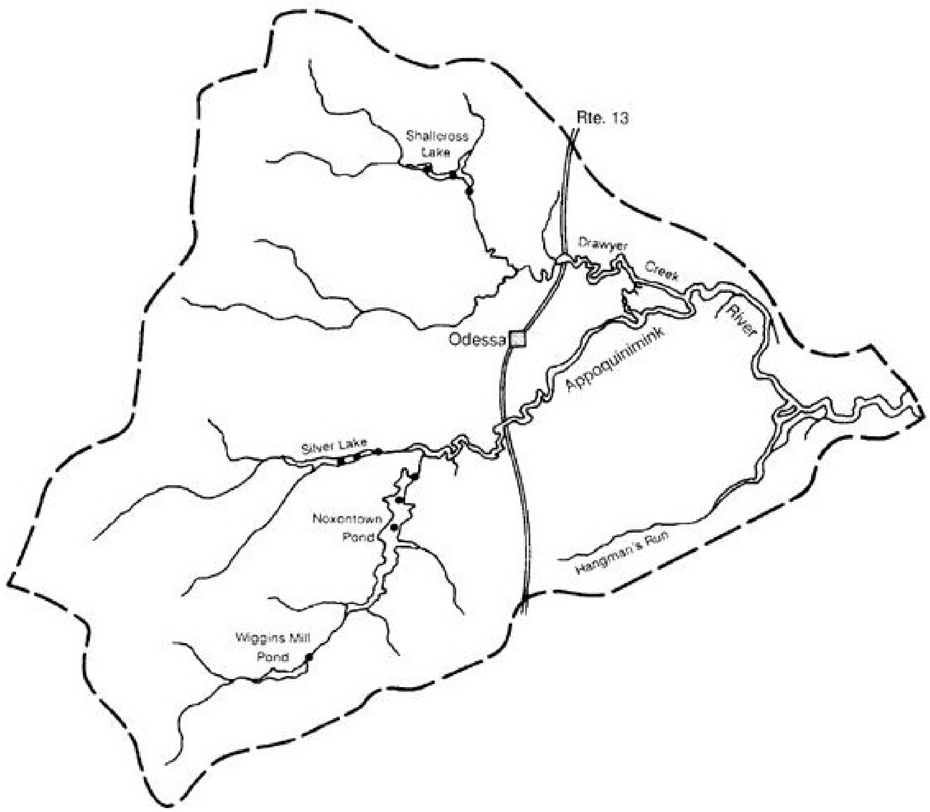
Technical Analysis for the Proposed Appoquinimink River Bacteria TMDLS



September, 2006

Prepared by
DNREC, DWR, Watershed Assessment Section
820 Silver Lake Blvd. Suite 220
Dover, DE 19904

Table of Contents

Table of Figures

Table of Tables

1. Introduction/Background

Under Section 303(d) of the Clean Water Act (CWA), States are required to identify and establish a priority ranking for waters in which existing pollution controls are not sufficient to attain and maintain State water quality standards, establish Total Maximum Daily Loads (TMDLs) for those waters, and periodically submit the list of impaired waters (303(d) list) and TMDLs to the United States Environmental Protection Agency (EPA). If a State fails to adequately meet the requirements of section 303(d), the CWA requires the EPA to establish a 303(d) list and/or determine TMDLs for that State.

In 1996, the EPA was sued under Section 303(d) of the CWA concerning the 303(d) list and TMDLs for the State of Delaware. The suit maintained that Delaware had failed to fulfill all of the requirements of Section 303(d) and the EPA had failed to assume the responsibilities not adequately preformed by the State. A settlement in the suit was reached and the Delaware Department of Natural Resources and Environmental Control (DNREC) and the EPA signed a Memorandum of Understanding (MOU) on July 25, 1997. Under the settlement, DNREC and the EPA agreed to complete TMDLs for all 1996 listed waters on a 10-year schedule.

In the Appoquinimink River watershed, a number of river segments, tributaries and ponds have been included on the State's Clean Water Action Section 303(d) List of Waters needing Total Maximum Daily Loads (TMDLs). TMDLs needed to be established for dissolved oxygen, nutrients (nitrogen and phosphorus) and bacteria concentrations.

In December, 2003, EPA Region III, in cooperation with DNREC adopted a TMDL for nutrients and oxygen demanding materials in the Appoquinimink River Watershed. This proposed TMDL will address the bacteria concentrations in the watershed.

Overall reductions required to meet the bacteria water quality standards within the watershed are 69% in marine waters and 9% in fresh waters. The WLA in marine waters requires a 68% reduction and the LA for marine waters requires a 69% reduction. For fresh waters the WLA reduction is 10% and the LA reduction is 9%.

The only point source within the watershed is the Middletown Odessa Townsend wastewater treatment plant (MOT). The maximum concentration limit for the MOT discharge will be 33 CFU/100mL (geometric mean, minimum 5 samples within 30 days).

The draft proposed TMDL for this watershed was reviewed during a public workshop held on June 5, 2006. All comments received at the workshop and during the June 1st through 30th comment period were considered by DNREC. This report has been updated to address these comments and minor modifications were made in this regulation.

1.1. Study Area

The Appoquinimink River watershed is located in the flat coastal plain of eastern Delaware (New Castle County). The watershed is approximately 47 square miles and can be described as primarily agricultural with three residential/urban centers: Middletown, Odessa and Townsend. The land is generally characterized as flat to gently sloping, which is typical of the coastal plain.

The Appoquinimink River system consists of three main branches. Moving south to north, it includes: the Appoquinimink River (Wiggins Mill Pond and Noxontown Lake); Deep Creek (Silver Lake); and Drawyer Creek (Shallcross Lake). The ponds and lakes included in the Appoquinimink River Watershed are typically shallow, man-made ponds maintained by dams.

The system is tidal up to the outlet dams of Noxontown Lake on the main stem Appoquinimink River and Silver Lake on Deep Creek, and to the Drawyer Creek's confluence with the Appoquinimink River. The salinity from Delaware Bay typically does extend past the Drawyer Creek - Appoquinimink confluence at river kilometer (Rkm) 8.5. The only point source within the system is the Middletown-Odessa-Townsend wastewater treatment plant (MOT WWTP) located at Rkm 10.

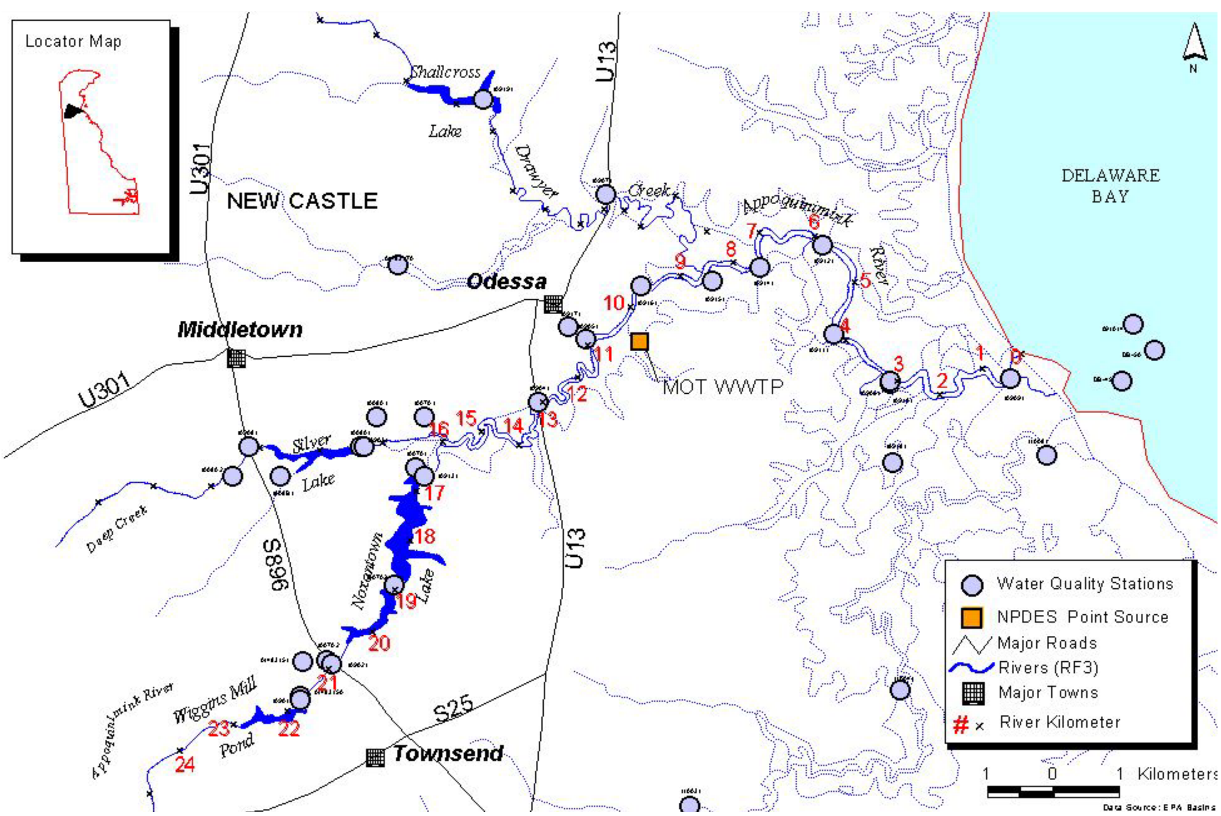


Figure 1-1 Study Area

1.2. Designated Uses

Section 9 of the State of Delaware Surface Water Quality Standards, as amended July 11, 2004, specifies the following designated uses for the waters of the Appoquinimink River watershed:

1. Primary Contact Recreation
2. Secondary Contact Recreation
3. Fish, Aquatic Life, and Wildlife
4. Industrial Water Supply
5. Agricultural Water Supply (freshwater segments)

1.3. Applicable Water Quality Standards

The following sections of the State of Delaware Surface Water Quality Standards, as amended July 11, 2004, provide specific numeric criteria for bacteria for the waters of the Appoquinimink River Watershed:

A. Enterococcus Bacteria

   a. For fresh waters, the geometric average of representative samples should not exceed 100 CFU/100 mL. Fresh waters are defined as those having a salinity of less than five parts per thousand.
   b. For marine waters, the geometric mean of representative samples should not exceed 35 CFU/100 mL. Marine waters are defined as those having a salinity of greater than five parts per thousand.

All tidal portions in the watershed are considered marine and all non-tidal segments are considered fresh.

2. Current Conditions

Recent water quality data (1997-2005) was compiled at a number of stations in the Appoquinimink River watershed. This data comes from the USEPA STORET database and includes 17 stations as presented below.

- 109091 – Mouth of Appoquinimink River to Delaware Bay;
- 109121 – Appoquinimink River at Route 9 Bridge;
- 109141 – Appoquinimink River at mouth of East Branch Drawyer Creek;
- 109151 – Appoquinimink River above West Branch Drawyer Creek;
- 109051 – Appoquinimink River at Route 299 Bridge (Odessa);
- 109171 – Appoquinimink River west bank from MOT WWTP;
- 109041 – Appoquinimink River at Route 13 Bridge;
- 109131 – Noxontown Pond Overflow (Road 38);
- 109221 – Downstream from Wiggins Mill Pond at Route 71;
- 109231 – Upstream from Wiggins Mill Pond at Grears Corner Road;
- 109071 – Drawyer Creek at Route 13;
- 109191 – Shallcross Lake Overflow;
- 109211 – Drawyer Creek above Shallcross Lake at Cedar Lane Road;
- 109201 – Tributary to Drawyer Creek at Marl Pit Road;
- 109031 – Silver Lake Overflow;
- 109241 – Deep Creek at DE Route 15;
- 109251 – Deep Creek above Silver Lake at Route 71;

Precipitation data used to determine if the sample was taken on a wet vs. dry day was obtained from the Office of the Delaware State Climatologist, the closest station with an adequate daily record was located at the New Castle County airport

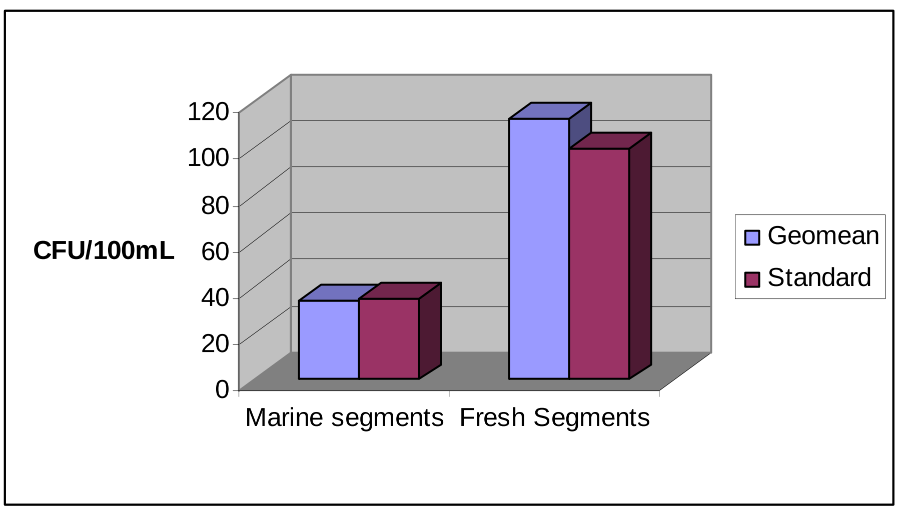


Figure 2-1 Geometric mean bacteria concentrations vs. WQS

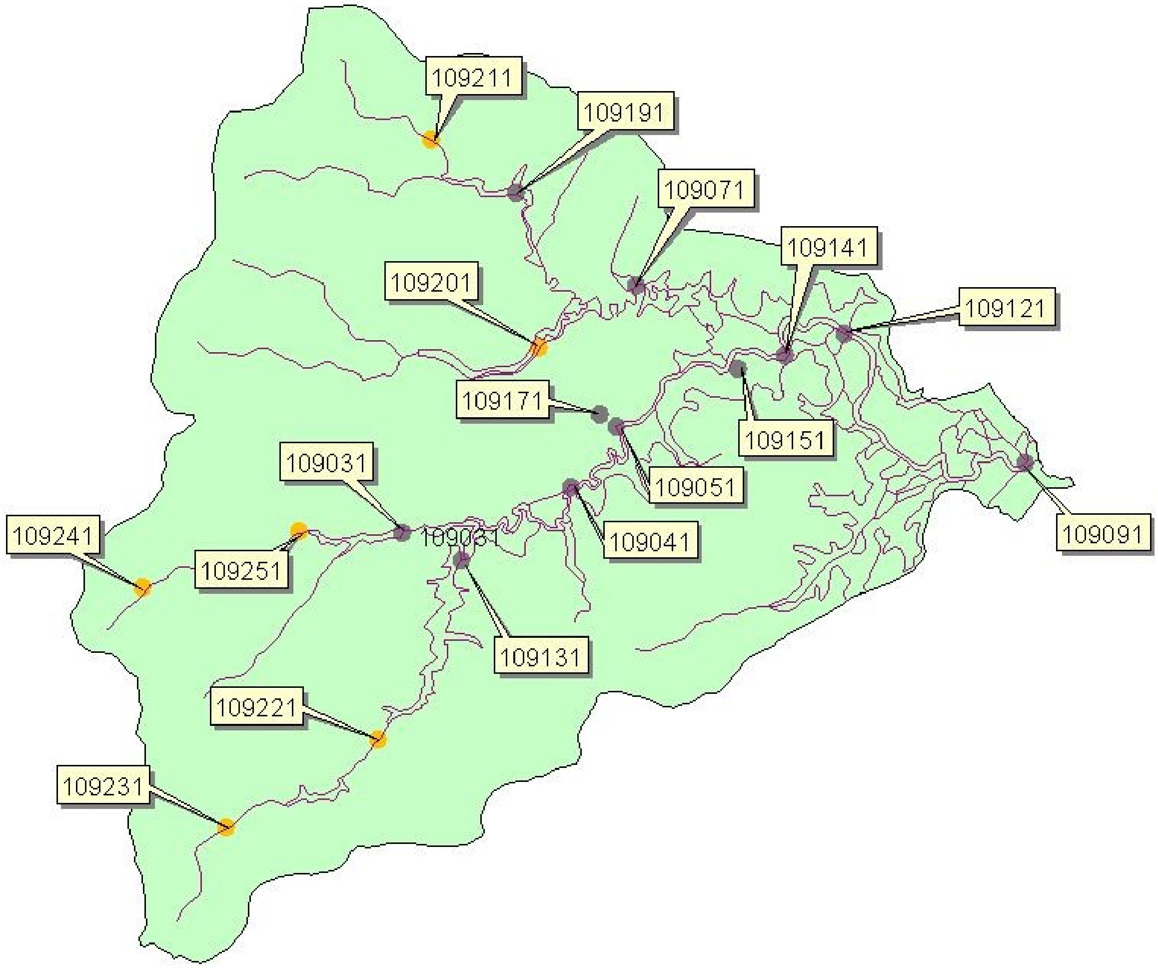


Figure 2-2 Monitoring Stations within the Appoquinimink River Watershed

	# samples dry weather	# samples wet weather	Average (CFU/100mL)	Geomean (CFU/100mL)	Log Std Dev
Marine segments	212	78	284	116	0.69
Fresh Segments	103	47	165	34	0.86

Table 2-1 Water Quality in the Appoquinimink River Watershed (1997-2005)

3. Establishment of the Bacteria TMDL for the Appoquinimink River Watersheds

Bacteria impairments were evaluated using the Cumulative Distribution Function Method to determine the reductions required in the Appoquinimink River to achieve water quality standards. This approach was developed by Lee Dunbar at the Connecticut Department of Environmental Protection and much of the following text is based upon or copied directly from documentation provided by the Connecticut Department of Environmental Protection

Overall reductions of 69% (marine) and 9% (fresh) in the bacteria loading for the Appoquinimink River Watersheds are required for the water quality to meet the geometric mean of 35CFU/100mL and 100CFU/100 mL, respectively. The only point source within the watershed is the Middletown Odessa Townsend wastewater treatment plant (MOT). The maximum concentration limit for the MOT discharge will be 33 CFU/100mL (geometric mean, minimum 5 samples within 30 days).

3.1. Overview of Cumulative Distribution Function Method

This analytical methodology provides a defensible scientific and technical basis for establishing TMDLs to address recreational use impairments in urban watersheds. Representative ambient water quality monitoring data for a minimum of 21 sampling dates is required for the analysis. The reduction in bacteria density from current levels needed to achieve consistency with the criteria is quantified by calculating the difference between the cumulative relative frequency of the sample data set and the criteria adopted by Delaware to support recreational use. Delaware's adopted water quality criteria for the indicator bacteria fecal enterococci are represented by a statistical distribution of geometric mean 100 and log standard deviation 0.4 for purposes of fresh water and a statistical distribution of geometric mean 35 and log standard deviation 0.7 for purposes of marine water TMDL calculations.

The geometric mean criterion was derived by the EPA scientists from epidemiological studies at beaches where the incidence of swimming related health effects (gastrointestinal illness rate) could be correlated with indicator bacteria densities. Delaware's recommended criteria reflect an average illness rate of 12.5 illnesses (fresh) and 19 illness (marine) per 1000 swimmers exposed. This condition was predicted to exist based on studies cited in the federal guidance when the steady-state geometric mean density of fecal enterococci was 100 CFU/100mL and 35CFU/100mL, respectively. The distribution of individual sample results around the geometric mean is such that approximately half of all individual samples are expected to exceed the geometric mean and half will be below the geometric mean.

EPA also derived a formula to calculate single sample maximum criteria from this same database to support decisions by public health officials regarding the closure of beaches when an elevated risk of illness exists. Because approximately half of all individual sample results for a beach where the risk of illness is considered "acceptable" are expected to exceed the geometric mean criteria, an upper boundary to the range of individual sample results was statistically derived that will be exceeded at frequencies less than 50% based on the variability of sample data. The mean log standard deviation for fecal enterococci densities at the freshwater beach sites studied by EPA was 0.4. Using these values, 457 CFU/100mL was calculated to represent the 95th percentile upper confidence limit (5% exceedance frequency) for this statistical distribution of data and was used as the acceptable, risk based upper boundary. For marine water, 158 CFU/100mL was calculated to represent the 95th percentile upper confidence limit.

TMDLs developed using this approach are expressed as the average percentage reduction from current conditions required to achieve consistency with criteria. The procedure partitions the TMDL into regulated point source wasteload allocation (WLA) and non-point source load allocation (LA) components by quantifying the contribution of ambient monitoring data collected during periods of high storm water influence and minimal storm water influence to the current condition. TMDLs developed using this analytical approach provide an ambient monitoring benchmark ideally suited for quantifying progress in achieving water quality goals as a result of TMDL implementation.

3.2. TMDL End Point Determination

The criteria can be expressed as a cumulative frequency distribution or "criteria curve" as shown in Figure 3-1.

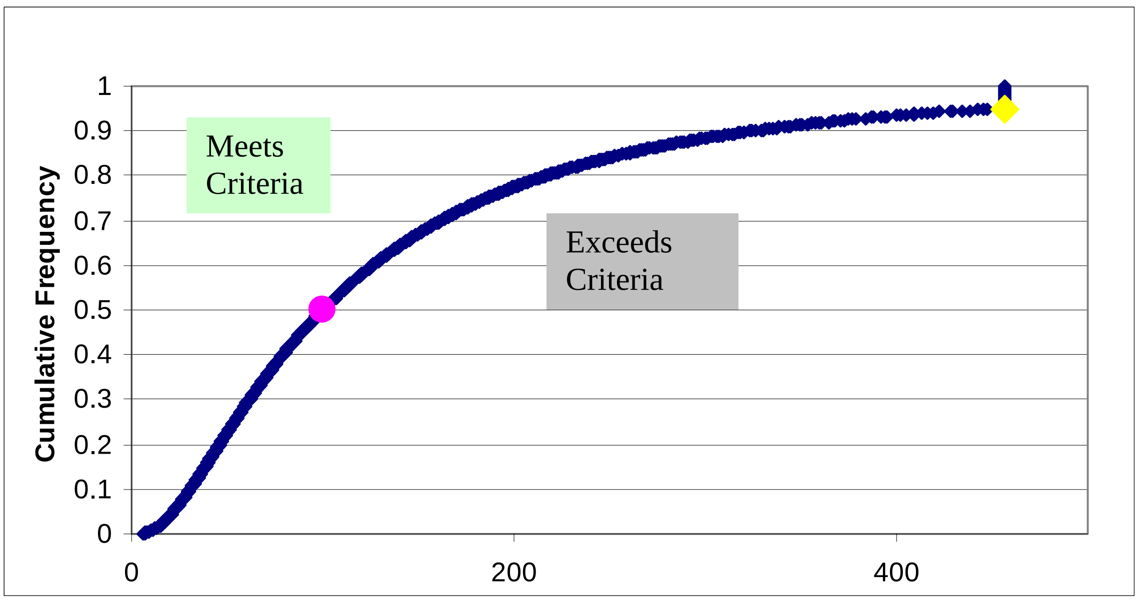


Figure 3-1Cumulative Relative Frequency Distribution representing Delaware Water Quality Standards

As with the cumulative relative frequency curve representing the criteria shown in Figure 3-1, a cumulative relative frequency curve can be prepared using site-specific sample data to represent current conditions at the TMDL monitoring sites. The TMDL for the monitored segments are derived by quantifying the difference between these two distributions as shown conceptually in Figure 3-2. This is accomplished by calculating the reduction required at representative points on the sample data cumulative frequency distribution curve and then averaging the reduction needed across the entire range of sampling data. This procedure allows the contribution of each individual sampling result to be considered when estimating the percent reduction needed to meet a criterion that is expressed as a geometric mean.

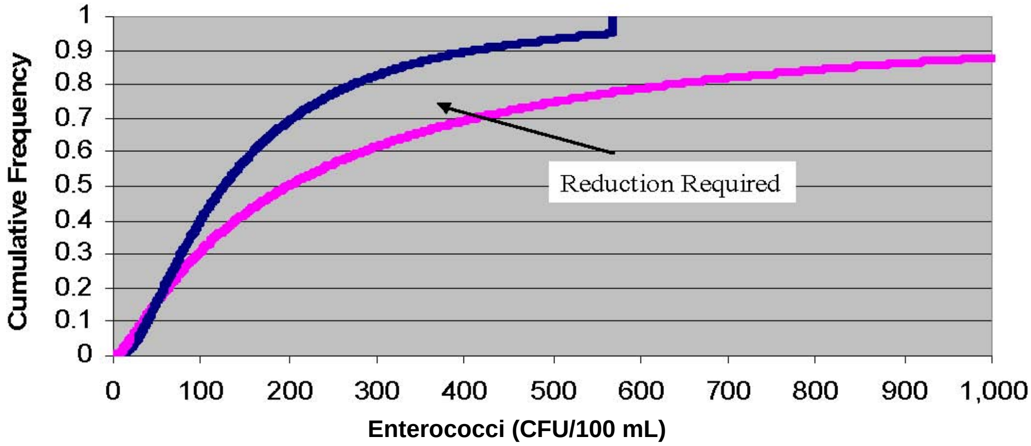


Figure 3-2 Reduction in indicator bacteria density needed from current condition (magenta line) to meet criteria (blue line) based on cumulative relative frequency distribution.

3.3. WLA and LA

Stormwater runoff in an urbanized area is considered a point source subject to regulation under the NPDES permitting program. TMDLs for indicator bacteria in waters draining urbanized areas must therefore be partitioned into a WLA to accommodate point source stormwater loadings of indicator bacteria and a LA to accommodate non-point loadings from unregulated sources. This is accomplished using the same ambient monitoring data used to establish the TMDL.

One common characteristic of urbanized areas is the high percentage of impervious surface. Much of the impervious surface is directly connected to nearby surface waters through stormwater drainage systems. As a result, runoff is rapid following rain events and flow in urban streams is typically dominated by stormwater runoff during these periods. Monitoring results for samples collected under these conditions are strongly influenced by stormwater quality. During dry conditions, urban streams contain little stormwater since urban watersheds drain quickly and base flows are reduced due to lower infiltration rates and reduced recharge of groundwater. At base flow, urban stream water quality is dominated by non-point sources of indicator bacteria since stormwater outfalls are inactive.

The relative contribution of indicator bacteria loadings occurring during periods of high or low stormwater influence to the geometric mean indicator density is estimated by calculating separate averages of the reduction needed to achieve consistency with criteria under “wet” and “dry” conditions. The reduction needed under “wet” conditions is assigned to the WLA and the reduction needed under “dry” conditions is assigned to the LA. Separate reduction goals are established for base flow and stormwater dominated periods that can assist local communities in selection of best management practices to improve water quality. The technique also facilitates the use of ambient stream monitoring data to track future progress in meeting water quality goals.

3.4. Analytical Procedure – TMDL

1. The fecal enterococcus monitoring data is ranked from lowest to highest. In the event of ties, monitoring results are assigned consecutive ranks in chronological order of sampling date. The sample proportion (p) is calculated for each monitoring result by dividing the assigned rank (r) for each sample by the total number of sample results (n): $p = r / n$

2. Next, a single sample criteria reference value is calculated for each monitoring result from the statistical distribution used to represent the criteria following the procedure described in steps 3-6 below:

3. If the sample proportion is equal to or greater than .95, the single sample criteria reference value is equivalent to the maximum value of 457 CFU/100mL (158 CFU/100mL – marine).

4. If the sample proportion is less than .95, and greater than .50, the single sample criteria reference value is calculated as:

criteria reference value = antilog_{10} [$\log_{10}$ 100 CFU/100mL + {F x 0.4}]

Note: 100 CFU/100mL is the geometric mean indicator bacteria criterion adopted into Delaware’s Water Quality Standards, F is a factor determined from areas under the Normal probability curve for a probability level equivalent to the sample proportion, 0.4 is the $\log_{10}$ standard deviation used by EPA in deriving the national guidance criteria recommendations (0.7 for marine).

5. If the sample proportion is equal to .50, the single sample reference criteria value is equal to the geometric mean criterion adopted into the Water Quality Standards.

6. If the sample proportion is less than .50, the single sample reference criteria value is calculated as:

criteria reference value = antilog_{10} [$\log_{10}$ 100 CFU/100mL - {F x 0.4}]

7. The percent reduction necessary to achieve consistency with the criteria is then calculated following the procedure described in steps 8-9 below:

8. If the monitoring result is less than the single sample reference criteria value, the percent reduction is zero.

9. If the monitoring result exceeds the single sample criteria reference value, the percent reduction necessary to meet criteria on that sampling date is calculated as:

percent reduction = ((monitoring result – criteria reference value)/monitoring result)x100

10. The TMDL, expressed as the average percent reduction to meet criteria, is then calculated as the arithmetic average of the percent reduction calculated for each sampling date.

11. Precipitation data is reviewed and each sampling date is designated as a "dry" or "wet" sampling event. Although a site-specific protocol may be specified in an individual TMDL analysis, typically samples collected within 48 hours of a precipitation event of 0.25 inches or greater are designated as "wet".

12. The average percent reduction for all sampling events used to derive the TMDL that are designated as "wet" is computed and established as the WLA.

13. The average percent reduction for all sampling events used to derive the TMDL that are designated as "dry" is computed and established as the LA.

3.4.1 Marine waters in the Appoquinimink

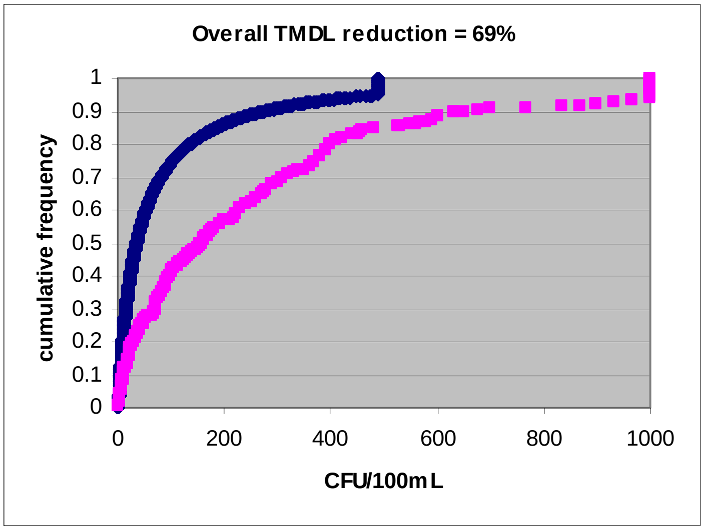


Figure 3-3 Marine waters, Overall TMDL needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on dry and wet weather data.

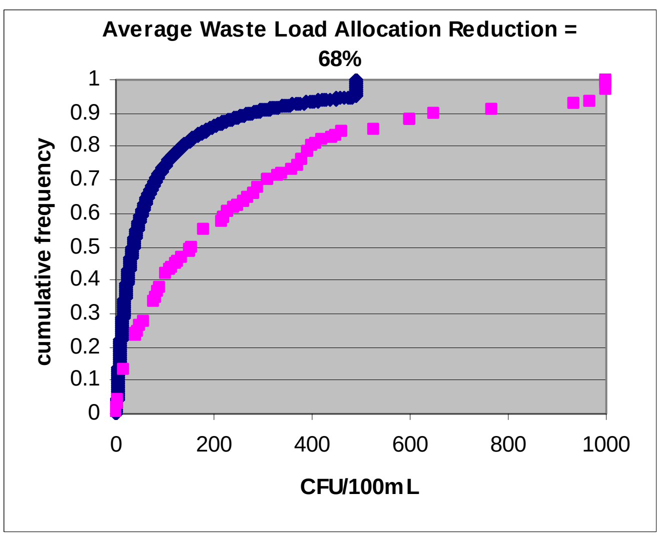


Figure 3-4 Marine waters, Waste Load Allocation (WLA) needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on wet weather data.

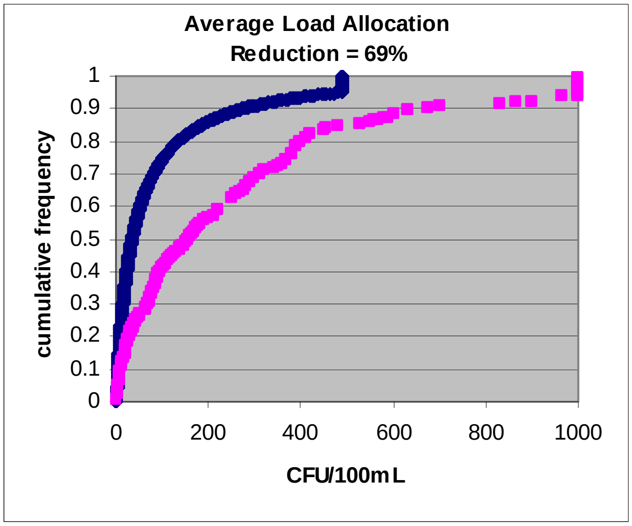


Figure 3-5 Marine waters, Load Allocation (LA) needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on dry weather data.

3.4.2 Fresh waters in the Appoquinimink

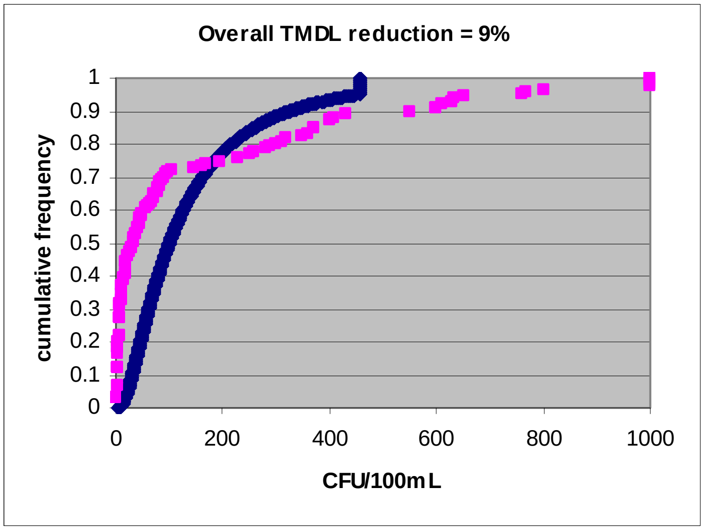


Figure 3-6 Fresh waters, Overall TMDL needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on dry and wet weather data.

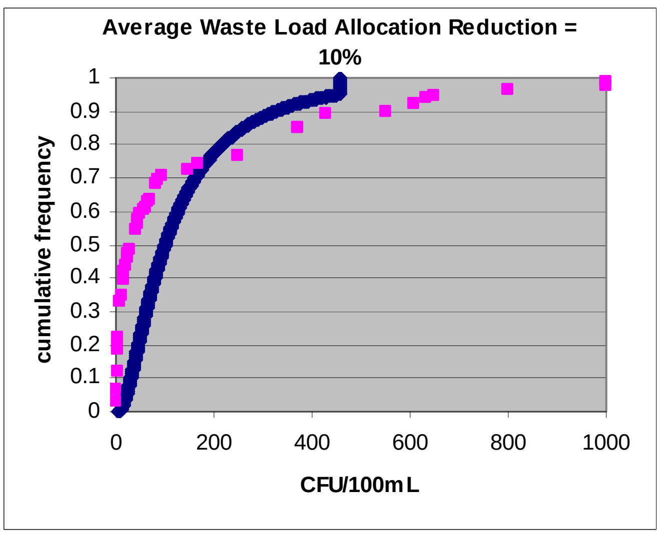


Figure 3-7 Fresh waters, Waste Load Allocation (WLA) needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on wet weather data.

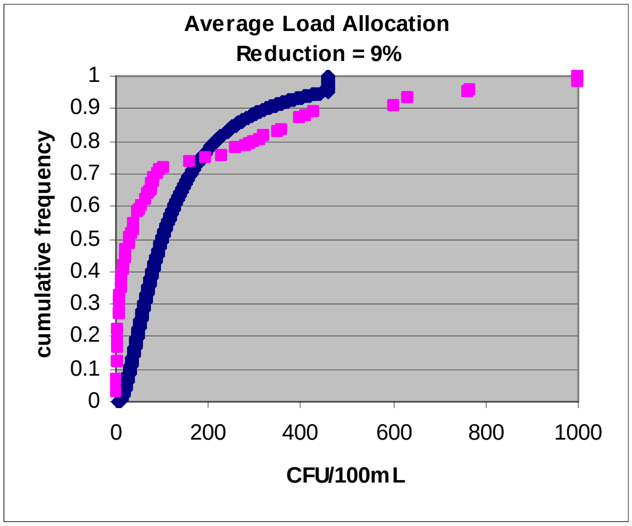


Figure 3-8 Fresh waters, Load Allocation (LA) needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on dry weather data.

3.5. TMDL Reductions

Appoquinimink River	Waste Load Allocation reduction	Load Allocation reduction	Overall TMDL reductions
Marine waters	69%	69%	**68%**
Fresh Waters	10%	9%	**9%**
MOT WWTP	33 CFU/100mL maximum 30-day, 5 sample geomean enterococcus concentration	na	**na**

Table 3-1 TMDL allocations for the Appoquinimink River Watershed.

3.6. Daily Loading

With respect to bacteria, the total maximum daily load can be considered in many different ways because the water quality standard is not expressed in daily terms but as a geometric mean over time, typically a period of 30 days. A theoretical maximum, albeit an unrealistic scenario, can be calculated so that the entire loading over the 30-day period occurs in one day. A more practical approach would be to calculate the maximum load at a level corresponding to the appropriate confidence interval and risk level, e.g. a 95% confidence interval and its related single sample value. However, this approach is problematic, as it does not ensure that the geometric mean will be equal to or below the water quality standard.

An average daily maximum, calculated by multiplying the average daily flow times the water quality standard would arguably be the most appropriate measure of a daily maximum with respect to TMDL requirements. Table illustrates all of the above maximum daily loading calculations.

	Flow (m^3/day)	Current loading – wet weather (CFU/day)	Current loading – dry weather (CFU/day)	Theoretical Maximum Daily Load (CFU/day)	95% Confidence Interval Daily Load (CFU/day)	Average Daily Maximum Load (CFU/day)
Fresh	60,566	6.1E+10	6.1E+10	6.1E+68	3.3E+11	6.1E+10

Table 3-1 Flow and Daily Loading

3.7. Source Tracing Adjustment Factor

The Source Tracking Adjustment Factor (STAF) is a multiplier used to normalize human health risk associated with total fecal enterococci counts to enterococci counts derived exclusively from human sources. Bacteria source tracking (BST) data and the STAF, when available, will be used throughout the State to determine the sources of fecal contamination and in the development of pollution control strategies (PCSs).

4. Discussion of Regulatory Requirements for TMDLs

Federal regulations at 40 CFR Section 130 require that TMDLs must meet the following eight minimum regulatory requirements:

1. The TMDLs must be designed to achieve applicable water quality standards
2. The TMDLs must include a total allowable load as well as individual waste load allocations for point sources and load allocations for nonpoint sources
3. The TMDLs must consider the impact of background pollutants
4. The TMDL must consider critical environmental conditions
5. The TMDLs must consider seasonal variations
6. The TMDLs must include a margin of safety
7. The TMDLs must have been subject to public participation
8. There should be a reasonable assurance that the TMDLs can be met

1. The Proposed Appoquinimink River Watershed TMDL is designed to achieve applicable water quality standards.

Cumulative frequency distribution analysis indicates that after the proposed reductions are met, the maximum bacteria concentrations in any portion of the Appoquinimink will not fall above the water quality standards.

2. The Proposed Appoquinimink River Watershed TMDL includes a total allowable load as well as individual waste load allocations for point sources and load allocations for nonpoint sources.

Table 3-1 lists the proposed WLA and LA for the Appoquinimink River Watershed. The WLA reductions will be 68% and 10% for marine and fresh waters, respectively. The LA reductions will be 69% and 9% for marine and fresh waters, respectively. The MOT WWTP will have a concentration maximum not to exceed 33 CFU/100mL.

3. The proposed Appoquinimink River TMDL considers the impact of background pollutants.

The proposed TMDL is based upon extensive water quality monitoring and precipitation databases. The water quality database included headwater streams representing background conditions. Therefore, it can be concluded that the impact of background pollutants are considered in the proposed Appoquinimink River Watershed TMDL.

4. The proposed Appoquinimink River Watershed TMDL considers critical environmental conditions

The proposed TMDL was established based on the achieving water quality standards at all environmental conditions. Therefore, it can be concluded that consideration of critical environmental conditions was incorporated in the Appoquinimink River Watershed TMDL analysis.

5. The proposed Appoquinimink River Watershed TMDL considers seasonal variations.

Data used in the cumulative frequency distribution analyses was for a period of 7 years and included every season. Therefore, it can be concluded that consideration of seasonal variations was incorporated in the Appoquinimink River Watershed TMDL analysis.

6. The proposed Appoquinimink River Watershed TMDL considers a margin of Safety.

EPA's technical guidance allows consideration of a margin of safety as implicit or as explicit. An implicit margin of safety is when conservative assumptions are considered for model development and TMDL establishment. An explicit margin of safety is when a specified percentage of assimilative capacity is kept unassigned to account for uncertainties, lack of sufficient data, or future growth.

The indicator bacteria criteria used in this TMDL analysis were developed exclusively from data derived from studies conducted at high use public bathing areas of which half were affected by point source discharges. Therefore, the criteria provide an additional level of protection when applied to water not designated for high use bathing and without point sources such as those within these watersheds. As a result, achieving the criteria results in an "implicit" MOS. A portion of this "implicit" MOS will be removed via use of the Source Tracking Adjustment Factor (STAF), a tool that will be used in the implementation and best management practice designs during development of the Pollution Control Strategies (PCS) following the adoption of the TMDL. However, the STAF incorporates an explicit margin of safety so that a portion of the "implicit" MOS remains intact. Therefore, an adequate margin of safety is included in the bacteria TMDLs.

7.0 The proposed Appoquinimink River Watershed TMDL has been subject to public participation.

An important public participation activity regarding this TMDL was the formation of the Appoquinimink Tributary Action Team in 2002. The Tributary Action Team, made up of concerned citizens and other affected parties within the watershed will assist the DNREC in developing pollution control strategies (PCS) to implement the requirements of the proposed Appoquinimink River Watershed TMDL.

In addition to the public participation and stakeholder involvement mentioned above, a public workshop was held on June 5, 2006 to present the proposed Appoquinimink River Watershed TMDL to the public and receive comments prior to formal adoption of the TMDL regulation. Comments received within the June 1 through June 30 comment period were considered when finalizing this document.

8.0 There should be a reasonable assurance that the proposed Appoquinimink River Watershed TMDL can be met.

The proposed Appoquinimink River Watershed TMDL considers the reduction of bacteria from point and nonpoint sources. The magnitude of load reductions suggested by the proposed TMDL are feasible. Following the adoption of the TMDL, the Appoquinimink River Tributary Action Team will assist the Department in developing a PCS to implement the requirements of the Appoquinimink River Watershed TMDL Regulation. The DNREC is planning to finalize and adopt the Appoquinimink River PCS within one year after formal adoption of the TMDL Regulation.

5. Appendix

5.1. Marine Water Data

# sample	Date	Source	enterococcus (CFU/100 mL)	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)
1	5/13/1997	109071	12	0	0	0	DRY
2	5/14/1997	109041	12	0	0	0	DRY
3	5/14/1997	109051	24	0	0	0	DRY
4	5/14/1997	109091	10	0	0	0	DRY
5	5/14/1997	109121	5	0	0	0	DRY
6	5/14/1997	109141	12	0	0	0	DRY
7	5/14/1997	109151	21	0	0	0	DRY
8	5/14/1997	109171	28	0	0	0	DRY
9	8/26/1997	109071	600	0	0	0.3	DRY
10	8/27/1997	109041	260	0	0.3	0.3	**WET**
11	8/27/1997	109051	217	0	0.3	0.3	**WET**
12	8/27/1997	109091	41	0	0.3	0.3	**WET**
13	8/27/1997	109121	103	0	0.3	0.3	**WET**
14	8/27/1997	109141	280	0	0.3	0.3	**WET**
15	8/27/1997	109151	310	0	0.3	0.3	**WET**
16	8/27/1997	109171	220	0	0.3	0.3	**WET**
17	10/14/1997	109041	310	0	0.2	0.3	DRY
18	10/14/1997	109051	410	0	0.2	0.3	DRY
19	10/14/1997	109091	200	0	0.2	0.3	DRY
20	10/14/1997	109121	360	0	0.2	0.3	DRY
21	10/14/1997	109141	400	0	0.2	0.3	DRY
22	10/14/1997	109151	390	0	0.2	0.3	DRY
23	10/14/1997	109171	380	0	0.2	0.3	DRY
24	10/15/1997	109071	1267	0.2	0.2	0.6	**WET**
25	4/13/1998	109041	43	0	0	0	DRY
26	4/13/1998	109071	21	0	0	0	DRY
27	4/14/1998	109051	32	0	0	0.7	DRY
28	4/14/1998	109091	15	0	0	0.7	DRY
29	4/14/1998	109121	35	0	0	0.7	DRY
30	4/14/1998	109141	22	0	0	0.7	DRY
31	4/14/1998	109151	22	0	0	0.7	DRY
32	4/14/1998	109171	30	0	0	0.7	DRY
33	6/1/1998	109041	600	0.4	0.9	0.9	**WET**
34	6/1/1998	109071	390	0.4	0.9	0.9	**WET**
35	6/2/1998	109051	180	0.4	0.4	0.4	**WET**
36	6/2/1998	109091	17	0.4	0.4	0.4	**WET**
37	6/2/1998	109121	43	0.4	0.4	0.4	**WET**
38	6/2/1998	109141	87	0.4	0.4	0.4	**WET**
39	6/2/1998	109151	153	0.4	0.4	0.4	**WET**

40	6/2/1998	109171	250	0.4	0.4	0.4	**WET**
41	8/25/1998	109041	567	0	0	0.1	DRY
42	8/25/1998	109051	1467	0	0	0.1	DRY
43	8/25/1998	109091	380	0	0	0.1	DRY
44	8/25/1998	109121	530	0	0	0.1	DRY
45	8/25/1998	109141	1133	0	0	0.1	DRY
46	8/25/1998	109151	967	0	0	0.1	DRY
47	8/25/1998	109171	1167	0	0	0.1	DRY
48	8/26/1998	109071	480	0	0.1	0.1	DRY
49	8/26/1998	109201	290	0	0.1	0.1	DRY
50	10/14/1998	109041	2033	0.2	0.2	0.2	**WET**
51	10/14/1998	109071	933	0.2	0.2	0.2	**WET**
52	10/14/1998	109201	1633	0.2	0.2	0.2	**WET**
53	10/15/1998	109051	559	0	0	0	DRY
54	10/15/1998	109091	83	0	0	0	DRY
55	10/15/1998	109121	250	0	0	0	DRY
56	10/15/1998	109141	190	0	0	0	DRY
57	10/15/1998	109151	550	0	0	0	DRY
58	10/15/1998	109171	290	0	0	0	DRY
59	4/13/1999	109041	87	0	0	0.2	DRY
60	4/13/1999	109071	100	0	0	0.2	DRY
61	4/13/1999	109201	220	0	0	0.2	DRY
62	4/14/1999	109051	50	0	0.1	0.2	DRY
63	4/14/1999	109091	5	0	0.1	0.2	DRY
64	4/14/1999	109121	20	0	0.1	0.2	DRY
65	4/14/1999	109141	40	0	0.1	0.2	DRY
66	4/14/1999	109151	36	0	0.1	0.2	DRY
67	4/14/1999	109171	38	0	0.1	0.2	DRY
68	6/28/1999	109041	340	0	0	0.2	DRY
69	6/28/1999	109071	270	0	0	0.2	DRY
70	6/28/1999	109201	390	0	0	0.2	DRY
71	6/29/1999	109051	370	0	0	0.3	DRY
72	6/29/1999	109091	92	0	0	0.3	DRY
73	6/29/1999	109121	380	0	0	0.3	DRY
74	6/29/1999	109141	410	0	0	0.3	DRY
75	6/29/1999	109151	310	0	0	0.3	DRY
76	6/29/1999	109171	590	0	0	0.3	DRY
77	8/17/1999	109041	1167	0	0	1.8	DRY
78	8/17/1999	109071	300	0	0	1.8	DRY

79	8/17/1999	109201	2000	0	0	1.8	DRY
80	8/18/1999	109051	1450	0	0	1.8	DRY
81	8/18/1999	109091	370	0	0	1.8	DRY
82	8/18/1999	109121	390	0	0	1.8	DRY
83	8/18/1999	109141	310	0	0	1.8	DRY
84	8/18/1999	109151	350	0	0	1.8	DRY
85	8/18/1999	109171	390	0	0	1.8	DRY
86	10/12/1999	109041	177	0	0	0	DRY
87	10/12/1999	109071	30	0	0	0	DRY
88	10/12/1999	109201	7	0	0	0	DRY
89	10/13/1999	109051	9	0	0	0	DRY
90	10/13/1999	109091	20	0	0	0	DRY
91	10/13/1999	109121	220	0	0	0	DRY
92	10/13/1999	109141	190	0	0	0	DRY
93	10/13/1999	109151	170	0	0	0	DRY
94	10/13/1999	109171	290	0	0	0	DRY
95	4/3/2000	109041	58	0.2	0.2	0.2	**WET**
96	4/3/2000	109071	39	0.2	0.2	0.2	**WET**
97	4/3/2000	109201	50	0.2	0.2	0.2	**WET**
98	4/4/2000	109051	72	0.1	0.1	0.1	DRY
99	4/4/2000	109091	21	0.1	0.1	0.1	DRY
100	4/4/2000	109121	47	0.1	0.1	0.1	DRY
101	4/4/2000	109141	52	0.1	0.1	0.1	DRY
102	4/4/2000	109151	45	0.1	0.1	0.1	DRY
103	4/4/2000	109171	87	0.1	0.1	0.1	DRY
104	6/5/2000	109041	525	0	0.5	0.5	**WET**
105	6/5/2000	109071	400	0	0.5	0.5	**WET**
106	6/5/2000	109201	650	0	0.5	0.5	**WET**
107	6/6/2000	109051	600	0.5	0.5	0.5	**WET**
108	6/6/2000	109091	150	0.5	0.5	0.5	**WET**
109	6/6/2000	109121	150	0.5	0.5	0.5	**WET**
110	6/6/2000	109141	330	0.5	0.5	0.5	**WET**
111	6/6/2000	109151	600	0.5	0.5	0.5	**WET**
112	6/6/2000	109171	600	0.5	0.5	0.5	**WET**
113	7/24/2000	109041	240	0.1	0.1	2.2	**WET**
114	7/24/2000	109071	123	0.1	0.1	2.2	**WET**
115	7/24/2000	109201	967	0.1	0.1	2.2	**WET**

116	7/25/2000	109051	440	0	2.1	2.1	**WET**
117	7/25/2000	109091	112	0	2.1	2.1	**WET**
118	7/25/2000	109121	230	0	2.1	2.1	**WET**
119	7/25/2000	109141	310	0	2.1	2.1	**WET**
120	7/25/2000	109151	290	0	2.1	2.1	**WET**
121	7/25/2000	109171	230	0	2.1	2.1	**WET**
122	9/11/2000	109041	833	0	0	0.7	DRY
123	9/11/2000	109071	260	0	0	0.7	DRY
124	9/11/2000	109201	260	0	0	0.7	DRY
125	9/12/2000	109051	700	0	0.1	0.9	DRY
126	9/12/2000	109091	97	0	0.1	0.9	DRY
127	9/12/2000	109121	400	0	0.1	0.9	DRY
128	9/12/2000	109141	633	0	0.1	0.9	DRY
129	9/12/2000	109151	420	0	0.1	0.9	DRY
130	9/12/2000	109171	900	0	0.1	0.9	DRY
131	3/19/2001	109041	1	0	0	1.4	DRY
132	3/19/2001	109071	13	0	0	1.4	DRY
133	3/20/2001	109051	3	0	1.4	1.4	**WET**
134	3/20/2001	109091	2	0	1.4	1.4	**WET**
135	3/20/2001	109121	5	0	1.4	1.4	**WET**
136	3/20/2001	109141	1	0	1.4	1.4	**WET**
137	3/20/2001	109151	1	0	1.4	1.4	**WET**
138	3/20/2001	109171	1	0	1.4	1.4	**WET**
139	5/29/2001	109041	310	0.1	0.1	0.7	**WET**
140	5/29/2001	109051	260	0.1	0.1	0.7	**WET**
141	5/29/2001	109071	460	0.1	0.1	0.7	**WET**
142	5/29/2001	109091	113	0.1	0.1	0.7	**WET**
143	5/29/2001	109121	270	0.1	0.1	0.7	**WET**
144	5/29/2001	109141	360	0.1	0.1	0.7	**WET**
145	5/29/2001	109151	250	0.1	0.1	0.7	**WET**
146	5/29/2001	109171	380	0.1	0.1	0.7	**WET**
147	7/10/2001	109041	380	0.3	0.3	0.3	**WET**
148	7/10/2001	109051	390	0.3	0.3	0.3	**WET**
149	7/10/2001	109071	240	0.3	0.3	0.3	**WET**
150	7/10/2001	109091	77	0.3	0.3	0.3	**WET**
151	7/10/2001	109121	220	0.3	0.3	0.3	**WET**
152	7/10/2001	109141	410	0.3	0.3	0.3	**WET**

153	7/10/2001	109151	420	0.3	0.3	0.3	**WET**
154	7/10/2001	109171	450	0.3	0.3	0.3	**WET**
155	9/5/2001	109041	1567	0	0	0	DRY
156	9/5/2001	109051	1133	0	0	0	DRY
157	9/5/2001	109071	2000	0	0	0	DRY
158	9/5/2001	109091	220	0	0	0	DRY
159	9/5/2001	109121	633	0	0	0	DRY
160	9/5/2001	109141	867	0	0	0	DRY
161	9/5/2001	109151	1033	0	0	0	DRY
162	9/5/2001	109171	1167	0	0	0	DRY
163	3/4/2002	109041	160	0	0	0	DRY
164	3/4/2002	109051	200	0	0	0	DRY
165	3/4/2002	109071	160	0	0	0	DRY
166	3/4/2002	109091	47	0	0	0	DRY
167	3/4/2002	109121	89	0	0	0	DRY
168	3/4/2002	109141	107	0	0	0	DRY
169	3/4/2002	109151	130	0	0	0	DRY
170	3/4/2002	109171	173	0	0	0	DRY
171	5/20/2002	109041	370	0	0	0	DRY
172	5/20/2002	109051	147	0	0	0	DRY
173	5/20/2002	109071	157	0	0	0	DRY
174	5/20/2002	109091	72	0	0	0	DRY
175	5/20/2002	109121	67	0	0	0	DRY
176	5/20/2002	109141	83	0	0	0	DRY
177	5/20/2002	109151	113	0	0	0	DRY
178	5/20/2002	109171	153	0	0	0	DRY
179	7/24/2002	109041	450	0	0	0	DRY
180	7/24/2002	109051	420	0	0	0	DRY
181	7/24/2002	109071	73	0	0	0	DRY
182	7/24/2002	109091	24	0	0	0	DRY
183	7/24/2002	109121	137	0	0	0	DRY
184	7/24/2002	109141	93	0	0	0	DRY
185	7/24/2002	109151	83	0	0	0	DRY
186	7/24/2002	109171	173	0	0	0	DRY
187	9/4/2002	109041	180	0	0	0	DRY
188	9/4/2002	109051	160	0	0	0	DRY
189	9/4/2002	109071	127	0	0	0	DRY

190	9/4/2002	109091	66	0	0	0	DRY
191	9/4/2002	109121	173	0	0	0	DRY
192	9/4/2002	109141	163	0	0	0	DRY
193	9/4/2002	109151	167	0	0	0	DRY
194	9/4/2002	109171	180	0	0	0	DRY
195	3/31/2003	109041	30	0	0	0	DRY
196	3/31/2003	109051	30	0	0	0	DRY
197	3/31/2003	109071	70	0	0	0	DRY
198	3/31/2003	109091	3	0	0	0	DRY
199	3/31/2003	109121	7	0	0	0	DRY
200	3/31/2003	109141	20	0	0	0	DRY
201	3/31/2003	109151	17	0	0	0	DRY
202	3/31/2003	109171	27	0	0	0	DRY
203	5/8/2003	109071	70	0.1	0.2	0.3	DRY
204	5/13/2003	109041	23	0	0	0.6	DRY
205	5/13/2003	109051	33	0	0	0.6	DRY
206	5/13/2003	109091	6	0	0	0.6	DRY
207	5/13/2003	109121	7	0	0	0.6	DRY
208	5/13/2003	109141	17	0	0	0.6	DRY
209	5/13/2003	109151	13	0	0	0.6	DRY
210	5/13/2003	109171	40	0	0	0.6	DRY
211	7/7/2003	109041	360	0	0	0.3	DRY
212	7/7/2003	109051	210	0	0	0.3	DRY
213	7/7/2003	109071	580	0	0	0.3	DRY
214	7/7/2003	109091	93	0	0	0.3	DRY
215	7/7/2003	109121	123	0	0	0.3	DRY
216	7/7/2003	109141	160	0	0	0.3	DRY
217	7/7/2003	109151	120	0	0	0.3	DRY
218	7/7/2003	109171	90	0	0	0.3	DRY
219	9/8/2003	109041	65	0	0	0	DRY
220	9/8/2003	109051	73	0	0	0	DRY
221	9/8/2003	109071	67	0	0	0	DRY
222	9/8/2003	109091	50	0	0	0	DRY
223	9/8/2003	109121	93	0	0	0	DRY
224	9/8/2003	109141	73	0	0	0	DRY
225	9/8/2003	109151	67	0	0	0	DRY
226	9/8/2003	109171	70	0	0	0	DRY

227	3/1/2004	109041	3	0	0.1	0.1	DRY
228	3/1/2004	109051	3	0	0.1	0.1	DRY
229	3/1/2004	109071	10	0	0.1	0.1	DRY
230	3/1/2004	109091	10	0	0.1	0.1	DRY
231	3/1/2004	109121	7	0	0.1	0.1	DRY
232	3/1/2004	109141	10	0	0.1	0.1	DRY
233	3/1/2004	109151	7	0	0.1	0.1	DRY
234	3/1/2004	109171	3	0	0.1	0.1	DRY
235	5/26/2004	109041	115	0	0	0	DRY
236	5/26/2004	109051	97	0	0	0	DRY
237	5/26/2004	109071	77	0	0	0	DRY
238	5/26/2004	109091	140	0	0	0	DRY
239	5/26/2004	109121	80	0	0	0	DRY
240	5/26/2004	109141	73	0	0	0	DRY
241	5/26/2004	109151	103	0	0	0	DRY
242	5/26/2004	109171	107	0	0	0	DRY
243	8/3/2004	109041	83	0	0.4	0.4	**WET**
244	8/3/2004	109051	460	0	0.4	0.4	**WET**
245	8/3/2004	109071	90	0	0.4	0.4	**WET**
246	8/3/2004	109091	220	0	0.4	0.4	**WET**
247	8/3/2004	109121	127	0	0.4	0.4	**WET**
248	8/3/2004	109141	380	0	0.4	0.4	**WET**
249	8/3/2004	109151	230	0	0.4	0.4	**WET**
250	8/3/2004	109171	933	0	0.4	0.4	**WET**
251	9/20/2004	109041	677	0	0	0	DRY
252	9/20/2004	109051	1030	0	0	0	DRY
253	9/20/2004	109071	100	0	0	0	DRY
254	9/20/2004	109091	455	0	0	0	DRY
255	9/20/2004	109121	380	0	0	0	DRY
256	9/20/2004	109141	900	0	0	0	DRY
257	9/20/2004	109151	1570	0	0	0	DRY
258	9/20/2004	109171	1000	0	0	0	DRY
259	3/2/2005	109041	93	0	0	0	DRY
260	3/2/2005	109051	87	0	0	0	DRY
261	3/2/2005	109071	20	0	0	0	DRY
262	3/2/2005	109091	32	0	0	0	DRY
263	3/2/2005	109121	27	0	0	0	DRY

264	3/2/2005	109141	80	0	0	0	DRY
265	3/2/2005	109151	100	0	0	0	DRY
266	3/2/2005	109171	73	0	0	0	DRY
267	5/3/2005	109041	12	0	0	0	DRY
268	5/3/2005	109051	10	0	0	0	DRY
269	5/3/2005	109071	17	0	0	0	DRY
270	5/3/2005	109091	5	0	0	0	DRY
271	5/3/2005	109121	7	0	0	0	DRY
272	5/3/2005	109141	7	0	0	0	DRY
273	5/3/2005	109151	23	0	0	0	DRY
274	5/3/2005	109171	7	0	0	0	DRY
275	7/6/2005	109041	133	0.2	0.4	2	**WET**
276	7/6/2005	109051	280	0.2	0.4	2	**WET**
277	7/6/2005	109071	767	0.2	0.4	2	**WET**
278	7/6/2005	109091	154	0.2	0.4	2	**WET**
279	7/6/2005	109121	280	0.2	0.4	2	**WET**
280	7/6/2005	109141	340	0.2	0.4	2	**WET**
281	7/6/2005	109151	370	0.2	0.4	2	**WET**
282	7/6/2005	109171	2000	0.2	0.4	2	**WET**
283	9/27/2005	109041	144	0	0	0	DRY
284	9/27/2005	109051	320	0	0	0	DRY
285	9/27/2005	109071	280	0	0	0	DRY
286	9/27/2005	109091	275	0	0	0	DRY
287	9/27/2005	109121	220	0	0	0	DRY
288	9/27/2005	109141	180	0	0	0	DRY
289	9/27/2005	109151	290	0	0	0	DRY
290	9/27/2005	109171	180	0	0	0	DRY

5.2. Fresh Water Data

# sample	Date	Source	enterococcus (CFU/100 mL)	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)
1	5/13/1997	109031	9	0	0	0	DRY
2	5/13/1997	109131	300	0	0	0	DRY
3	5/13/1997	109191	8	0	0	0	DRY
4	8/26/1997	109031	12	0	0	0.3	DRY
5	8/26/1997	109131	18	0	0	0.3	DRY
6	8/26/1997	109191	7	0	0	0.3	DRY
7	10/15/1997	109031	5.5	0.2	0.2	0.6	**WET**
8	10/15/1997	109131	45	0.2	0.2	0.6	**WET**
9	10/15/1997	109191	20	0.2	0.2	0.6	**WET**
10	4/13/1998	109031	1	0	0	0	DRY
11	4/13/1998	109131	2	0	0	0	DRY
12	4/13/1998	109191	1	0	0	0	DRY
13	6/1/1998	109031	370	0.4	0.9	0.9	**WET**
14	6/1/1998	109131	46	0.4	0.9	0.9	**WET**
15	6/1/1998	109191	16	0.4	0.9	0.9	**WET**
16	8/26/1998	109031	12	0	0.1	0.1	DRY
17	8/26/1998	109131	80	0	0.1	0.1	DRY
18	8/26/1998	109191	7	0	0.1	0.1	DRY
19	8/26/1998	109211	230	0	0.1	0.1	DRY
20	8/26/1998	109221	**760**	0	0.1	0.1	DRY
21	8/26/1998	109231	320	0	0.1	0.1	DRY
22	8/26/1998	109241	400	0	0.1	0.1	DRY
23	8/26/1998	109251	630	0	0.1	0.1	DRY
24	10/14/1998	109031	60	0.2	0.2	0.2	**WET**
25	10/14/1998	109131	23	0.2	0.2	0.2	**WET**
26	10/14/1998	109191	10	0.2	0.2	0.2	**WET**
27	10/14/1998	109211	1200	0.2	0.2	0.2	**WET**
28	10/14/1998	109221	800	0.2	0.2	0.2	**WET**
29	10/14/1998	109251	610	0.2	0.2	0.2	**WET**
30	4/13/1999	109031	1	0	0	0.2	DRY
31	4/13/1999	109131	7	0	0	0.2	DRY
32	4/13/1999	109191	2	0	0	0.2	DRY
33	4/13/1999	109211	32	0	0	0.2	DRY
34	4/13/1999	109221	600	0	0	0.2	DRY
35	4/13/1999	109231	90	0	0	0.2	DRY
36	4/13/1999	109241	3	0	0	0.2	DRY
37	4/13/1999	109251	20	0	0	0.2	DRY
38	6/28/1999	109031	7	0	0	0.2	DRY
39	6/28/1999	109131	15	0	0	0.2	DRY
40	6/28/1999	109191	5	0	0	0.2	DRY
41	6/28/1999	109211	430	0	0	0.2	DRY

42	6/28/1999	109221	360	0	0	0.2	DRY
43	6/28/1999	109231	260	0	0	0.2	DRY
44	6/28/1999	109241	410	0	0	0.2	DRY
45	6/28/1999	109251	630	0	0	0.2	DRY
46	8/17/1999	109031	33	0	0	1.8	DRY
47	8/17/1999	109131	37	0	0	1.8	DRY
48	8/17/1999	109191	30	0	0	1.8	DRY
49	8/17/1999	109211	2000	0	0	1.8	DRY
50	8/17/1999	109221	600	0	0	1.8	DRY
51	8/17/1999	109231	1367	0	0	1.8	DRY
52	8/17/1999	109251	1167	0	0	1.8	DRY
53	10/12/1999	109131	4	0	0	0	DRY
54	10/12/1999	109191	320	0	0	0	DRY
55	10/12/1999	109211	6	0	0	0	DRY
56	10/12/1999	109221	78.5	0	0	0	DRY
57	10/12/1999	109231	97	0	0	0	DRY
58	10/12/1999	109241	1	0	0	0	DRY
59	10/12/1999	109251	160	0	0	0	DRY
60	4/3/2000	109031	5	0.2	0.2	0.2	**WET**
61	4/3/2000	109131	18	0.2	0.2	0.2	**WET**
62	4/3/2000	109191	6	0.2	0.2	0.2	**WET**
63	4/3/2000	109211	44	0.2	0.2	0.2	**WET**
64	4/3/2000	109221	650	0.2	0.2	0.2	**WET**
65	4/3/2000	109231	1	0.2	0.2	0.2	**WET**
66	4/3/2000	109241	2	0.2	0.2	0.2	**WET**
67	4/3/2000	109251	82	0.2	0.2	0.2	**WET**
68	6/5/2000	109031	5	0	0.5	0.5	**WET**
69	6/5/2000	109131	167	0	0.5	0.5	**WET**
70	6/5/2000	109191	5	0	0.5	0.5	**WET**
71	6/5/2000	109211	430	0	0.5	0.5	**WET**
72	6/5/2000	109231	370	0	0.5	0.5	**WET**
73	6/5/2000	109241	57	0	0.5	0.5	**WET**
74	6/5/2000	109251	250	0	0.5	0.5	**WET**
75	7/24/2000	109031	12	0.1	0.1	2.2	**WET**
76	7/24/2000	109131	50	0.1	0.1	2.2	**WET**
77	7/24/2000	109191	93	0.1	0.1	2.2	**WET**
78	7/24/2000	109211	633	0.1	0.1	2.2	**WET**
79	7/24/2000	109221	370	0.1	0.1	2.2	**WET**
80	7/24/2000	109231	370	0.1	0.1	2.2	**WET**

81	7/24/2000	109241	1000	0.1	0.1	2.2	**WET**
82	7/24/2000	109251	550	0.1	0.1	2.2	**WET**
83	9/11/2000	109031	7	0	0	0.7	DRY
84	9/11/2000	109131	7	0	0	0.7	DRY
85	9/11/2000	109191	13	0	0	0.7	DRY
86	9/11/2000	109211	350	0	0	0.7	DRY
87	9/11/2000	109221	310	0	0	0.7	DRY
88	9/11/2000	109231	195	0	0	0.7	DRY
89	9/11/2000	109241	40	0	0	0.7	DRY
90	9/11/2000	109251	290	0	0	0.7	DRY
91	3/19/2001	109031	1	0	0	1.4	DRY
92	3/19/2001	109131	1	0	0	1.4	DRY
93	3/19/2001	109191	1	0	0	1.4	DRY
94	5/29/2001	109031	147	0.1	0.1	0.7	**WET**
95	5/29/2001	109131	25	0.1	0.1	0.7	**WET**
96	5/29/2001	109191	6	0.1	0.1	0.7	**WET**
97	7/10/2001	109031	17	0.3	0.3	0.3	**WET**
98	7/10/2001	109131	20	0.3	0.3	0.3	**WET**
99	7/10/2001	109191	30	0.3	0.3	0.3	**WET**
100	9/5/2001	109031	400	0	0	0	DRY
101	9/5/2001	109131	230	0	0	0	DRY
102	9/5/2001	109191	260	0	0	0	DRY
103	3/4/2002	109031	13	0	0	0	DRY
104	3/4/2002	109131	3	0	0	0	DRY
105	3/4/2002	109191	3	0	0	0	DRY
106	5/20/2002	109031	70	0	0	0	DRY
107	5/20/2002	109131	32	0	0	0	DRY
108	5/20/2002	109191	7	0	0	0	DRY
109	7/24/2002	109031	37	0	0	0	DRY
110	7/24/2002	109131	50	0	0	0	DRY
111	7/24/2002	109191	7	0	0	0	DRY
112	9/4/2002	109031	83	0	0	0	DRY
113	9/4/2002	109131	81	0	0	0	DRY
114	9/4/2002	109191	17	0	0	0	DRY
115	3/31/2003	109031	3	0	0	0	DRY
116	3/31/2003	109131	7	0	0	0	DRY
117	3/31/2003	109191	7	0	0	0	DRY

118	5/13/2003	109031	6	0	0	0.6	DRY
119	5/13/2003	109131	57	0	0	0.6	DRY
120	5/13/2003	109191	6	0	0	0.6	DRY
121	7/7/2003	109031	20	0	0	0.3	DRY
122	7/7/2003	109131	30	0	0	0.3	DRY
123	7/7/2003	109191	103	0	0	0.3	DRY
124	9/8/2003	109031	77	0	0	0	DRY
125	9/8/2003	109131	37	0	0	0	DRY
126	9/8/2003	109191	10	0	0	0	DRY
127	3/1/2004	109031	3	0	0.1	0.1	DRY
128	3/1/2004	109131	3	0	0.1	0.1	DRY
129	3/1/2004	109191	3	0	0.1	0.1	DRY
130	5/26/2004	109031	3	0	0	0	DRY
131	5/26/2004	109131	47	0	0	0	DRY
132	5/26/2004	109191	13	0	0	0	DRY
133	8/3/2004	109031	10	0	0.4	0.4	**WET**
134	8/3/2004	109131	40	0	0.4	0.4	**WET**
135	8/3/2004	109191	3	0	0.4	0.4	**WET**
136	9/20/2004	109031	40	0	0	0	DRY
137	9/20/2004	109131	20	0	0	0	DRY
138	9/20/2004	109191	767	0	0	0	DRY
139	3/2/2005	109031	3	0	0	0	DRY
140	3/2/2005	109131	3	0	0	0	DRY
141	3/2/2005	109191	23	0	0	0	DRY
142	5/3/2005	109031	3	0	0	0	DRY
143	5/3/2005	109131	3	0	0	0	DRY
144	5/3/2005	109191	73	0	0	0	DRY
145	7/6/2005	109031	70	0.2	0.4	2	**WET**
146	7/6/2005	109131	67	0.2	0.4	2	**WET**
147	7/6/2005	109191	87	0.2	0.4	2	**WET**
148	9/27/2005	109031	63	0	0	0	DRY
149	9/27/2005	109131	280	0	0	0	DRY
150	9/27/2005	109191	13	0	0	0	DRY