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FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Division of Environmental Assessment and Restoration,
Bureau of Watershed Restoration

SOUTHWEST DISTRICT • TAMPA BAY

TMDL Report
Fecal Coliforms
for
Smacks Bayou (WBID 1683)

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Web sites

Florida Department of Environmental Protection, Bureau of Watershed Restoration

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>

2008 Integrated Report

http://www.dep.state.fl.us/water/tmdl/docs/2008_Integrated_Report.pdf

Criteria for Surface Water Quality Classifications

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

Basin Status Report for the Tampa Bay Basin

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

Basin Water Quality Assessment Report for the Tampa Bay Basin

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

U.S. Environmental Protection Agency

Region 4: Total Maximum Daily Loads in Florida

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

National STORET Program

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

Chapter 1: INTRODUCTION

1.1 Purpose of Report

This report presents the Total Maximum Daily Loads (TMDL) for fecal coliform for the Smacks Bayou (WBID 1683) watershed in the Group 1 Tampa Bay Basin. This waterbody was verified as impaired for fecal coliform; therefore, was included on the Verified List of impaired waters for the Tampa Bay Basin that was readopted by Secretarial Order on May 14, 2009. The TMDL establishes the allowable loadings to Smacks Bayou that would restore the waterbody so that it meets its applicable water quality criteria for fecal coliform bacteria.

1.2 Identification of Waterbody

Smacks Bayou is located in the eastern portion of Pinellas County (**Figure 1.1**) and drains to Tampa Bay Upper Segment (WBID 1558C). Smacks Bayou is located within the City of St. Petersburg. Additional information about Smacks Bayou is available in the Basin Status Report for the Tampa Bay Basin (Florida Department of Environmental Protection [Department], 2001).

For assessment purposes, the Department has divided the Tampa Bay Basin into water assessment polygons with a unique **waterbody identification** (WBID) number for each watershed or stream reach. Smacks Bayou is assigned to WBID 1683 (**Figure 1.2**).

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).

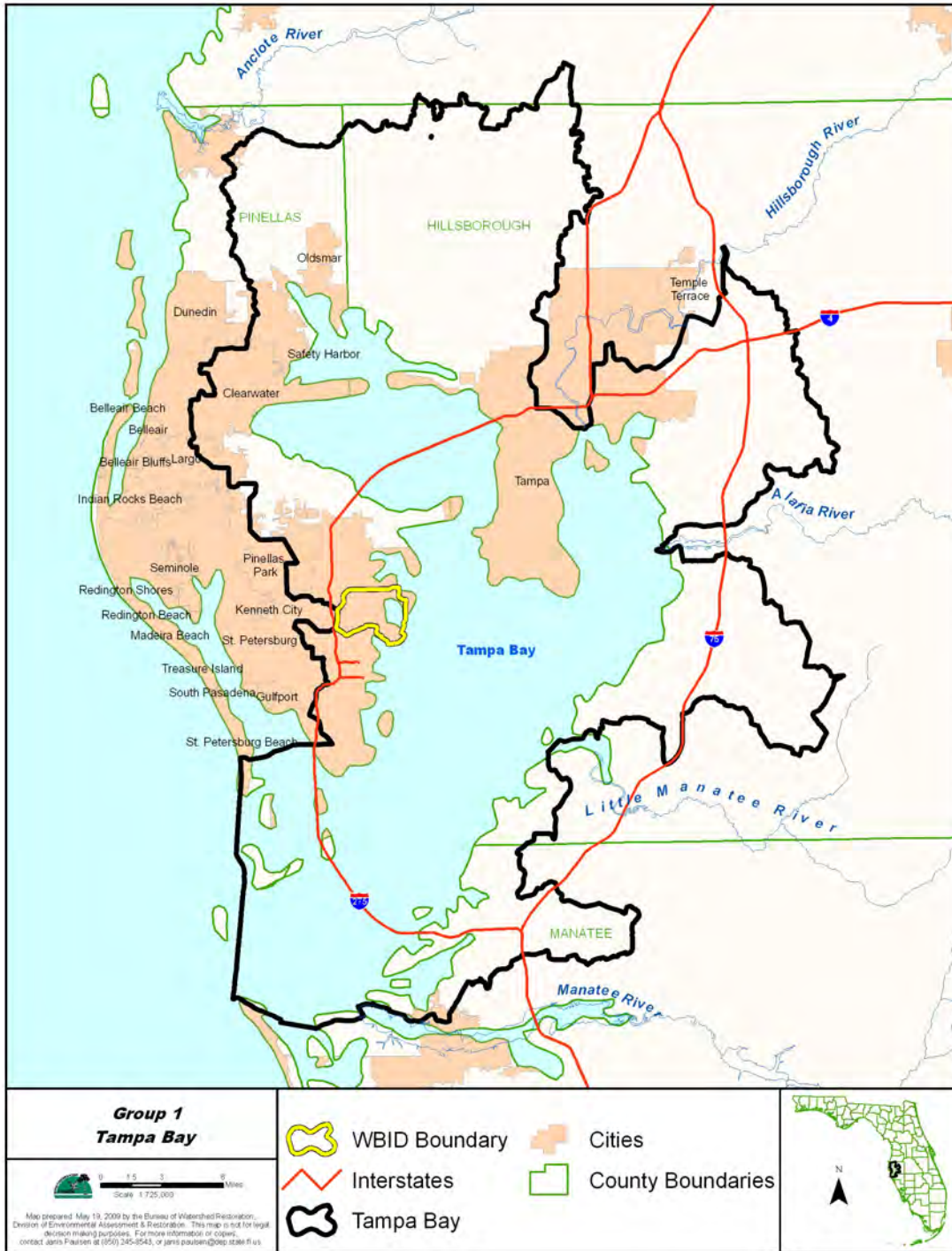


Figure 1.1. Location of Smacks Bayou in Pinellas County and Major Geopolitical Features in the Area

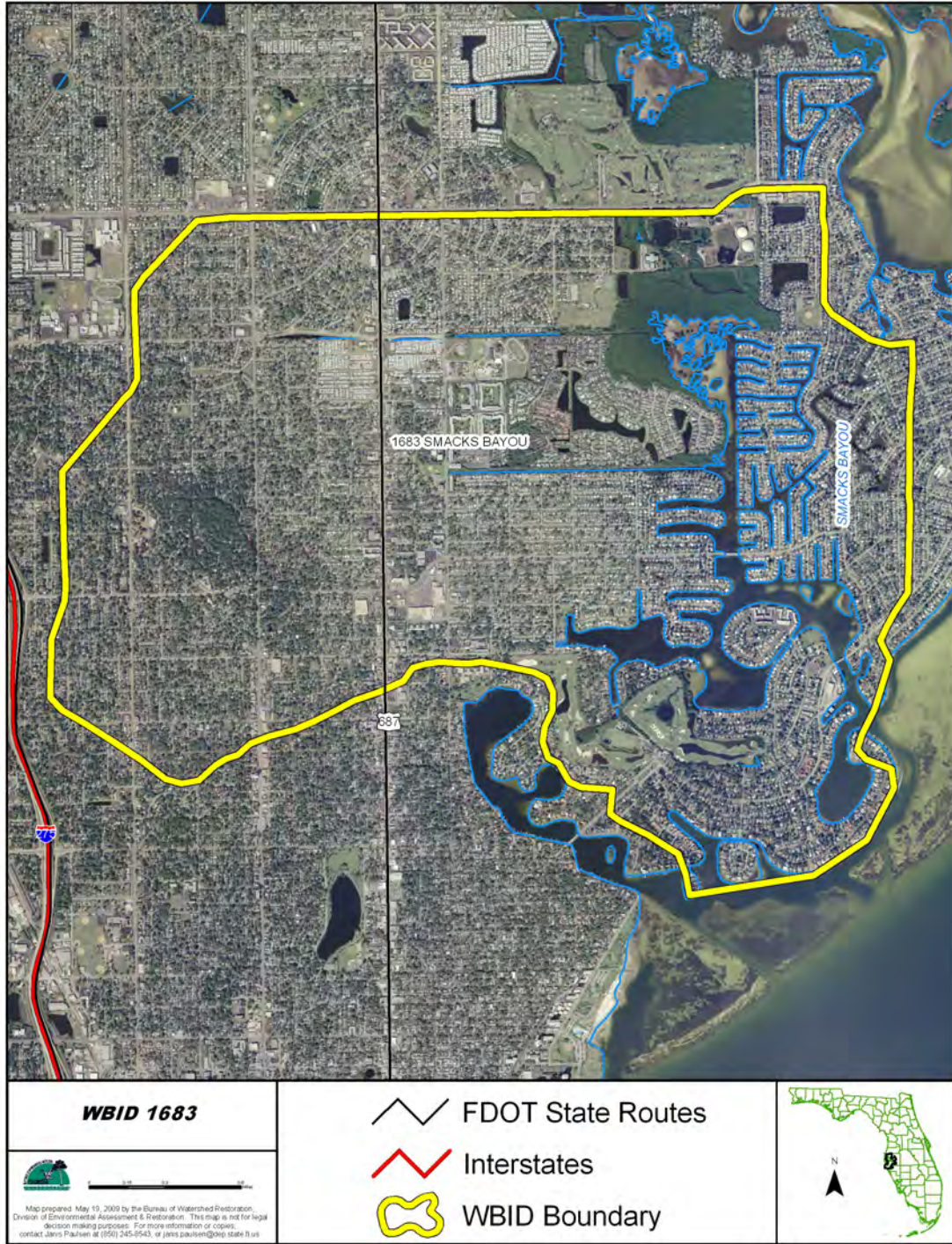


Figure 1.2. Location of Smacks Bayou (WBID 1683)

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, designed to reduce the amount of fecal coliforms that caused the verified impairment of Smacks Bayou. These activities will depend heavily on the active participation of the Southwest Florida Water Management District (SWFWMD), Pinellas County, the City of St. Petersburg, 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) lists of surface waters that do not meet applicable water quality standards (impaired waters) and establish a TMDL for each pollutant causing impairment of 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.]); the state's 303(d) list is amended annually to include basin updates.

Florida's 1998 303(d) list included 47 waterbodies in the Tampa Bay 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 Rule 62-303, Florida Administrative Code (F.A.C.) (Identification of Impaired Surface Waters Rule, or IWR), in April 2001; the rule was modified in 2006 and 2007.

Data for Smacks Bayou that was used to place it on the 1998 303(d) list came from 1992-1993. At this time, only two stations were assessed. Station 21FLPDEM42-01 located at 45TH Ave. NE and 1st St., on the 45th Ave Canal (Canal) and station 21FLPDEM32-01, located off the north side of the Overlook Dr. bridge (Bayou) (**Figure 2.1**). For the Canal station, the median values were turbidity of 3.5 NTU (Nephelometric turbidity units), Dissolve Oxygen (DO) of 1.9 milligrams per liter (mg/L), Biochemical Oxygen Demand – five (5) day (BOD₅) of 3.0 mg/L, total nitrogen (TN) of 1.10 mg/L, total phosphorus (TP) of 0.22, chlorophyll-a (Chl a) of 7.0 micrograms per liter (ug/L), and fecal coliform of 860 colony forming unit (cfu)/100mL. For the Bayou station, the median values were turbidity 1.6 NTU, DO 6.3 mg/L, BOD₅ of 1.5 mg/L, TN of 0.50 mg/L, TP of 0.26 mg/L, Chl a of 6 ug/L, and fecal coliform of 20 cfu/100mL. Based on the water quality index used in during this period, the canal station was given a fair rating and the bayou station was given a good rating. Based on EPA practices, a rating of fair was sufficient to be determined as impaired; therefore, Smacks Bayou was placed on the 1998 303(d) list.

2.2 Information on Verified Impairment

The Department used the IWR to assess water quality impairments in the Smacks Bayou watershed and has verified that this waterbody segment is impaired for fecal coliform, dissolved oxygen, and nutrients (**Table 2.1**). The verification of the fecal coliform impairment was based on the fact that there were 31 samples out of a total of 67 samples exceeding 400 cfu/100 mL during the verified period (January 1, 1995, through June 30, 2002) (Rule 62-302, F.A.C.)

(Table 2.2). The impairments for dissolved oxygen and nutrients will be addressed by the Department through a separate TMDL.

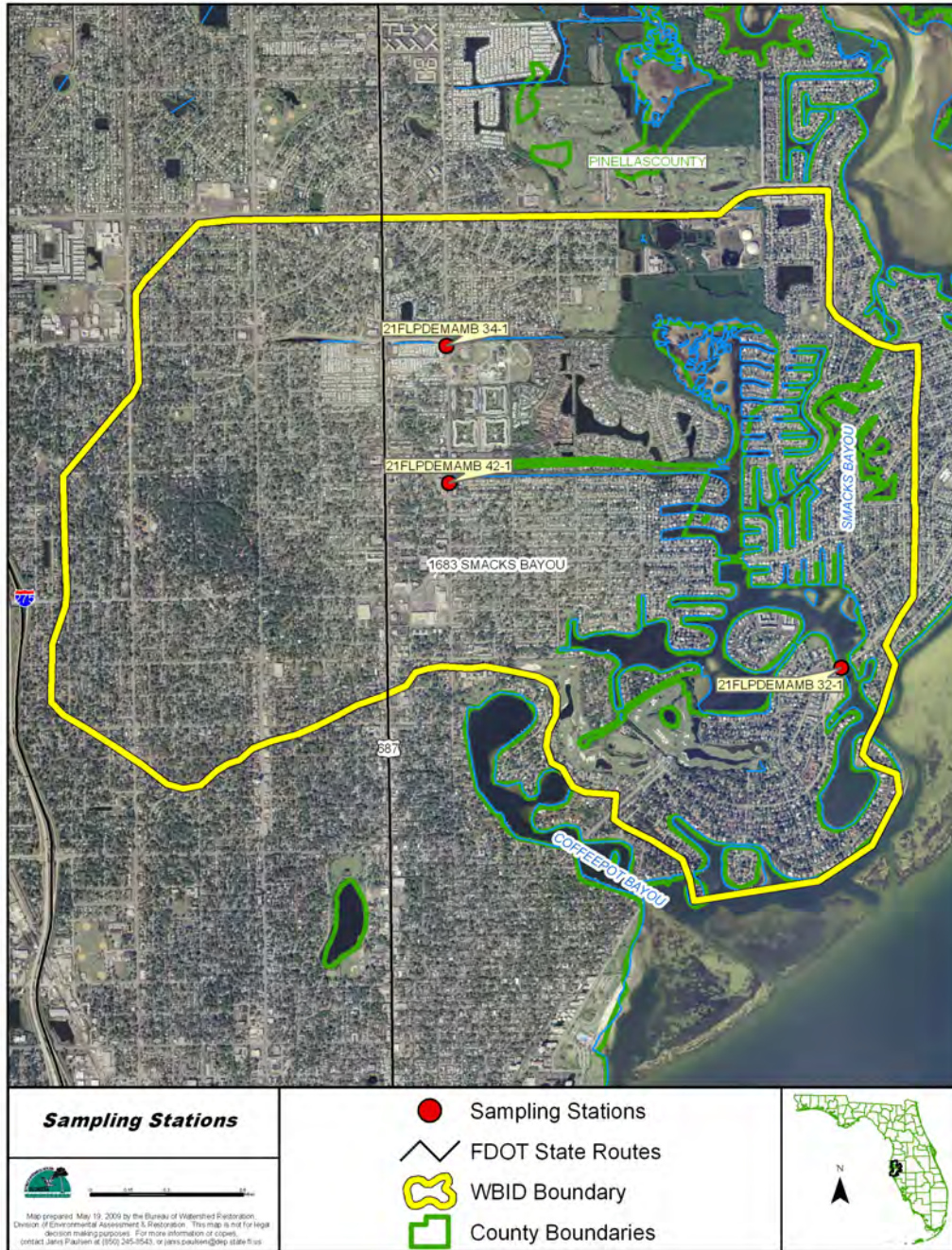


Figure 2.1. Water Quality Stations for Smacks Bayou (WBID 1683)

Table 2.1. Verified Impaired Waterbody Segment and Parameters

WBID	Waterbody Segment	Parameters of Concern	Priority for TMDL Development
1683	Smacks Bayou	Fecal Coliform	Low
1683	Smacks Bayou	Dissolved Oxygen	Low
1683	Smacks Bayou	Nutrients	Low

Note: The verified impairments for dissolved oxygen and nutrients will be addressed through a separate TMDL.

Table 2.2. Summary of Fecal Coliform Data in the Verified Period for Smacks Bayou (WBID 1683)

WBID	Parameter	Summary of observations
1683	Range of fecal coliform concentration (cfu/100mL)	1 – 12000
	Median fecal coliform concentration (cfu/100mL)	210
	Mean fecal coliform concentration (cfu/100mL)	1263
	Total Number of Samples	67
	Exceedances	31
	IWR required number of exceedances for the verified list	11

The verified impairments were based on data collected by Pinellas County, the WBID location and STORET stations are shown in **Figure 2.1**.

At this time, there were two canals being sampled that represent two local subbasins and a portion of the open water of Smacks Bayou. Subbasin "45th Avenue NE Canal" is monitored at station 21FLPDEM42-01, subbasin "54th Avenue East Canal" is monitored at station 21FLPDEM34-01, and the open water segment of Smacks Bayou is monitored at station 21FLPDEM 32-01 (see **Figure 2.1**). The Canal stations are at the dead end of ~1,500 meter long canals (see **Figure 2.2**). The other station represents water quality of the more open areas of the bayou.



Figure 2.2. Sampling Location for 45th Avenue NE Canal (at station looking down canal towards bayou, with silt /trash screen).

Rainfall:

Rainfall for the period 1992 through 2007 was obtained for the NOAA station located at the St. Petersburg Airport.

Figure 2.4 depicts the annual average rainfall (1992-2007). Based on these data, the annual average is 50.9 inches. The average rainfall during the verified period (1995-2002) is 55.5 inches making the average rainfall during the verified period slightly higher than the period 1992-2007. The years 1995 (65 in), 1997 (73 in), 2001 (55 in) and 2002 (62 in) were wetter than average. Therefore, the verified period experienced a predominantly higher than normal amount of rainfall.

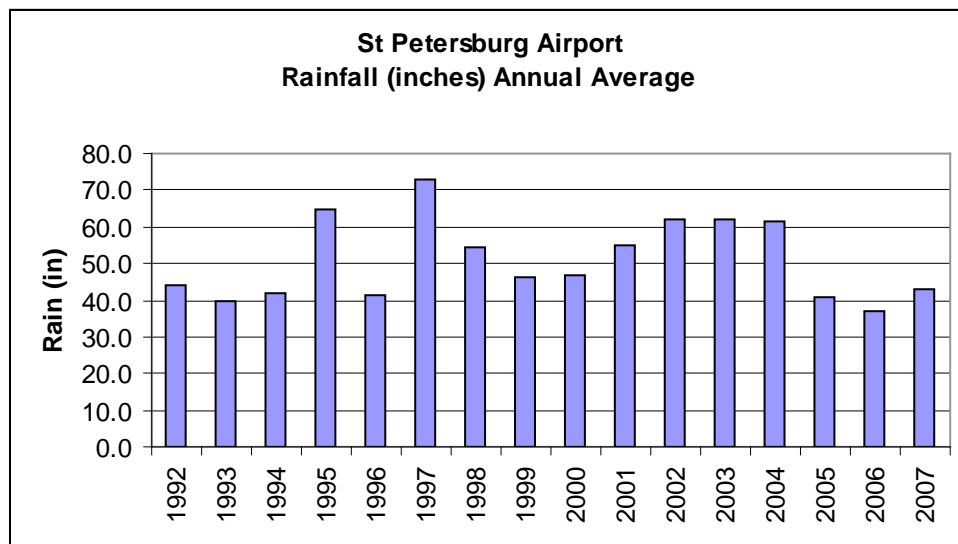


Figure 2.4. Annual Average Rainfall at St. Petersburg Airport

Figure 2.5 presents the monthly average rainfall for the years 1992 to 2007. It is clear from these data that June, July, August, and September are much wetter than other months of the year.

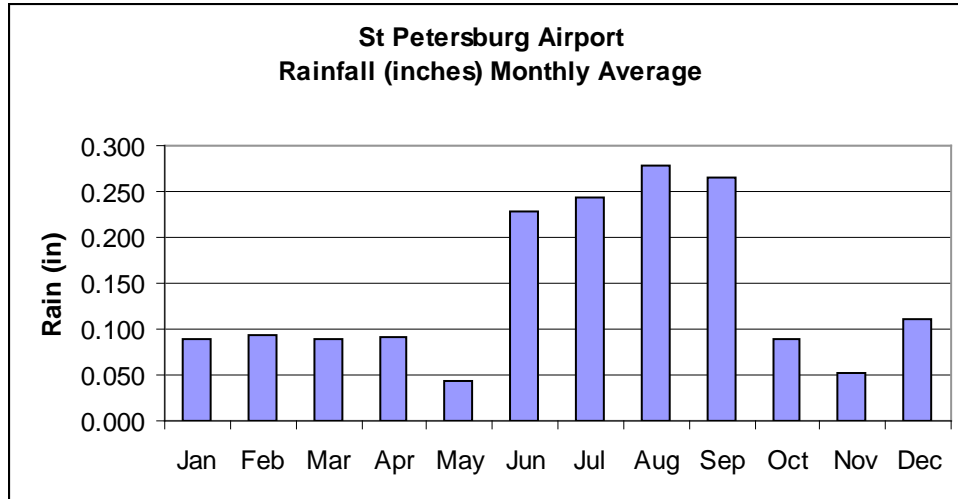


Figure 2.5. Monthly Average Rainfall at St. Petersburg Airport

Salinity:

Salinity data were examined to verify that the sampling locations at the ends of the two canals were predominantly marine and not freshwater. As can be seen in the **Table 2.3**, the 54th East Canal (station 34-01) is considerably less saline than the more open areas of the bayou (32-01) and the 45th NE Canal (42-01) is slightly less saline. Based on these data, both canals are considered predominantly marine and therefore are part of Smacks Bayou.

Table 2.3. Summary of Salinity Data by Sampling Location

Primary Stations Salinity	Period of Record	Count	Minimum (PPT)	25th Percentile (PPT)	Average (PPT)	Median (PPT)	75th Percentile (PPT)	Maximum (PPT)
21FLPDEM32-01	Feb92 - Oct02	359	0.00	23.00	25.56	26.00	29.00	41.27
21FLPDEM34-01	Feb92 - Oct02	252	0.00	5.00	11.88	12.37	17.83	27.00
21FLPDEM42-01	Feb92 - Oct02	257	0.00	14.00	18.71	21.00	24.50	31.00

Note: Verified Period ends June 2002

Chapter 3: DESCRIPTION OF APPLICABLE WATER QUALITY STANDARDS AND TARGETS

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)

Smacks Bayou is a Class III waterbody, with a designated use of recreation, propagation, and the maintenance of a healthy, well-balanced population of fish and wildlife. Additionally, Smacks Bayou has been designated as an Outstanding Florida Water (OFW) and is part of the Pinellas County Aquatic Preserve. The criterion applicable to this TMDL is the Class III criteria for fecal coliform.

3.2 Applicable Water Quality Standards and Numeric Water Quality Target

3.2.1 Fecal Coliform

Numeric criteria for bacterial quality are expressed in terms of fecal coliform bacteria concentration. The water quality criterion for the protection of Class III waters, as established by Rule 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.

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. During the development of the TMDL for the impaired waterbody (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 criterion selected for the TMDL was not to exceed 400 MPN/100mL in any sampling event for fecal coliform. The 10 percent exceedance allowed by the water quality criterion for fecal coliform bacteria was not used directly in estimating the TMDL, but was included in the TMDL margin of safety (as described in subsequent chapters).

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 pollutants in the impaired waterbody and the amount of pollutant loadings 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 five acres, and a wide variety of industries (see **Appendix A** 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 in the Smacks Bayou Watershed

4.2.1 Point Sources

There are no NPDES permitted domestic or industrial wastewater facilities that discharge within the watershed. There is one state permitted facility in the northeast corner of the watershed (**Figure 4.1**). The facility is the City of St. Petersburg Northeast Water Reclamation Facility, permit number FLA128856. This facility is not a likely source of bacteria as it does not have a surface water discharge within the Smacks Bayou watershed.

Municipal Separate Storm Sewer System Permittees

The stormwater collection systems owned and operated by Pinellas County and Co Permittees, including FDOT District 7 are covered by a Phase I NPDES municipal separate storm sewer

system (MS4) permit (FLS000005). There are no Phase II MS4 permits identified for this 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 fecal coliform include loadings from surface runoff, wildlife, livestock, pets, leaking sewer lines and septic tanks.

Land Uses

The spatial distribution and acreage of different land use categories were identified using the Southwest Florida Water Management District's (SWFWMD's) 2006 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 and tabulated in **Table 4.1** and shown in **Figure 4.1**.

As shown in **Table 4.1**, the Smacks Bayou watershed drains about 4,393 acres of land. The dominant land use category is urban (urban and built-up; low-, medium-, and high-density residential; and transportation, communication, and utilities), which accounts for 85.3% of the watershed's total area. Water amounts to 11.2 %, and natural land use areas, which include wetlands, upland forest, and barren land, occupy about 3.4 % of the total area.

Table 4.1. Classification of Land Use Categories for Smacks Bayou (WBID 1683)

Land Use	Description	Area (acre)	Percent Area
1	Urban and Built-Up	3,659	83.3%
2	Agriculture	0	0.0%
3	Rangeland	0	0.0%
4	Upland Forest	18	0.4%
5	Water	494	11.2%
6	Wetlands	132	3.0%
7	Barren Land	0	0.0%
8	Transportation, Communication, and Utilities	90	2.0%
	Total	4,393	100.0%

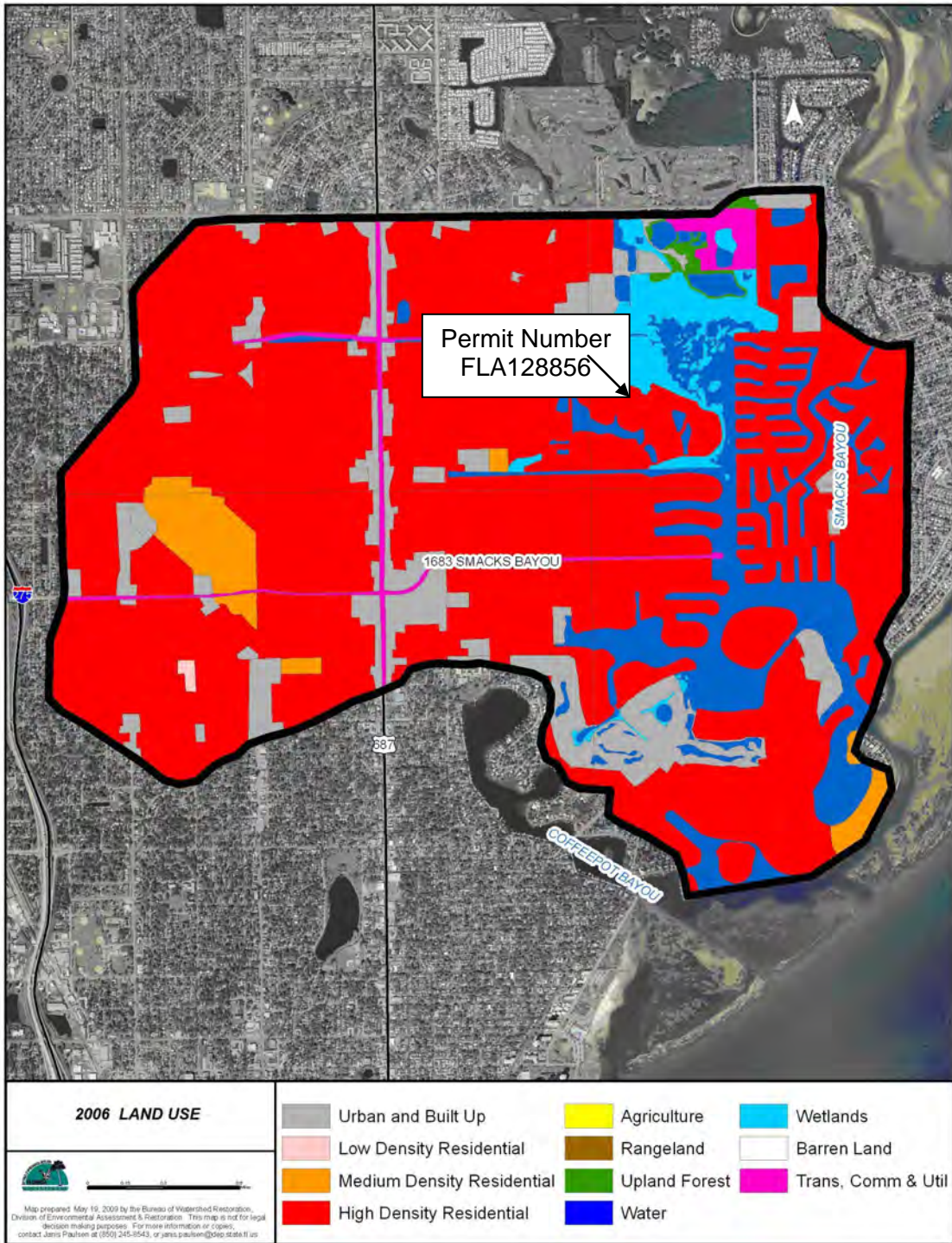


Figure 4.1. Principal 2006 Land Uses in the Smacks Bayou Watershed (WBID 1683)

Septic Tanks

Septic tanks are another potentially important source of fecal coliform. In areas with a relatively high ground water table, the drainage field can be flooded during the rainy season, and pollutants can be transported to the surface water through storm runoff. Additionally, any well that is installed in the surficial aquifer system will cause a drawdown around the well. If the septic tank system is built too close to the well (e.g., less than 75 feet), the septic tank discharge will be within the cone of influence of the well. As a result, septic tank effluent may go into the well and once the polluted water is used to irrigate lawns, pollutants may reach the land surface and wash into surface waters during rain events.

However, based on 2009 Florida Department of Health (FDOH) onsite sewage GIS coverage (<http://www.doh.state.fl.us/environment/programs/EhGis/EhGisDownload.htm>), only 5 housing units (*N*) were identified as being on septic tanks in the Smacks Bayou watershed. Due to the high residential and commercial land uses in the watershed, the main waste transport is the sanitary sewer system. Therefore, contribution of septic tanks for fecal coliform to Smacks Bayou is insignificant.

Sanitary Sewer Overflows

Sanitary sewer overflows (SSOs) can also be a potential source of fecal coliform pollution. Human sewage can be introduced into surface waters even when storm and sanitary sewers are separated. Leaks and overflows are common in many older sanitary sewers where capacity is exceeded, high rates of infiltration and inflow occur (i.e., outside water gets into pipes, reducing capacity), frequent blockages occur, or sewers are simply falling apart due to poor joints or pipe materials. Power failures at pumping stations are also a common cause of SSOs. The greatest risk of an SSO occurs during storm events; however, few comprehensive data are available to quantify SSO frequency and bacteria loads in most watersheds.

Chapter 5: DETERMINATION OF ASSIMILATIVE CAPACITY

5.1 Determination of Loading Capacity

Typically, there are continuous flow measurements in a watershed that can be used to develop bacteria TMDLs. However, since the majority of the Smacks Bayou watershed, where the fecal coliform data were collected, is influenced by tides, this fecal coliform TMDL was developed using the “percent reduction” approach. For this method, the percent reduction needed to meet the applicable criterion is calculated for each value above the criterion, and then a median percent reduction is calculated.

5.1.1 Data Used in the Determination of the TMDL

The data used to develop this TMDL were obtained through the IWR dataset “Run 35-2.” The data for the three stations used in this TMDL were collected by the Pinellas County Department of Environmental Management as part of their routine ambient monitoring program.

5.1.2 TMDL Development Process for Smacks Bayou

As described in **Section 5.1**, the percent reduction (PR) needed to meet the fecal coliform criterion was determined for each individual exceedance using the following equation:

$$PR = \frac{[\text{Measured Exceedance} - \text{Criterion}] \times 100}{\text{Measured Exceedance}}$$

The fecal coliform TMDL was calculated as the median of the percent reductions needed over the data range where exceedances occurred (see **Table 5.1** for data). As noted in the next section, exceedances occurred throughout the calendar year, and the median percent reduction for the verified period is 75 percent.

Table 5.1. Calculation of Percent Reduction in Fecal Coliform Necessary to Meet the Water Quality Standard of 400 cfu/100mL in Smacks Bayou (WBID 1683)

Date	Station	Fecal Coliform Exceedances	Fecal Coliform Target	% Reduction
4/3/1996	21FLPDEM42-01	480	400	17
11/13/1996	21FLPDEM42-01	500	400	20
2/7/1996	21FLPDEM42-01	550	400	27
5/31/1995	21FLPDEM42-01	580	400	31
4/4/1995	21FLPDEM42-01	600	400	33
5/1/1996	21FLPDEM34-01	600	400	33
2/8/1995	21FLPDEM42-01	800	400	50
1/11/1995	21FLPDEM42-01	880	400	55
2/8/1995	21FLPDEM34-01	1000	400	60
11/15/1995	21FLPDEM42-01	1100	400	64
3/6/1996	21FLPDEM42-01	1100	400	64
6/28/1995	21FLPDEM42-01	1200	400	67
5/21/1996	21FLPDEM34-01	1200	400	67
1/10/1996	21FLPDEM42-01	1400	400	71
10/16/1996	21FLPDEM42-01	1400	400	71
9/20/1995	21FLPDEM34-01	1600	400	75
8/29/1995	21FLPDEM34-01	1700	400	76
6/26/1996	21FLPDEM42-01	1800	400	78
9/18/1996	21FLPDEM42-01	2200	400	82
7/26/1995	21FLPDEM34-01	2900	400	86
3/8/1995	21FLPDEM42-01	3000	400	87
7/26/1995	21FLPDEM42-01	3000	400	87
8/29/1995	21FLPDEM42-01	3000	400	87
10/18/1995	21FLPDEM34-01	3000	400	87
6/26/1996	21FLPDEM34-01	3000	400	87
6/28/1995	21FLPDEM34-01	5600	400	93
3/8/1995	21FLPDEM34-01	6000	400	93
9/20/1995	21FLPDEM42-01	6000	400	93
5/21/1996	21FLPDEM42-01	6000	400	93
10/18/1995	21FLPDEM42-01	11000	400	96
5/1/1996	21FLPDEM42-01	12000	400	97
Median Percent Reduction =				75

5.1.3 Critical Conditions/Seasonality

The critical conditions for bacteria loadings in a given watershed depend on the existence of point sources, land use patterns, and rainfall 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, pollutants that have built up on the land surface under dry weather conditions are washed off by rainfall, resulting in wet weather loadings. 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 pollutants 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. As previously noted, there are no point source discharges within the watershed.

Measurements were sorted by month and season (the calendar year was divided into quarters) to determine whether there was a temporal pattern of exceedances. Monthly rainfall data from St. Petersburg Airport were also obtained and included in the analysis. **Table 5.2** presents summary statistics by month and season, respectively, for fecal coliform measurements (Winter: January–March; Spring: April–June; Summer: July–September; Fall: October–December). As previously mentioned, exceedances occurred throughout each month of the calendar year, with typically as least two exceedances. The highest exceedance frequency is observed during the spring, which is prior to the highest rainfall observed during the summer months. This implies that the exceedances may be mainly related to nonpoint source contributions through surface runoff and that heavy rainfall events during the summer may cause dilution of the fecal coliform counts. **Figure 5.1** shows this information in a graph form.

Table 5.2. Summary Statistics of Fecal Coliform Data for Smacks Bayou (WBID 1683), by Month and Season

Month	Minimum	Maximum	Median	Mean	Number of Exceedances	% Exceedances of Total	Rainfall Mean
1	30	1400	215	462	2	6	0.11
2	27	1000	315	415	3	10	0.09
3	6	6000	576	1699	3	10	0.09
4	2	600	108	218	2	6	0.09
5	2	12000	250	1771	5	16	0.04
6	36	5600	1500	1948	4	13	0.21
7	8	3000	350	1254	2	6	0.25
8	2	3000	190	855	2	6	0.27
9	10	6000	1600	1970	3	10	0.28
10	2	11000	740	2585	3	10	0.10
11	1	1100	150	318	2	6	0.06
12	N/A	N/A	N/A	N/A	N/A	N/A	0.13
N/A – Not applicable, there were no samples collected during the month of December							
Season	Minimum	Maximum	Median	Mean	Number of Exceedances	% Exceedances of Total	Rainfall Mean
Winter	1	11000	215	1452	8	26	0.10
Spring	2	12000	270	1427	11	35	0.11
Summer	2	6000	285	1328	7	23	0.26
Fall	6	6000	150	858	5	16	0.10

/

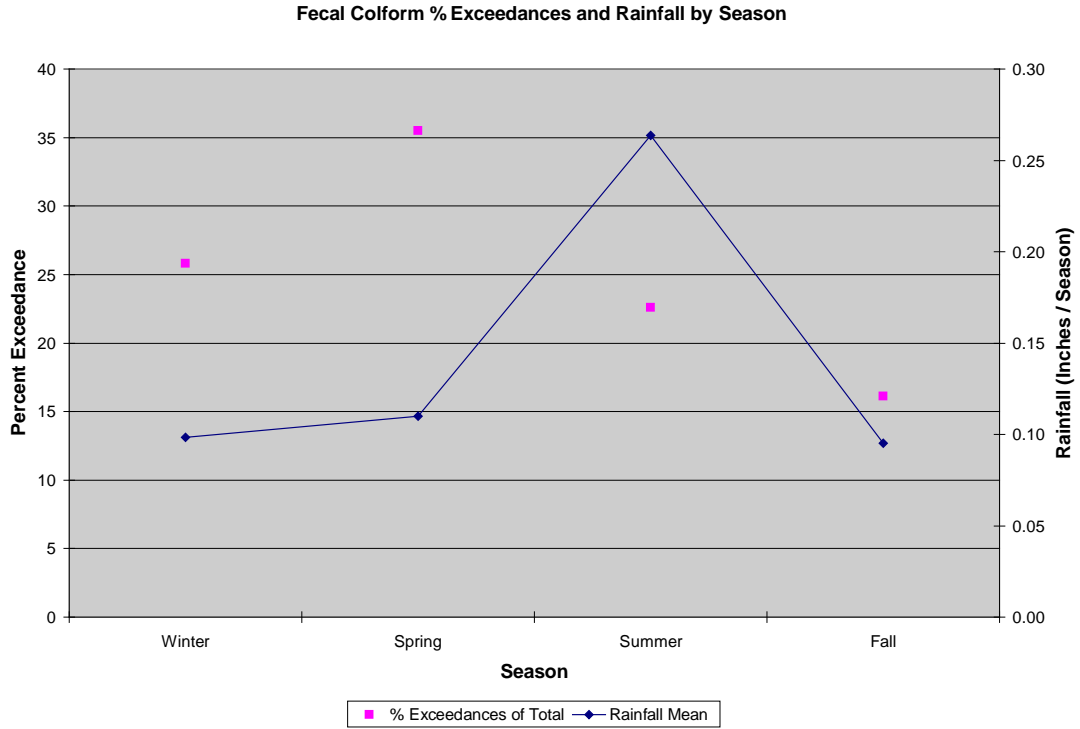


Figure 5.1. Fecal Coliform Exceedances and Rainfall for Smacks Bayou (WBID 1683), by Month and Season, 1995-2002

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:

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

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

$$\text{TMDL} \cong \sum \text{WLAs}_{\text{wastewater}} + \sum \text{WLAs}_{\text{NPDES Stormwater}} + \sum \text{LAs} + \text{MOS}$$

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 TMDL for Smacks Bayou is expressed in terms of a percent reduction, this TMDL represents the maximum daily loads in the Smacks Bayou can assimilate and maintain the fecal coliform criterion (**Table 6.1**).

Table 6.1. TMDL Components for Fecal Coliform in Smacks Bayou (WBID 1683)

WBID	Parameter	WLA		LA (% reduction)	MOS
		Wastewater	NPDES Stormwater (% reduction)		
1683	Fecal Coliform	N/A	75	75	Implicit

N/A – Not applicable.

6.2 Load Allocation

A percent reduction in fecal coliform of 75 is needed from nonpoint sources in the subbasins tributary to the two canals identified as 45th Ave. NE Canal and 54th Ave. East Canal. It should be noted that the LA includes loading from stormwater discharges regulated by the Department and the water management districts that are not part of the NPDES Stormwater Program (see **Appendix A**).

6.3 Wasteload Allocation

6.3.1 NPDES Wastewater Discharges

There are no NPDES surface water dischargers within the Smacks Bayou Watershed.

6.3.2 NPDES Stormwater Discharges

The WLA for stormwater discharges with an MS4 permit is a 75 percent reduction in fecal coliform. This reduction is needed from MS4 sources in the subbasins tributary to the two canals identified as 45th Ave. NE Canal and 54th Ave. East Canal. The MS4 permittees influenced by this TMDLs are Pinellas County and FDOT District 7. There are no Phase II MS4 permits identified for this watershed. It should be noted that any MS4 permittee is only responsible for reducing the anthropogenic 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.

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 MOS was included in the TMDL by meeting the water quality criterion of 400 colonies/100mL, while the actual criterion allows for a 10 percent exceedance over that level.

Chapter 7: NEXT STEPS: IMPLEMENTATION PLAN DEVELOPMENT AND BEYOND

7 TMDL Implementation

Following the adoption of this TMDL by rule, the Department will determine the best course of action regarding its implementation. Depending upon the pollutant(s) causing the waterbody impairment and the significance of the waterbody, the Department will select the best course of action leading to the development of a plan to restore the waterbody. **Often** this will be accomplished cooperatively with stakeholders by creating a Basin Management Action Plan, referred to as the BMAP. Basin Management Action Plans are the primary mechanism through which TMDLs are implemented in Florida [see Subsection 403.067(7) F.S.]. A single BMAP may provide the conceptual plan for the restoration of one or many impaired waterbodies.

If the Department determines a BMAP is needed to support the implementation of this TMDL, a BMAP will be developed through a transparent stakeholder-driven process intended to result in a plan that is cost-effective, technically feasible, and meets the restoration needs of the applicable waterbodies. Once adopted by order of the Department Secretary, BMAPs are enforceable through wastewater and municipal stormwater permits for point sources and through BMP implementation for nonpoint sources. Among other components, BMAPs typically include:

- Water quality goals (based directly on the TMDL);
- Refined source identification;
- Load reduction requirements for stakeholders (quantitative detailed allocations, if technically feasible);
- 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;
- Implementation funding mechanisms;
- An evaluation of future increases in pollutant loading due to population growth;
- Implementation milestones, project tracking, water quality monitoring, and adaptive management procedures; and
- Stakeholder statements of commitment (typically a local government resolution).

BMAPs are updated through annual meetings and may be officially revised every five years. Completed BMAPs in the state have improved communication and cooperation among local stakeholders and state agencies, improved internal communication within local governments, applied high-quality science and local information in managing water resources, clarified

obligations of wastewater point source, MS4 and non-MS4 stakeholders in TMDL implementation, enhanced transparency in DEP decision-making, and built strong relationships between DEP and local stakeholders that have benefited other program areas.

However, in some basins, and for some parameters, particularly those with fecal coliform impairments, the development of a BMAP using the process described above will not be the most efficient way to restore a waterbody, such that it meets its' designated uses. Why? Because fecal coliform impairments result from the cumulative effects of a multitude of potential sources, both natural and anthropogenic. Addressing these problems requires good old fashioned detective work that is best done by those in the area. There are a multitude of assessment tools that are available to assist local governments and interested stakeholders in this detective work. The tools range from the simple – such as Walk the WBIDs and GIS mapping - to the complex such as Bacteria Source Tracking. Department staff will provide technical assistance, guidance, and oversight of local efforts to identify and minimize fecal coliform sources of pollution. Based on work in the Lower St Johns River tributaries and the Hillsborough River basin, the Department and local stakeholders have developed a logical process and tools to serve as a foundation for this detective work. In the near future, the Department will be releasing these tools to assist local stakeholders with the development of local implementation plans to address fecal coliform impairments. In such cases, the Department will **rely on these local initiatives** as a more cost-effective and simplified approach to identify the actions needed to put in place a roadmap for restoration activities, while still meeting the requirements of Chapter 403.067(7), F.S.

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Appendices

Appendix A: 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 water management districts, along with wetland protection requirements, into the Environmental Resource Permit regulations.

Rule 62-40 also requires the state's water management districts 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. 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 implementing 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 Florida Department of Transportation throughout the 15 counties meeting the population criteria. The Department received authorization to implement the NPDES stormwater program in 2000.

An important difference between the federal NPDES and the state's stormwater/environmental resource permitting programs is that the NPDES Program covers both new and existing discharges, while the state's program focus 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 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, as are 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 reopener clause that allows permit revisions to implement TMDLs when the implementation plan is formally adopted.



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