Total Maximum Daily Load

for

Fecal Coliforms

in

Pinellas Park Ditch No. 5

(WBID 1668B)

Pinellas County, Florida

March 2008

EPA United States Environmental Protection Agency

Region 4 serving the southeast

In compliance with the provisions of the Federal Clean Water Act, 33 U.S.C §1251 et. seq., as amended by the Water Quality Act of 1987, P.L. 400-4, the U.S. Environmental Protection Agency is hereby establishing this Total Maximum Daily Load (TMDL) for fecal coliforms in Pinellas Park Ditch No. 5 (WBID 1668B). Subsequent actions must be consistent with this TMDL.

_____/s/_____ _03/31/08_

James D. Giattina
Director
Water Management Division

Date

Acknowledgments

EPA would like to acknowledge that the contents of this report and the total maximum daily load (TMDL) contained herein were developed by the Florida Department of Environmental Protection (FDEP). For this reason, many of the text and figures may not read as though EPA is the primary author, but EPA is officially establishing this TMDL for fecal coliforms in Pinellas Park Ditch #5 (WBID 1668B) in order to meet consent decree requirements pursuant to the Consent Decree entered in the case of Florida Wildlife Federation, et al. v. Carol Browner, et al., Case No. 98-356-CIV-Stafford.

This study could not have been accomplished without significant contributions from staff in the Florida Department of Environmental Protection's (FDEP) Watershed Assessment Section.

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Geographic Information Systems (GIS) and map production assistance was provided by Janis Paulsen.

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Florida Department of Environmental Protection, Bureau of Watershed Management

Total Maximum Daily Load (TMDL) Program

http://www.dep.state.fl.us/water/tmdl/index.htm

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http://www.dep.state.fl.us/water/tmdl/docs/AmendedIWR.pdf

Florida STORET Program

http://www.dep.state.fl.us/water/storet/index.htm

2006 305(b) Report

http://www.dep.state.fl.us/water/tmdl/docs/2006_Integrated_Report.pdf

Criteria for Surface Water Quality Classifications

http://www.dep.state.fl.us/water/wqssp/classes.htm

Water Quality Status and Assessment Reports for the Coastal Pinellas County-Springs Coast Basin
http://www.dep.state.fl.us/water/basin411/springscoast/index.htm

Allocation Technical Advisory Committee (ATAC) Report

http://www.dep.state.fl.us/water/tmdl/docs/Allocation.pdf

U.S. Environmental Protection Agency, National STORET Program

Region 4: Total Maximum Daily Loads in Florida

http://www.epa.gov/region4/water/tmdl/florida/

National STORET Program

http://www.epa.gov/storet/

SUMMARY SHEET
Total Maximum Daily Load (TMDL)

1. **303(d) Listed Waterbody Information**
   State: Florida
   Major River Basins: Springs Coast Basin

1998 303(d) Listed Waterbodies for TMDLs addressed in this report:

WBID	Segment Name	County	Class and Waterbody Type	Constituent(s)
1668B	Pinellas Park Ditch No. 5	Pinellas	III freshwater	Fecal Coliforms

2. TMDL Endpoints (i.e., Targets)

Fecal Coliform: The most probable number (MPN) or membrane filter (MF) counts per 100 milliliter (ml) of fecal coliform bacteria shall not exceed a monthly average of 200, nor exceed 400 in 10 percent of the samples, nor exceed 800 on any one day. Monthly averages shall be expressed as geometric means based on a minimum of 10 samples taken over a 30-day period.

3. TMDL Approach

The TMDLs were analyzed using a load duration curve approach. Since exceedances occurred between "moist" and "dry" flow zones, the percent reduction for the TMDL is represented by the median value of the percent reductions between the 10^{th} and the 90^{th} percentile flows.

4. TMDL Allocations

Parameter	Zone	TMDL (colonies/day)	WLA		LA	MOS
			Wastewater (colonies/day)	NPDES Stormwater (percent reduction)	(percent reduction)	
Fecal Coliform	Median 10^{th} & 90^{th} Percentile	2.0×10^{10}	N.A.	71	71	Implicit

WLA - Waste Load Allocation
TMDL - Total Maximum Daily Load
LA - Load allocation
MOS - Margin of Safety

5. **Endangered Species (yes or blank):** Yes

6. **USEPA Lead on TMDL (USEPA or blank):**

7. **TMDL Considers Point Source, Nonpoint Source, or both:** Both

8. **Major NPDES Discharges to surface waters addressed in USEPA TMDL:** None

Chapter 1: INTRODUCTION

1.1 Purpose of Report

This report presents the Total Maximum Daily Load (TMDL) for fecal coliform bacteria for Pinellas Park Ditch No. 5, which is located in the Anclote River / Coastal Pinellas County Planning Unit, which is part of the larger Springs Coast Basin. The TMDL establishes the allowable loadings to Pinellas Park Ditch No. 5 that would restore the waterbody so that it meets its applicable water quality criteria for fecal coliform bacteria.

1.2 Identification of Waterbody

The Pinellas Park Ditch No. 5 waterbody segment is located within the Long Bayou Watershed, in the west central portion of Pinellas County, Florida, (Figure 1.1). For assessment purposes, the FDEP identified Pinellas Park Ditch No. 5 as a water assessment polygon with a unique **w**ater**b**ody **id**entification (WBID) number designated 1668B (Figure 1.2).

Pinellas Park Ditch No. 5, discharges to Saint Joes Creek which flows into the Cross Bayou, Long Bayou and the Boca Ciega Bay estuaries. The Pinellas Park Ditch No. 5 watershed has a surface area of 0.6 square miles and is entirely within Pinellas County.

Pinellas Park Ditch No. 5 is a free flowing freshwater system which flows into the estuarine segment of Saint Joes Creek. The channel length is approximately 1.3 miles and has concrete lined banks along most of its length. The watershed is part of the Pinellas Park Water Management District, which manages the basins within its jurisdiction for stormwater drainage pursuant to Florida Statute.

Land use in the WBID is predominantly residential, with 45 percent of the area designated as such. Major urban areas include portions of the City of Pinellas Park and the City of St. Petersburg. In 2003, the population of the City of Pinellas Park was 46,449, according to the U.S. Census Bureau. Based on the population density of the City of Pinellas Park (3095.8 persons/square mile) the estimated existing population in the Pinellas Park Ditch No. 5 WBID area is estimated at 7863.

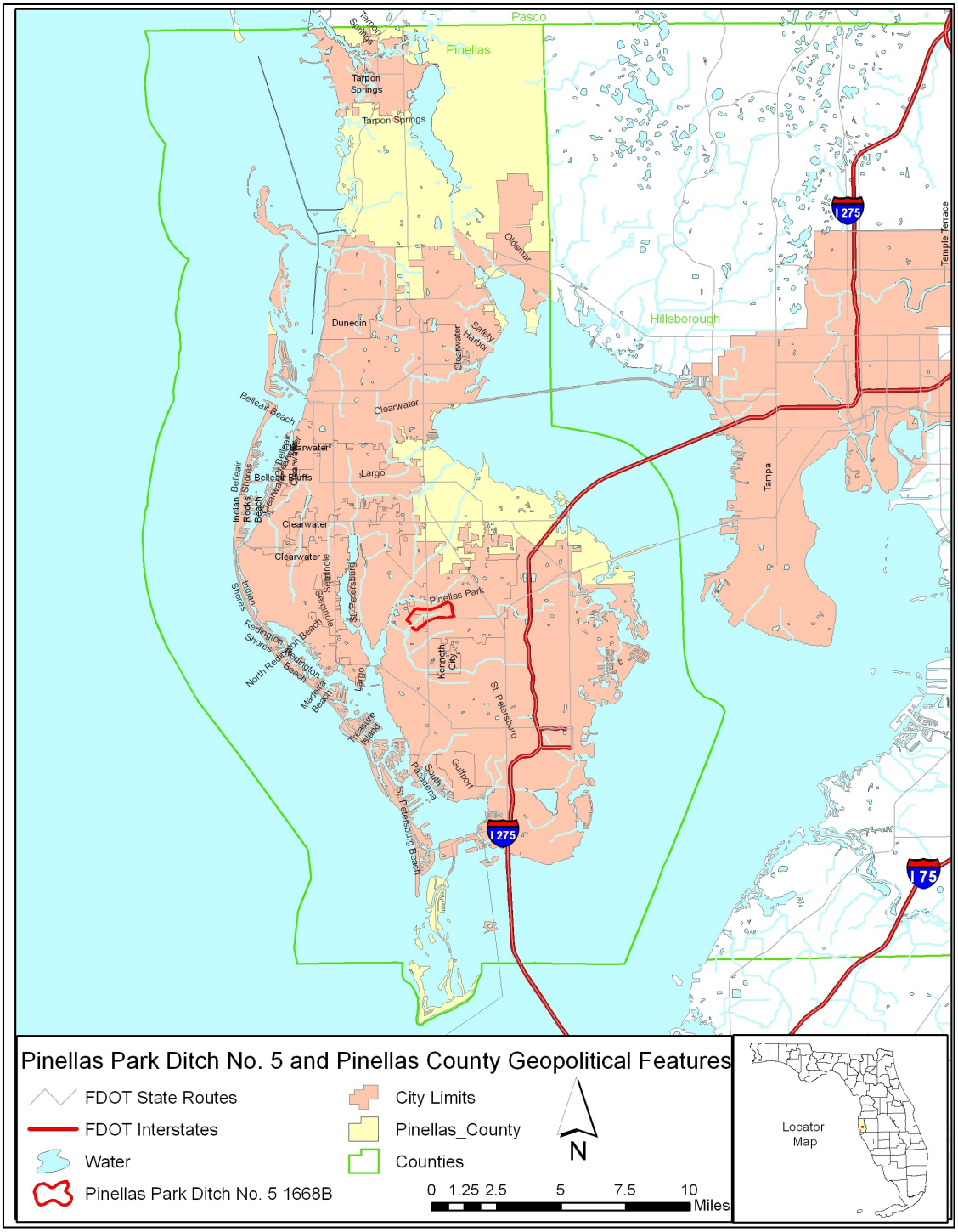

Figure 1.1 Pinellas Park Ditch No. 5, WBID 1668B, and Major Geopolitical Features in the Coastal Pinellas County Springs Coast Basin

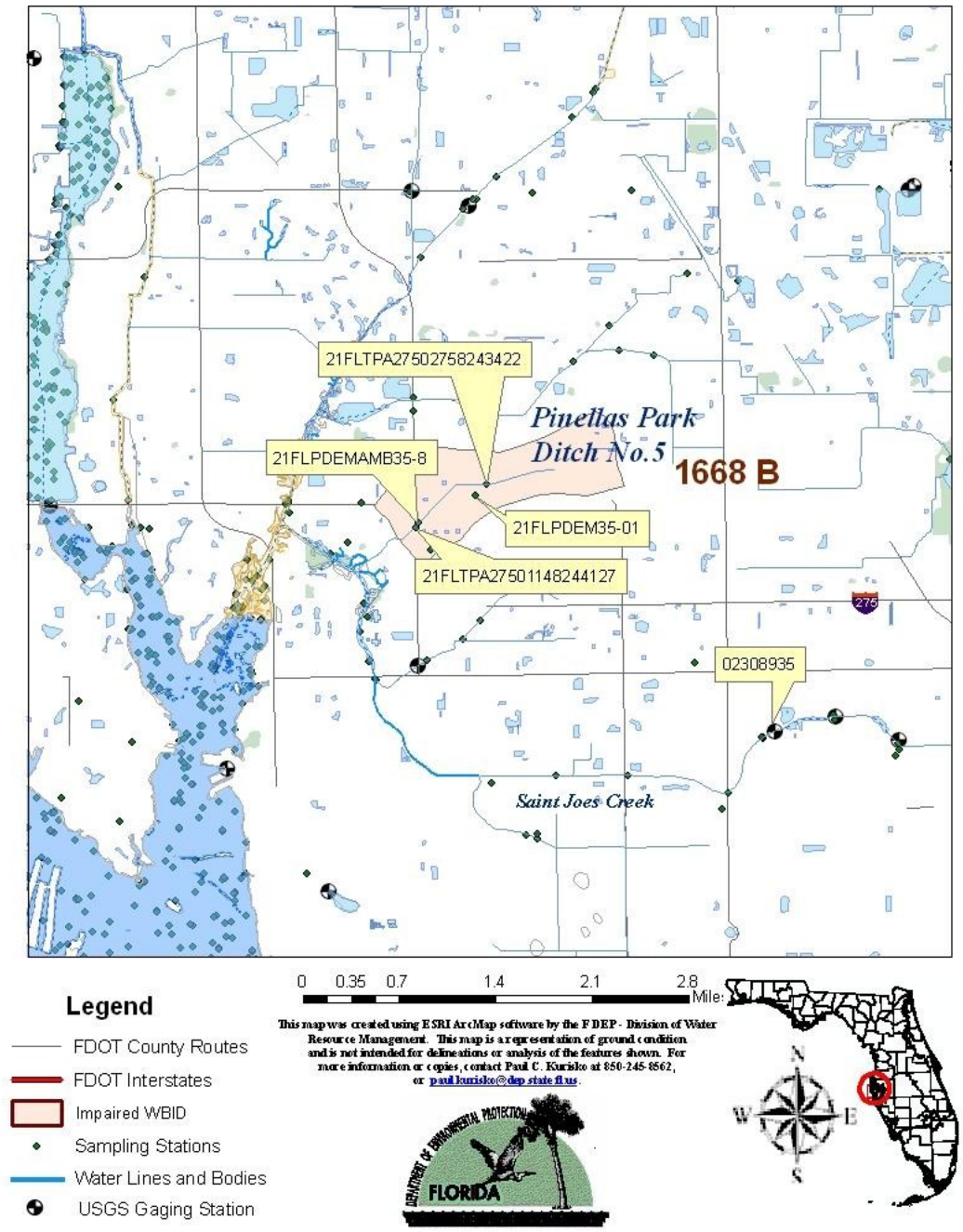

Figure 1.2 Pinellas Park Ditch No. 5, WBID 1668B, and Monitoring Locations

1.3 Background

This report was developed as part of the FDEP's watershed management approach for restoring and protecting state waters and addressing TMDL Program requirements. The watershed approach, which is implemented using a cyclical management process that rotates through the state's 52 river basins over a 5-year cycle, provides a framework for implementing the TMDL Program–related requirements of the 1972 federal Clean Water Act and the 1999 Florida Watershed Restoration Act (FWRA) (Chapter 99-223, Laws of Florida).

A TMDL represents the maximum amount of a given pollutant that a waterbody can assimilate and still meet water quality standards, including its applicable water quality criteria and its designated uses. TMDLs are developed for waterbodies that are verified as not meeting their water quality standards. They provide important water quality restoration goals that will guide restoration activities.

This TMDL report will be followed by the development and implementation of a Basin Management Action Plan, or BMAP, to reduce the amount of fecal coliform bacteria that caused the verified impairment of Pinellas Park Ditch No. 5. These activities will depend heavily on the active participation of the Southwest Florida Water Management District (SWFWMD), local governments, businesses, and other stakeholders. The FDEP will work with these organizations and individuals to undertake or continue reductions in the discharge of pollutants and achieve the established TMDLs for impaired waterbodies.

Chapter 2: DESCRIPTION OF WATER QUALITY PROBLEM

2.1 Statutory Requirements and Rulemaking History

Section 303(d) of the Federal Clean Water Act requires states to submit to the U.S. Environmental Protection Agency (EPA) a list of surface waters that do not meet applicable water quality standards (impaired waters) and establish a TMDL for each pollutant identified as causing the impairment of the listed waters on a schedule. The FDEP has developed such lists, commonly referred to as 303(d) lists, since 1992. The list of impaired waters in each basin, referred to as the Verified List, is also required by the FWRA (Subsection 403.067[4], Florida Statutes [F.S.]), and the state's 303(d) list is amended annually to include basin updates.

Florida's 1998 303(d) list included 22 waterbodies (WBIDs) in the Springs Coast Basin. However, the FWRA (Section 403.067, F.S.) stated that all previous Florida 303(d) lists were for planning purposes only and directed the FDEP to develop, and adopt by rule, a new science-based methodology to identify impaired waters. After a long rulemaking process, the Environmental Regulation Commission adopted the new methodology as Rule 62-303, Florida Administrative Code (F.A.C.) (Identification of Impaired Surface Waters Rule, or IWR), in April 2001, and as amended.

2.2 Information on Verified Impairment

The FDEP used the IWR to assess water quality impairments in Pinellas Park Ditch No. 5 and verified the impairments for fecal coliform bacteria. **Table 2.1.** and **Table 2.2.** summarize the data collected during the verification period (January 1, 1999, to June 30, 2006). The segment was verified as impaired for fecal coliform bacteria because more than 10 percent of values exceeded the Class III freshwater criterion of 400 counts per 100 milliliters (counts/100mL) for fecal coliforms (21 out of 28 samples in the verified period exceeded the criteria of 400 counts/100mL).

The verified impairments were based on data collected by FDEP's Southwest District. These include two STORET Stations: 21FLTPA 27502758243422 and 21FLTPA 27501148244127. (Note that an audit of the Southwest District Laboratory was conducted in May 2007 by the FDEP Environmental Assessment Section. The purpose of the audit was to evaluate data for TMDL listing purposes. The results of the audit and a discussion of its applicability to the Pinellas Park Ditch No. 5 TMDL data, is provided in Section 5.2.)

Figure 1.2. shows the locations of the sampling sites. **Figure 2.1.** displays the fecal coliform data collected from May 2005 through May 2006, and **Appendix A** tabulates all available fecal coliform data for the impaired segment. Fecal coliform values exceeding the criteria of 400 counts/100mL during this period were used to develop the TMDL, as described in Chapter 5.

Table 2.1. Verified Impairment in the Pinellas Park Ditch No. 5, WBID 1668B

Parameter Causing Impairment	Priority for TMDL Development	Projected Year for TMDL Development*
Fecal Coliform	High	2006

*The TMDL was scheduled to be completed by December 31, 2004, based on a Consent Decree between the EPA and Earthjustice, but the Consent Decree allows a nine-month extension for completing the TMDL.

Table 2.2. Summary of Fecal Coliform Data for the Pinellas Park Ditch No. 5, WBID 1668B, May 2005 to May 2006

Water Body	Parameter Causing Impairment	Total Number of Samples	30-Day Geometric Mean	Percent Fecal Coliform Samples > 400 counts/100mL	Minimum Concentration (counts/100mL)	Maximum Concentration (counts/100mL)
Pinellas Park Ditch No. 5	Fecal Coliform	28	N/A	75	1	20,000

N/A – Not Available
mL – milliliters

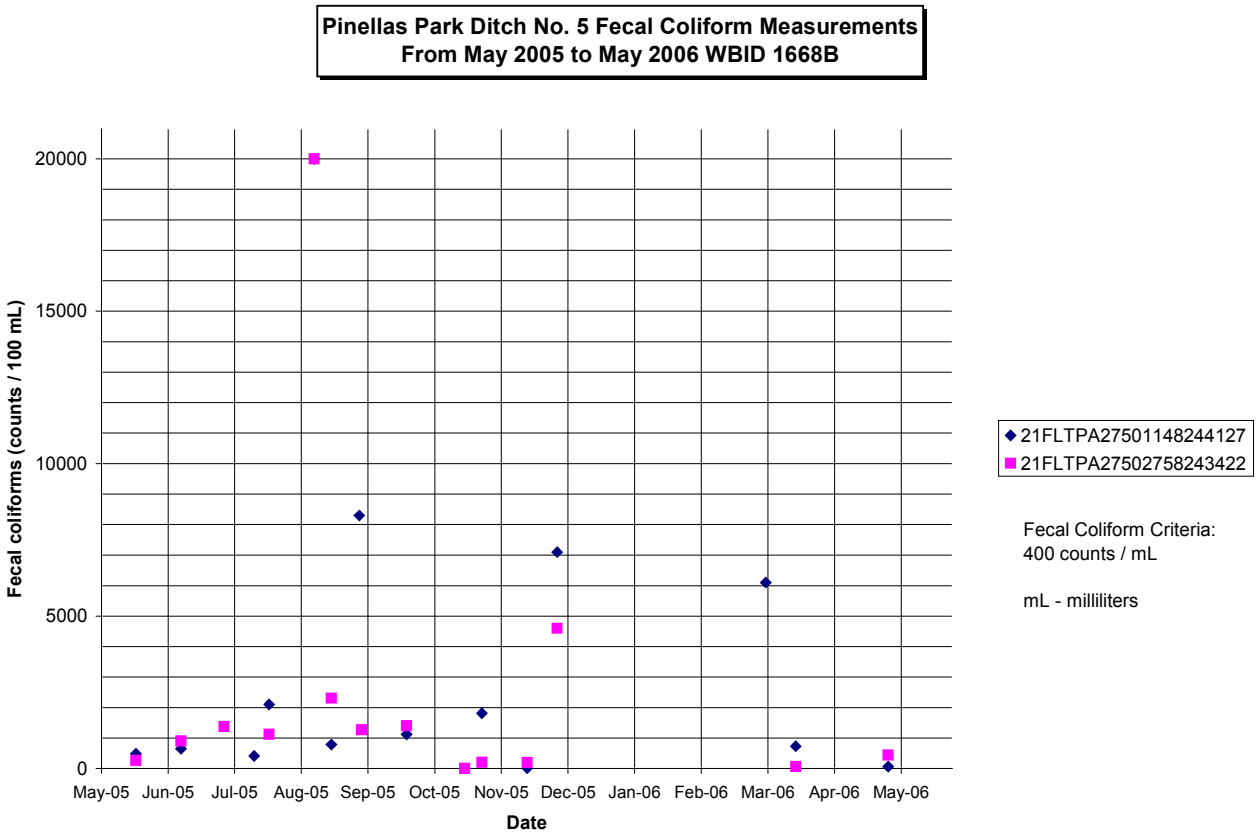

Figure 2.1. Fecal Coliform Measurements for the Pinellas Park Ditch No. 5, WBID 1668B, May 2005 – May 2006.

Chapter 3. DESCRIPTION OF APPLICABLE WATER QUALITY STANDARDS

3.1 Classification of the Waterbody and Criteria Applicable to the TMDL

Florida's surface waters are protected for five designated use classifications, as follows:

Class I Potable water supplies
Class II Shellfish propagation or harvesting
Class III Recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife
Class IV Agricultural water supplies
Class V Navigation, utility, and industrial use (there are no state waters currently in this class)

Pinellas Park Ditch No. 5 is a Class III waterbody, with a designated use of recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife. The Class III water quality criterion applicable to the impairment addressed by this TMDL is for fecal coliform bacteria.

3.2 Applicable Water Quality Standards and Numeric Water Quality Target

3.2.1 Fecal Coliform Criterion

Numeric criteria for bacterial quality are expressed in terms of fecal coliform bacteria concentrations. The water quality criterion for the protection of Class III waters, as established by Rule 62-302, F.A.C., is as follows:

> ***Fecal Coliform Bacteria:***
> *The most probable number (MPN) or membrane filter (MF) counts per 100 mL of fecal coliform bacteria shall not exceed a monthly average of 200, nor exceed 400 in 10 percent of the samples, nor exceed 800 on any one day.*

For fecal coliform, the criterion states that monthly averages shall be expressed as geometric means, based on a minimum of 10 samples taken over a 30-day period. However, during the development of load curves for the impaired segment (as described in subsequent chapters), there were insufficient data (fewer than 10 samples in a given month) available to evaluate the geometric mean criterion for fecal coliform bacteria. Therefore, the fecal coliform criterion selected for the TMDL is that values are not to exceed 400 counts/100mL in more than 10 percent of the samples. The 10 percent exceedance allowed by the water quality criterion was not used directly in estimating the target load, but was included in the TMDL margin of safety (MOS) (described in **Section 6.4**).

Chapter 4: ASSESSMENT OF SOURCES

4.1 Types of Sources

An important part of the TMDL analysis is the identification of pollutant source categories, source subcategories, or individual sources of the pollutant causing impairment in the watershed and the amount of pollutant loading contributed by each of these sources. Sources are broadly classified as either "point sources" or "nonpoint sources." Historically, the term "point sources" has meant discharges to surface waters that typically have a continuous flow via a discernable, confined, and discrete conveyance, such as a pipe. Domestic and industrial wastewater treatment facilities (WWTFs) are examples of traditional point sources. In contrast, the term "nonpoint sources" was used to describe intermittent, rainfall-driven, diffuse sources of pollution associated with everyday human activities, including runoff from urban land uses, agriculture, silviculture, and mining; discharges from failing septic systems; and atmospheric deposition.

However, the 1987 amendments to the Clean Water Act redefined certain nonpoint sources of pollution as point sources subject to regulation under the EPA's National Pollutant Discharge Elimination System (NPDES) Program. These nonpoint sources included certain urban stormwater discharges, including those from local government master drainage systems, construction sites over 5 acres, and a wide variety of industries (see **Appendix B** for background information on the federal and state stormwater programs).

To be consistent with Clean Water Act definitions, the term "point source" will be used to describe traditional point sources (such as domestic and industrial wastewater discharges) and stormwater systems requiring an NPDES stormwater permit when allocating pollutant load reductions required by a TMDL (see **Section 6.1**). However, the methodologies used to estimate nonpoint source loads do not distinguish between NPDES stormwater discharges and non-NPDES stormwater discharges, and as such, this source assessment section does not make any distinction between the two types of stormwater.

4.2 Potential Sources of Fecal Coliform Bacteria in the Pinellas Park Ditch No. 5, WBID 1668B

4.2.1 Point Sources

There are no WWTFs that are currently permitted to discharge fecal coliforms loads directly into Pinellas Park Ditch No. 5.

Municipal Separate Storm Sewer System Permittees

Like other nonpoint sources of pollution, urban stormwater discharges are associated with land use and human activities, and are driven by rainfall and runoff processes leading to the intermittent discharge of pollutants in response to storms. The 1987 amendments to the Clean Water Act designated certain stormwater discharges from urbanized areas as point sources requiring NPDES stormwater permits. In October 2000, US EPA authorized FDEP to implement the NPDES stormwater program in all areas of Florida except Indian Tribal lands. FDEP's authority to administer the NPDES program is set forth in Section 403.0885, F.S. The three major components of the NPDES stormwater regulations are:

- Municipal Separate Storm Sewer Systems (or MS4s) permits that are issued to entities that own and operate master stormwater systems, primarily local governments. Permittees are required to implement comprehensive stormwater management programs designed to reduce the discharge of pollutants from the MS4 to the maximum extent practicable.
- Stormwater Associated with Industrial Activities, which is regulated primarily by a multisector general permit that covers various types of industrial facilities. Regulated industrial facilities must obtain NPDES stormwater permit coverage and implement appropriate pollution prevention techniques to reduce contamination of stormwater.
- Construction activity generic permits for projects that ultimately disturb one or more acres of land and which require the implementation of stormwater pollution prevention plans to provide for erosion and sediment control during construction.

In addition to the NPDES stormwater construction permitting regulations, Florida was the first state in the country to require the treatment of stormwater for all new developments with the adoption of the State Stormwater Rule in late 1981. The Stormwater Rule is a technology-based program that relies on the implementation of BMPs that are designed to achieve a specific level of treatment (i.e., performance standards) as set forth in Chapter 62-40, F.A.C. In 1994, state legislation created the Environmental Resource Permitting program to consolidate stormwater quantity, stormwater quality, and wetlands protection into a single permit. Presently, the majority of environmental resource permits are issued by the state's water management districts, although DEP continues to do the permitting for specified projects.

The NPDES stormwater program was implemented in two phases, with Phase I MS4 areas including municipalities having a population above 100,000 based on 1990 census data. Because the master drainage systems of most local governments in Florida are interconnected, EPA implemented Phase 1 of the MS4 permitting program on a countywide basis, which brings in all cities, Chapter 298 urban water control districts, and the Florida DOT throughout the fifteen counties meeting the population criteria. Phase II of the NPDES Program, defined in Rule 62-624.800, F.A.C., was implemented in 2003 and now requires stormwater permits for construction sites between one and five acres, and to local governments in "Urbanized Areas" as defined by the Bureau of Census.

Although MS4 discharges are technically referred to as "point sources" for the purpose of regulation, they are still diffuse sources of pollution that cannot be easily collected and treated by a central treatment facility. All Phase 1 MS4 permits issued in Florida include a re-opener clause allowing permit revisions for implementing TMDLs once they are formally adopted by rule. Florida's Phase II MS4 Generic Permit has a "self-implementing" requirement once TMDLs are adopted, and requires the MS4 permittee to update its stormwater management program as needed to meet its TMDL allocations.

A Phase I MS4 permit regulates the stormwater collection systems in Pinellas Park Ditch No. 5 that are owned and operated by Pinellas County in conjunction with the Florida Department of Transportation (FDOT). Currently, no local governments in the watershed have applied for coverage under the Phase II NPDES MS4 permit.

Pinellas Park Ditch No. 5 falls under the Pinellas County Phase I MS4 permit (No. FLS000005). The co-permittees of the Pinellas County permit include the City of Pinellas Park and the Florida Department of Transportation. All future areas with populations meeting the MS4 requirements will be required to achieve the allocations presented in the TMDL. In addition, Florida may designate an area as a regulated Phase II MS4 in accordance with Rule 62-620.800, F.A.C.

4.2.2 Land Uses and Nonpoint Sources

Nonpoint source pollution, unlike pollution from industrial and sewage treatment plants, comes from many diffuse sources. Nonpoint pollution is caused by rainfall moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters, and even underground sources of drinking water (EPA, 1994). Potential nonpoint sources of coliform include loadings from surface runoff, wildlife, livestock, pets, leaking sewer lines, and leaking septic tanks.

Wildlife

Wildlife deposit coliform bacteria with their feces onto land surfaces, where they can be transported during storm events to nearby streams. Some wildlife (such as otters, beavers, raccoons, and birds) deposit their feces directly into the water. The bacterial load from naturally occurring wildlife is assumed to be background. In addition, any strategy employed to control this source would probably have a negligible impact on attaining water quality standards.

Agricultural Animals

Agricultural animals are the source of several types of coliform loading to streams. Agricultural activities, including runoff from pastureland and cattle in streams, can affect water quality. A review of the land use categories, found no Florida Land Use Cover Classification System codes involving animal feeding operations, or specialty farms which contain animals.

Land Uses

The spatial distribution and acreage of different land use categories were identified using the SWFWMD 2004 land use coverage (scale 1:40,000) contained in the FDEP's geographic information system (GIS) library. Land use categories in the Pinellas Park Ditch No. 5 watershed were aggregated using the simplified Level 1 codes **(Table 4.1). Figure 4.1** shows the acreage of the principal land uses in this segment. The urban, built-up, transportation and utilities land use categories predominate, covering 97 percent of the area. No agricultural land uses associated with sources of fecal coliforms are present in the watershed.

Table 4.1. Classification of 2004 Land Use Categories in Pinellas Park Ditch No. 5, WBID 1668B

Code	Land Use	Acreage	Percent of Total
1000	Recreational and Open Land	19	5%
1200	Residential Med Density 2-5 Dwelling Units/Acre	37	9%
1300	Residential High Density 6 or more Dwelling Units/Acre	146	36%
1400	Commercial	124	31%
1500	Industrial	12	3%
1700	Institutional	36	9%
4000	Forests	4	1%
5000	Water	3	1%
6000	Wetlands	3	1%
8000	Transportation and Utilities	20	5%
	Totals	402	100%

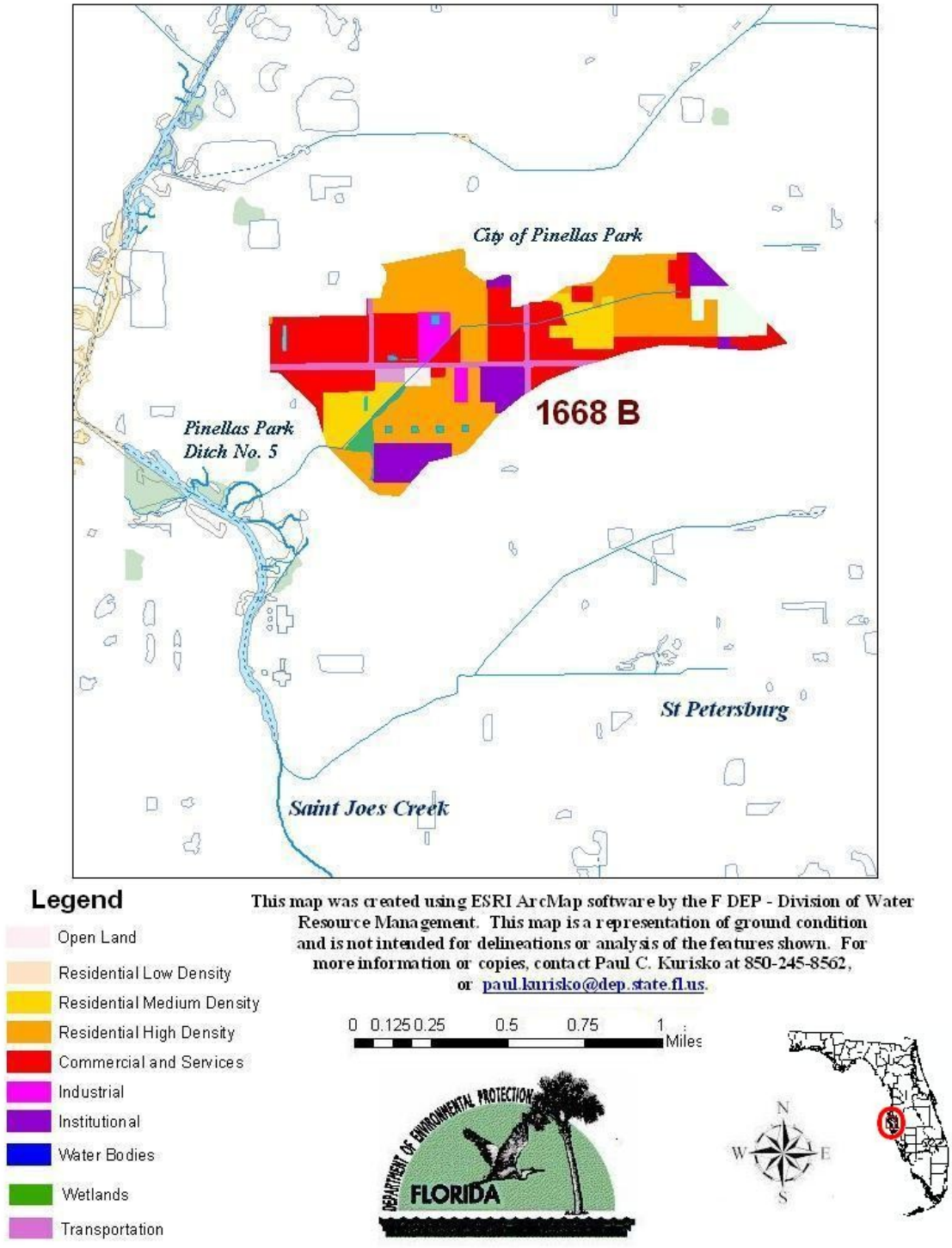

Figure 4.1. Principal Land Uses in Pinellas Park Ditch No. 5,

Urban Development

Coliform loading from urban areas is attributable to multiple sources, including stormwater runoff, leaks and overflows from sanitary sewer systems, illicit discharges of sanitary waste, runoff from improper disposal of waste materials, leaking septic systems, and domestic animals.

Since 45 percent of the land area in the subject watershed is residential, it is possible that pets, especially dogs and cats, are affecting Pinellas Park Ditch No. 5. The FDEP has been unable to obtain data on the number of dogs and cats in the area; however, estimates can be made **(Table 4.2)** using household-to-dog and cat ratio estimates from the American Veterinary Medical Association (AVMA). Assuming that 10 percent of coliforms reach the waterbody and are viable upon reaching it, the approximate loading would be 7.22 x 10^{11} organisms/day. This is an estimate, as the actual loading from dogs and cats is not known.

Table 4.2. Estimated Coliform Loading from Dogs and Cats in Pinellas Park Ditch No. 5, WBID 1668B

Pet	Estimated Number of Housing Units in WBID 1668B	Estimated Housing Unit Pet Ratio[1]	Estimated Total Pet Population in Watershed	Estimated Loading of Total	Estimated Number of Pets with Impact to WBID	Estimated Counts/Pet/Day[2]	Estimated Counts/Day
Dogs	2132	0.361	770	10%	77	5.0 x 10^{9}	3.85 x 10^{11}
Cats	2132	0.316	674	10%	67	5.0 x 10^{9}	3.37 x 10^{11}

[1] From the AVMA Web site, which states the original source as the *2002 U.S. Pet Ownership and Demographic Sourcebook*
[2] From the EPA document, *Protocol for Developing Pathogen TMDLs*, January 2001. pg. 5-7

Population

According to the U.S. Census Bureau, the population density in Pinellas County in the year 2006 was at or less than 3302 people per square mile **(Table 4.3).** The U.S. Census Bureau reports that the total population in 2006 for Pinellas County, which includes (but is not exclusive to) WBID 1668B, was 924,413, with 495,191 housing units (2005 estimate). For all of Pinellas County, FDEP determined a housing unit density of 1769 houses units per square mile. Pinellas County is above the average housing unit density of Florida of 153 housing units per square mile (U.S. Census Bureau Web site, 2005). In the Pinellas Park Ditch No. 5 1668B WBID area, the estimated population density is about 4163 people per square mile based on population estimates for the City of Pinellas Park (U.S. Census Bureau). See **Figure 4.2** for a U.S. Census Bureau map of the area.

Table 4.3. Population Density in Pinellas County, Florida, in 2006

Persons per Square Mile	Total Population	Housing Units per Square Mile	Housing Units
3302	924,413	1,769	495,191

Source: U.S. Census Bureau Web site, 2007. http://quickfacts.census.gov/qfd/states/12/12103.html

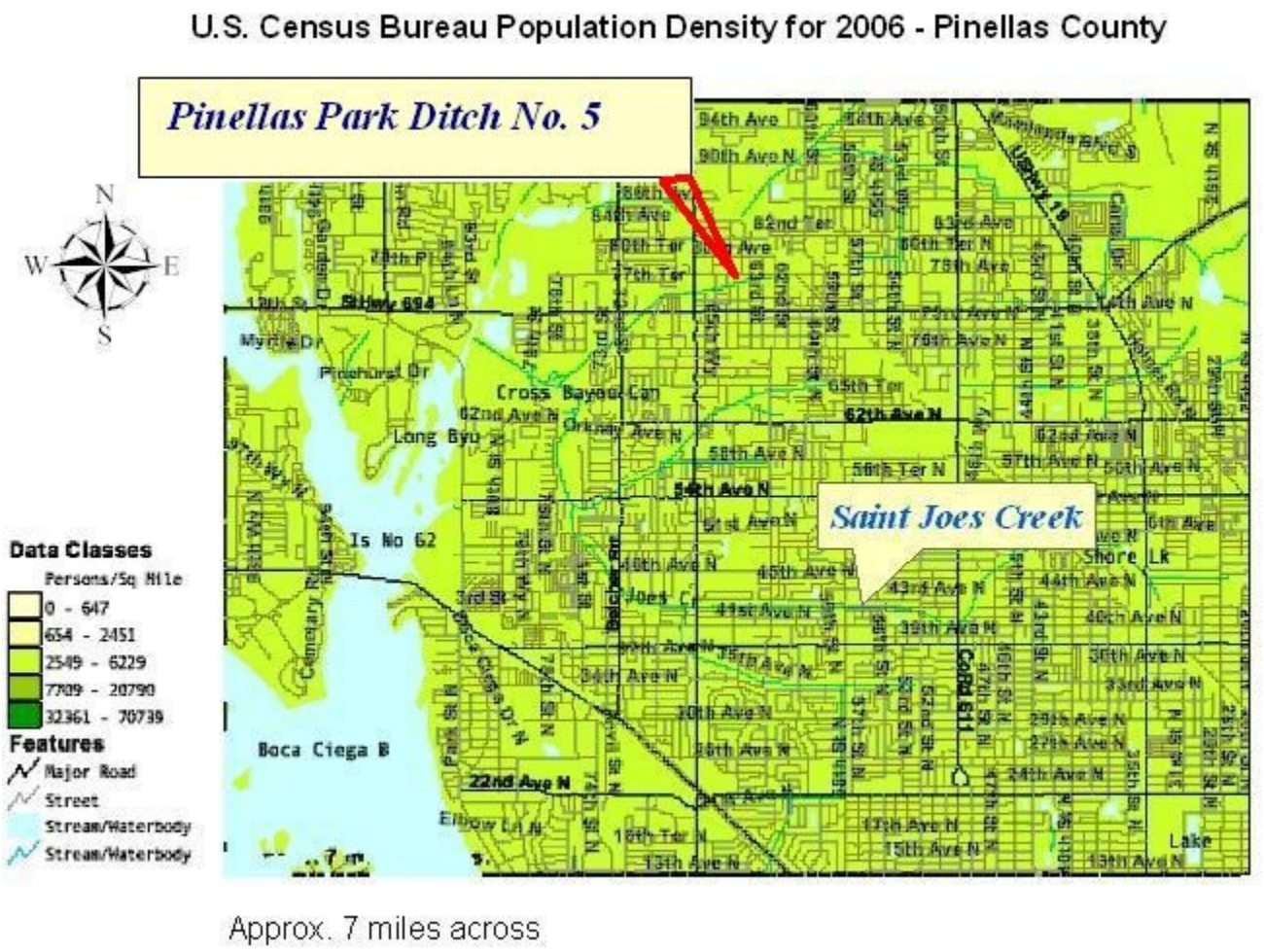

Figure 4.2. Population Density in the Area of Pinellas Park Ditch No. 5 WBID 1668B in 2006

Septic Tanks

According to the City of Pinellas Park's Public Works Department, Sewer Division's representatives, nearly all of the residences are connected to the sanitary sewer system, with connections to the South Cross Bayou Water Reclamation Facility (WRF); virtually eliminating septic tank effluent as a significant non-stormwater source of coliform loadings.

Domestic Sludge

When domestic wastewater is treated, the solid material that accumulates in the wastewater treatment plant must be removed periodically to keep the plant operating properly. The collected material, called "residuals," "biosolids," or more commonly, "sewage sludge," is the byproduct of these processes. The land application of sludge from domestic wastewater treatment facilities is a potential source of coliform bacteria loading to surrounding surface waters. There are no known residual land application sites in the area of Pinellas Park Ditch No. 5. The South Cross Bayou WRF produces Class AA sludge residual. Class AA residuals (highest quality) are treated to eliminate pathogens and meet strict pollutant criteria. As a result, Class AA residuals may be used without restriction and may be sold to the public. Certain Class AA products are found in stores and garden centers.

Reclaimed Water Usage

Wastewater treatment plants with the ability to reuse its effluent for irrigation are called water reclamation facilities. The South Cross Bayou wastewater treatment plant is a water reclamation facility. The effluent is reused as irrigation water for parks, golf courses and other sport fields, parks, cemeteries and other open spaces where water irrigation is needed or beneficial. The effluent may also be used for industrial applications (e.g., closed circuit cooling systems) as well. The effluent, although of good water quality, is not potable and direct human contact should be avoided or at least minimized for public health and safety. The effluent is disinfected for fecal coliform destruction, tested daily, and stored prior to land application reuse. Effluent is not applied during rain events to preclude runoff to water bodies. The permitted effluent limitation for 75% of fecal coliform values is "below detection limits," and "any one sample shall not exceed 25 fecal coliform values per 100 ml of sample.

All water reclamation facilities have a master reuse plan identifying permitted areas for irrigation and distribution. Some of the reclaimed water users are within the watershed of Pinellas Park Ditch No. 5. Area groundwater is monitored periodically for fecal coliform values; however, there are no known monitoring wells within the watershed. There are two monitoring wells, one above (MWC-09) and one below (MWC-06) the watershed. These monitoring wells are sampled and reported by the Pinellas County Utilities. A review of the sampling results revealed nearly all of the fecal coliform values were non-detect. The application of reclaimed wastewater effluent in the watershed is not considered a source for elevated coliform counts.

Chapter 5: DETERMINATION OF ASSIMILATIVE CAPACITY

5.1 Method Used To Determine Loading Capacity

The methodology used for this TMDL is the "load duration curve." Also known as the "Kansas Approach" because it was developed by the state of Kansas (Stiles, 2002), this method has been well documented in the literature, with improved modifications used by the EPA Region 4 in 2004. Basically, the method relates the pollutant concentration to the flow of the stream to establish the existing loading capacity and the allowable pollutant load (TMDL) under a spectrum of flow conditions. It then determines the maximum allowable pollutant load and load reduction requirement based on the analysis of the critical flow conditions. Using this method, it takes five steps to develop the TMDL and establish the required load reduction:

1. *Identify available flow and water quality data,*
2. *Develop the flow duration curve,*
3. *Develop the load duration curve for the existing loading,*
4. *Define the critical conditions, and*
5. *Establish the needed load reduction by comparing the existing loading with the allowable load under critical conditions.*

5.2 Data Used in the Determination of Loading Capacity

Fecal coliform bacteria concentrations and flow measurements were used to estimate both the allowable coliform loads and existing coliform loads. The primary collectors of water quality data in the watershed are the Pinellas County Watershed Management Division and the FDEP. For the verified period, only the FDEP had fecal coliform bacteria data for Pinellas Park Ditch No. 5. The FDEP's stations (Southwest District) include two STORET Stations: 21FLTPA 27502758243422 and 21FLTPA 27501148244127.

Figure 1.2. shows the locations of these sampling sites, while **Table 2.2.** provides a statistical overview of the observed data at the sites. **Figure 2.1.** displays the data for fecal coliform bacteria used in this analysis, and **Appendix A** lists the water quality monitoring results for fecal coliform bacteria.

Flow measurements for TMDL development were estimated using flows from a U.S. Geological Survey (USGS) gaging station located on Saint Joes Creek ("USGS 02308935, at Pinellas Park," Florida, Latitude 27°48'50", Longitude 82°41'45" (located in the City of St. Petersburg); See **Figure 1.2.**) The flow data from this gage were selected for this analysis because it is the only flow gaging station within close proximity to the WBID area with flow data for the necessary time period and the hydrologic conditions are expected to be similar due to similarities in watershed characteristics. The drainage area for this gaging station and the drainage area for WBID 1668B are virtually the same (2.55 sq. mi.) and the land use distribution is similar for both drainage areas.

In May 2007, an audit of the FDEP Southwest District Laboratory was conducted by the FDEP Environmental Assessment Section in order to evaluate data for TMDL listing purposes as specified in Chapter 62-303, F.A.C. (FDEP, 2007). The audit consisted of a field performance audit to evaluate

current field procedures, and a project audit of select data retrieved from STORET that were identified as having been produced by the Southwest District Laboratory. The analytes included in the audit were fecal coliforms, turbidity, BOD, and field parameters (DO, pH, and Specific Conductance). Twenty-one fecal coliform data records, each for one sample collected from a different waterbody between 02/14/2001 and 03/29/2005, were reviewed to determine whether those records contained sufficient information to demonstrate the quality of the data.

The audit identified procedural and documentation issues for several fecal coliform data. The recommendation of the auditors was to exclude, for "Verified" TMDL purposes, all fecal coliform data generated by the laboratory before September 2007, which is when the lab responded to the audit with acceptable corrective actions. The audit report characterizes all historic and current fecal coliform data as suitable for "Planning" uses.

After reviewing the lab audit report as well as the fecal coliform data for WBID 1668B, EPA has concluded that the use of data generated by the Southwest District Laboratory should not undermine the results of the TMDL analysis. As discussed above, the TMDL for Pinellas Park Ditch No. 5 was generated using data collected after May 2005, which is outside the time period for which the audit reviewed data. None of the samples included in the audit were collected in Pinellas Park Ditch No. 5. Many of the audit findings are specific to the selected data, and even those that might apply more broadly relate to complete documentation of the quality of the data, not necessarily the actual quality of the data. In addition, the TMDL data from 2005 and 2006 are very similar to fecal coliform data collected between 1994 and 1996 by the Pinellas County Watershed Management Division on St. Joe's Creek (which is the receiving water for Pinellas Park Ditch No. 5). This lends support to the quality of the more recent data and the results of the TMDL. Despite being collected ten years apart, in different streams (within the same WBID), and by different agencies, both datasets suggest that fecal coliform concentrations in WBID 1668B average between 2500 and 3000 counts/100ml, and are above the applicable standard of 400 counts/100ml 72-75% of the time (Figure 5.1). Because the Target Load Duration Curve is a function of the applicable water quality standard and the stream flow, it is unaffected by the selection of specific data to characterize the existing concentrations of fecal coliforms. Futhermore, the median percent reduction that would be required from nonpoint sources and MS4s is also similar (71% versus 83%) between the older and more current datasets.

The recent audit of FDEP's Southwest District Laboratory underscores the need for proper documentation of all calibration and quality control procedures, and serves as a valuable opportunity to identify areas for improvement. However, given the presence of potential nonpoint and MS4 stormwater sources of fecal coliforms identified in the Source Assessment section of the report (see Chapter 4), the fact that data from Pinellas Park Ditch #5 were not specifically audited, and were not even generated within the audited data period, and considering the concurrence of older fecal coliform data from the same WBID, EPA has concluded that the use of the data for this TMDL is reasonable. As with any TMDL, FDEP may collect additional data and revise the required percent reduction as necessary.

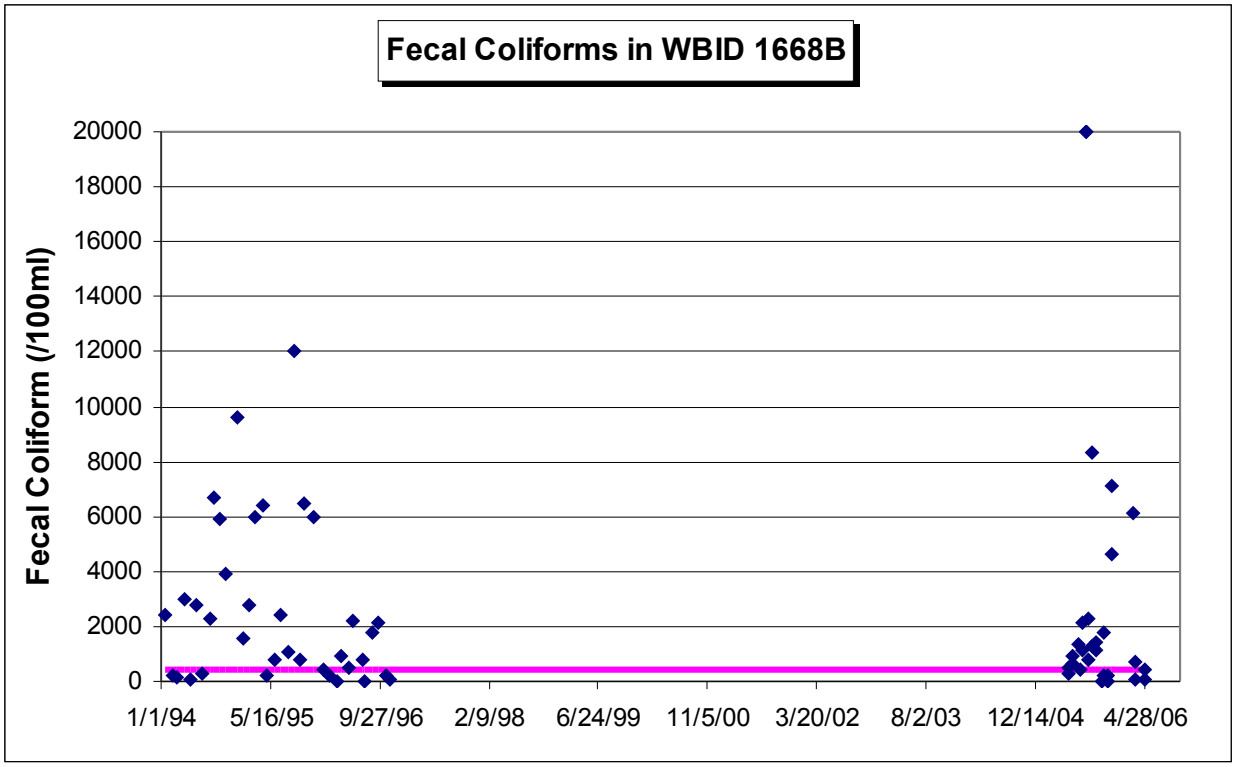

Figure 5.1. Fecal coliforms collected in St. Joe's Creek (94-96) and Pinellas Park Ditch No. 5 (05-06).

5.3 TMDL Development Process

The range of flows from the USGS flow gage was divided into "flow zones." The concept of zones is adopted from Dr. Bruce Cleland (Cleland, August 15, 2002). The purpose of the zones is to demarcate hydrologic conditions between drought and peak flood into flow ranges such as low, dry, average, moist, and high.

Expressing the flows in terms of frequency of recurrence (duration) allows exceedances of the criterion to be linked to specific flow intervals and durations. For example, if all of the exceedances occurred during low-flow conditions, point sources of the pollutant would be suspected. Conversely, if all the exceedances took place during higher-flow periods, then nonpoint sources of the pollutant would be suspected. Following Cleland's approach (Cleland, September 2003), the FDEP selected the following flow zones: "High" (0–10), "Moist" (11–40), "Mid-range" (41–60), "Dry" (61–90), and "Low" (91–100). **Figure 5.1.** shows the flow duration curve estimated for Pinellas park Ditch No.5 based on USGS Gage 02308935.

Using the flows from the flow duration curve, load duration curves for fecal coliform bacteria **(Figure 5.2)** were calculated using the following equation:

(1) (observed flow) x (conversion factor) x (state criteria) = ([parameter quantity]/day or daily load)

The equation above yields the load duration curve or allowable load curve, shown as the fecal coliform target lines in **Figure 5.2.** Using Equation 1 (above), a table of fecal coliform loads **(Table 5.1)** was calculated, substituting the observed coliform exceedances for the state criterion value. All the fecal coliform observations were then plotted, and it was noted where the samples were in relation to the allowable load curve (above or below the curve). Those above the curve **(Figure 5.2)** are noted as exceedances to the state criterion and are indicated by a red square.

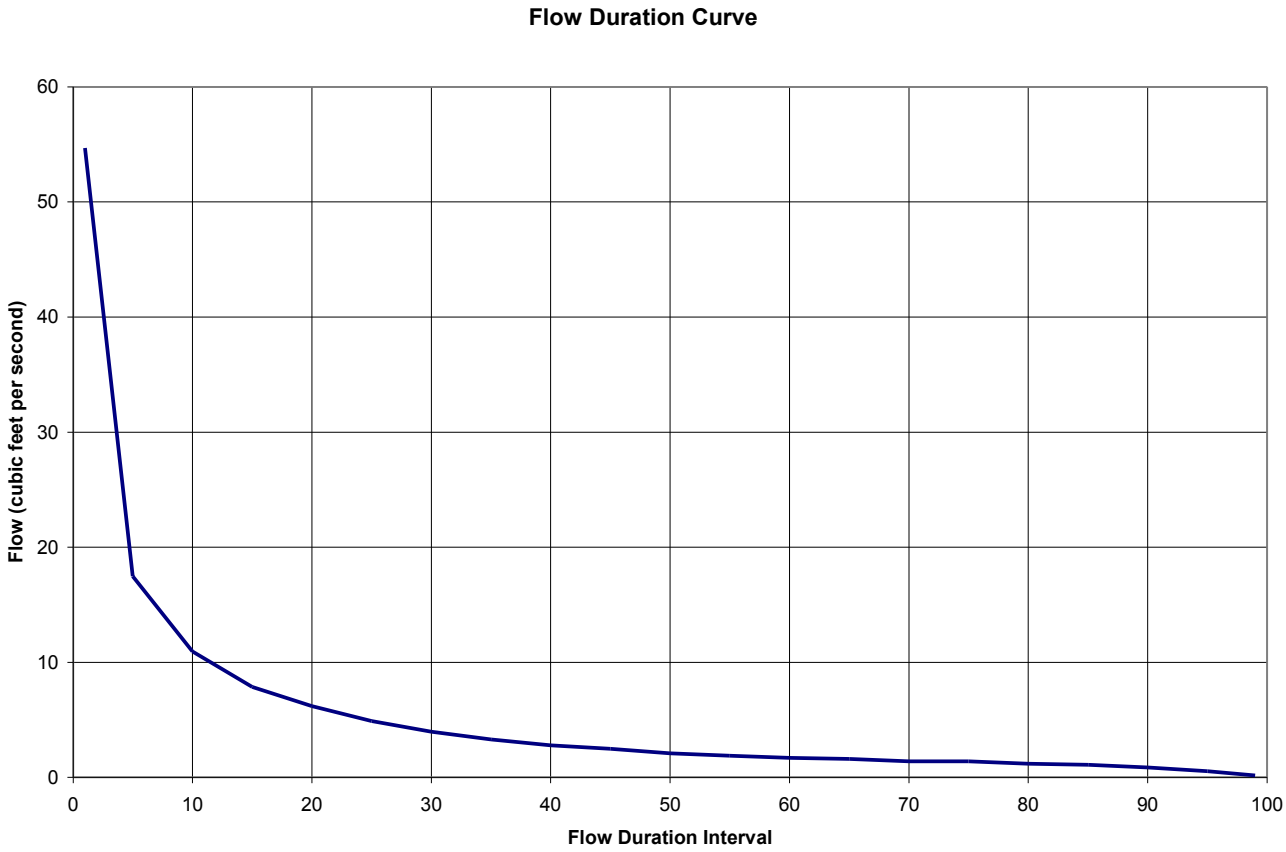

Figure 5.2. Flow Duration Curve Estimate for Pinellas Park Ditch No. 5, Based on USGS Gage 02308935 (Years 2000 – 2007)

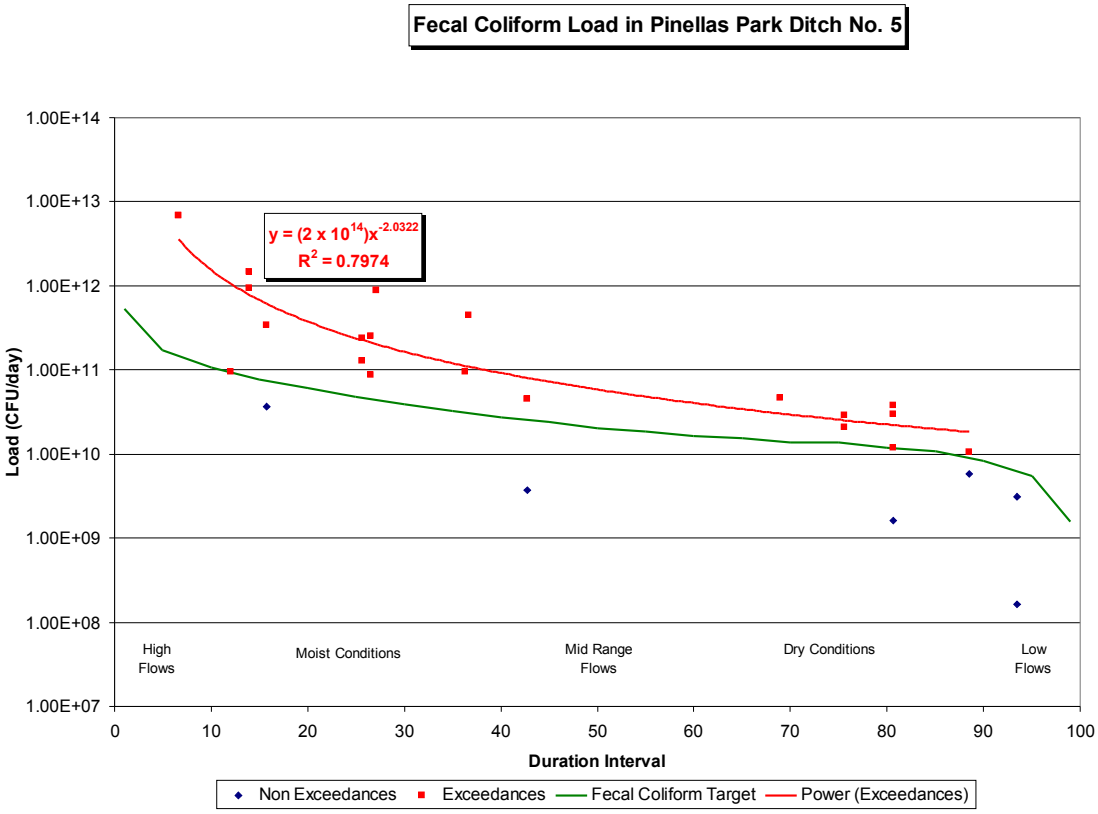

Figure 5.3. Load Duration Curve for Fecal Coliform in Pinellas Park Ditch No. 5 WBID 1668B

Table 5.1. Observed Fecal Coliform Data for Calculating Exceedances to the State Criterion for Pinellas Park Ditch No. 5, WBID 1668B

Station	Sample Date	Flow (cfs)	Flow Rank	Flow Rank %	Fecal Coliform (CFU/100mL)	Fecal Coliform Load (CFU/day)
21FLTPA 27501148244127	5/17/2005	0.90	88.50%	88.5	480	1.06×10^{10}
21FLTPA 27502758243422	6/7/2005	1.30	75.60%	75.6	900	2.86×10^{10}
21FLTPA 27501148244127	6/7/2005	1.30	75.60%	75.6	650	2.07×10^{10}
21FLTPA 27502758243422	6/27/2005	1.40	69.00%	69	1370	4.69×10^{10}
21FLTPA 27501148244127	7/11/2005	9.50	12.00%	12	410	9.53×10^{10}
21FLTPA 27501148244127	7/18/2005	4.70	25.60%	25.6	2100	2.41×10^{11}
21FLTPA 27502758243422	7/18/2005	4.70	25.60%	25.6	1120	1.29×10^{11}
21FLTPA 27501148244127	8/8/2005	14.00	6.60%	6.6	20000	6.85×10^{12}
21FLTPA 27502758243422	8/8/2005	14.00	6.60%	6.6	20000	6.85×10^{12}
21FLTPA 27502758243422	8/16/2005	4.50	26.50%	26.5	2300	2.53×10^{11}
21FLTPA 27501148244127	8/16/2005	4.50	26.50%	26.5	780	8.59×10^{10}
21FLTPA 27501148244127	8/29/2005	4.40	27.10%	27.1	8300	8.93×10^{11}
21FLTPA 27502758243422	8/30/2005	3.10	36.30%	36.3	1270	9.63×10^{10}
21FLTPA 27502758243422	9/20/2005	1.10	80.60%	80.6	1400	3.77×10^{10}
21FLTPA 27501148244127	9/20/2005	1.10	80.60%	80.6	1120	3.01×10^{10}
21FLTPA 27501148244127	10/25/2005	7.60	15.70%	15.7	1810	3.37×10^{11}
21FLTPA 27501148244127	11/29/2005	8.40	13.90%	13.9	7100	1.46×10^{12}
21FLTPA 27502758243422	11/29/2005	8.40	13.90%	13.9	4600	9.45×10^{11}
21FLTPA 27501148244127	3/6/2006	3.00	36.70%	36.7	6100	4.48×10^{11}
21FLTPA 27501148244127	3/20/2006	2.50	42.70%	42.7	730	4.47×10^{10}
21FLTPA 27502758243422	5/2/2006	1.10	80.60%	80.6	440	1.18×10^{10}

Note: Flow and concentration data analyzed for the TMDL were from May 2005 through May 2006. The Group 5 verification period is from January 1, 1999, through June 30, 2006. Flow data were from USGS Gage 02308935, located in WBID 1668A.

cfs – cubic feet per second.

CFU – Coliform Forming Units

mL – milliliters

As noted previously, values on the load duration curve can generally be grouped by hydrologic conditions to identify the most likely potential sources. Exceedances falling into the 10th through 40th percentile flows are typically associated with moist conditions when stormwater loads are the most likely source, and exceedances falling into the 60th through 90th percentiles are typically associated with dry conditions when point sources are likely the dominant source. As shown in **Figure 5.2.**, the fecal coliform exceedances in Pinellas Park Ditch No. 5, occur mostly within the moist and the dry condition flow zones, with no exceedances within the 90th to 100th percentiles.

Table 5.2. depicts the allowable coliform bacteria load for peak flow, low flow, and 5-percentile increments in flow for Pinellas Park Ditch No. 5. The table was created by taking the Nth-percentile flow (flow rank in the table) from the measured flow data and multiplying each percentile flow by the fecal coliform criterion of 400 counts/100mL and converting into bacteria counts/day. This conversion was accomplished by multiplying the criterion by [(28317/100)*60*60*24]. The factor 28317/100 converts counts/100mL into counts per cubic foot, and the 60*60*24 converts seconds to days.

Table 5.2. Coliform Target Loads As a Function of Flow

Flow Rank	Flow Rank (%)	Flow cfs	Allowable Loads	
			FC Target Load (counts/day)	Flow Conditions
0.040%		207.00	2.03×10^{12}	*Peak*
0.100%		144.88	1.42×10^{12}	
0.274%		114.93	1.12×10^{12}	*1-day*
1%	1	54.69	5.35×10^{11}	
5%	5	17.48	1.71×10^{11}	
10%	10	10.96	1.07×10^{11}	
15%	15	7.87	7.70×10^{10}	
20%	20	6.18	6.04×10^{10}	
25%	25	4.88	4.78×10^{10}	
30%	30	3.98	3.90×10^{10}	
35%	35	3.29	3.22×10^{10}	
40%	40	2.79	2.73×10^{10}	
45%	45	2.49	2.44×10^{10}	
50%	50	2.09	2.05×10^{10}	
55%	55	1.89	1.85×10^{10}	
60%	60	1.69	1.66×10^{10}	
65%	65	1.59	1.56×10^{10}	
70%	70	1.39	1.36×10^{10}	
75%	75	1.39	1.36×10^{10}	
80%	80	1.20	1.17×10^{10}	
85%	85	1.10	1.07×10^{10}	
90%	90	0.86	8.38×10^{9}	
95%	95	0.55	5.41×10^{9}	
99%	99	0.16	1.57×10^{9}	
100%	100	0.03	2.92×10^{8}	*Low*

cfs – cubic feet per second

Finally, the percentage reduction in loading needed for compliance with the state criterion was calculated. For the purposes of this TMDL, critical periods occurred for "Moist" (11–40), "Mid Range" (41-60) and "Dry" (61-90) flow zones for Pinellas Park Ditch No. 5. The critical periods are the flow intervals where the majority of the criteria exceedances occurred, as shown in **Figure 5.2.** and tabulated in Table 5.3. Since exceedances occurred between the "moist" and "dry" flow zones, the percent reduction for the TMDL is the median value of the percent reductions between the 10^{th} and the 90^{th} percentile flows. This calculation involved both the median of allowable loads, which previously were calculated using percentile increments of 5, 25, 50, 75, and 95 as the median of the zones, and the median of the existing load based on measured exceedances computed for each critical zone. The needed reduction of daily load was completed using the formula:

$$(2) \qquad \frac{\text{(existing load)} - \text{(allowable load)}}{\text{(existing load)}} \times 100$$

Table 5.3. Fecal Coliform Percentage Reductions Required for Different Flow Zones Pinellas Park Ditch No. 5, WBID 1668B

TMDL Details	High (0-10)	Moist (10-40)	Mid-Range (40-60)	Dry (60-90)	Low (90-100)
TMDL - allowed load (colonies/day)	1.7×10^{11}	4.8×10^{10}	2.0×10^{10}	1.4×10^{10}	5.4×10^{9}
Existing Load (colonies/day)	6.85×10^{12}	2.9×10^{11}	7.1×10^{10}	3.1×10^{10}	N.A.
Percent Reduction	97.5	83.4	71.0	55.9	N.A.

N.A. - Not Applicable

5.4 Critical Conditions/Seasonality

The critical conditions for coliform loadings in a given watershed depend on the existence of point sources and land use patterns in the watershed. Typically, the critical condition for nonpoint sources is an extended dry period, followed by a rainfall runoff event. During wet weather periods, coliform bacteria that have built up on the land surface under dry weather conditions are washed off by rainfall, resulting in wet weather exceedances. However, significant nonpoint source contributions could also occur under dry weather conditions without any major surface runoff event. This usually happens when nonpoint sources contaminate the surficial aquifer, and coliform bacteria are brought into the receiving waters through baseflow. Animals with direct access to the receiving water could also contribute to the exceedances during dry weather conditions. The critical condition for point source loading typically occurs during periods of low stream flow, when dilution is minimized.

For Pinellas Park Ditch No. 5, the fecal coliform bacteria exceedances mostly occurred during "Moist" (11–40), and "Dry" (61–90) flow conditions **(Figure 5.2.)**.

Chapter 6: DETERMINATION OF THE TMDL

6.1 Expression and Allocation of the TMDL

The objective of a TMDL is to provide a basis for allocating acceptable loads among all of the known pollutant sources in a watershed so that appropriate control measures can be implemented and water quality standards achieved. A TMDL is expressed as the sum of all point source loads (waste load allocations, or WLAs), nonpoint source loads (load allocations, or LAs), and an appropriate margin of safety (MOS), which takes into account any uncertainty concerning the relationship between effluent limitations and water quality:

$$\mathbf{TMDL = \sum WLAs + \sum LAs + MOS}$$

As discussed earlier, the WLA is broken out into separate subcategories for wastewater discharges and stormwater discharges regulated under the NPDES Program:

$$\mathbf{TMDL \cong \sum WLAs_{wastewater} + \sum WLAs_{NPDES\ Stormwater} + \sum LAs + MOS}$$

It should be noted that the various components of the revised TMDL equation may not sum up to the value of the TMDL because (a) the WLA for NPDES stormwater is typically based on the percent reduction needed for nonpoint sources and is also accounted for within the LA, and (b) TMDL components can be expressed in different terms (for example, the WLA for stormwater is typically expressed as a percentage reduction, and the WLA for wastewater is typically expressed as mass per day).

WLAs for stormwater discharges are typically expressed as percentage reduction because it is very difficult to quantify the loads from MS4s (given the numerous discharge points) and to distinguish loads from MS4s from other nonpoint sources (given the nature of stormwater transport). The permitting of stormwater discharges also differs from the permitting of most wastewater point sources. Because stormwater discharges cannot be centrally collected, monitored, and treated, they are not subject to the same types of effluent limitations as wastewater facilities, and instead are required to meet a performance standard of providing treatment to the “maximum extent practical” through the implementation of best management practices (BMPs).

This approach is consistent with federal regulations (40 CFR § 130.2[I]), which state that TMDLs can be expressed in terms of mass per time (e.g., pounds per day), toxicity, or **other appropriate measure**. The fecal coliform bacteria TMDL for Pinellas Park Ditch No. 5 is expressed in terms of colonies per day for the overall TMDL and as a percent reduction for MS4 areas and other nonpoint sources to meet the applicable criterion. The TMDL represents the maximum daily fecal coliform load the river can assimilate and maintain the applicable fecal coliform bacteria criterion **(Table 6.1.)**. Nothing in this TMDL should be understood to preclude appropriate water quality trading implemented within the context of the State's NPDES program.

Table 6.1. TMDL Components for Pinellas Park Ditch No. 5, WBID 1668B

Parameter	Zone	TMDL (colonies/day)	WLA		LA (percent reduction)	MOS
			Wastewater (colonies/day)	NPDES Stormwater (percent reduction)		
Fecal Coliform	Median 10th & 90th Percentile	2.0 x 10^{10}	N.A.	71	71	Implicit

WLA - Waste Load Allocation
TMDL - Total Maximum Daily Load
LA - Load allocation
MOS - Margin of Safety

6.2 Load Allocation

Based on a load duration curve approach similar to that developed by the state of Kansas (Stiles, 2002), the load allocation for nonpoint sources in Pinellas Park Ditch No. 5 is a percent reduction of 71 percent.

It should be noted that the LA includes loading from stormwater discharges that are not part of the NPDES stormwater program (see **Appendix B**).

6.3 Wasteload Allocation

6.3.1 NPDES Wastewater Discharges

As previously mentioned, there are no permitted wastewater treatment facilities that discharge fecal coliform loads directly into Pinellas Park Ditch No.5. Consequently, there are no reductions that would be applied to domestic and/or industrial point sources in the watershed.

6.3.2 NPDES Stormwater Discharges

The WLA for Pinellas County, the City of Pinellas Park and the FDOT municipal separate storm sewer system (MS4) permit is a 71 percent reduction in current anthropogenic fecal coliform loading in Pinellas Park Ditch No. 5. It should be noted that any MS4 permittee will only be responsible for reducing the loads associated with stormwater outfalls that it owns or otherwise has responsible control over, and it is not responsible for reducing other nonpoint source loads in its jurisdiction.

While the LA and WLA for fecal coliform have been expressed as the percent reduction needed to attain the applicable Class III criterion, it is the combined reductions from both anthropogenic point and nonpoint sources that will result in the required reduction of instream fecal coliform concentrations. However, it is not the intent of the TMDL to abate natural background conditions.

6.4 Margin of Safety

Consistent with the recommendations of the Allocation Technical Advisory Committee (FDEP, February 2001), an implicit MOS was used in the development of this TMDL. An implicit MOS was provided by the conservative decisions associated with the analytical assumptions and the development of assimilative capacity, which only focuses on exceedances. An MOS was included in the TMDL by not allowing any exceedances of the state criterion, even though intermittent natural exceedances of the criterion would be expected and would be taken into account when determining impairment. Additionally, the implicit MOS is appropriate, as existing loads are based on instream coliform measurements. These measurements include decay processes occurring instream and do not represent the maximum load that can be applied to the land and transported to the stream during a rain event.

Chapter 7: NEXT STEPS: IMPLEMENTATION PLAN DEVELOPMENT AND BEYOND

7.1 Basin Management Action Plan

Following the adoption of this TMDL by rule, the next step in the TMDL process is to develop an implementation plan for the TMDL, referred to as the BMAP. This document will be developed over the next year in cooperation with local stakeholders, who will attempt to reach consensus on detailed allocations and on how load reductions will be accomplished. The BMAP will include, among other things:

- Appropriate load reduction allocations among the affected parties,
- A description of the load reduction activities to be undertaken, including structural projects, nonstructural BMPs, and public education and outreach,
- A description of further research, data collection, or source identification needed in order to achieve the TMDL,
- Timetables for implementation,
- Confirmed and potential funding mechanisms,
- Any applicable signed agreement(s),
- Local ordinances defining actions to be taken or prohibited,
- Any applicable local water quality standards, permits, or load limitation agreements,
- Milestones for implementation and water quality improvement, and
- Implementation tracking, water quality monitoring, and follow-up measures.

An assessment of progress toward the BMAP milestones will be conducted every five years, and revisions to the plan will be made as appropriate, in cooperation with basin stakeholders.

References

American Veterinary Medical Association Web site. 2006. Available: http://www.avma.org/reference/marketstats/ownership.asp#households1

Cleland, B. August 15, 2002. *TMDL development from the bottom up–Part II: Using load duration curves to connect the pieces*. Washington, D.C.: America's Clean Water Foundation. Available: http://www.in.gov/idem/programs/water/tmdl/bottomup.pdf

Cleland, B. September 2003. *TMDL development from the bottom up–Part III: Duration curves and wet-weather assessments*. Washington, D.C.: America's Clean Water Foundation. Available: http://www.tmdls.net/tipstools/docs/TMDLsCleland.pdf

Florida Administrative Code. *Chapter 62-302, Surface water quality standards.* Available: http://www.dep.state.fl.us/legal/Rules/shared/62-302/62-302.pdf

Florida Administrative Code. *Chapter 62-303, Identification of impaired surface waters.* Available: http://www.dep.state.fl.us/legal/Rules/shared/62-303/62-303.pdf

Florida Department of Environmental Protection. February 2005. *Florida's Total Maximum Daily Load Program: the First 5 Years A Report to the Legislature and Governor* Tallahassee, Florida: Division of Watershed Management. Available: http://www.dep.state.fl.us/water/tmdl/docs/2005TMDL_Report_final_2-25-05.pdf

June 2006. Water Quality Status Report – Springs Coast, FDEP, Tallahassee, Florida. Available: ftp://ftp.dep.state.fl.us/pub/water/basin411/springscoast/status/SpringCst.pdf

Florida Department of Health Web site. Available: http://www.doh.state.fl.us/ and http://www.doh.state.fl.us/environment/OSTDS/statistics/ostdsstatistics.htm.

Florida Watershed Restoration Act. Chapter 99-223, Laws of Florida. Available: http://election.dos.state.fl.us/laws/99laws/ch_99-223.pdf

Stiles, T. 2002. *A simple method to define bacteria TMDLs in Kansas*. Topeka, Kansas: Kansas Department of Health and Environment.

U.S. Census Bureau Web site. 2005. Available: http://www.census.gov/.

U.S. Department of Agriculture. 2002. *Agricultural Census Report.* Available: http://www.nass.usda.gov/Census_of_Agriculture/index.asp.

U.S. Environmental Protection Agency. 1994. *Nonpoint source pollution: The nation's largest water quality problem.* Pointer No. 1. EPA-841-F-94-005. Available: http://www.epa.gov/owow/nps/facts/point1.htm.

U.S. Environmental Protection Agency. 2001. *Protocol for developing pathogen TMDLs, First Edition.* Washington, D.C.: Office of Water. EPA 841-R-00-002. Available: http://www.epa.gov/owow/tmdl/pathogen_all.pdf

Appendices

Appendix A Summary of Monitoring Results for Fecal Coliform in Pinellas Park Ditch No. 5, WBID 1668B.

Station	Sample Date	Flow (cfs) estimated using USGS Station 02308935	Flow Rank	Flow Rank (%)	Fecal Coliform (counts/100mL)	Fecal Coliform Load (counts/day)	Remark Code
21FLTPA 27502758243422	5/17/2005	0.90	88.5%	88.5	260	5.73×10^{9}	
21FLTPA 27501148244127	5/17/2005	0.90	88.5%	88.5	**480**	1.06×10^{10}	
21FLTPA 27502758243422	6/7/2005	1.30	75.6%	75.6	**900**	2.86×10^{10}	B
21FLTPA 27501148244127	6/7/2005	1.30	75.6%	75.6	**650**	2.07×10^{10}	B
21FLTPA 27502758243422	6/27/2005	1.40	69.0%	69	**1370**	4.69×10^{10}	B
21FLTPA 27501148244127	7/11/2005	9.50	12.0%	12	**410**	9.53×10^{10}	
21FLTPA 27502758243422	7/18/2005	4.70	25.6%	25.6	**1120**	1.29×10^{11}	B
21FLTPA 27501148244127	7/18/2005	4.70	25.6%	25.6	**2100**	2.41×10^{11}	B
21FLTPA 27502758243422	8/8/2005	14.00	6.6%	6.6	**20000**	6.85×10^{12}	B
21FLTPA 27501148244127	8/8/2005	14.00	6.6%	6.6	**20000**	6.85×10^{12}	B
21FLTPA 27502758243422	8/16/2005	4.50	26.5%	26.5	**2300**	2.53×10^{11}	
21FLTPA 27501148244127	8/16/2005	4.50	26.5%	26.5	**780**	8.59×10^{10}	B
21FLTPA 27501148244127	8/29/2005	4.40	27.1%	27.1	**8300**	8.93×10^{11}	B
21FLTPA 2 27502758243422	8/30/2005	3.10	36.3%	36.3	**1270**	9.63×10^{10}	B
21FLTPA 27502758243422	9/20/2005	1.10	80.6%	80.6	**1400**	3.77×10^{10}	B
21FLTPA 27501148244127	9/20/2005	1.10	80.6%	80.6	**1120**	3.01×10^{10}	B
21FLTPA 27502758243422	10/17/2005	0.22	98.3%	98.3	1	5.38×10^{6}	K

Station	Sample Date	Flow (cfs) estimated using USGS Station 02308935	Flow Rank	Flow Rank (%)	Fecal Coliform (counts/100mL)	Fecal Coliform Load (counts/day)	Remark Code
21FLTPA 27502758243422	10/25/2005	7.60	15.7%	15.7	200	3.72×10^{10}	
21FLTPA 27501148244127	10/25/2005	7.60	15.7%	15.7	**1810**	3.37×10^{11}	B
21FLTPA 27502758243422	11/15/2005	0.66	93.5%	93.5	190	3.07×10^{9}	B
21FLTPA 27501148244127	11/15/2005	0.66	93.5%	93.5	10	1.61×10^{8}	B
21FLTPA 27502758243422	11/29/2005	8.40	13.9%	13.9	**4600**	9.45×10^{11}	
21FLTPA 27501148244127	11/29/2005	8.40	13.9%	13.9	**7100**	1.46×10^{12}	B
21FLTPA 27501148244127	3/6/2006	3.00	36.7%	36.7	**6100**	4.48×10^{11}	
21FLTPA 27501148244127	3/20/2006	2.50	42.7%	42.7	**730**	4.47×10^{10}	
21FLTPA 27501148244127	5/2/2006	1.10	80.6%	80.6	60	1.61×10^{9}	
21FLTPA 27502758243422	3/20/2006	2.50	42.7%	42.7	60	3.67×10^{9}	
21FLTPA 27502758243422	5/2/2006	1.10	80.6%	80.6	440	1.18×10^{10}	

NFM - No Flow Measured
NA - Not Applicable
cfs - cubic feet per second (stream flow)
mL - milliliter

Note: Flow and concentration data analyzed for the TMDL were from May 2005 through May 2006. The Group 5 verification period is from January 1, 1999, through June 30, 2006. Flow data were from USGS Gage 02308935, located in WBID 1668A on Saint Joes Creek in St. Petersburg
Bold fecal coliform numbers indicate measurements that exceeded the 400 criteria.
Remark Codes: B - Results based upon colony counts outside the acceptable range
K - Actual value is known to be less than the value given

Appendix B: Background Information on Federal and State Stormwater Programs

In 1982, Florida became the first state in the country to implement statewide regulations to address the issue of nonpoint source pollution by requiring new development and redevelopment to treat stormwater before it is discharged. The Stormwater Rule, as authorized in Chapter 403, F.S., was established as a technology-based program that relies on the implementation of BMPs that are designed to achieve a specific level of treatment (i.e., performance standards) as set forth in Rule 62-40, F.A.C. In 1994, the Department's stormwater treatment requirements were integrated with the stormwater flood control requirements of the state's water management districts, along with wetland protection requirements, into the Environmental Resource Permit regulations.

Chapter 62-40, F.A.C., also requires the water management districts (WMDs) to establish stormwater pollutant load reduction goals (PLRGs) and adopt them as part of a Surface Water Improvement and Management (SWIM) plan, other watershed plan, or rule. Stormwater PLRGs are a major component of the load allocation part of a TMDL.

In 1987, the U.S. Congress established Section 402(p) as part of the federal Clean Water Act Reauthorization. This section of the law amended the scope of the federal NPDES permitting program to designate certain stormwater discharges as "point sources" of pollution. The EPA promulgated regulations and began implementation of the Phase I NPDES stormwater program in 1990. These stormwater discharges include certain discharges that are associated with industrial activities designated by specific standard industrial classification (SIC) codes, construction sites disturbing 5 or more acres of land, and master drainage systems of local governments with a population above 100,000, which are better known as MS4s. However, because the master drainage systems of most local governments in Florida are interconnected, the EPA implemented Phase I of the MS4 permitting program on a countywide basis, which brought in all cities (incorporated areas), Chapter 298 urban water control districts, and the FDOT throughout the 15 counties meeting the population criteria. EPA authorized the Department to implement the NPDES stormwater program (with the exception of Indian lands) in October 2000.

An important difference between the NPDES and other state stormwater/environmental resource permitting programs is that the NPDES program covers both new and existing discharges, while the state's program focuses on new discharges only. Additionally, Phase II of the NPDES Program, implemented in 2003, expands the need for these permits to construction sites between 1 and 5 acres, and to local governments with as few as 10,000 people. These revised rules require that these additional activities obtain permits by 2003.

While these urban stormwater discharges are now technically referred to as "point sources" for the purpose of regulation, they are still diffuse sources of pollution that cannot be easily collected and treated by a central treatment facility, as are other point sources of pollution such as domestic and industrial wastewater discharges. All MS4 permits issued in Florida include requirements to implement TMDLs when the implemer