FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Division of Water Resource Management, Bureau of Watershed Management

SOUTHWEST DISTRICT • SARASOTA BAY–PEACE–MYAKKA BASIN

TMDL Report

Fecal Coliform TMDL for Wahneta Farms Drain Canal, (WBID 1580)

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Web sites

Florida Department of Environmental Protection, Bureau of Watershed Management

TMDL Program

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

Identification of Impaired Surface Waters Rule

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

STORET Program

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

2004 305(b) Report

http://www.dep.state.fl.us/water/docs/2004_Integrated_Report.pdf

Criteria for Surface Water Quality Classifications

http://www.dep.state.fl.us/legal/rules/shared/62-302t.pdf

Basin Status Reports

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Allocation Technical Advisory Committee (ATAC) Report

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U.S. Environmental Protection Agency

Region 4: Total Maximum Daily Loads in Florida

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Chapter 1: INTRODUCTION

1.1 Purpose of Report

This report presents the Total Maximum Daily Load (TMDL) for fecal coliform bacteria for the Wahneta Farms Drain Canal, which is located in the Upper Peace River Planning Unit, and part of the larger Sarasota Bay, Peace, and Myakka (Sarasota Bay–Peace–Myakka) Basin. The stream was verified as impaired for fecal coliform bacteria, and was included on the Verified List of impaired waters for the Sarasota Bay–Peace–Myakka Basin that was adopted by Secretarial Order in June 2005.

The TMDL process quantifies the amount of a pollutant that can be assimilated in a waterbody, identifies the sources of the pollutant, and provides water quality targets needed to achieve compliance with applicable water quality standards based on the relationship between pollution sources and instream water quality. This TMDL establishes the allowable loadings to the Wahneta Farms Drain Canal that would restore the waterbody so that it meets its applicable water quality criterion for fecal coliform bacteria.

1.2 Identification of Waterbody

The Wahneta Farms Drain Canal watershed is located in the Upper Peace Basin in a moderately populated region of central Polk County, Florida, about 3 miles south of the city of Winter Haven. Lake Lulu, the headwaters of the canal, receives drainage from the southern chain of the Winter Haven Chain of Lakes. The canal's watershed drains 28 square miles (mi^2). The adjacent land area draining directly to the canal is 6.4 mi^2 **(Figure 1.1)**. The canal flows for approximately 5.8 miles between Lake Lulu Outlet and the confluence with the Peace Creek Drainage Canal **(Figure 1.2)**. The Peace River watershed has a total surface area of 2,350 mi^2.

Ninety percent of the Peace River watershed lies within Polk, Hardee, DeSoto, and Charlotte Counties, and the remainder is within Lee, Highlands, Manatee, Hillsborough, Glades, and Sarasota Counties. In 2000, the population of the watershed was about 366,000 people. By 2020, that number is projected to increase to approximately 480,000. Rainfall averages about 55 inches per year, with 70 percent occurring between May and October. Citrus is the primary crop in Polk County, although other agricultural activities, including livestock production, contribute significantly to the local economy. Additional information about the region's hydrology and geology are available in the Basin Status Report for the Sarasota Bay–Peace–Myakka Basin (Florida Department of Environmental Protection [Department], June 2003).

For assessment purposes, the Department divided the Upper Peace Basin into water assessment polygons with a unique **w**ater**b**ody **id**entification (WBID) number for each watershed or stream reach. Wahneta Farms Drain Canal is WBID 1580 **(Figure 1.2).**

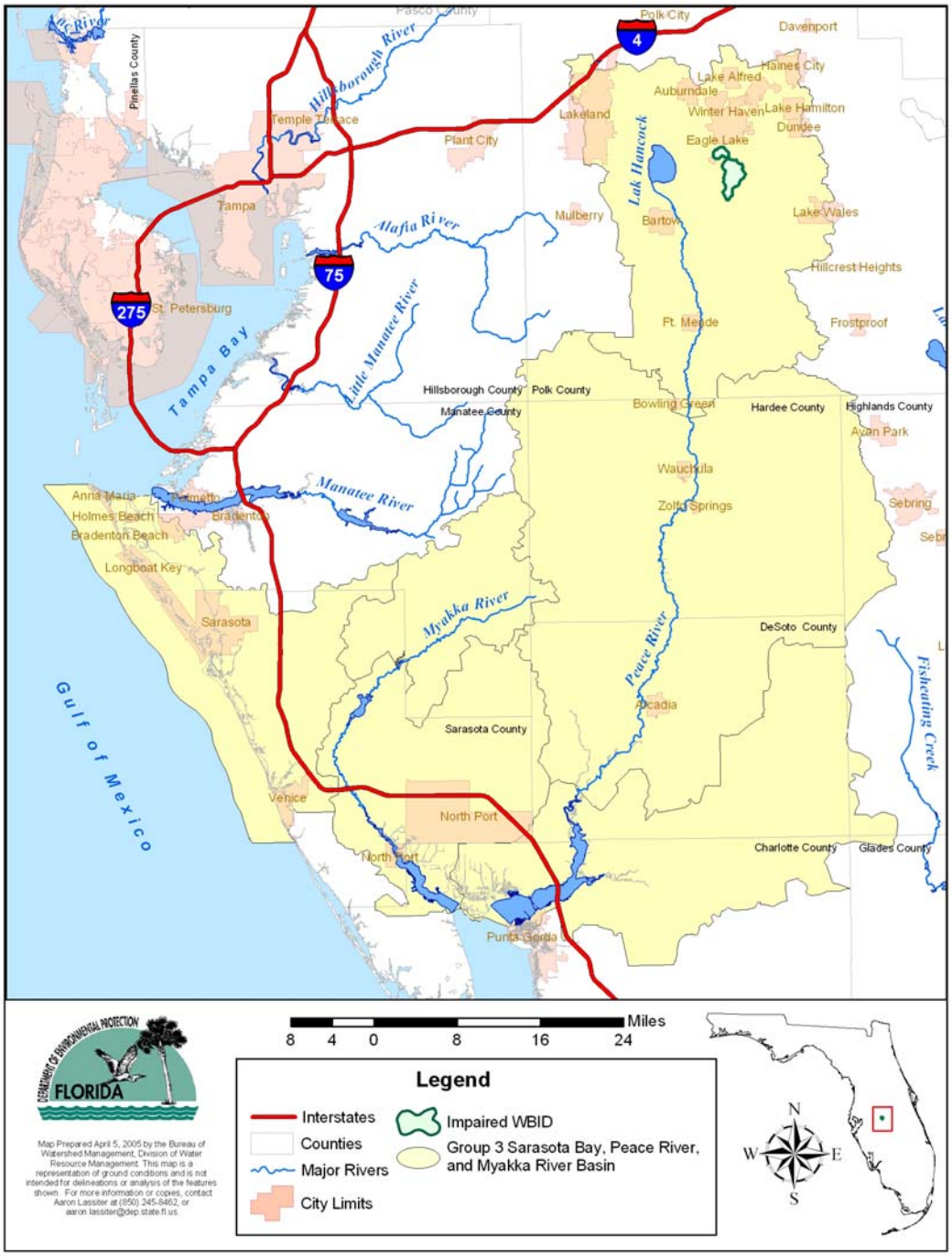


Figure 1.1. Location of the Wahneta Farms Drain Canal Watershed, WBID 1580, and Major Geopolitical Features in the Sarasota Bay–Peace–Myakka Basin

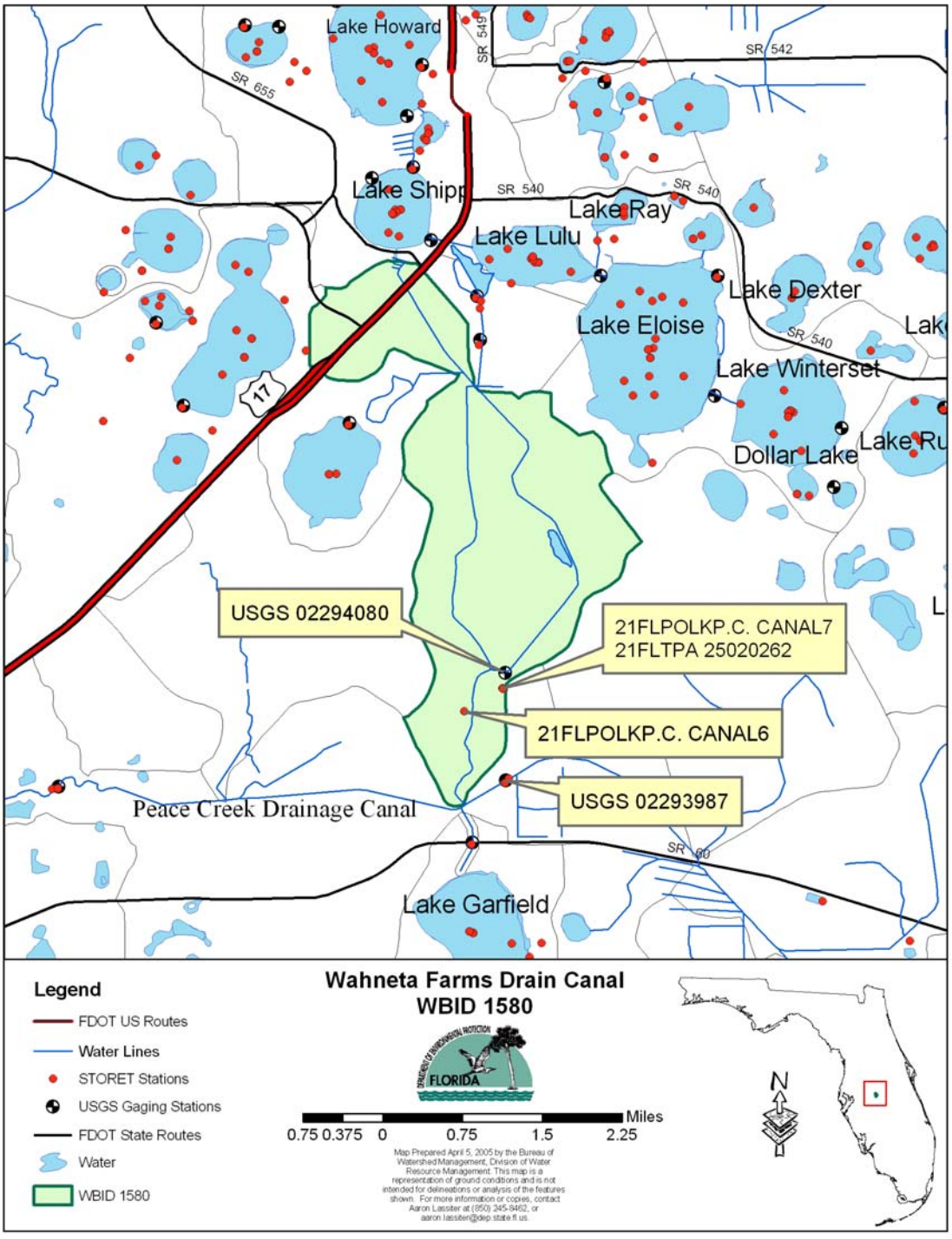


Figure 1.2. Monitoring Locations in the Wahneta Farms Drain Canal Watershed, WBID 1580

1.3 Background

This report was developed as part of the Department'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 the Wahneta Farms Drain Canal. These activities will depend heavily on the active participation of the Southwest Florida Water Management District (SWFWMD), local governments, businesses, and other stakeholders. The Department 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 Department 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 84 waterbodies in the Sarasota Bay–Peace–Myakka 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 Department 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 Chapter 62-303, Florida Administrative Code (F.A.C.) (Identification of Impaired Surface Waters Rule, or IWR), in April 2001.

2.2 Information on Verified Impairment

The Department used the IWR to assess water quality impairments in the Wahneta Farms Drain Canal and verified the impairment for fecal coliform **(Table 2.1). Table 2.2** summarizes the data collected during the verification period (January 1, 1997–June 30, 2004). The canal was verified as impaired for fecal coliform because, using the IWR methodology, more than 10 percent of the values exceeded the Class III freshwater criterion of 400 counts per 100 milliliters (mL) for fecal coliform (14 out of 22 samples in the verified period exceeded the criterion of 400 counts per 100 mL).

The verified impairment was based on data collected by the Polk County Natural Resources Division and the Department. Polk County STORET stations include 21FLPOLKP.C. CANAL6, and 21FLPOLKP.C. CANAL7. One sample was taken by the Department at STORET Station 21FLTPA 25020262. **Figure 1.2** shows the locations of the sampling sites in the canal. **Figure 2.1** displays the fecal coliform data collected from 1999 through 2004, and **Appendix A** tabulates the available fecal coliform data for the canal. Fecal coliform values exceeding the criterion of 400 counts per 100 mL during this period were used to develop the TMDL, as described in Chapter 5.

Table 2.1. Verified Impairment in the Wahneta Farms Drain Canal, WBID 1580

Parameter Causing Impairment	Priority for TMDL Development	Projected Year for TMDL Development*
Fecal Coliform	High	2004

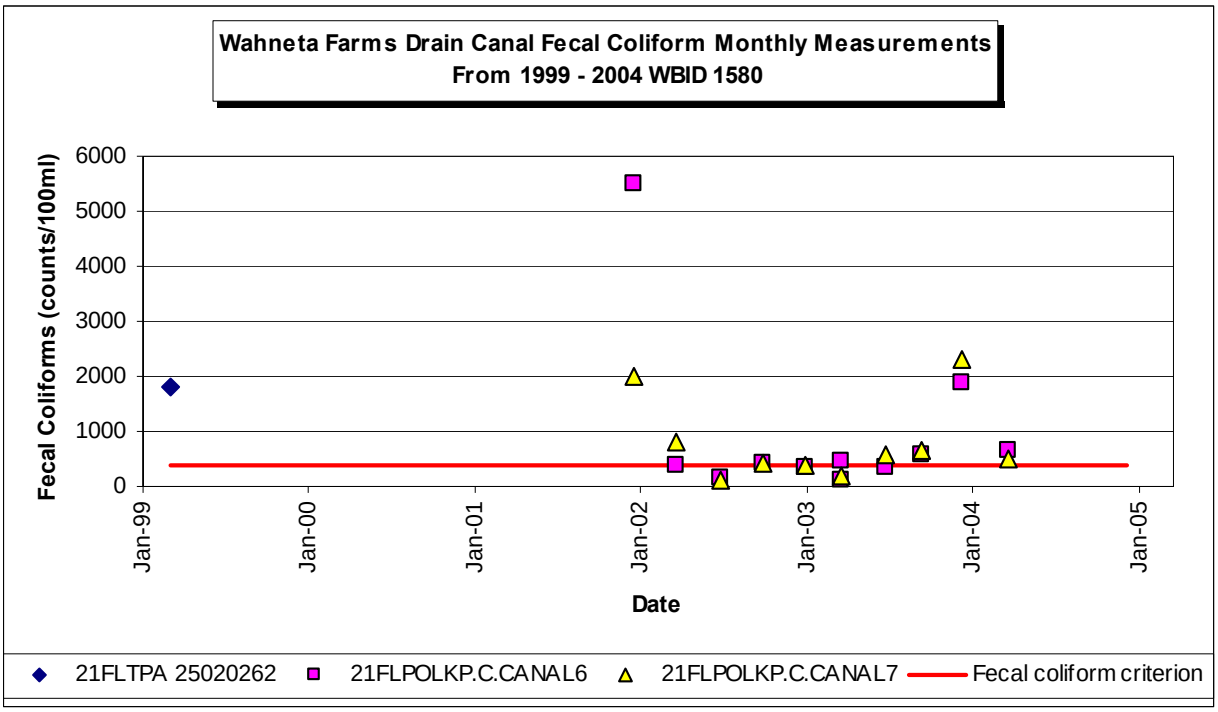
*The TMDL was scheduled to be completed by December 31, 2004, based on a Consent Decree between the EPA and EarthJustice, but the Consent Decree allows a nine-month extension for completing the TMDL.

Table 2.2. Summary of Fecal Coliform Data for the Wahneta Farms Drain Canal, WBID 1580 (January 1, 1997–June 30, 2004)

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)
Fecal Coliform	22	N/A	63.6	100	5,500

N/A – Not applicable.

Figure 2.1. Fecal Coliform Measurements for the Wahneta Farms Drain Canal, WBID 1580 (March 1999–April 2004)



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)**

The Wahneta Farms Drain Canal 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 protection of Class III waters, as established by Chapter 62-302, F.A.C., states the following:

> ***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 percent reduction loads for the impaired canal (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 (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 waterbody 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 Wahneta Farms Drain Canal

4.2.1 Point Sources

There are no permitted domestic wastewater treatment facilities that discharge coliform loads either directly or indirectly into the Wahneta Farms Drain Canal.

Municipal Separate Storm Sewer System Permittees

Municipal separate storm sewer systems (MS4s) may also discharge pollutants to waterbodies in response to storm events. To address stormwater discharges, the EPA developed the NPDES stormwater permitting program in two phases. Phase 1, promulgated in 1990, addresses large and medium-size MS4s located in incorporated areas and counties with populations of 100,000 or more. Phase 2 permitting began in 2003. Regulated Phase 2 MS4s are defined in Section 62-624.800, F.A.C., and typically cover urbanized areas serving jurisdictions with a population of at least 10,000 or discharging into Class I or Class II waters, or into Outstanding Florida Waters.

The stormwater collection systems in the Wahneta Farms Drain Canal watershed, which are owned and operated by Polk County in conjunction with the Florida Department of Transportation (FDOT), are covered by a Phase 1 MS4 permit. Currently, no local governments in the watershed have applied for coverage under the Phase 2 NPDES MS4 permit.

The Wahneta Farms Drain Canal watershed falls under the Polk County Phase 1 MS4 Permit (Number FLS000015). The City of Eagle Lake and the FDOT District 1 are co-permittees, with portions of their jurisdictions located in the watershed.

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 our 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. **Table 4.1** provides 2002 livestock data for Polk County (U. S. Department of Agriculture, 2002).

Land Uses

The spatial distribution and acreage of different land use categories were identified using the SWFWMD 1999 land use coverage (scale 1:40,000) contained in the Department's geographic information system (GIS) library. Land use categories in the watershed were aggregated using the simplified Level 1 codes **(Table 4.2). Figure 4.1** shows the acreage of the principal land

uses in the watershed. Land use is predominately agriculture, 41.3 percent; and urban and residential, 36.8 percent. Natural land uses (water and wetlands) represent approximately 13.4 percent of the watershed.

Table 4.1. Livestock Distribution for Polk County

Livestock Distribution	Polk County (number of livestock)
Cattle/Calves	108,126
Milk cows	888
Hogs/Pigs	893
Poultry layers >13 weeks	(D)
Poultry broilers	144
Sheep/Lambs	125
Horses	2,562

(D) – Data withheld to avoid disclosing data for individual farms.
Source: U.S. Department of Agriculture, NASS, 2002.

Table 4.2. Classification of Land Use Categories in the Wahneta Farms Drain Canal Watershed, WBID 1580

Code	Land Use	Acreage	Percent of Total
1000	Urban open	280	6.80
1100	Residential low density: < 2 dwelling units/acre	256	6.20
1200	Residential medium density: 2-5 dwelling units/acre	889	21.58
1300	Residential high density: 6 or more dwelling units/acre	90	2.19
2000	Agriculture	1,701	41.29
3000	Rangeland	65	1.59
4000	Upland forests	244	5.92
5000	Water	35	0.86
6000	Wetlands	518	12.57
8000	Transportation, communication, and utilities	42	1.01
	Total	**4,121**	**100**

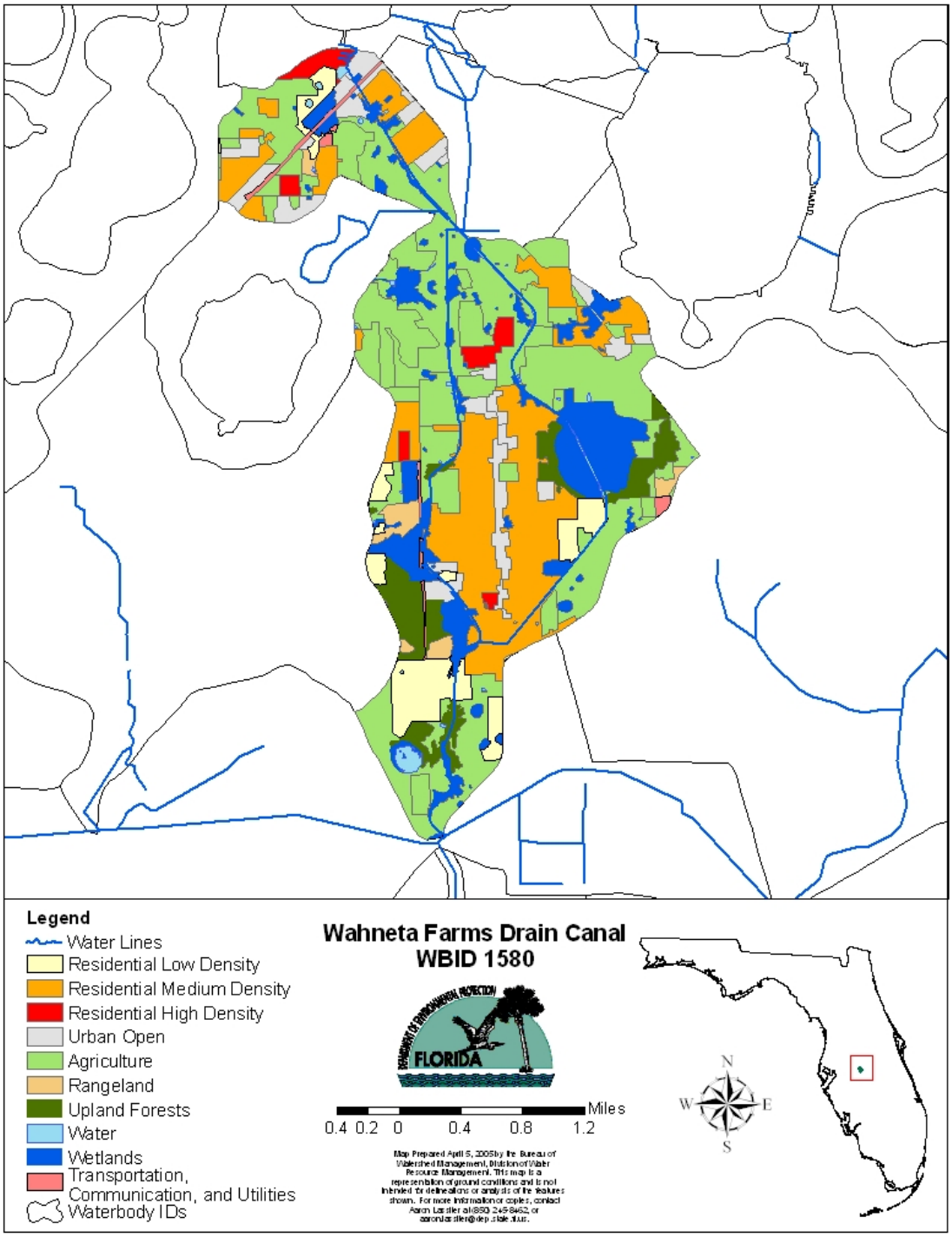


Figure 4.1. Principal Land Uses in the Wahneta Farms Drain Canal Watershed, WBID 1580, in 1999

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 30 percent of the watershed's land area is residential, pets (especially dogs) may be having an impact on the canal. The Department has been unable to obtain data on the number of dogs in the area; however, estimates can be made **(Table 4.3)** using household-to-dog 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 4.5×10^{11} organisms/day. This is an estimate, as the actual loading from dogs is not known.

Table 4.3. Estimated Loading from Dogs in the Wahneta Farms Drain Canal Watershed, WBID 1580

Pet	Estimated Number of Households in WBID 1580	Estimated Household: Pet Ratio[1]	Estimated Total Dog Population in Watershed	Estimated Loading of Total	Estimated Number of Pets with Impact to Canal	Estimated Counts/ Pet/Day[2]	Estimated Counts/Day
Dogs	2,502	0.361	903	10%	90	5.0E+9	4.5E+11

[1]From the AVMA Web site, which states the original source to be the *U. S. pet ownership and demographics sourcebook,* 2002.
[2] From Protocol for developing pathogen TMDLs, (EPA, January 2001).

Population

According to the U. S. Census Bureau, the population density in Polk County in the year 2000 was at or less than 258.2 people per mi^2 **(Table 4.4).** The Census Bureau reports that the total population in 2000 for Polk County, which includes (but is not exclusive to) WBID 1580, was 483,924, with 226,376 housing units. For all of Polk County, the Bureau reported a housing density of 120.8 houses per mi^2. Polk County is just below the average housing density of Florida, which has 134.3 housing units per mi^2 average (U. S. Census Bureau Web site, 2004). In the Wahneta Farms Drain Canal watershed, the population density is between 814 and 1,006 persons per mi^2 **(Figure 4.2)**.

Septic Tanks

Data for septic tanks are based on the 1970 census results, with year-by-year additions based on new septic tank construction. The data do not reflect septic tanks that have been removed. Polk County has a cumulative registry of 112,848 septic tanks. With 226,376 households in the county, this means that approximately 50 percent of the residences in the county are connected to WWTPs, with the remainder (50 percent) using septic tanks (Florida Department of Health [FDOH] Web site, 2005).

Figure 4.2. Population Density in the Area of the Wahneta Farms Drain Canal Watershed, WBID 1580, in 2000

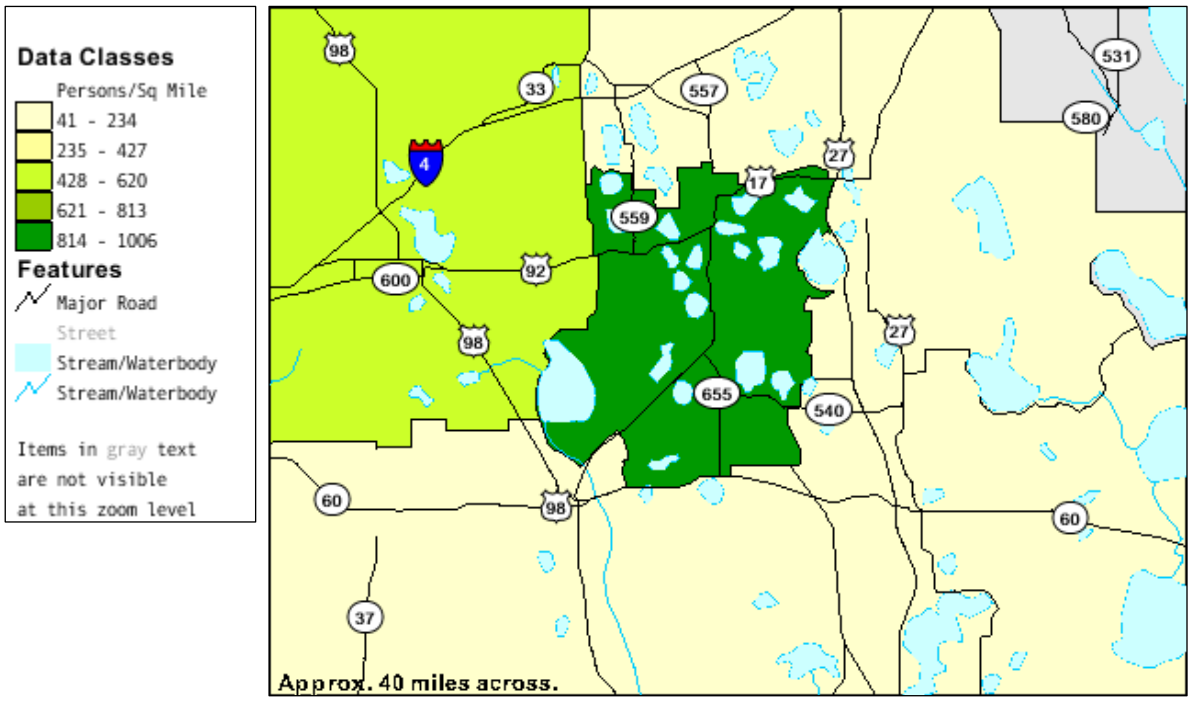


Table 4.4. Population Density in Polk County, Florida

Persons per Square Mile	Total Population	Houses per Square Mile	Housing Units
258.2	483,924	120.8	226,376

Source: U. S. Census Bureau Web site, 2005.

Based on 2000 U. S. Census Bureau data, there are an estimated 1,168 persons/mi^2 in the WBID, or **7,525** for the watershed area. The average household in the Wahneta Farms Drain Canal watershed has 3 persons (see **Table 4.5**). According to the FDOH, there is an annual average of 1,256 repairs (fiscal years 1993–2004) in Polk County. Based on this information, and assuming that the failures are spread evenly throughout the county, there are approximately 3.8 failures in the Wahneta Farms Drain Canal watershed annually. Using 70 gallons/day/person (EPA, 2001), a loading of 3.02 x 10^{10} colonies/day is derived. **Table 4.6** shows this estimation.

Table 4.5. Estimation of Average Household Size in the Wahneta Farms Drain Canal Watershed, WBID 1580

Household Size	Number of Households	Percent of Total	Number of People
1-person household	458	18.32%	458
2-person household	777	31.04%	1,554
3-person household	408	16.30%	1,224
4-person household	394	15.74%	1,576
5-person household	224	8.95%	1,120
6-person household	97	3.86%	582
7-or-more-person household	145	5.81%	1,017
TOTAL	**2,502**	**100.00%**	**7,531**
		AVERAGE HOUSEHOLD SIZE	**3.0**

Table 4.6. Estimation of Annual Fecal Coliform Loading from Failed Septic Tanks in the Wahneta Farms Drain Canal Watershed, WBID 1580

Estimated Population Density and Area	WBID Area (mi^2)	Estimated Population in Watershed	Estimated Number of Tank Failures[1]	Estimated Load From Failed Tank[2]	Gallons/ Person/Day[2]	Estimated Number of Persons Per Household[3]	Estimated Load From Failing Tanks
1,168 persons/mi^2 in WBID 1580	5.57	7,525	3.8	1.00 x 10^4/mL	70	3.0	3.02 x 10^{10}

[1] Based on septic tank repair permits issued in the watershed from March 1990 to April 2004 (FDOH); see text.
[2] From *Protocol for developing pathogen TMDLs* (EPA, January 2001).
[3] From the U. S. Census Bureau; see **Table 4.5** for more information on this estimate.

Domestic Sludge

When domestic wastewater is treated, solid material accumulates in the WWTP and 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 is one residual land application site in the area of the Wahneta Farms Drain Canal watershed **(Figure 4.3)**. The site, Winter Haven WWTP #3, covers approximately 10 acres. The sources for the WWTP are the cities of Winter Haven and Cypresswood.

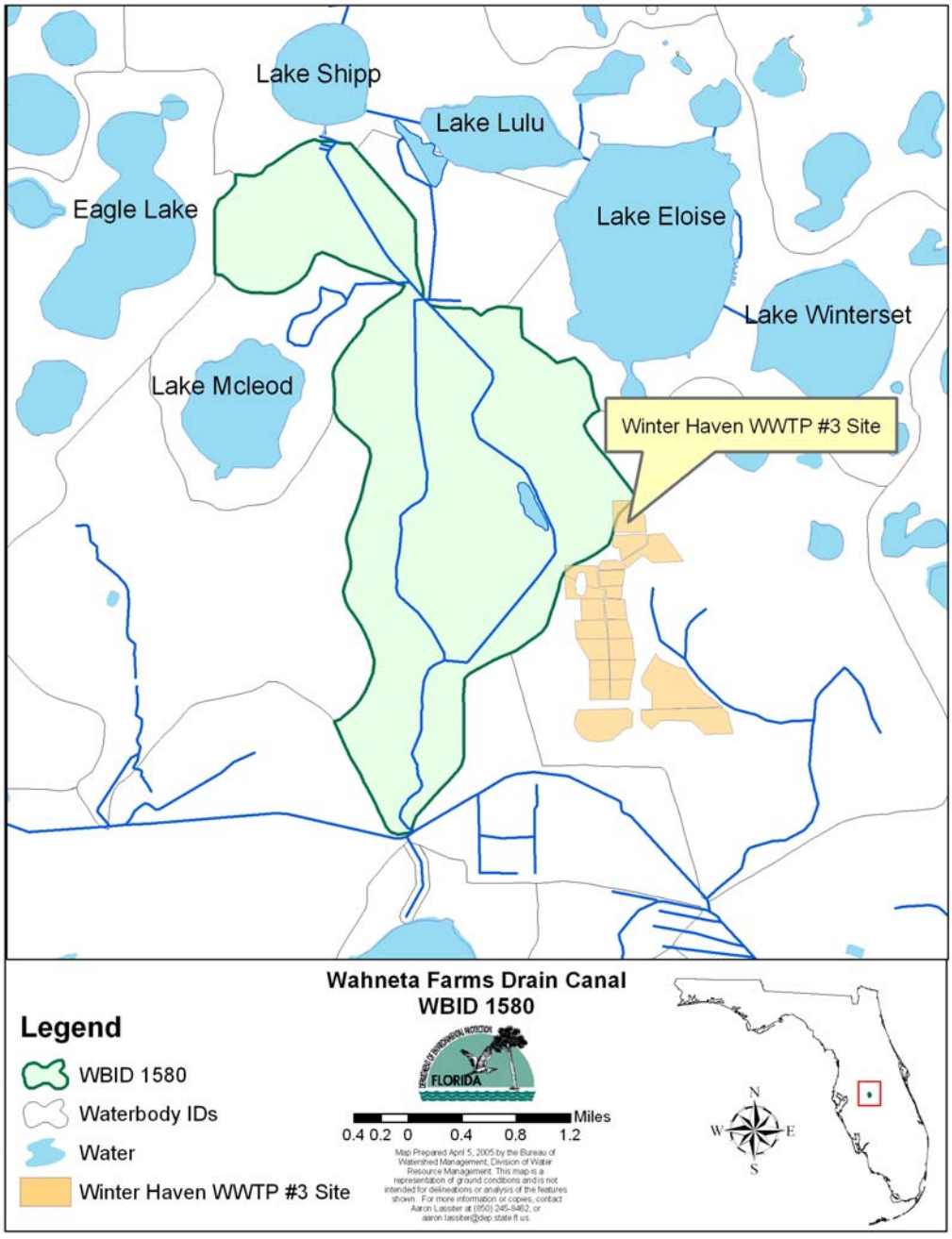


Figure 4.3. Domestic Sludge Application Sites in the Wahneta Farms Drainage Canal Watershed, WBID 1580

Chapter 5: DETERMINATION OF ASSIMILATIVE CAPACITY

5.1 Method Used To Determine Loading Capacity

The fecal coliform TMDL for Wahneta Farms Drain Canal is based on the "percent reduction" methodology. Under this method, the percent reduction needed to meet the applicable criterion is calculated for each measured value above the criterion, and then the median of the percent reductions is calculated. As described in Chapter 3, criterion concentrations of 400 counts/100mL for fecal coliform were used, as specified in Florida's Surface Water Quality Standards.

5.2 Data Used in the Determination of the Loading Capacity

The primary collector of water quality data in the Wahneta Farms Drain Canal is the Polk County Natural Resources Division. The Department collected one additional sample. Polk County STORET stations include 21FLPOLKP.C. CANAL6 and 21FLPOLKP.C. CANAL7. The Department sampled at STORET Station 21FLTPA 25020262. **Figure 1.2** shows the locations of these 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 used in this analysis, and **Appendix A** lists the water quality monitoring results for fecal coliform.

5.3 TMDL Development Process

5.3.1 Attempts To Use the Load Duration Method

Coliform TMDLs are commonly developed using load duration curves. This method requires daily flow data (typically a U.S. Geological Survey [USGS] gaged site in the watershed) to calculate coliform loads. However, continuous flow data were not available for Wahneta Farms Drain Canal for the period when coliform data were collected. When flow data are not available, the approach used to estimate a TMDL is based on the percent reduction required to reduce the coliform count exceedances to the water quality criterion.

According to USGS methods, flows can be estimated at ungaged sites using drainage area ratios to a nearby gaged stream when the weighted drainage ratios of the two sites are within 0.5 to 1.5 mi^2 (Ries and Friesz, 2000; EPA, 2004). However, gaged streams in the Upper Peace Basin were determined not to adequately represent the hydrologic conditions in the Wahneta Farms Drain Canal.

5.3.2 Calculation of Required Percent Reduction

To calculate the required percent reduction in fecal coliform counts needed to meet the water quality criterion, the state's criterion for fecal coliform (400 counts/100mL) was subtracted from each fecal coliform sample exceedance, respectively, divided by the sample result, and then multiplied by 100. This value provides the percent reduction required to achieve the instream

concentration criterion established for fecal coliform. The median value of the percent reduction values for each sample exceedance for fecal coliform was then calculated and used as the overall percent reduction required to meet water quality standards. As shown in **Table 5.1**, a 38.9 percent reduction in fecal coliform is required to achieve an instream concentration of 400 counts/100mL.

Table 5.1. Summary of Fecal Coliform Sample Exceedances for Wahneta Farms Drain Canal, WBID 1580

Station ID	Date	Time	Fecal Coliform (counts/100ml)	Percent Reduction
21FLTPA 25020262	3/29/1999	1020	1,820	78.02
21FLPOLKP.C. CANAL7	1/15/2002	945	2,000	80
21FLPOLKP.C. CANAL6	1/15/2002	930	5,500	92.73
21FLPOLKP.C. CANAL7	4/16/2002	925	790	49.37
21FLPOLKP.C. CANAL6	10/22/2002	915	420	4.76
21FLPOLKP.C. CANAL7	10/22/2002	900	420	4.76
21FLPOLKP.C. CANAL6	4/15/2003	950	460	13.04
21FLPOLKP.C. CANAL6	7/22/2003	930	590	32.20
21FLPOLKP.C. CANAL7	10/7/2003	1020	570	29.82
21FLPOLKP.C. CANAL6	10/7/2003	1005	670	40.30
21FLPOLKP.C. CANAL7	1/6/2004	940	1,900	78.95
21FLPOLKP.C. CANAL6	1/6/2004	925	2,300	82.61
21FLPOLKP.C. CANAL6	4/14/2004	1000	510	21.57
21FLPOLKP.C. CANAL7	4/14/2004	1010	640	37.50
Median Percent Reduction of Fecal Coliforms				**38.90**

5.4 Critical Conditions/Seasonality

The critical condition for the coliform loading from nonpoint sources is typically an extended dry period followed by a rainfall runoff event. Nonpoint sources of coliform bacteria generally, but not always, involve the accumulation of coliform bacteria on land surfaces that wash off as a result of storm events. Wildlife and ground water polluted by sources such as failed septic tanks and central sewer system leaks/breaks may also contribute additional bacteria.

Due to the lack of flow data, flow and coliform loading could not be correlated. While the critical conditions are not known, the determination of the required percent reduction is sufficiently protective because the method analyzed all of the exceedances. The approach is considered conservative because only the exceedances were used, which excludes conditions when the fecal coliform criterion is met in the canal. Seasonality was addressed by assessing water quality in the impaired canal based on data collected throughout the year (i.e., values were collected during three seasons in 2002 and 2003, two seasons in 2004 [winter and spring], and a single season in 1999 [winter]).

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 (wasteload 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 percent reduction, and the WLA for wastewater is typically expressed as mass per day).

WLAs for stormwater discharges are typically expressed as "percent 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 TMDL for the Wahneta Farms Drain Canal is expressed as the "median percent reduction" required to reduce the observed water quality exceedances to the state's water quality criterion **(Table 6.1).** The percent reduction value for fecal coliform was determined by taking the median of the percent reductions for each sample result that exceeded the criterion. The percent reduction was calculated as 38.9 percent which is needed to achieve an instream median concentration of 400 counts/100mL.

Table 6.1. TMDL Components for the Wahneta Farms Drain Canal, WBID 1580

Parameter	TMDL (Percent reduction)	WLA		LA (Percent reduction)	MOS
		Wastewater (counts/day)	NPDES Stormwater (Percent reduction)		
Fecal Coliform	39	N/A	39	39	Implicit

N/A – Not applicable.

6.2 Load Allocation

Based on the percent reduction approach, the load allocation for nonpoint sources is a 38.9 percent reduction of in-stream fecal coliform concentrations. It should be noted that the LA includes loading from stormwater discharges regulated that are not part of the NPDES stormwater program (see **Appendix B**).

6.3 Wasteload Allocation

6.3.1 NPDES Wastewater Discharge

No NPDES-permitted domestic wastewater treatment facilities discharge coliform bacteria to surface waters in the Wahneta Farms Drain Canal watershed. Thus, the wasteload allocation for wastewater facilities is not applicable. Any facilities permitted to discharge to the Wahneta Farms Drain Canal watershed in the future will be required to meet the state Class III criterion for fecal coliform.

6.3.2 NPDES Stormwater Discharges

The WLA for FDOT's Municipal Separate Storm Sewer System (MS4) permit is to address anthropogenic sources in the basin to result in a 38.9 percent reduction of in-stream fecal coliform concentrations. It should be noted that any MS4 permittee will only be responsible for reducing the loads associated with stormwater outfalls for which it owns or otherwise has responsible control, and is not responsible for reducing other nonpoint source loads within its jurisdiction.

While the LA and WLA for fecal coliforms have been expressed as the percent reduction needed to attain the applicable Class III criteria, it is the combined reductions from both anthropogenic point and nonpoint sources that will result in the required reduction of in-stream 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 (Department, 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

of the state criterion. A MOS was included in the TMDL by not allowing any exceedances of the state criterion, even though intermittent natural exceedances 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 canal 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.

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Appendices

Appendix A: Summary of Monitoring Results for Fecal Coliform in the Wahneta Farms Drain Canal Watershed for the Verified Period (January 1997–June 2004)

HUC	WBID	Station	Date	Time	Result	Remark Code
3100101	1580	21FLTPA 25020262	3/29/1999	1020	**1,820**	-
3100101	1580	21FLPOLKP.C. CANAL6	1/15/2002	930	**5,500**	-
3100101	1580	21FLPOLKP.C. CANAL7	1/15/2002	945	**2,000**	-
3100101	1580	21FLPOLKP.C. CANAL6	4/16/2002	945	390	B
3100101	1580	21FLPOLKP.C. CANAL7	4/16/2002	925	**790**	B
3100101	1580	21FLPOLKP.C. CANAL6	7/23/2002	915	150	B
3100101	1580	21FLPOLKP.C. CANAL7	7/23/2002	900	100	B
3100101	1580	21FLPOLKP.C. CANAL6	10/22/2002	915	**420**	-
3100101	1580	21FLPOLKP.C. CANAL7	10/22/2002	900	**420**	-
3100101	1580	21FLPOLKP.C. CANAL6	1/27/2003	935	340	-
3100101	1580	21FLPOLKP.C. CANAL7	1/27/2003	950	400	-
3100101	1580	21FLPOLKP.C. CANAL6	4/15/2003	950	**460**	-
3100101	1580	21FLPOLKP.C. CANAL6	4/15/2003	955	210	-
3100101	1580	21FLPOLKP.C. CANAL7	4/15/2003	1000	120	-
3100101	1580	21FLPOLKP.C. CANAL6	7/22/2003	930	**590**	-
3100101	1580	21FLPOLKP.C. CANAL7	7/22/2003	945	360	-
3100101	1580	21FLPOLKP.C. CANAL6	10/7/2003	1005	**670**	-
3100101	1580	21FLPOLKP.C. CANAL7	10/7/2003	1020	**570**	-
3100101	1580	21FLPOLKP.C. CANAL6	1/6/2004	925	**2,300**	-
3100101	1580	21FLPOLKP.C. CANAL7	1/6/2004	940	**1,900**	-
3100101	1580	21FLPOLKP.C. CANAL6	4/14/2004	1000	**510**	-
3100101	1580	21FLPOLKP.C. CANAL7	4/14/2004	1010	**640**	-

Note: Bold numbers represent measurements that exceeded the water quality criterion.
Remark Code: - – No remark code.

B – Results based on colony counts outside the acceptable range. This code applies to microbiological tests and specifically to membrane filter colony counts. The code is used if the colony count is generated from a plate in which the total number of coliform colonies is outside the method indicated ideal range. The code is not used if a 100 mL sample has been filtered and the colony count is less than the lower value of the ideal range.

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 Chapter 62-40, F.A.C.

The rule requires the state's water management districts (WMDs) to establish stormwater pollutant load reduction goals (PLRGs) and adopt them as part of a SWIM plan, other watershed plan, or rule. Stormwater PLRGs are a major component of the load allocation part of a TMDL. To date, stormwater PLRGs have been established for Tampa Bay, Lake Thonotosassa, the Winter Haven Chain of Lakes, the Everglades, Lake Okeechobee, and Lake Apopka.

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 five or more acres of land, and master drainage systems of local governments with a population above 100,000, which are better known as municipal separate storm sewer systems (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 Florida Department of Transportation throughout the fifteen counties meeting the population criteria. The Department received authorization to implement the NPDES stormwater program in 2000.

An important difference between the NPDES and other state stormwater permitting programs is that the NPDES program covers both new and existing discharges, while the other state programs focus on new discharges. Additionally, Phase II of the NPDES Program, implemented in 2003, expands the need for these permits to construction sites between one and five acres, and to local governments with as few as 1,000 people. 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 similar to other point sources of pollution, such as domestic and industrial wastewater discharges. It should be noted that all MS4 permits issued in Florida include a re-opener clause that allows permit revisions to implement TMDLs when the implementation plan is formally adopted.

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