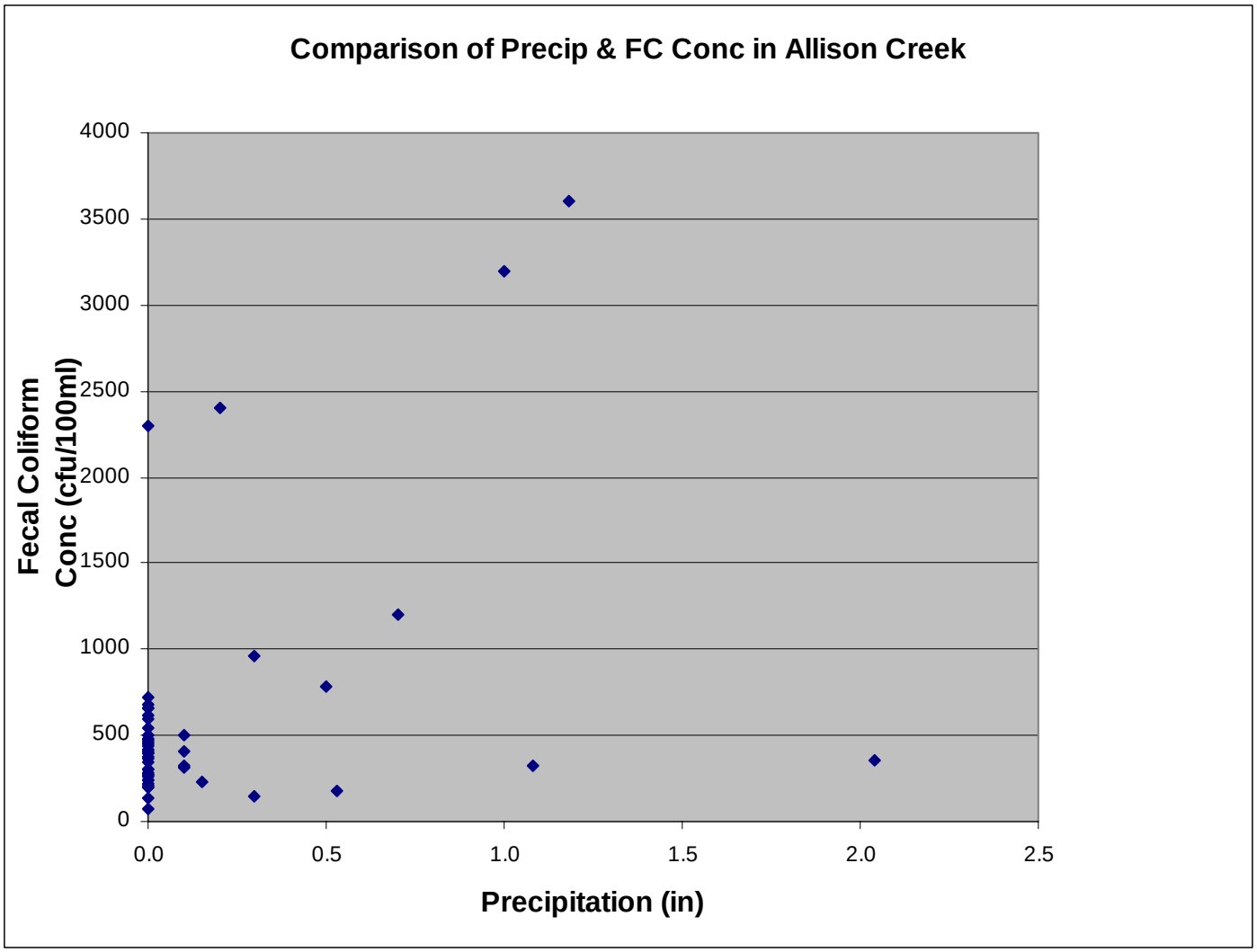

Figure 3. Comparison between precipitation and fecal coliform concentration in Allison Creek.

3.0 SOURCE ASSESSMENT AND LOAD ALLOCATION

Surface waters may be contaminated by fecal coliform bacteria that originate from both point and nonpoint sources. Point sources are facilities, such as wastewater treatment plants and factories, that have NPDES permits and discharge wastewater through a pipe or similar structure. Until recently poorly treated or untreated municipal sewage has been a major source of fecal coliform bacteria. With improved treatment and enforcement brought about by the Clean Water Act, point sources are seldom sources of fecal coliform contamination. All point sources must have a NPDES permit and are required to treat wastewater to a minimum level. In South Carolina NPDES permittees that discharge sanitary wastewater must meet the state standards for fecal coliform at the point of discharge.

3.1 Point Sources in the Allison Creek Watershed

There is one NPDES facility in this watershed, North Safety Products (SC0002801). This facility, located on a tributary of Allison Creek, discharges process wastewater that does not contain domestic wastes or fecal coliform bacteria.

3.2 Nonpoint Sources in Allison Creek Watershed

3.2.1 Wildlife

Wildlife (mammals and birds) contribute a low level of fecal coliform to surface waters. Wildlife wastes are carried into nearby streams by runoff during rainfall events or by direct deposition. Because of the higher infiltration rates reduce the amount of runoff and organic material on the land surface slows the velocity of the water that does runoff, forests typically do not contribute much fecal coliform bacteria to streams flowing through them. Of wildlife in the Allison Creek watershed, deer, being the largest wild animals, are the most obvious. The SC Department of Natural Resources (Charles Ruth, DNR Deer Project Supervisor, personal communication, 2000) has estimated a density of 30 deer/mi^2 for this area. Other wildlife that are likely to be significant sources of fecal coliform bacteria in Allison Creek are water birds. Wildlife are unlikely to be primary sources of fecal coliform bacteria in Allison Creek. In any case control of these sources would be difficult to implement.

3.2.2 Agricultural Activities

Agricultural activities that involve livestock or animal wastes are potential sources of fecal coliform contamination of surface waters. Allison Creek watershed has two permitted animal feeding operations. One is a turkey brooder facility that is permitted to have 40,000 birds (ND0013340). The other is permitted for 10 sows with litters (ND0013340). The 1997 Agricultural Census reports that there were 21,234 cattle and calves in York County. Assuming that cattle are distributed throughout the county with the pasture land; the ratio of pasture in the watershed to the county as a whole indicates that about 1040 animals are in the watershed. Due to several years of drought and

perhaps other conditions, the number of cattle now in the watershed is probably smaller (Maryann Trent, NRCS, personal Communication, 2003).

3.2.2.1 Land Application of Turkey Litter

Litter (waste) from the turkeys is removed from the turkey houses periodically and stored. If not stored properly, rainwater may carry fecal coliform bacteria into nearby streams. The liter is usually applied to pastures as the final disposal. Improper application also has the potential to contaminate nearby streams. The turkey facility has some 13 fields in the watershed that are permitted for land application of the turkey litter. Swine operations also typically as a final step apply wastes to land. It has one field that is permitted for animal waste application.

3.2.2.2 Grazing Animals

Livestock such as cattle, goats, and horses spend most of their time grazing on pasture land. Runoff from rainfall may wash some of the manure deposited on the pastures into nearby by streams. Good grass cover on the pastures and intact riparian buffers should reduce the likelihood of the bacteria reaching streams.

Cattle and other livestock that are allowed access to streams deposit manure directly into the streams. Manure deposited in streams can be a significant source of fecal coliform bacteria. As a result of the drought many farmers have installed wells to provide their cattle with water, which would reduce the likelihood of the cattle accessing streams (Maryann Trent, NRCS, personal Communication, 2003).

3.2.3 Failing Septic Systems

Improperly designed or installed septic systems and septic systems that no longer function properly are potential sources of fecal coliform contamination. A small part of the watershed is within the Clover town limits and is sewered. An estimated 1700 people in 660 households in the Allison Creek watershed are not served by sewers. Using a GIS, the 2000 census database layer was compared to a sewer line data layer and the boundaries of the Allison Creek watershed. The precise failure rate of these septic systems is unknown; but Schueler (1999) has reported failure rates of 20 %. However, in this watershed the load from failing septic systems is probably much smaller than the load from agricultural activities. A complete unknown is possibility of direct or illicit discharges to the creek in this rural watershed.

LOAD-DURATION METHOD

Load-duration curves were developed as a method of developing TMDLs that applies to all hydrologic conditions. The load-duration curve method uses the cumulative frequency distribution of stream flow and pollutant concentration data to estimate the existing and the TMDL loads for a water body. Development of the load-duration curve is described in this chapter.

In the ideal situation a long period of record for flow data would be available for the water body of interest. A longer period of record increases the confidence in the results of the load-duration method. Allison Creek, like most small streams in South Carolina is not gauged. Long Creek, in Gaston County, NC, is a comparable, gauged, nearby stream, with a similar sized drainage area, land uses, and topography. Data from the gauge (USGS 0214400) on Long Creek near Bessemer City, North Carolina for the period of record (Jan. 1, 1953 to Sept 30, 2001) was used to generate the flow-duration curve. The Long Creek watershed is somewhat larger, 82.4 km^2 compared to 39.5 km^2 for Allison Creek at the Bessemer City gauge.

The flow for Allison Creek was estimated by multiplying the daily flow rates from Long Creek by the ratio of Allison Creek drainage area to that of Long Creek (0.4797). The flows were ranked from low to high and the values that exceed certain selected percentiles determined. The load-duration curve was generated by calculating the load from the observed fecal coliform concentrations, the flow rate that corresponds to the date of sampling, and a conversion factor (Figure 4). The load was plotted against the appropriate flow recurrence interval to generate the curve. The target line was created by calculating the allowable load from the flow and the appropriate fecal coliform standard concentration in the same manner. Sample loads above this line are violations of the standard, while loads below the line are in compliance.

The trend line was determined for loads that are above the target line. The trend line for Allison Creek with the best fit was a power curve; the r^2 was 0.6145. The equation for the line and supporting data are provided in Appendix B. This trend line represents samples that violated the water quality standard. The existing load to Allison Creek was calculated from values along this trend line. Most of the violating loads were between the 10 % and 90 % flow recurrence intervals. The existing load is the average of loads from the 10 % to 90 % recurrence intervals at 5 % intervals, i.e. 0, 15, 20, 25 … 90.

The TMDL load is calculated from the target line in the same manner, that is the average of loads at 5 % intervals from 10 % to 90 %. The Load Allocation values are 95 % of the loads from the target line, that is the TMDL load minus the Margin of Safety. Calculations for both existing and TMDL loads are provided in Appendix B.

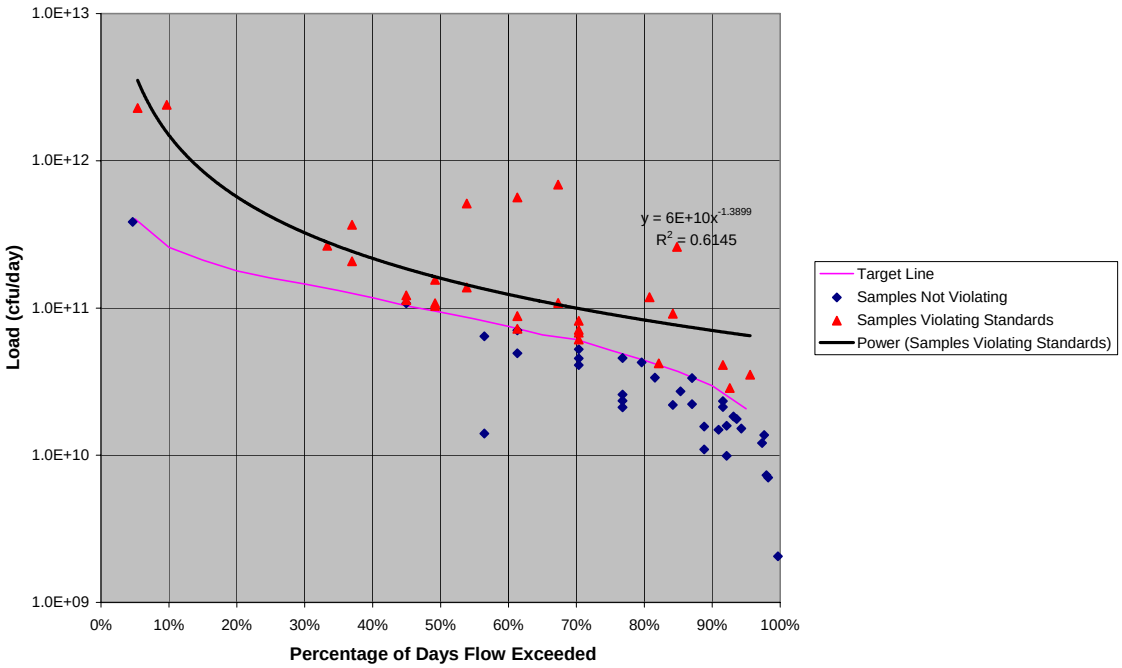

Figure 4. Load-Duration plot of Allison Creek at CW-171. Based on 1990 – 2000 fecal coliform data.

5.0 DEVELOPMENT OF TOTAL MAXIMUM DAILY LOAD

A total maximum daily load (TMDL) for a given pollutant and water body is comprised of the sum of individual wasteload allocations (WLAs) for point sources, and load allocations (LAs) for both nonpoint sources and natural background levels. In addition, the TMDL must include a margin of safety (MOS), either implicitly or explicitly, to account for the uncertainty in the relationship between pollutant loads and the quality of the receiving water body. Conceptually, this definition is represented by the equation:

TMDL = 3 WLAs + 3 LAs + MOS

The TMDL is the total amount of pollutant that can be assimilated by the receiving water body while still achieving water quality standards. In TMDL development, allowable loadings from all pollutant sources that cumulatively amount to no more than the TMDL must be established and thereby provide the basis to establish water quality-based controls.

For most pollutants, TMDLs are expressed as a mass load (e.g., kilograms per day). For bacteria, however, TMDLs are expressed in terms of number (#), cfu, or organism counts (or resulting concentration), in accordance with 40 CFR 130.2(l).

5.1 Critical Conditions

Critical conditions for Allison Creek occur when a long period of low flow is followed by rainfall event that produces runoff. At low flow rates the continual sources like poorly functioning wastewater treatment plants, cattle in the streams, and failing septic systems cause the concentration of the fecal coliform in the creek to rise as dilution decreases. During the long dry period, fecal coliform bacteria build up on the land surface. Rainfall flushes much of this accumulation into the creek with runoff, which causes the already high concentrations to increase further.

Though most of the standard violations occurred during medium flows, standard violations occurred over much of the total range of flows. The inclusion of all flow conditions in the load-duration curve analysis insures that the critical conditions are protected. Existing and TMDL loads were calculated from the 10 – 90 % flow exceedence intervals.

5.2 Existing Load

The existing load was calculated from the trend line of observed values that exceeded the water quality standard and were between and including 10 and 90 % reoccurrence limits. Loadings from all sources are included in this figure: failing septic systems, cattle-in-streams, and loading from runoff. The total existing load for CW-171 is 3.1E+11 cfu/day.

5.3 Margin of Safety

The margin of safety (MOS) may be explicit and/or implicit. The explicit margin of safety is 5 % of the TMDL or 20 counts/ 100ml. For CW-171 this is equivalent to 5.4 E+09 cfu/day**.**

5.4 Total Maximum Daily Load

The Total Maximum Daily Load (TMDL) represents the maximum load the stream may carry and meet the water quality standard for the pollutant of interest. For this TMDL the load will be expressed as cfu/day (colony forming units/day).

There is no Waste Load Allocation for this TMDL because this watershed has no NPDES facilities that discharge fecal coliform bacteria.

The Load Allocation (LA) was determined from the TMDL load by subtracting out the margin of safety. The load allocation for Allison Creek at CW-171 is 1.03 E+11 cfu/day (Table 2).

The required reduction is the difference between the existing load and the target load expressed as a percentage. The target load to the creek is the TMDL minus the MOS and for Allison Creek is equivalent to the LA. The target loading for Allison Creek at CW-171 requires a reduction of 67 % from the current load of 3.1 E+11 cfu/day.

Table 2. TMDL components for Allison Creek.

Impaired Station	WLA cfu/day	LA cfu/day	MOS cfu/day	TMDL cfu/day	% Reduction
CW-171	NA	1.03E+11	5.4E+09	1.08E+11	67 %

6.0 IMPLEMENTATION

As discussed in the *Implementation Plan for Achieving Total Maximum Daily Load Reductions From Nonpoint Sources for the State of South Carolina* (SCDHEC,1998), South Carolina has several tools available for implementing this nonpoint source TMDL. Specifically, SCDHEC's animal agriculture permitting program addresses animal operations and land application of animal wastes. In addition, SCDHEC will work with the existing agencies in the area to provide nonpoint source education in the Allison Creek Watershed. Local sources of nonpoint source education and assistance include Clemson Extension Service, the Natural Resource Conservation Service (NRCS), the York County Soil and Water Conservation Services, and the South Carolina Department of Natural Resources. Clemson Extension Service offers a 'Farm-A-Syst' package to farmers. Farm-A-Syst allows the farmer to evaluate practices on their property and determine the nonpoint source impact they may be having. It recommends best management practices (BMPs) to correct nonpoint source problems on the farm. NRCS can provide cost share money to land owners installing BMPs.

SCDHEC is empowered under the State Pollution Control Act to perform investigations of and pursue enforcement for activities and conditions which threaten the quality of waters of the state. In addition, other interested parties (universities, local watershed groups, etc.) may apply for section 319 grants to install BMPs that will reduce fecal coliform loading to Allison Creek. TMDL implementation projects are given highest priority for 319 funding.

In addition to the resources cited above for the implementation of this TMDL in the Allison Creek watershed, Clemson Extension has developed a Home-A-Syst handbook that can help urban or rural homeowners reduce sources of NPS pollution on their property. This document guides homeowners through a self-assessment, including information on proper maintenance practices for septic tanks. SCDHEC also employs a nonpoint source educator who can assist with distribution of these tools as well as provide additional BMP information.

Using existing authorities and mechanisms, these measures will be implemented in the Allison Creek watershed in order to bring about a 67 % reduction in fecal coliform bacteria loading to Allison Creek. DHEC will continue to monitor, according to the basin monitoring schedule, the effectiveness of implementation measures and evaluate stream water quality as the implementation strategy progresses.

7.0 REFERENCES

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APPENDIX A Fecal Coliform Data

CW-171 Allison Creek at US-321, 3.1 mi S of Clover

Date	Time	FC (fcu/100 ml)
8-May-90	1432	680
11-Jun-90	1325	500
11-Jul-90	1258	450
1-Aug-90	1245	600
5-Sep-90	1230	720
2-Oct-90	1348	270
6-May-91	1231	3600
26-Jun-91	1040	320
15-Jul-91	1145	230
29-Aug-91	1010	410
23-Sep-91	1020	240
10-Oct-91	1155	140
5-May-92	1120	280
3-Jun-92	1220	660
7-Jul-92	1105	270
4-Aug-92	1147	340
2-Sep-92	1045	150
8-Oct-92	1140	360
20-May-93	1335	780
15-Jun-93	1210	410
20-Jul-93	1050	320
4-Aug-93	1120	3200
14-Sep-93	1020	260
21-Oct-93	1210	70
31-May-94	1005	380
7-Jun-94	1042	470
7-Jul-94	1420	180
18-Aug-94	1020	2400
21-Sep-94	1452	200
6-Oct-94	1010	220
24-May-95	1405	400
20-Jun-95	1024	1200
12-Jul-95	1408	480
15-Aug-95	1115	200
7-Sep-95	1111	370
10-Oct-95	1034	420
22-May-96	1100	2300
18-Jun-96	1114	460
12-Sep-96	1106	960
22-May-97	1045	440
4-Jun-97	1150	400
7-Jul-97	1125	540
3-Sep-97	1115	240
22-Oct-97	1055	310
21-May-98	1015	620
16-Jun-98	1330	500
22-Jul-98	1258	660
6-Aug-98	1100	300
10-Sep-98	1107	300
29-Oct-98	1350	210
11-May-99		430
24-Jun-99		390
15-Jul-99		1100
18-Aug-99		140
27-Sep-99		2800
21-Oct-99		390
16-May-00		300
22-Jun-00		300
17-Jul-00		230
31-Aug-00		400
19-Sep-00		4200
26-Oct-00		330

APPENDIX B Calculations

Calculation of Existing Load for Allison Creek at CW-171

Trend Line: Power **Equation: y = 6E+10 * x ^ -1.399**

x Exceedence	y Load
0.10	1.50E+12
0.15	8.53E+11
0.20	5.70E+11
0.25	4.17E+11
0.30	3.23E+11
0.35	2.61E+11
0.40	2.16E+11
0.45	1.83E+11
0.50	1.58E+11
0.55	1.38E+11
0.60	1.23E+11
0.65	1.10E+11
0.70	9.88E+10
0.75	8.97E+10
0.80	8.20E+10
0.85	7.53E+10
0.90	6.95E+10
Mean:	3.10E+11

Existing Load: 3.10E+11 cfu/day

Calculation of TMDL Load for Allison Creek at CW-171

Target Concentration: **380 cfu/100 ml**

x Exceedence	**y Load**
0.10	2.45E+11
0.15	2.01E+11
0.20	1.69E+11
0.25	1.52E+11
0.30	1.38E+11
0.35	1.25E+11
0.40	1.11E+11
0.45	9.81E+10
0.50	8.92E+10
0.55	8.03E+10
0.60	7.14E+10
0.65	6.24E+10
0.70	5.8E+10
0.75	4.91E+10
0.80	4.19E+10
0.85	3.52E+10
0.90	2.81E+10
Mean:	1.03E+11

TMDL Load: **1.03E+11 cfu/day**

Calculation of observed load in Allison Creek at CW-171 from estimated flow (using Long Creek at USGS 0214400) and observed fecal coliform concentrations.

Samples not Violating Standard

Date	FC (fcu/100ml)	Est Flow (cfs)	Est Load (FC cfu/day)	Flow Rank	Exceedence
21-Oct-93	70	8.2	1.40E+10	7755	56.44%
18-Aug-99	140	0.6	2.06E+09	55	99.69%
10-Oct-91	140	3.2	1.10E+10	1988	88.83%
2-Sep-92	150	2.7	9.91E+09	1402	92.13%
7-Jul-94	180	4.8	2.11E+10	4130	76.80%
21-Sep-94	200	4.8	2.35E+10	4130	76.80%
15-Aug-95	200	3.2	1.57E+10	1988	88.83%
29-Oct-98	210	2.9	1.49E+10	1613	90.94%
6-Oct-94	220	4.8	2.58E+10	4130	76.80%
17-Jul-00	230	1.3	7.32E+09	359	97.98%
15-Jul-91	230	3.9	2.19E+10	2816	84.18%
23-Sep-91	240	2.7	1.59E+10	1402	92.13%
3-Sep-97	240	1.2	7.05E+09	313	98.24%
14-Sep-93	260	3.5	2.23E+10	2308	87.04%
2-Oct-90	270	2.3	1.52E+10	1014	94.30%
7-Jul-92	270	6.2	4.10E+10	5278	70.36%
5-May-92	280	7.2	4.93E+10	6887	61.32%
16-May-00	300	6.2	4.55E+10	5278	70.36%
22-Jun-00	300	2.4	1.76E+10	1140	93.60%
6-Aug-98	300	2.5	1.83E+10	1225	93.12%
10-Sep-98	300	3.7	2.72E+10	2611	85.34%
22-Oct-97	310	2.8	2.12E+10	1499	91.58%
26-Jun-91	320	8.2	6.42E+10	7755	56.44%

20-Jul-93	320	4.3	3.37E+10	3285	81.55%
26-Oct-00	330	1.5	1.21E+10	473	97.34%
4-Aug-92	340	2.8	2.33E+10	1499	91.58%
8-Oct-92	360	43.7	3.85E+11	16975	4.66%
7-Sep-95	370	5.8	5.25E+10	5278	70.36%
31-May-94	380	4.6	4.28E+10	3633	79.60%
24-Jun-99	390	3.5	3.34E+10	2308	87.04%
21-Oct-99	390	4.8	4.58E+10	4130	76.80%
31-Aug-00	400	1.4	1.37E+10	415	97.67%
24-May-95	400	7.2	7.05E+10	6887	61.32%
4-Jun-97	400	11	1.08E+11	9801	44.95%

Samples Violating Standard:

29-Aug-91	410	4.2	4.21E+10	3184	82.12%
15-Jun-93	410	7.2	7.22E+10	6887	61.32%
10-Oct-95	420	11	1.13E+11	9801	44.95%
11-May-99	430	5.8	6.10E+10	5278	70.36%
22-May-97	440	9.6	1.03E+11	9046	49.19%
11-Jul-90	450	2.6	2.86E+10	1316	92.61%
18-Jun-96	460	9.6	1.08E+11	9046	49.19%
7-Jun-94	470	10.6	1.22E+11	9801	44.95%
12-Jul-95	480	5.8	6.81E+10	5278	70.36%
11-Jun-90	500	7.2	8.81E+10	6887	61.32%
16-Jun-98	500	5.8	7.10E+10	5278	70.36%
7-Jul-97	540	6.2	8.19E+10	5278	70.36%
1-Aug-90	600	2.8	4.11E+10	1499	91.58%
21-May-98	620	9.1	1.38E+11	8216	53.86%
3-Jun-92	660	6.7	1.08E+11	5820	67.31%
22-Jul-98	660	9.6	1.55E+11	9046	49.19%

8-May-90	680	12.5	2.08E+11	11225	36.96%
5-Sep-90	720	2	3.52E+10	786	95.59%
20-May-93	780	13.9	2.65E+11	11877	33.29%
12-Sep-96	960	3.9	9.16E+10	2816	84.18%
15-Jul-99	1100	4.4	1.18E+11	3421	80.79%
20-Jun-95	1200	12.5	3.67E+11	11225	36.96%
22-May-96	2300	9.1	5.12E+11	8216	53.86%
18-Aug-94	2400	38.9	2.28E+12	16845	5.39%
27-Sep-99	2800	3.8	2.60E+11	2703	84.82%
4-Aug-93	3200	7.2	5.64E+11	6887	61.32%
6-May-91	3600	27.3	2.40E+12	16078	9.70%
19-Sep-00	4200	6.7	6.88E+11	5820	67.31%

APPENDIX C Public Notification

The following notice was published in *The* (Rock Hill) *Herald* newspaper on August 11, 2003, sent to a list of persons whom had requested to be notified of TMDL notices, and placed on the department web site.

PUBLIC NOTICE

AVAILABILITY OF PROPOSED TOTAL MAXIMUM DAILY LOADS FOR WATERS AND POLLUTANTS OF CONCERN IN THE STATE OF SOUTH CAROLINA

Allison Creek, York County and Calabash Branch, York County

Section 303(d)(1) of the Clean Water Act (CWA), 33 U.S.C. §1313(d)(1)(C), and the implementing regulation of the US Environmental Protection Agency (EPA, 40 C.F.R. § 130.7(c)(1), require the establishment of total maximum daily loads (TMDLs) for waters identified as impaired pursuant to §303(d)(1)(A) of the CWA. Each of these TMDLs is to be established at a level necessary to implement applicable water quality standards with seasonal variations and a margin of safety, to account for lack of knowledge concerning the relationship between effluent limitations and water quality. At this time, the South Carolina Department of Health and Environmental Control (DHEC) has developed proposed TMDLs for the §303(d)(1)(A) waters:

Allison Creek, York County, Fecal Coliform Bacteria, 03050101-190-010; Calabash Branch, York County, Fecal Coliform Bacteria, 03050101-190-010.

Upon review of any public comment and revision, if necessary, the Department will submit these TMDLs to EPA for approval as final TMDLs.

Persons wishing to comment on the proposed TMDLs or to offer new data regarding the proposed TMDLs are invited to submit the same in writing no later than September 10, 2003, to:

South Carolina Department of Health and Environmental Control
Bureau of Water
2600 Bull St.
Columbia, S.C. 29201
Attn: Mark Giffin

Mr. Giffin's phone number is 803-898-4203. His E-mail address is giffinma@dhec.sc.gov. Interested persons may also call Kathy Stecker at 803-898-4011 or e-mail her at steckemk@dhec.sc.gov.

Copies of individual TMDLs can be obtained by calling, writing, or e-mailing Mr. Giffin at the address above or from the Bureau of Water web site: <http://www.scdhec.net/water/>. The administrative record, including technical information, data and analyses supporting the proposed TMDLs, are available for review. Requests to review this information must be submitted in

writing to DHEC's Freedom of Information Office at 2600 Bull Street, Columbia, SC 29201 or requests can be submitted via FAX to the Freedom of Information Office at 803.898.3816. Reproduction of documents is available at a cost of $0.25 per page.