Total Maximum Daily Load

Evaluation

for

Kings Ferry County Park Beach

in the

Ogeechee River Basin

for

Enterococci

Submitted to:
The U.S. Environmental Protection Agency
Region 4
Atlanta, Georgia

Submitted by:
The Georgia Department of Natural Resources
Environmental Protection Division
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EXECUTIVE SUMMARY

The State of Georgia assesses its water bodies for compliance with water quality standards criteria established for their designated uses as required by the Federal Clean Water Act (CWA). Assessed water bodies are placed into one of three categories, supporting designated use, not supporting designated use, or assessment pending, depending on water quality assessment results. These water bodies are found on Georgia's 305(b) list as required by that section of the CWA that defines the assessment process, and are published in *Water Quality in Georgia* (GA EPD, 2012 – 2013). This document is available on the Georgia Environmental Protection Division (EPD) website.

Some of the 305(b) not supporting water bodies are also assigned to Georgia's 303(d) list, also named after that section of the CWA. Water bodies on the 303(d) list are required to have a Total Maximum Daily Load (TMDL) evaluation for the water quality constituent(s) in violation of the water quality standard. The TMDL in this document is based on the 2014 303(d) listing, which is available on the EPD website. The TMDL process establishes the allowable pollutant loadings or other quantifiable parameters for a water body based on the relationship between pollutant sources and instream water quality conditions. This allows water quality-based controls to be developed to reduce pollution and restore and maintain water quality.

Every water in the State has one or more designated uses, and each designated use has water quality criteria established to protect it. The State of Georgia has placed one stream segment in the Ogeechee River Basin on the 303(d) list of impaired waters because they were assessed as "not supporting" its designated use of "Recreation" due to violation of the enterococci water quality criteria established under the 2000 Beach Act. The water quality criteria for enterococci bacteria for a water with a designated use of recreation are as follows: For Tier One Beaches water samples are collected weekly, enterococci counts are not to exceed a geometric mean of 35 per 100 mL based on at least three samples collected from a given sampling site over a 30-day period. For Tier Two Beaches water samples are collected monthly from April to October, enterococci counts are not to exceed an annual geometric mean of 35 per 100 mL based on all samples taken between May and October. If a beach is placed on a Permanent Swimming Advisory, samples are collected quarterly, enterococci counts are not to exceed an annual geometric mean of 35 per 100 mL based on all samples taken during each calendar year. A water is assessed as "not supporting" its use if more than 10 percent of the geometric means exceeded the water quality criteria cited above, or if more than 10 percent of individual samples exceed the enterococci single sample criteria of 104 per 100 mL.

An important part of the TMDL analysis is the identification of potential source categories. Sources are broadly classified as either point or nonpoint sources. A point source is defined as a discernable, confined, and discrete conveyance from which pollutants are or may be discharged to surface waters. Nonpoint sources are diffuse, and generally, but not always, involve accumulated enterococci bacteria that wash off land surfaces as a result of storm events.

The process of developing enterococci bacteria TMDLs for the Ogeechee River Basin listed segments includes the determination of the following:

- The current critical enterococci load to the stream under existing conditions;
- The TMDL for similar conditions under which the current critical load was determined; and
- The percent reduction in the current critical enterococci load necessary to achieve the TMDL.

The calculation of the enterococci load at any point in a stream requires the enterococci concentration and stream flow. The availability of water quality and flow data varies considerably among the listed segments. The Loading Curve Approach was used to determine the current enterococci load and TMDL. The enterococci load and required reduction for the listed beach is summarized in the table below.

Management practices that may be used to help reduce enterococci source loads include:

- Compliance with NPDES permit limits and requirements;
- Adoption of NRCS Conservation Practices; and
- Application of Best Management Practices (BMPs) appropriate to reduce nonpoint sources.

The amount of enterococci bacteria delivered to a stream is difficult to determine. However, the use of these management practices should improve beach water quality, and future monitoring will provide a measurement of TMDL implementation.

Enterococci Loads and Required Enterococci Load Reductions

Stream Segment	Current Load (counts/ 30 days)	TMDL Components					Percent Reduction
		WLA (counts/ 30 days)	WLAsw (counts/ 30 days)	LA (counts/ 30 days)	MOS (counts/ 30 days)	TMDL (counts/ 30 days)	
Kings Ferry County Park Beach	2.00E+14	0.00E+00	1.44E+11	2.92E+13	3.26E+12	3.26E+13	84

1.0 INTRODUCTION

1.1 Background

The State of Georgia assesses its water bodies for compliance with water quality standards criteria established for their designated uses as required by the Federal Clean Water Act (CWA). Assessed water bodies are placed into one of three categories depending on water quality assessment results, supporting designated use, not supporting designated use, or assessment pending. These water bodies are found on Georgia's 305(b) list as required by that section of the CWA that addresses the assessment process, and are published in *Water Quality in Georgia* (GA EPD, 2012 – 2013). This document is available on the Georgia Environmental Protection Division (EPD) website.

A subset of the water bodies that do not meet designated uses, those in Category 5 on the 305(b) list, are assigned to Georgia's 303(d) list, named after that section of the CWA. Water bodies included in the 303(d) list are required to have a Total Maximum Daily Load (TMDL) evaluation for the water quality constituent(s) in violation of the water quality criteria. The TMDLs in this document are based on the 2014 303(d) listing, which is available on the EPD website. The TMDL process establishes the allowable loading of pollutants or other quantifiable parameters for a water body based on the relationship between pollution sources and in-stream water quality conditions. This allows water quality based controls to be developed to reduce pollution and restore and maintain water quality.

The list identifies the waterbodies that are not supporting their designated use classifications due to exceedances of water quality standards for enterococci bacteria. Enterococci bacteria are used as an indicator of the potential presence of pathogens in a stream. Table 1 presents the beach in the Ogeechee River Basin included on the 2014 303(d) list for exceedance of the enterococci standard criteria.

Table 1. Water Bodies Listed on the 2014 303(d) List for Enterococci Bacteria in the Ogeechee River Basin

Beach Segment	**Location**	Reach ID	Beach Length (miles)	Designated Use
Kings Ferry County Park Beach	US Hwy 17 Kings Ferry Bridge on Ogeechee River - Entire Beach	R030602040306	0.04	Recreation

1.2 Watershed Description

The Ogeechee River Basin is located in mid to southeastern Georgia, encompassing approximately 5,540 square miles. It is bordered by the Oconee and Altamaha River Basins to the west and the Savannah River Basin to the east. The Ogeechee River originates in Greene County, in central Georgia. The headwaters of the Ogeechee River consist of the North and South Forks, which join to form the mainstem. The River then flows approximately 245 miles southeast to the Atlantic Ocean. The Canoochee River originates in Emanuel County and flows southeast to join the Ogeechee River near Richmond Hill. The Ogeechee River Basin contains parts of the Piedmont and Coastal Plain physiographic provinces, which extend throughout the southeastern United States.

The United States Geologic Survey (USGS) has divided the Ogeechee basin into four sub-basins, or Hydrologic Unit Codes (HUCs). These are numbered as HUCs 03060201 through 03060204. Figure 1 shows the locations of these sub-basins, and Figure 2 shows the sub-basins with impaired stream segments.

The land use characteristics of the Kings Ferry County Park Beach watershed were determined using data from the Georgia Land Use Trends (GLUT) for Year 2008. This raster land use trend product was developed by the University of Georgia – Natural Resources Spatial Analysis Laboratory (NARSAL) and follows land use trends for years 1974, 1985, 1991, 1998, 2001, 2005 and 2008. The raster data sets were developed from Landsat Thematic Mapper (TM) and Enhanced Thematic Mapper Plus (ETM+). Some of the NARSAL land use types were reclassified, aggregated into similar land use types, and used in the final watershed characterization. Table 2 lists the watershed land use distribution for the drainage area of Kings Ferry County Park Beach.

Table 2. Kings Ferry County Park Beach Land Coverage

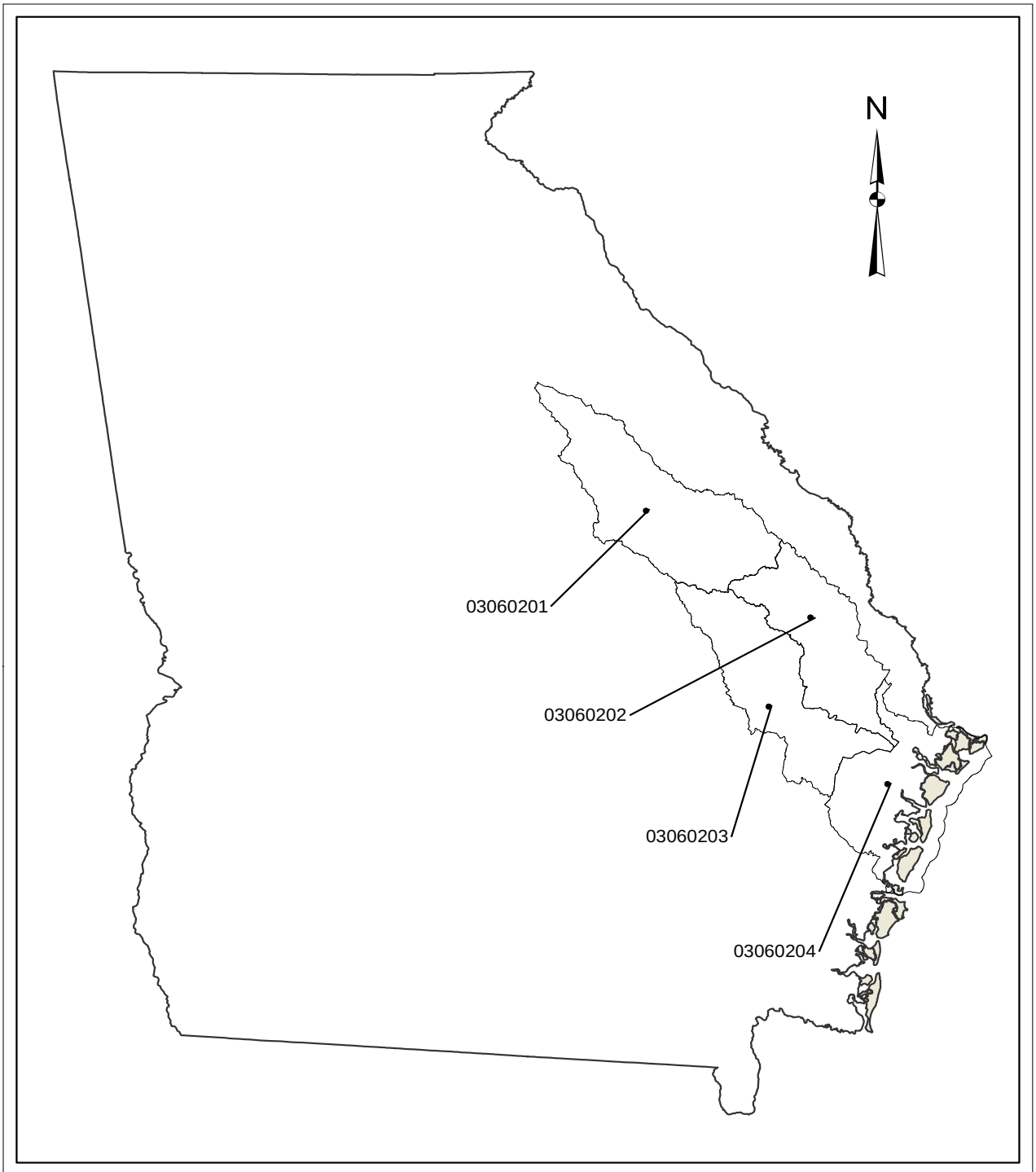
Land Use Categories - Acres (Percent)													
Open Water	**Low Intensity Residential**	**High Intensity Residential**	**High Intensity Commercial, Industrial, Transportation**	**Bare Rock, Sand, Clay**	**Quarries, Strip Mines, Gravel Pits**	**Transitional**	**Forest**	**Row Crops**	**Pasture, Hay**	**Other Grasses (Urban, recreational; e.g. parks, lawns)**	**Woody Wetlands**	**Emergent Herbaceous Wetlands**	**Total**
17,835	51,890	12,598	4,762	4,434	408	122,672	1,264,079	564,082	119,799	122,105	530,206	8,608	2,823,479
0.6%	1.8%	0.4%	0.2%	0.2%	0.0%	4.3%	44.8%	20.0%	4.2%	4.3%	18.8%	0.3%	100.0%

1.3 Water Quality Standard

The water use classification for Kings Ferry County Park Beach is Recreation. The criterion violated is listed as enterococci. The potential cause listed is nonpoint sources. The use classification water quality standards for bacteria, as stated in the *State of Georgia's Rules and Regulations for Water Quality Control*, Chapter 391-3-6-.03(6)(b)(i) (GA EPD, 2013), are:

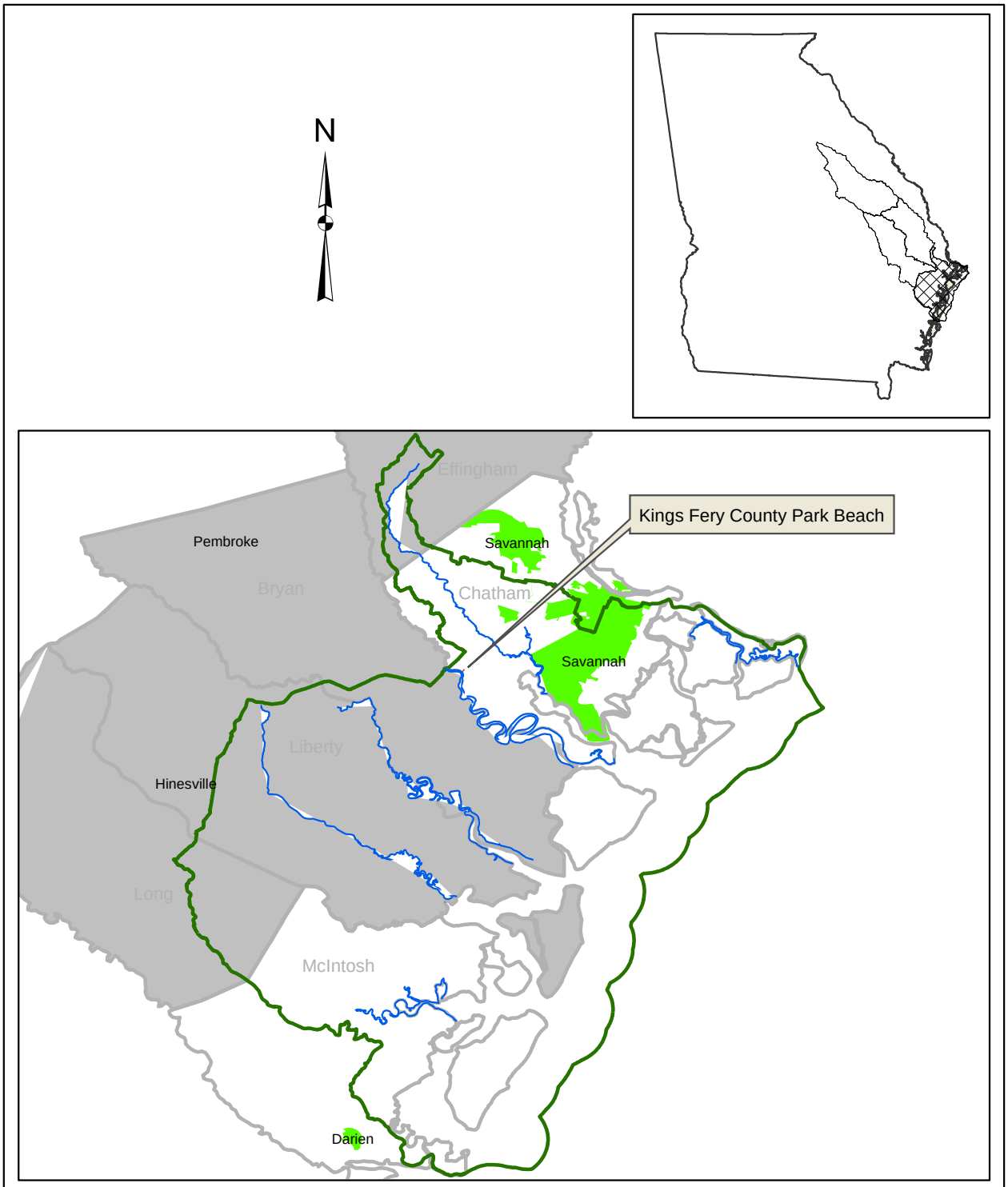
> (b) Recreation: General recreational activities such as water skiing, boating, and swimming, or for any other use requiring water of a lower quality, such as recreational fishing. These criteria are not to be interpreted as encouraging water contact sports in proximity to sewage or industrial waste discharges regardless of treatment requirements:
>
> (i) Bacteria: Fecal coliform not to exceed the following geometric means based on at least four samples collected from a given sampling site over a 30-day period at intervals not less than 24 hours:
>
> Coastal waters 100 per 100 mL
>
> All other recreational waters 200 per 100 mL
>
> Should water quality and sanitary studies show natural fecal coliform levels exceed 200/100 mL (geometric mean) occasionally in high quality recreational waters, then the allowable geometric mean fecal coliform level shall not exceed 300 per 100 mL in lakes and reservoirs and 500 per 100 mL in free flowing fresh water streams.

The 2000 Beaches Environmental Assessment and Coastal Health (BEACH) Act required States with coastal recreation waters to adopt by April 10, 2004, bacteria criteria that are "as protective of human health as" the 1986 EPA bacteria criteria. There is currently no standard for enterococci bacteria in the *State of Georgia's Rules and Regulations for Water Quality Control.* EPD is following the 2000 BEACH Act recommendation for enterococci bacteria of a geometric mean of 35 per 100 mL or a single sample of 104 per 100 mL. The EPD is currently in the process of adopting the Environmental Protection Agency's (EPA) 2012 Recreational Water Quality Criteria that recommend enterococci levels not to exceed a geometric mean of 35 per 100 mL. The geometric mean duration shall not be greater than 30 days. No greater than a ten percent excursion frequency of an enterococci statistical threshold value (STV) of 130 CFU per 100 mL the same 30 day interval.



TMDL Evaluation - Enterococci
Kings Ferry County Park Beach

Figure 1. USGS 8-Digit Hucs for Ogeechee River Basin



TMDL Evaluation - Enterococci
Kings Ferry County Park Beach

Figure 2. Impaired Stream Segments in HUC 03060204

2.0 WATER QUALITY ASSESSMENT

Beach segments are placed on the 303(d) list as not supporting their water use classification based on water quality sampling data. A stream is placed on this list if more than 10% of the samples exceed the enterococci criteria. Water quality samples that have a geometric mean in excess of 35 counts per 100 milliliters or a single sample maximum criterion of 104 counts per 100 milliliters are in violation of the Beach Act criteria for bacteria. For Tier One Beaches, geometric means are based on at least three samples collected over a 30-day period. For Tier Two Beaches, an annual geometric mean is calculated from monthly samples from May through October. For beaches on a Permanent Swimming Advisory, an annual geometric mean is calculated from all samples collected during each calendar year. Kings Ferry County Park Beach is a on a permanent swimming advisory.

Enterococci data used for the TMDL developed in this document were collected during calendar years 2008 through 2013 by the Georgia Coastal Resources Division (CRD). These data are presented in Appendix A.

3.0 SOURCE ASSESSMENT

An important part of the TMDL analysis is the identification of potential source categories. Sources are broadly classified as either point or nonpoint sources. A point source is defined as a discernable, confined, and discrete conveyance from which pollutants are or may be discharged to surface waters. Nonpoint sources are diffuse, and generally, but not always, involve accumulation of enterococci bacteria on land surfaces that wash off as a result of storm events.

3.1 Point Source Assessment

Title IV of the Clean Water Act establishes the National Pollutant Discharge Elimination System (NPDES) permit program. There are two basic kinds of NPDES permits: 1) municipal and industrial wastewater treatment facilities, and 2) regulated stormwater discharges.

3.1.1 Wastewater Treatment Facilities

In general, municipal and industrial wastewater treatment facilities have NPDES permits with effluent limits. These permit limits are either based on federal and state effluent guidelines (technology-based limits) or on water quality standards (water quality-based limits).

The United States Environmental Protection Agency (USEPA) has developed technology-based guidelines, which establish a minimum standard of pollution control for municipal and industrial discharges without regard for the quality of the receiving waters. These are based on Best Practical Control Technology Currently Available (BPT), Best Conventional Control Technology (BCT), and Best Available Technology Economically Achievable (BAT). The level of control required by each facility depends on the type of discharge and the pollutant.

The USEPA and the states have also developed numeric and narrative water quality standards. Typically, these standards are based on the results of aquatic toxicity tests and/or human health criteria and include a margin of safety. Water quality-based effluent limits are set to protect the receiving stream. These limits are based on water quality standards that have been established for a stream based on its intended use and the prescribed biological and chemical conditions that must be met to sustain that use.

Discharges from municipal and industrial wastewater treatment facilities can contribute enterococci to receiving waters. There are no NPDES permitted discharges with a flow greater than 0.1 MGD identified in the Ogeechee River Basin that could potentially impact Kings Ferry County Park Beach for enterococci bacteria.

Combined sewer systems convey a mixture of raw sewage and stormwater in the same conveyance structure to the wastewater treatment plant. These are considered a component of municipal wastewater treatment facilities. When the combined sewage exceeds the capacity of the wastewater treatment plant, the excess is diverted to a combined sewage overflow (CSO) discharge point. There are no permitted CSO outfalls in the Ogeechee River Basin.

3.1.2 Regulated Stormwater Discharges

Some stormwater runoff is covered under the NPDES Permit Program as a point source. Some industrial facilities included under the program will have limits similar to traditional NPDES-permitted dischargers, whereas others establish controls: “to the maximum extent practicable” (MEP). Currently, regulated stormwater discharges that may contain enterococci bacteria

consist of those associated with industrial activities and large, medium, and small municipal separate storm sewer systems (MS4s) that serve populations of 50,000 or more.

3.1.2.1 Industrial General Stormwater NPDES Permit

Stormwater discharges associated with industrial activities are currently covered under the 2012 General Storm Water NPDES Permit (GAR050000), also called the Industrial General Permit (IGP). This permit requires visual monitoring of stormwater discharges, site inspections, implementation of Best Management Practices (BMPs), and record keeping. The IGP requires that stormwater discharging into an impaired stream segment or within one linear mile upstream of, and within the same watershed as, any portion of an impaired stream segment identified as "not supporting" its designated use(s), must satisfy the requirements of Appendix C of the 2012 IGP if the pollutant(s) of concern for which the impaired stream segment has been listed may be exposed to stormwater as a result of industrial activity at the site. If a facility is covered under Appendix C of the IGP, then benchmark monitoring for the pollutant(s) of concern is required.

3.1.2.2 MS4 NPDES Permits

Stormwater discharges from MS4s are very diverse in pollutant loadings and frequency of discharge. At present, all cities and counties within the state of Georgia that had a population of greater than 100,000 at the time of the 1990 Census are permitted for their stormwater discharge under Phase I. This includes 58 permittees in Georgia.

Phase I MS4 permits require the prohibition of non-stormwater discharges (i.e., illicit discharges) into the storm sewer systems and controls to reduce the discharge of pollutants to the maximum extent practicable, including the use of management practices, control techniques and systems, as well as design and engineering methods (Federal Register, 1990). A site-specific Stormwater Management Plan (SWMP) outlining appropriate controls is required by and referenced in the permit. There are 7 Phase I MS4s in the Ogeechee River Basin (Table 3).

Table 3. Phase I Permitted MS4s in the Ogeechee River Basin

Name	Permit No.	Watershed
Bloomingdale	GAS000207	Ogeechee, Savannah
Chatham County	GAS000206	Ogeechee, Savannah
Garden City	GAS000208	Ogeechee, Savannah
Pooler	GAS000209	Ogeechee, Savannah
Savannah	GAS000205	Ogeechee, Savannah
Thunderbolt	GAS000210	Ogeechee
Tybee Island	GAS000212	Ogeechee, Savannah

Source: Nonpoint Source Program, GA EPD, 2014

Small MS4s serving urbanized areas are required to obtain a stormwater permit under the Phase II stormwater regulations. The urbanized areas are defined by the U.S. Census Bureau. Thirty-five counties, 73 cities, 5 Department of Defense facilities and the Georgia Department of Transportation (DOT) are permitted under the Phase II regulations in Georgia. In addition to the DOT, which is located in all river basins, there are 8 Phase II MS4s in the Ogeechee River Basin (Table 4).

Table 4. Phase II Permitted MS4s in the Ogeechee River Basin

Name	Watershed
Allenhurst	Ogeechee
Fleming	Ogeechee
Fort Stewart	Ogeechee
Hinesville	Ogeechee
Hunter Army Airfield	Ogeechee
Richmond Hill	Ogeechee
Vernonburg	Ogeechee
Walthourville	Ogeechee

Source: Nonpoint Source Program, GA EPD, 2014

Table 5 lists the Phase I or Phase II MS4 city or county urbanized areas upstream of listed segments in the Ogeechee River Basin. The table provides the total area of this watershed and the percentage of the watershed that is MS4 city or county urbanized area.

Table 5. Percentage of MS4 City or County Urbanized Area Upstream of Kings Ferry County Park Beach

Beach Segment	Location	Total Area (square miles)	% In MS4 Urbanized Area
Kings Ferry County Park Beach	US Hwy 17 Kings Ferry Bridge on Ogeechee River - Entire Beach	4411.69	0.7%

3.1.3 Concentrated Animal Feeding Operations

Under the Clean Water Act, Concentrated Animal Feeding Operations (CAFOs) are defined as point sources of pollution and are therefore subject to NPDES permit regulations. From 1999 through 2001, Georgia adopted rules for permitting swine and non-swine liquid manure animal feeding operations (AFOs). Georgia rules required medium size AFOs with more than 300 animal units (AU) but less than 1000 AU to apply for a non-discharge State land application system (LAS) waste disposal permit. Large operations with more than 1000 AU were required to apply for an NPDES permit (also non-discharge) as a CAFO. The USEPA CAFO regulations were successfully appealed in 2005. They were revised to comply with the court's decision that NPDES permits only be required for actual discharges. Georgia's rules were amended on August 7, 2012 to reflect the USEPA revisions. The revised state rules will continue LAS permitting of medium size liquid manure AFOs and extend LAS permitting to large liquid manure AFOs with more than 1000 AU, unless they elect to obtain an NPDES permit. There are no swine and non-swine liquid manure CAFOs located in the vicinity of the Kings Ferry County Park Beach that have NPDES or land application permits.

In 2002, the USEPA promulgated expanded NPDES permit regulations for CAFOs that added dry manure poultry operations larger than 125,000 broilers or 82,000 layers. In accordance with the Georgia rule amendment discussed above, the general permit covering these facilities has been terminated and they are no longer covered under any permit. Georgia is consistently among the top three states in the U.S. in terms of poultry operations. The majority of poultry farms are dry manure operations where the manure is stored for a time and then land applied. Freshly stored litter can be a nonpoint source of enterococci. However, land applied litter that was previously stored for an

extended length of time typically exhibits very low enterococci levels. There are no known dry manure poultry operations located in the vicinity of Kings Ferry County Park Beach.

3.2 Nonpoint Source Assessment

In general, nonpoint sources cannot be identified as entering a waterbody through a discrete conveyance at a single location. Typical nonpoint sources of enterococci bacteria include:

- Wildlife
- Agricultural Livestock
- Animal grazing
- Animal access to streams
- Application of manure to pastureland and cropland
- Urban Development
- Leaking sanitary sewer lines
- Leaking septic systems
- Land Application Systems
- Landfills

In urban areas, a large portion of stormwater runoff may be collected in storm sewer systems and discharged through distinct outlet structures. For large urban areas, these storm sewer discharge points may be regulated as described in Section 3.1.2.

3.2.1 Wildlife

The significance of wildlife as a source of enterococci bacteria in streams varies considerably depending on the animal species present in the watershed. Based on information provided by the Wildlife Resources Division (WRD) of GA DNR, the greatest wildlife sources of enterococci are the animals that spend a large portion of their time in or around aquatic habitats. Of these, waterfowl, especially ducks and geese, are considered to be the most significant source, because when present, they are typically found in large numbers on the water surface. Other animals regularly found around aquatic environments include racoons, beavers, muskrats, and to a lesser extent, river otters and minks. Recently, rapidly expanding feral swine populations have become a substantial presence in the floodplain areas of the major rivers in Georgia.

White-tailed deer populations are abundant throughout the Ogeechee River Basin. Enterococci bacteria contributions to water bodies from deer are generally considered to be less significant than that of waterfowl, racoons, and beavers. This is because a greater portion of their time is spent in terrestrial habitats. This also holds true for other terrestrial mammals such as squirrels and rabbits, and for terrestrial birds (GA WRD, 2007). However, feces deposited on the land surface can result in the introduction of enterococci to streams during runoff events. Between storm events, considerable decomposition of the fecal matter might occur, resulting in a decrease in the associated enterococci numbers.

3.2.2 Agricultural Livestock

Agricultural livestock are a potential source of enterococci to streams in the Ogeechee River Basin. The animals grazing on pastureland deposit their feces onto land surfaces, where it can then be transported during storm events to nearby streams. Animal access to pastureland varies monthly, resulting in varying enterococci loading rates throughout the year. Beef cattle spend all of their time in pastures, while dairy cattle and hogs are periodically confined. In

addition, agricultural livestock will often have direct access to streams that pass through their pastures, and can thus impact water quality in a more direct manner (USDA, 2002).

Table 6 provides the estimated number of beef cattle, dairy cattle, goats, horses, swine, sheep, and chickens reported by county.

Table 6. Estimated Agricultural Livestock Populations in the Ogeechee River Basin

County	Livestock							
	Beef Cattle	**Dairy Cattle**	**Swine**	**Sheep**	**Horses**	**Goats**	**Chickens Layers**	**Chickens-Broilers Sold**
Bryan	250	-	-	-	150	-	-	-
Bulloch	12,000	-	-	100	400	2,450	-	4,792,320
Burke	10,000	6,400	-	100	500	1,300	-	-
Candler	2,100	-	300	75	30	500	-	240,000
Chatham	-	-	-	-	-	-	-	-
Effingham	3,500	-	750	-	500	1,000	-	-
Emanuel	8,000	-	-	-	500	2,100	-	-
Evans	3,750	-	-	25	25	150	-	8,823,816
Glascock	3,800	-	120	220	430	850	-	-
Greene	8,787	2,600	-	50	285	300	-	7,372,800
Hancock	3,650	-	-	80	370	850	-	-
Jefferson	4,500	3,100	120	20	30	700	-	-
Jenkins	2,897	875	-	224	12	383	-	-
Liberty	725	-	-	-	50	200	-	-
Long	1,600	-	60	25	350	500	-	4,204,032
McIntosh	-	-	-	-	-	-	-	-
Screven	6,000	750	-	100	-	1,000	500	-
Taliaferro	-	-	-	-	-	-	-	-
Tattnall	11,000	-	-	600	150	1,500	-	47,162,880
Warren	5,450	700	250	225	1,150	1,800	-	-
Washington	3,800	750	-	30	600	1,100	-	-

Source: Center for Agribusiness and Economic Development, 2014

3.2.3 Urban Development

Enterococci bacteria from urban areas are attributable to multiple sources, including: domestic animals, leaks and overflows from sanitary sewer systems, illicit discharges, leaking septic systems, runoff from improper disposal of waste materials, and leachate from both operational and closed landfills.

Urban runoff can contain high concentrations of enterococci from domestic animals and urban wildlife. Enterococci bacteria enter streams by direct washoff from the land surface, or the runoff may be diverted to a stormwater collection system and discharged through a discrete outlet structure. For large, medium, and small urban areas (populations greater than 50,000), the stormwater outlets are regulated under MS4 permits (see Section 3.1.2). For smaller urban areas, the stormwater discharge outlets currently remain unregulated.

In addition to urban animal sources of enterococci, there may be illicit connections to the storm sewer system. As part of the MS4 permitting program, municipalities are required to conduct dry-weather monitoring to identify and then eliminate these illicit discharges. Enterococci

bacteria may also enter streams from leaky sewer pipes, or during storm events when inflow and infiltration can cause sewer overflows.

3.2.3.1 Leaking Septic Systems

A portion of the enterococci contributions in the Ogeechee River Basin may be attributed to failure of septic systems and illicit discharges of raw sewage. Table 7 presents the number of septic systems in each county of the Ogeechee River Basin existing at the end of 2008 and the number existing at the end of 2013. This is based on data provided by the Georgia Department of Human Resources, Division of Public Health, and information obtained from the U.S. Census. In addition, an estimate of the number of septic systems installed and repaired during the period from 2009 through 2013 is given. These data show an increase in the number of septic systems in all of the counties. This is often a reflection of population increases outpacing the expansion of sewage collection systems.

Table 7. Estimated Number of Septic Systems in the Ogeechee River Basin

County	Existing Septic Systems (2008)	Existing Septic Systems (2013)	Number of Septic Systems Installed (2009 to 2013)	Number of Septic Systems Repaired (2009 to 2013)
Bryan	9,800	10,385	585	261
Bulloch	20,788	21,636	848	430
Burke	11,421	11,807	386	130
Candler	2,791	2,938	147	50
Chatham	15,177	15,366	189	86
Effingham	17,474	18,161	687	307
Emanuel	8,110	8,405	295	239
Evans	3,734	3,897	163	26
Glascock	1,165	1,231	66	15
Greene	5,972	6,239	267	42
Hancock	4,536	4,674	138	22
Jefferson	5,633	5,792	159	59
Jenkins	2,155	2,236	81	11
Liberty	11,455	11,819	364	53
Long	5,112	6,017	905	62
McIntosh	3,135	3,395	260	90
Screven	8,069	8,280	211	70
Taliaferro	805	846	41	5
Tattnall	7,336	7,739	403	97
Warren	2,038	2,099	61	19
Washington	6,722	6,949	227	131

Source: The Georgia Dept. of Public Health, Environmental Health Section, 2014

3.2.3.2 Land Application Systems

Some communities and industries use land application systems (LAS) for wastewater disposal. These facilities are required through LAS permits to dispose of their treated wastewater by land application, and to operate as non-discharging systems, that do not contribute wastewater runoff to surface waters. However, sometimes the soil's percolation rate is exceeded when applying the wastewater, or encountering excess precipitation, resulting in runoff. This runoff could contribute enterococci bacteria to nearby surface waters. Runoff of stormwater might also carry surface residual containing enterococci bacteria. There are no permitted LAS systems with flows greater than 0.1 MGD identified in the Ogeechee River Basin that could potentially impact Kings Ferry County Park Beach.

3.2.3.3 Landfills

Leachate from landfills may contain enterococci bacteria that could at some point reach surface waters. Sanitary (or municipal) landfills are the most likely to serve as a source of enterococci bacteria. These types of landfills receive household wastes, animal manure, offal, hatchery and poultry processing plant wastes, dead animals, and other types of wastes. Older sanitary landfills were not lined and most have been closed. Those that remain active and have not been lined operate as construction/demolition landfills. Currently active sanitary landfills are lined and have leachate collection systems. All landfills, excluding inert landfills, are now required to install environmental monitoring systems for groundwater and methane sampling. There are 107 known landfills in the Ogeechee River Basin. Of these, 13 are active landfills, 3 are in closure and 90 are inactive or closed. Table 8 presents the landfills that are within 25 miles upstream of Kings Ferry County Park Beach.

Table 8. Landfills Upstream of Kings Ferry County Park Beach

Name	County	Permit No.	Status
Bryan County -US 280 / Mill Creek	Bryan	015-004D(SL)	Closed
Bryan Co. - Hwy 204	Bryan	-	Inactive
Ellabell	Bryan	-	Inactive
Yarbrough	Effingham	-	Inactive

Source: Land Protection Branch, GA DNR, 2014

4.0 ANALYTICAL APPROACH

The process of developing the enterococci TMDL for the Ogeechee River Basin listed segment includes the determination of the following:

- The current critical enterococci load to the beach under existing conditions;
- The TMDL for similar conditions under which the current load was determined; and
- The percent reduction in the current critical enterococci load necessary to achieve the TMDL.

The calculation of the enterococci load at any point in a stream requires the enterococci concentration and stream flow. The Loading Curve Approach was used to determine the current enterococci load and the TMDL. For the listed segment, enterococci sampling data were sufficient to calculate at least one geometric mean to compare with the regulatory criteria (see Appendix A).

4.1 Loading Curve Approach

For the Kings Ferry County Park Beach segment, sufficient water quality data were collected to calculate at least one geometric mean that was above the recommended criteria. Therefore, the loading curve approach was used. This method involves comparing the current critical load to the TMDL curve.

The available field measurements and water quality data used to develop the TMDL for Kings Ferry County Park Beach did not include stream flow data. Therefore, stream flows for this site were estimated using data from two upstream USGS gages. The gaged streams had relatively similar watershed characteristics, including landuse, slope, and drainage area to the sample location. The stream flows were estimated by adding the gaged flows from the two upstream sites, then multiplying this flow by the ratio of the listed stream drainage area to the sum of the gaged streams drainage areas. Table 9 provides the USGS stream gages used to estimate the flows for the Kings Ferry County Park Beach segment.

Table 9. Corresponding USGS Flow Gages for Estimated Flows

USGS Station Name	Station No.
Ogeechee River near Eden, GA	02202500
Canoochee River at Bridge 38, at Fort Stewart, GA	02203518

Georgia's beaches that have a permanent swimming advisory are sampled quarterly The current critical load is determined using enterococci data collected quarterly to calculate an annual geometric mean, and multiplying this value by the arithmetic mean of the flows estimated at the time the water quality samples were collected. To reflect this in the load calculation, the enterococci loads are expressed as 30-day accumulated loads, with units of counts per 30 days. This is described by the equation below:

$$L_{critical} = C_{geomean} \times Q_{mean}$$

Where:

$L_{critical}$ = current critical enterococci load
$C_{geomean}$ = enterococci concentration as an annual geometric mean
Q_{mean} = stream flow as an arithmetic mean

These loads do not represent the full range of flow conditions or loading rates that can occur. Therefore, it must be kept in mind that the current critical loads used only represent the worst-case scenario that occurred during the sampling period.

The maximum enterococci load at which the recommended instream enterococci criteria will be met can be determined using a variation of the equation above. By setting C equal to the recommended enterococci criteria, the load will equal the TMDL. However, the TMDL is dependent on stream flow. Figures in Appendix A graphically illustrate that the TMDL is a continuum for the range of flows (Q) that can occur in the stream over time. The TMDL curve shown in this figure represents the TMDL for the period April through October when the recommended geometric mean standard is 35 counts/100 mL. The equation for this TMDL curve is:

$$TMDL = 35 \text{ counts (as an annual geometric mean)}/100 \text{ mL} \times Q$$

The graph shows the relationship between the current critical load ($L_{critical}$) and the TMDL. The TMDL is the load for the mean flow corresponding to the current critical load. This is the point where the current load exceeds the TMDL curve by the greatest amount. This critical TMDL can be represented by the following equation:

$$TMDL_{critical} = C_{standard} \times Q_{mean}$$

Where:

$TMDL_{critical}$ = critical enterococci TMDL load
$C_{standard}$ = enterococci standard of 35 counts/100 mL (as an annual geometric mean)
Q_{mean} = stream flow as an arithmetic mean

A geometric mean load that plots above the respective seasonal TMDL curve represents an exceedance of the instream enterococci standard. The difference between the current critical load and the TMDL curve represents the load reduction required for the stream segment to meet the appropriate instream enterococci standard. There is also a single sample maximum criterion (104 counts per 100 milliliters). If a single sample exceeds the maximum criterion, and the seasonal geometric mean criteria is also exceeded, then the TMDL is based on the criteria exceedance requiring the largest load reduction. The percent load reduction can be expressed as follows:

$$\text{Percent Load Reduction} = \frac{L_{critical} - TMDL_{critical}}{L_{critical}} \times 100$$

5.0 TOTAL MAXIMUM DAILY LOADS

A Total Maximum Daily Load (TMDL) is the amount of a pollutant that can be assimilated by the receiving waterbody without exceeding the recommended water quality criteria. In this case it is the recommended 2000 BEACH Act criteria for enterococci. A TMDL is the sum of the individual waste load allocations (WLAs) for point sources and load allocations (LAs) for nonpoint sources, as well as natural background (40 CFR 130.2) for a given waterbody. The TMDL must also include a margin of safety (MOS), either implicitly or explicitly, that accounts for the uncertainty in the relationship between pollutant loads and the water quality response of the receiving water body. TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measures. For enterococci bacteria, the TMDLs are expressed as counts per 30 days as a geometric mean.

A TMDL is expressed as follows:

$$TMDL = WLAs + LAs + MOS$$

The TMDL calculates the WLAs and LAs with a margin of safety to meet the stream's water quality standards. The allocations are based on estimates that use the best available data and provide the basis to establish or modify existing controls so that water quality standards can be achieved. In developing a TMDL, it is important to consider whether adequate data are available to identify the sources, and to understand the fate and transport of the pollutant to be controlled.

TMDLs may be developed using a phased approach. Under a phased approach, the TMDL includes: 1) WLAs that confirm existing limits and controls or lead to new limits, and 2) LAs that confirm existing controls or include implementing new controls (USEPA, 1991). A phased TMDL requires additional data be collected to determine if load reductions required by the TMDL are leading to the attainment of water quality standards.

Watershed based plans may be developed to address and assess both point and nonpoint sources. These plans establish a schedule or timetable for the installation and evaluation of source control measures, data collection, and assessment of water quality standard attainment. Future monitoring of the listed segment water quality may be used to evaluate this phase of the TMDL, and if necessary, to reallocate the loads.

The enterococci loads calculated for Kings Ferry County Park Beach include the sum of the total loads from all point and nonpoint sources for the segment. The load contributions to the listed segment from unlisted upstream segments are represented in the background loads. Point source loads originating in upstream segments are included in the background loads of the downstream segment. The following sections describe the various enterococci TMDL components.

5.1 Waste Load Allocations

5.1.1 Wastewater Treatment Facilities

The waste load allocation is the portion of the receiving water's loading capacity that is allocated to existing or future point sources. WLAs are provided to the point sources with flows greater than 0.1 MGD from municipal and industrial wastewater treatment systems with NPDES effluent limits for enterococci bacteria. There are no wastewater treatment facilities that discharge into the Ogeechee River within 25-miles upstream of Kings Ferry County Park Beach. There may be some wastewater treatment systems further upstream, but they do not have permit limits for enterococci. However, disinfection treatment methods currently employed by most wastewater treatment facilities should achieve enterococci limits of 35 counts/ 100mL.

5.1.2 Regulated Stormwater Discharges

State and Federal Rules define stormwater discharges covered by NPDES permits as point sources. However, stormwater discharges are from diffuse sources and there are multiple stormwater outfalls. Stormwater sources (point and nonpoint) are different than traditional NPDES permitted sources in four respects: 1) they do not produce a continuous (pollutant loading) discharge; 2) their pollutant loading depends on the intensity, duration, and frequency of rainfall events, over which the permittee has no control; 3) the activities contributing to the pollutant loading may include the various allowable activities of others, and control of these activities is not solely within the discretion of the permittee; and 4) they do not have wastewater treatment plants that control specific pollutants to meet numerical limits.

The intent of stormwater NPDES permits is not to treat the water after collection, but to reduce the exposure of stormwater to pollutants by implementing various controls. It would be infeasible and prohibitively expensive to control pollutant discharges from each stormwater outfall. Therefore, stormwater NPDES permits require the establishment of controls or BMPs to reduce the pollutants entering the environment.

The waste load allocations from stormwater discharges associated with MS4s (WLAsw) are estimated based on the percentage of urban area in each watershed covered by the MS4 stormwater permit. At this time, the portion of each watershed that goes directly to a permitted storm sewer and that which goes through non-permitted point sources, or is sheet flow or agricultural runoff, has not been clearly defined. Thus, it is assumed that approximately 70 percent of stormwater runoff from the regulated urban area is collected by the municipal separate storm sewer systems.

5.2 Load Allocation

The load allocation is the portion of the receiving water's loading capacity that is attributed to existing or future nonpoint sources or to natural background sources. Nonpoint sources are identified in 40 CFR 130.6 as follows:

- Residual waste;
- Land disposal;
- Agricultural and silvicultural;
- Mines;
- Construction;

- Saltwater intrusion; and
- Urban stormwater (non-permitted).

The LA is calculated as the remaining portion of the TMDL load available, after allocating the WLA, WLAsw, and the MOS, using the following equation:

$$LA = TMDL - (\Sigma WLA + \Sigma WLAsw + MOS)$$

As described above, there are two types of load allocations: loads to the stream independent of precipitation, including sources such as failing septic systems, leachate from landfills, animals in the stream, leaking sewer system collection lines, and background loads; and loads associated with enterococci accumulation on land surfaces that is washed off during storm events, including runoff from saturated LAS fields. At this time, it is not possible to partition the various sources of load allocations. Table 10 presents the Kings Ferry County Park Beach total load allocation for the current critical condition expressed as counts per 30 days. In the future, after additional data has been collected, it may be possible to partition the load allocation by source.

5.3 Seasonal Variation

The enterococci criteria are year round which provides the protection needed for recreation. The conditions for which this TMDL is developed are assumed to represent the conditions when enterococci levels are the highest. This TMDL will provide year-round protection of water quality. The base flow of a stream will generally range from low flows during critical conditions to higher flows at other times. Runoff from storm events will contribute additional flow to the stream. Seasonal variability in flow is addressed by expressing the TMDL as a concentration equal to the enterococci standard multiplied by the flow, resulting in a variable TMDL based on the seasonal flow.

Analyses of the available enterococci data and corresponding flows were performed to determine if the enterococci violations occurred during wet weather (high flow) or dry weather (low flow) conditions. The flow data from the sampling site was normalized by dividing the measured flow by the product of the average annual runoff (cfs/sq mile), published in Open-File Report 82-577 (Carter, 1982), and the appropriate drainage area. A plot of the normalized flows (Q/Q_o) versus enterococci is shown in Appendix B. The plot does not show a consistent relationship between enterococci concentrations and flow. The plot shows that the enterococci violations occur during both high (wet weather) and low (dry weather) flow conditions.

5.4 Margin of Safety

The MOS is a required component of TMDL development. There are two basic methods for incorporating the MOS: 1) implicitly incorporate the MOS using conservative modeling assumptions to develop allocations; or 2) explicitly specify a portion of the TMDL as the MOS and use the remainder for allocations. For this TMDL, an explicit MOS of 10 percent of the TMDL was used. The MOS values are presented in Table 10.

5.5 Total Enterococci Load

The enterococci TMDL for the listed stream segment is dependent on the stream flow and the applicable state water quality standard.

The total maximum enterococci loads for Georgia are given below:

TMDL = 35 counts (as an annual geometric mean)/100 mL x Q

TMDL = 104 counts (instantaneous)/100 mL x Q

For purposes of determining necessary load reductions required to meet the instream water quality criteria, the current critical TMDL was determined. This load is the product of the applicable enterococci standard and the mean flow used to calculate the current critical load. It represents the sum of the allocated loads from point (WLA and WLA_{sw}) and nonpoint (LA) sources located within the immediate drainage area of the listed segment and a margin of safety (MOS). For Kings Ferry County Park Beach there are no applicable WLAs. The individual TMDL components for this beach are presented in Table 10. .

The relationships of the current critical loads to the TMDLs are shown graphically in Appendix A. The vertical distance between the two values represents the load reductions necessary to achieve the TMDLs. As a consequence of the localized nature of the load evaluations, the calculated enterococci load reductions pertain to point and nonpoint sources occurring within the immediate drainage area of the listed segment. These current critical values represent a worst-case scenario for the limited set of data. Thus, the load reductions required are conservative estimates, and should be sufficient to prevent exceedances of the instream enterococci standard for a wide range of conditions.

Evaluation of the relationship between instream water quality and the potential sources of pollutant loading is an important component of TMDL development, and is the basis for later implementation of corrective measures and BMPs. For the current TMDLs, the association between enterococci loads and the potential sources occurring within the subwatersheds of each segment was examined on a qualitative basis.

Table 10. Enterococci Loads and Required Enterococci Load Reductions

Stream Segment	Current Load (counts/ 30 days)	TMDL Components					Percent Reduction
		WLA (counts/ 30 days)[1]	WLAsw (counts/ 30 days)	LA (counts/ 30 days)	MOS (counts/ 30 days)	TMDL (counts/ 30 days)	
Kings Ferry County Park Beach	2.00E+14	0.00E+00	1.44E+11	2.92E+13	3.26E+12	3.26E+13	84

6.0 RECOMMENDATIONS

The TMDL process consists of an evaluation of the subwatersheds for each 303(d) listed stream segment to identify, as best as possible, the sources of the enterococci loads causing the stream to exceed the recommended criteria. The TMDL analysis was performed using the best available data to specify WLAs and LAs that will meet enterococci water quality criteria so as to support the use classification specified for the listed segment.

This TMDL represents part of a long-term process to reduce enterococci loading to meet recommended water quality criteria in the Ogeechee River Basin. Implementation strategies will be reviewed and the TMDLs will be refined as necessary in the next phase (next five-year cycle). The phased approach will support progress toward water quality standards attainment in the future. In accordance with USEPA TMDL guidance, this TMDL may be revised based on the results of future monitoring and source characterization data efforts. The following recommendations emphasize further source identification and involve the collection of data to support the current allocations and subsequent source reductions.

6.1 Monitoring

Water quality monitoring is conducted at a number of locations along the coast each year. Sampling along the coast is conducted primarily by CRD personnel in Brunswick.

In the case where a watershed based plan has been developed for a listed beach segment, an appropriate water quality monitoring program will be outlined. The monitoring program will be developed to help identify the various fecal coliform sources. The monitoring program may be used to verify the 303(d) stream segment listings. This will be especially valuable for those segments where limited data resulted in the listing.

6.2 Enterococci Management Practices

Based on the findings of the source assessment, NPDES point source enterococci loads from wastewater treatment facilities usually do not significantly contribute to the impairment of the listed stream segments. This is because most facilities employ disinfection treatment methods that should achieve recommended enterococci levels. Sources of enterococci in urban areas include wastes that are attributable to domestic animals, leaks and overflows from sanitary sewer systems, illicit discharges of sanitary waste, leaking septic systems, runoff from improper disposal of waste materials, and leachate from both operational and closed landfills. In agricultural areas, potential sources of enterococci may include CAFOs, animals grazing in pastures, dry manure storage facilities and lagoons, chicken litter storage areas, and direct access of livestock to streams. Wildlife, especially waterfowl can be a significant source of enterococci bacteria.

Management practices are recommended to reduce enterococci source loads to the listed 303(d) stream segment, with the result of achieving the instream enterococci standard criteria. These recommended management practices include:

- Compliance with NPDES permit limits and requirements;
- Adoption of NRCS Conservation Practices; and
- Application of Best Management Practices (BMPs) appropriate to agricultural or urban land uses, where applicable.

6.2.1 Point Source Approaches

Point sources are defined as discharges of treated wastewater or stormwater into rivers and streams at discrete locations. The NPDES permit program provides a basis for municipal, industrial, and stormwater permits, monitoring and compliance with limitations, and appropriate enforcement actions for violations.

In accordance with EPD rules and regulations, all discharges from point source facilities are required to be in compliance with the conditions of their NPDES permit at all times. Municipal and industrial wastewater treatment facilities with the potential for fecal coliform in their discharge are given end-of-pipe limits to meet the applicable water quality standard. An exception is constructed wetland systems, which have a natural level of fecal coliform input from animals attracted to the artificial wetlands. In addition, the permits include routine monitoring and reporting requirements.

6.2.2 Nonpoint Source Approaches

EPD is responsible for administering and enforcing laws to protect the waters of the State. EPD is the lead agency for implementing the State's Nonpoint Source Management Program. Regulatory responsibilities that have a bearing on nonpoint source pollution include establishing water quality standards and use classifications, assessing and reporting water quality conditions, and regulating land use activities that may affect water quality. Georgia is working with local governments, agricultural and forestry agencies such as the Natural Resources Conservation Service, the Georgia Soil and Water Conservation Commission, and the Georgia Forestry Commission, to foster the implementation of BMPs to address nonpoint source pollution. In addition, public education efforts are being targeted to individual stakeholders to provide information regarding the use of BMPs to protect water quality. The following sections describe, in more detail, recommendations to reduce nonpoint source loads of enterococci bacteria in Georgia's surface waters.

6.2.2.1 Agricultural Sources

EPD should coordinate with other agencies that are responsible for agricultural activities in the state to address issues concerning enterococci loading from agricultural lands. It is recommended that information such as livestock populations by subwatershed, animal access to streams, manure storage and application practices be periodically reviewed so that watershed evaluations can be updated to reflect current conditions. It is also recommended that BMPs be utilized to reduce the amount of enterococci bacteria transported to surface waters from agricultural sources to the maximum extent practicable.

The following three organizations have primary responsibility for working with farmers to promote soil and water conservation, and to protect water quality:

University of Georgia (UGA) - Cooperative Extension Service;
Georgia Soil and Water Conservation Commission (GSWCC); and
Natural Resources Conservation Service (NRCS).

UGA has faculty, County Cooperative Extension Agents, and technical specialists who provide services in several key areas relating to agricultural impacts on water quality.

EPD designated the GSWCC as the lead agency for agricultural Nonpoint Source Management in the State. The GSWCC develops nonpoint source management programs and conducts

educational activities to promote conservation and protection of land and water devoted to agricultural uses.

The NRCS works with federal, state, and local governments to provide financial and technical assistance to farmers. The NRCS develops standards and specifications for BMPs that are to be used to improve, protect, and/or maintain our state's natural resources. In addition, every five years, the NRCS conducts the National Resources Inventory (NRI). The NRI is a statistically based sample of land use and natural resource conditions and trends that covers non-federal land in the United States.

The NRCS is also providing technical assistance to the GSWCC and the EPD with the Georgia River Basin Planning Program. Planning activities associated with this program will describe conditions of the agricultural natural resource base once every five years. It is recommended that the GSWCC and the NRCS continue to encourage BMP implementation, education efforts, and river basin surveys with regard to river basin planning.

6.2.2.2 Urban Sources

Both point and nonpoint sources of enterococci bacteria can be significant in the Ogeechee River Basin urban areas. Urban sources of enterococci can best be addressed using a strategy that involves public participation and intergovernmental coordination to reduce the discharge of pollutants to the maximum extent practicable. Management practices, control techniques, public education, and other appropriate methods and provisions may be employed. In addition to water quality monitoring programs, discussed in Section 6.1, the following activities and programs conducted by cities, counties, and state agencies are recommended:

Uphold requirements that all new and replacement sanitary sewage systems be designed to minimize discharges into storm sewer systems;

Further develop and streamline mechanisms for reporting and correcting illicit connections, breaks, surcharges, and general sanitary sewer system problems;

Maintain compliance with stormwater NPDES permit requirements; and

Continue efforts to increase public awareness and education towards the impact of human activities in urban settings on water quality, ranging from the consequences of industrial and municipal discharges to the activities of individuals in residential neighborhoods.

6.3 Reasonable Assurance

Permitted discharges will be regulated through the NPDES permitting process described in this report. An allocation to a point source discharger does not automatically result in a permit limit or a monitoring requirement. Through its NPDES permitting process, EPD will determine whether a new or existing discharger has a reasonable potential of discharging enterococci levels equal to or greater than the total allocated load. The results of this reasonable potential analysis will determine the specific type of requirements in an individual facility's NPDES permit. As part of its analysis, EPD will use its USEPA approved 2003 NPDES Reasonable Potential Procedures to determine whether monitoring requirements or effluent limitations are necessary.

Georgia is working with local governments, agricultural and forestry agencies, such as the Natural Resources Conservation Service, the Georgia Soil and Water Conservation Commission, and the Georgia Forestry Commission, to foster the implementation of best management practices to address nonpoint sources. In addition, public education efforts will be targeted to individual stakeholders to provide information regarding the use of best management practices to protect water quality.

6.4 Public Participation

A thirty-day public notice was provided for this TMDL. During this time, the TMDL was available on the GA EPD website, a copy of the TMDL was provided on request, and the public was invited to provide comments on the TMDL.

7.0 INITIAL TMDL IMPLEMENTATION PLAN

This plan identifies applicable State-wide programs and activities that may be employed to manage point and nonpoint sources of bacteria loads for one segment in the Ogeechee River Basin. Local watershed planning and management initiatives will be fostered, supported, or developed through a variety of mechanisms. Implementation may be addressed by Watershed-Based Plans or other assessments funded by Section 319 (h) grants, the local development of watershed protection plans, or "Targeted Outreach" initiated by EPD. These initiatives will supplement or possibly replace this initial implementation plan.

7.1 Impaired Segments

This initial plan is applicable to the following beach that was added to Georgia's 303(d) list available on the EPD website (www.epd.georgia.gov):

Water Bodies Listed on the 2014 303(d) List for Enterococci Bacteria in the Ogeechee River Basin

Beach Segment	Location	Reach ID	Beach Length (miles)	Designated Use
Kings Ferry County Park Beach	US Hwy 17 Kings Ferry Bridge on Ogeechee River - Entire Beach	R030602040306	0.04	Recreation

Enterococci bacteria are used as an indicator of the potential presence of pathogens in a stream. The water use classification for Kings Ferry County Park Beach is Recreation. The criterion violated is listed as enterococci. The potential cause listed is nonpoint sources. The use classification water quality standards for bacteria, as stated in the *State of Georgia's Rules and Regulations for Water Quality Control*, Chapter 391-3-6-.03(6)(b)(i) (GA EPD, 2013), are:

(b) Recreation: General recreational activities such as water skiing, boating, and swimming, or for any other use requiring water of a lower quality, such as recreational fishing. These criteria are not to be interpreted as encouraging water contact sports in proximity to sewage or industrial waste discharges regardless of treatment requirements:

(i) Bacteria: Fecal coliform not to exceed the following geometric means based on at least four samples collected from a given sampling site over a 30-day period at intervals not less than 24 hours:
1. Coastal waters 100 per 100 mL
2. All other recreational waters 200 per 100 mL
3. Should water quality and sanitary studies show natural fecal coliform levels exceed 200/100 mL (geometric mean) occasionally in high quality recreational waters, then the allowable geometric mean fecal coliform level shall not exceed 300 per 100 mL in lakes and reservoirs and 500 per 100 mL in free flowing fresh water streams.

The 2000 Beaches Environmental Assessment and Coastal Health (BEACH) Act required States with coastal recreation waters to adopt by Aril 10, 2004, bacteria criteria that are "as protective of human health as" the 1986 EPA bacteria criteria. There is currently no standard for

enterococci bacteria in the *State of Georgia's Rules and Regulations for Water Quality Control.* EPD is following the 2000 BEACH Act recommendation for enterococci bacteria of a geometric mean of 35 per 100 mL or a single sample of 104 per 100 mL. The EPD is currently in the process of adopting the Environmental Protection Agency's (EPA) 2012 Recreational Water Quality Criteria that recommend enterococci levels not to exceed a geometric mean of 35 per 100 mL. The geometric mean duration shall not be greater than 30 days. No greater than a ten percent excursion frequency of an enterococci statistical threshold value (STV) of 130 CFU per 100 mL the same 30 day interval.

7.2 Potential Sources

An important part of the TMDL analysis is the identification of potential source categories. A source assessment characterizes the known and suspected bacteria sources in the watershed.

Sources are broadly classified as either point or nonpoint sources. A point source is defined as a discernable, confined, and discrete conveyance from which pollutants are or may be discharged to surface waters. Point sources of bacteria include NPDES permittees discharging treated wastewater and stormwater. Nonpoint sources of bacteria are diffuse sources that cannot be identified as entering the water body at a single location. These sources generally involve land use activities that contribute bacteria to streams during a rainfall runoff event.

NPDES point source enterococci loads from wastewater treatment facilities usually do not contribute to impairments. This is because most facilities employ disinfection treatment methods that should achieve recommended enterococci levels. However, point sources can and do fail, which may contribute to bacteria loads through leaks and overflows from sanitary sewer systems, CAFOs, or leachate from operational landfills.

Nonpoint sources of enterococci in urban areas include wastes that are attributable to domestic animals, illicit discharges of sanitary waste, leaking septic systems, runoff from improper disposal of waste materials, and leachate from closed landfills. In non-urban areas, potential sources of enterococci may include animals grazing in pastures, dry manure storage facilities and lagoons, chicken litter storage areas, and direct access of livestock to streams. Wildlife, especially waterfowl, can be a significant source of enterococci bacteria.

7.3 Management Practices and Activities

EPD is responsible for administering and enforcing laws to protect the waters of the State and is the lead agency for implementing the State's Nonpoint Source Management Program. Georgia is working with local governments, agricultural and forestry agencies such as the Georgia Department of Agriculture, the Natural Resource Conservation Service (NRCS), the Georgia Soil and Water Conservation Commission (GSWCC), and the Georgia Forestry Commission (GFC) to foster implementation of BMPs that address nonpoint source pollution. The following management practices are recommended to reduce enterococci loads to stream segments:

- Sustained compliance with NPDES permit limits and requirements where applicable;
- Adoption of NRCS Conservation Practices for primarily agricultural lands;
- Application of BMPs appropriate to specific non-urban and urban land uses;
- Further development and streamlining of local jurisdictional mechanisms for identifying, reporting, and correcting illicit connections, breaks, and other sanitary sewer system problems;
- Adoption of local ordinances (i.e. septic tanks, stormwater, etc.) that address local water quality; and

- Ongoing public education efforts on the sources of enterococci and common sense approaches to lessen the impact of this contaminant on surface waters.

Public education efforts target individual stakeholders to provide information regarding the use of BMPs to protect water quality. EPD will continue efforts to increase awareness and educate the public about the impact of human activities on water quality.

7.4 Monitoring

EPD encourages local governments and municipalities to develop water quality monitoring programs. These programs can help pinpoint various enterococci sources, as well as verify the 303(d) stream segment listings. This will be particularly valuable for those segments where listing was based on limited data. In addition, regularly scheduled sampling will determine if there has been some improvement in the water quality of the listed beach segment. EPD is available to assist in providing technical guidance regarding the preparation of monitoring plans and Sampling Quality Assurance Plans (SQAP).

7.5 Future Action

This Initial TMDL Implementation Plan includes a general approach to pollutant source identification as well as management practices to address pollutants. In the future, EPD will continue to determine and assess the appropriate point and non-point source management measures needed to achieve the TMDL and also to protect and restore water quality in impaired waterbodies.

For point sources, any wasteload allocations for wastewater treatment plant facilities will be implemented in the form of water-quality based effluent limitations in NPDES permits. Any wasteload allocations for regulated stormwater will be implemented in the form of best management practices in the NPDES permits. Contributions of bacteria from regulated communities may also be managed using permit requirements such as watershed assessments, watershed protection plans, and long term monitoring. These measures will be directed through current point source management programs.

EPD will work to support watershed restoration, improvement and protection projects that address nonpoint source pollution. This is a process whereby EPD and/or Regional Commissions or other agencies or local governments, under a contract with EPD, will develop a watershed management plan intended to address water quality at the small watershed level (HUC 10 or smaller). These plans will be developed as resources and willing partners become available. The development of these plans may be funded via several grant sources, including but not limited to, Clean Water Act Section 319(h), Section 604(b), and/or Section 106 grant funds. These plans are intended for implementation upon completion.

Any watershed management plan that specifically addresses a waterbody contained within this TMDL will supersede this Initial TMDL Implementation Plan for that waterbody, once EPD accepts and/or approves the plan. Watershed management plans intended to address this TMDL and other water quality concerns, prepared for EPD, and for which EPD and/or the EPD Contractor are responsible, will contain at a minimum the US EPA's 9 Elements of Watershed Planning:

1) An identification of the sources or groups of similar sources contributing to nonpoint source pollution to be controlled to implement load allocations or achieve water quality standards. Sources should be identified at the subcategory level with estimates of the extent to which they are present in the watershed (e.g., X numbers

of cattle feedlots needing upgrading, Y acres of row crops needing improved bacteria control, or Z linear miles of eroded streambank needing remediation);

2) An estimate of the load reductions expected for the management measures;

3) A description of the NPS management measures that will need to be implemented to achieve the load reductions established in the TMDL or to achieve water quality standards;

4) An estimate of the sources of funding needed, and/or authorities that will be relied upon, to implement the plan;

5) An information/education component that will be used to enhance public understanding of and participation in implementing the plan;

6) A schedule for implementing the management measures that is reasonably expeditious;

7) A description of interim, measurable milestones (e.g., amount of load reductions, improvement in biological or habitat parameters) for determining whether management measures or other control actions are being implemented;

8) A set of criteria that can be used to determine whether substantial progress is being made towards attaining water quality standards and, if not, the criteria for determining whether the plan needs to be revised; and;

9) A monitoring component to evaluate the effectiveness of the implementation efforts, measured against the criteria established under item (8).

The public will be provided an opportunity to participate in the development of watershed management plans that are prepared for EPD, and for which EPD and/or the EPD Contractor are responsible, and will be able to comment on them before they are finalized.

EPD will offer technical and financial assistance, when and where available, in the preparation of watershed management plans that address the impaired waterbodies listed in this TMDL document. Assistance may include but will not be limited to:

- Assessments of pollutant sources within watersheds;
- Determinations of appropriate management practices to address impairments;
- Identification of potential stakeholders and other partners;
- Developing a plan for outreach to the general public and other groups;
- Assessing the resources needed to implement the plan upon completion; and
- Other needs determined by the lead organization responsible for plan development.

EPD will also make this same assistance available, if needed, to proactively address water quality concerns. This assistance may be in the way of financial, technical, or other aid and may be requested and provided outside of the TMDL process or schedule.

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Appendix A

30-day Geometric Mean Enterococci Monitoring Data

Water Quality Monitoring Stations

Stream Segment	Location	CRD Monitoring Station	Monitoring Station Description
Kings Ferry County Park Beach	US Hwy 17 Kings Ferry Bridge on Ogeechee River - Entire Beach	KING	Kings Ferry County Park Beach

Figure A-1
Enterococci Geometric Mean Loads, Critical Load, and TMDL Curve
Kings Ferry County Park Beach at US Hwy 17 Kings Ferry Bridge on the Ogeechee River

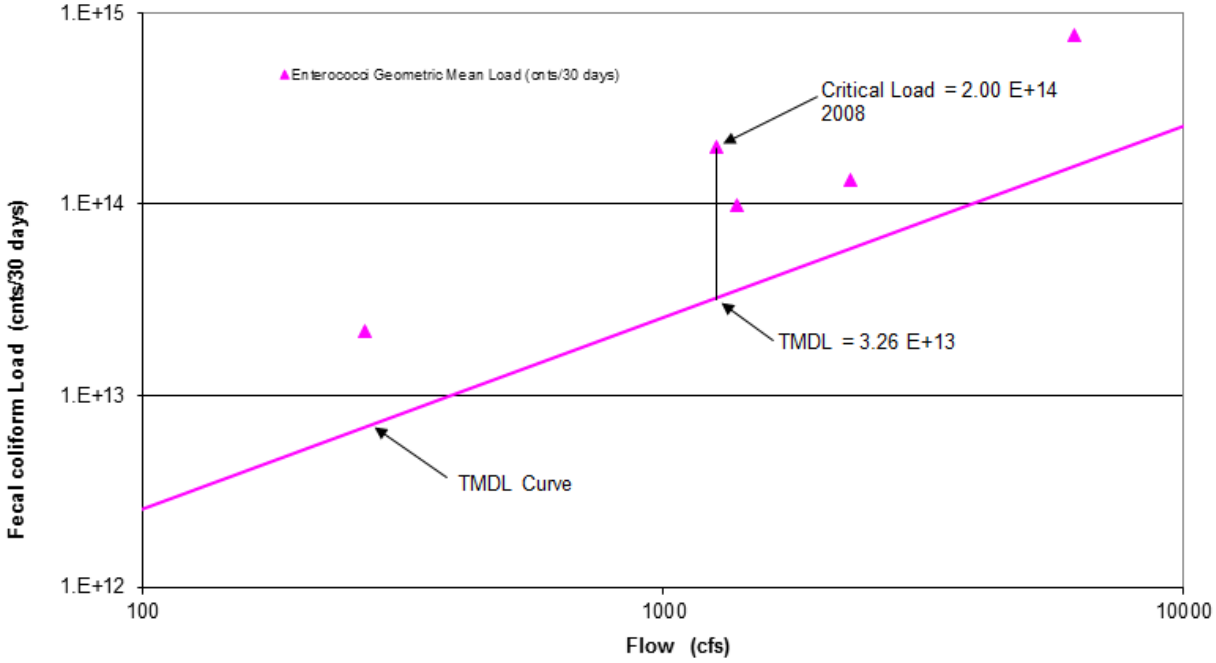
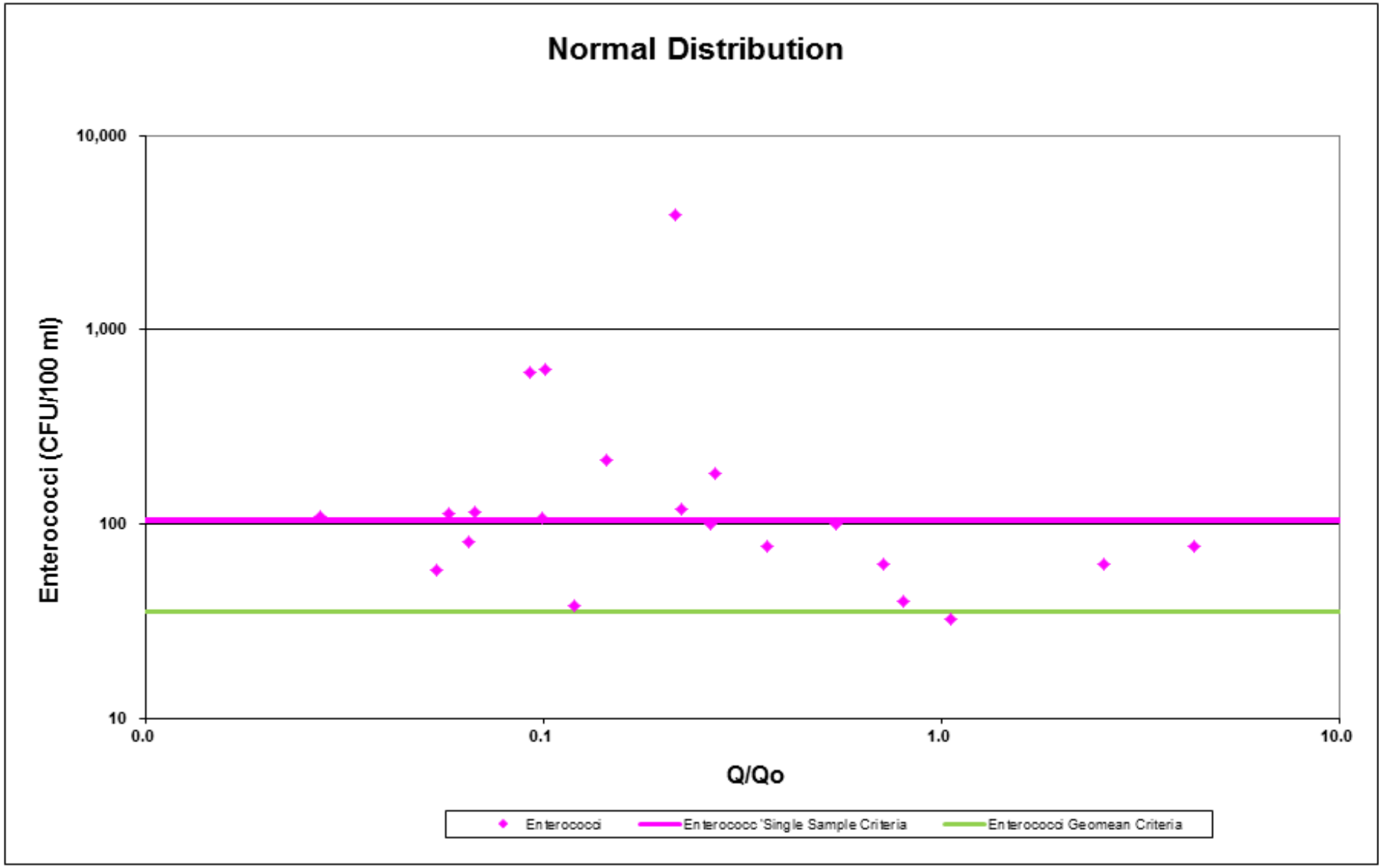


Table A-1. Data for Figure A-1

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (counts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
3/27/2008	32	3728.5				
6/26/2008	80	230.6				
8/27/2008	600	326.7				
12/1/2008	3900	757.2				
12/8/2008	76	1294.1	**214.6**	**1267.4**	**2.00E+14**	**3.26E+13**
4/14/2009	77	15247.3				
6/16/2009	100	1931.4				
9/1/2009	620	358.0	168.4	6157.6	7.61E+14	1.58E+14
4/13/2010	40	2833.9				
5/25/2010	180	952.2				
7/13/2010	107	351.7				
9/21/2010	114	237.1	96.8	1381.4	9.82E+13	3.55E+13
2/24/2011	62	2525.6				
5/10/2011	213	512.1				
8/1/2011	109	97.4				
10/13/2011	58	190.3	110.4	266.6	2.16E+13	6.85E+12
1/10/2012	38	422.0				
4/3/2012	100	928.7				
10/9/2012	113	205.6				
1/2/2013	118	787.2				
4/2/2013	62	9070.8	79.3	2282.8	1.33E+14	5.86E+13

Appendix B

Normalized Flows Versus Enterococci Plots


Normal Distribution
10,000
1,000
100
10
Enterococci (CFU/100 ml)
0.0
0.1
1.0
10.0
Q/Qo
Enterococci
Enterococci Single Sample Criteria
Enterococci Geomean Criteria