FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Division of Environmental Assessment and Restoration, Bureau of Watershed Restoration

SOUTHWEST DISTRICT • MANATEE RIVER BASIN

Final TMDL Report

Fecal Coliform TMDLs for Gilly Creek (WBID 1840), Nonsense Creek (WBID 1913), Braden River above Ward Lake (WBID 1914), Rattlesnake Slough (WBID 1923), and Cedar Creek (WBID 1926)

David Tyler

September, 2009

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TMDL Program

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

Identification of Impaired Surface Waters Rule

http://www.dep.state.fl.us/legal/Rules/shared/62-303/62-303.pdf

STORET Program

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

2008 Integrated Report

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

Criteria for Surface Water Quality Classifications

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

Basin Status Report for the Tampa Bay Tributaries Basin

http://www.dep.state.fl.us/water/basin411/tbtribs/status.htm

Water Quality Assessment Report for the Tampa Bay Tributaries Basin

http://www.dep.state.fl.us/water/basin411/tbtribs/assessment.htm

U.S. Environmental Protection Agency

Region 4: Total Maximum Daily Loads in Florida

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National STORET Program

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Chapter 1: INTRODUCTION

1.1 Purpose of Report

This report presents the Total Maximum Daily Loads (TMDLs) for fecal coliform bacteria for Gilly Creek, Nonsense Creek, Braden River above Ward Lake, Rattlesnake Slough, and Cedar Creek, all located within the Tampa Bay Tributaries Basin. For this report, Braden River above Ward Lake is referred to as Braden River AWL. These waterbodies were verified as impaired for fecal coliform and therefore were included on the Verified List of impaired waters for the Tampa Bay Tributaries Basin that was adopted by Secretarial Order on May 19, 2009. The TMDLs establish the allowable fecal coliform loadings to Gilly Creek, Nonsense Creek, Braden River AWL, Rattlesnake Slough, and Cedar Creek that would restore these waterbodies so that they meet the applicable water quality criterion for fecal coliform.

1.2 Identification of Waterbody

Gilly Creek, Nonsense Creek, Braden River AWL, Rattlesnake Slough, and Cedar Creek are located in the central portion of Manatee County along the Interstate I-75 corridor (**Figure 1.1**). There are no major cities in these watersheds, but the City of Bradenton (about 53,270 people) is located approximately 6 miles to the northwest. Gilly Creek (about 7.77 miles in length) flows southwest, feeding into the Lake Manatee Reservoir. Nonsense Creek (about 0.91 miles long) also flows southwest, feeding into the east side of the Bill Evers Reservoir (formally known as Ward Lake). Braden River AWL (about 13.42 miles in length) flows west just above the Bill Evers Reservoir. Rattlesnake Slough (about 3.72 miles long) flows east, feeding into the Braden River just above the Bill Evers Reservoir. Cedar Creek (about 1.43 miles long) flows north, feeding into the Braden River approximately a half mile above the Bill Evers Reservoir. Additional information on all these rivers' hydrology and geology is available in the Basin Status Report for the Tampa Bay Tributaries Basin (Florida Department of Environmental Protection [Department], 2002).

For assessment purposes, the Department has divided the Tampa Bay Tributaries Basin into water assessment polygons with a unique **w**ater**b**ody **id**entification (WBID) number for each watershed or stream reach. The following WBIDs are addressed in this report: Gilly Creek (WBID 1840), Nonsense Creek (WBID 1913), Braden River AWL (WBID 1914), Rattlesnake Slough (WBID 1923), and Cedar Creek (WBID 1926) (**Figure 1.2a** and **1.2b**).

Figure 1.1. Location of the Gilly Creek, Nonsense Creek, Braden River AWL, Rattlesnake Slough, and Cedar Creek Watersheds in the Tampa Bay Tributaries Basin, and Major Geopolitical Features in the Area

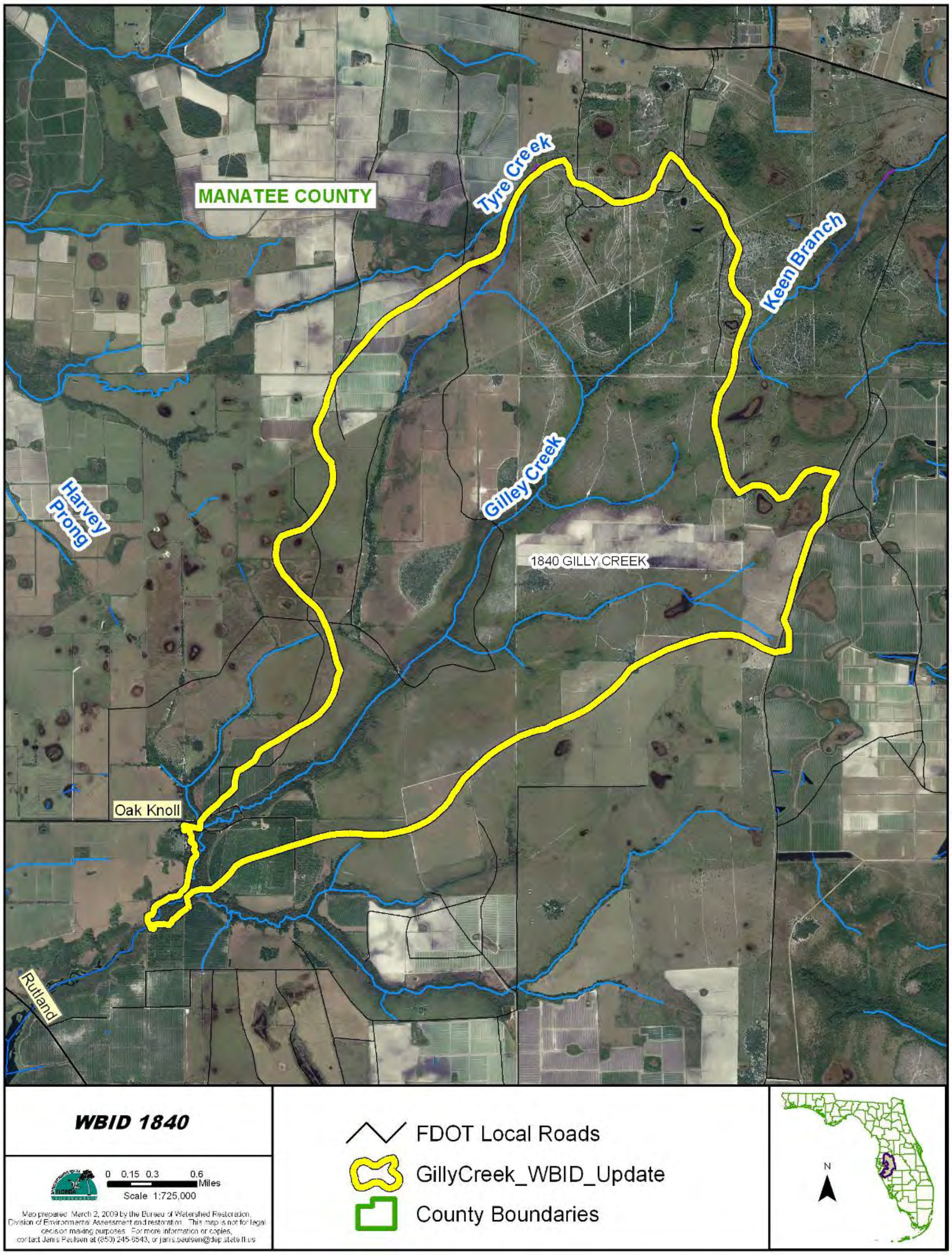


Figure 1.2a. Location of the Gilly Creek Watershed (WBID 1840) in Manatee County

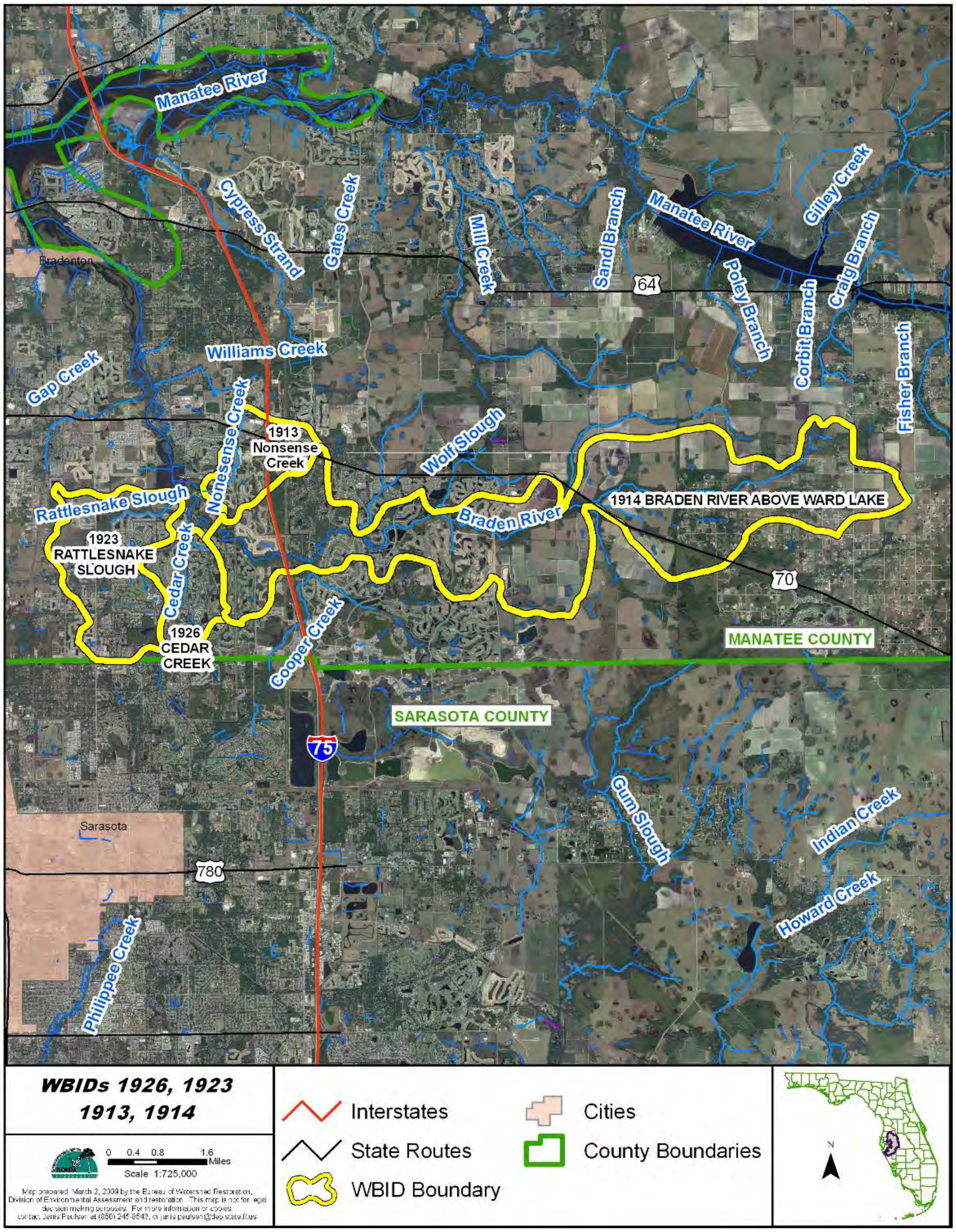


Figure 1.2b. Location of the Nonsense Creek (WBID 1913), Braden River AWL (WBID 1914), Rattlesnake Slough (WBID 1923), and Cedar Creek (WBID 1926) Watersheds in Manatee County

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 restoration plan, designed to reduce the amount of fecal coliform that caused the verified impairment of Gilly Creek, Nonsense Creek, Braden River AWL, Rattlesnake Slough, and Cedar Creek. These activities will depend heavily on the active participation of the Southwest Florida Water Management District (SWFWMD), Manatee County, 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) lists of surface waters that do not meet applicable water quality standards (impaired waters) and establish a TMDL for each pollutant causing the 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 10 waterbodies in the Manatee River Basin, within the Tampa Bay Tributaries 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.

2.2 Information on Verified Impairment

The Department used the IWR to assess water quality impairments in the Gilly Creek, Nonsense Creek, Braden River AWL, Rattlesnake Slough, and Cedar Creek watersheds, and verified the impairments during the second cycle of the TMDL Program (**Table 2.1**). Except for Gilly Creek, these waterbodies are spatially and hydrologically connected; thus all five WBIDs are included in this report to address the fecal coliform impairments. **Table 2.2** summarizes the fecal coliform data collected during the verified period (January 1, 2001, through June 30, 2008). The projected year for the 1998 303(d)–listed fecal coliform bacteria TMDLs for Gilly Creek, Nonsense Creek, Braden River AWL, Rattlesnake Slough, and Cedar Creek was 2008, but the Settlement Agreement between the EPA and Earthjustice, which drives the TMDL development schedule for waters on the 1998 303(d) list, allows an additional nine months to complete the TMDLs. As such, these TMDLs must be adopted and submitted to the EPA by September 30, 2009. These waterbodies were verified as impaired for fecal coliform because, using the IWR methodology, more than 10 percent of the values exceeded the Class I potable water supply criterion of 400 counts per 100 milliliters (counts/100mL) for fecal coliform. During the verified period, Gilly Creek (14 out of 21 samples), Nonsense Creek (24 out of 73 samples), Braden River AWL (60 out of 283 samples), Rattlesnake Slough (17 out of 76 samples), and Cedar Creek (41 out of 79 samples) all exceeded this criterion.

The fecal coliform data used in this report are based on the data from IWR Run35_2. Note that Stations 21FLMANAUM3 and 21FLGW 26909, located in the downstream portion of Gilly Creek at County Road 675, and previously assigned to Gilly Creek (WBID 1840), were recently reassigned to Lake Manatee Reservoir (WBID 1807B). This change will be reflected in the next interim IWR run. The station reassignments are based on Manatee County's comments and the

Department's analysis of water quality conditions at the site locations, which shows that these stations are more representative of Lake Manatee Reservoir conditions and not Gilly Creek.

The verified impairments were based on data collected by Manatee County and the Department's Southwest District and Ambient Monitoring Program. **Figures 5.1a** and **5.1b** show the WBID locations and STORET stations. **Figures 2.1a** through **2.1e** display the fecal coliform data collected during the verified period (June 30, 2001, to December 31, 2008) for each waterbody.

Table 2.1. Verified Impairments for Gilly Creek (WBID 1840), Nonsense Creek (WBID 1913), Braden River AWL (WBID 1914), Rattlesnake Slough (WBID 1923), and Cedar Creek (WBID 1926)

WBID	Waterbody Segment	Waterbody Type	Waterbody Class	1998 303(d) Parameters of Concern	Parameter Causing Impairment
1840	Gilly Creek	Stream	1	Coliform	Fecal Coliform
1913	Nonsense Creek	Stream	1	Coliform	Fecal Coliform
				Dissolved Oxygen	Dissolved Oxygen
1914	Braden River AWL	Stream	1	Coliform	Fecal Coliform
1923	Rattlesnake Slough	Stream	1	Coliform	Fecal Coliform
				Dissolved Oxygen	Dissolved Oxygen
1926	Cedar Creek	Stream	1	Coliform	Fecal Coliform
				Dissolved Oxygen	Dissolved Oxygen

Table 2.2. Summary of Fecal Coliform Data Collected During the Verified Period (January 1, 2001–June 30, 2008) for Gilly Creek (WBID 1840), Nonsense Creek (WBID 1913), Braden River AWL (WBID 1914), Rattlesnake Slough (WBID 1923), and Cedar Creek (WBID 1926)

[1] Exceedances represent values above 400 counts/100mL.
[2] Coliform counts are #/100mL.

WBID	Waterbody Segment	Total Number of Samples	IWR-Required Number of Exceedances for the Verified List[1]	Number of Observed Exceedances[1]	Number of Observed Non-exceedances[1]	Number of Seasons Data Were Collected	Mean[2]	Median[2]	Min[2]	Max[2]
1840	Gilly Creek	20	5	14	6	4	952	636	0.5	3,700
1913	Nonsense Creek	73	12	24	49	4	508	260	10	3,400
1914	Braden River AWL	283	36	60	223	4	320	110	1	4,800
1923	Rattlesnake Slough	76	12	17	59	4	412	173	1	8,000
1926	Cedar Creek	79	12	41	38	4	732	480	1	3,400

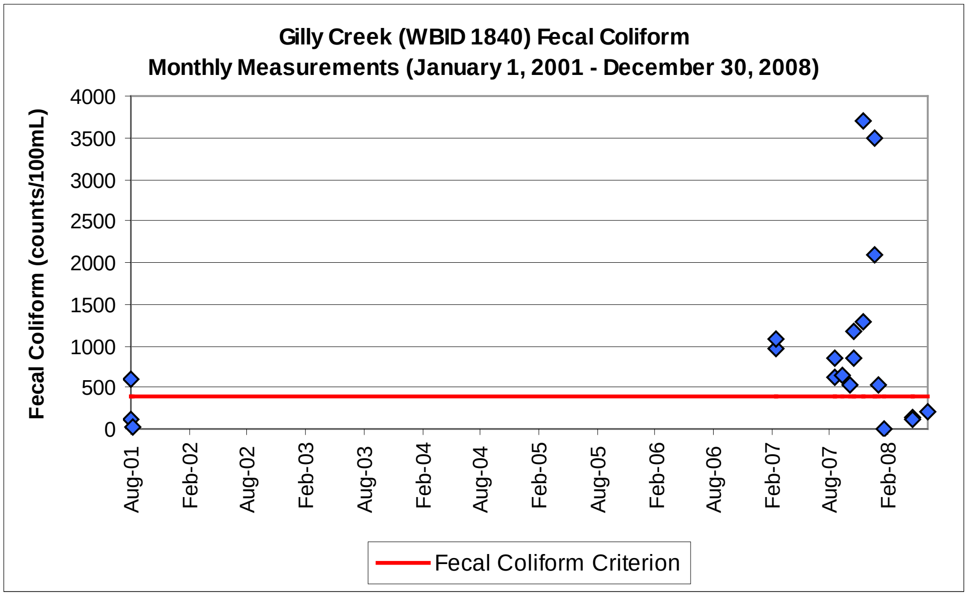


Figure 2.1a. Fecal Coliform Measurements for Gilly Creek (WBID 1840) During the Verified Period (January 1, 2001–June 30, 2008)

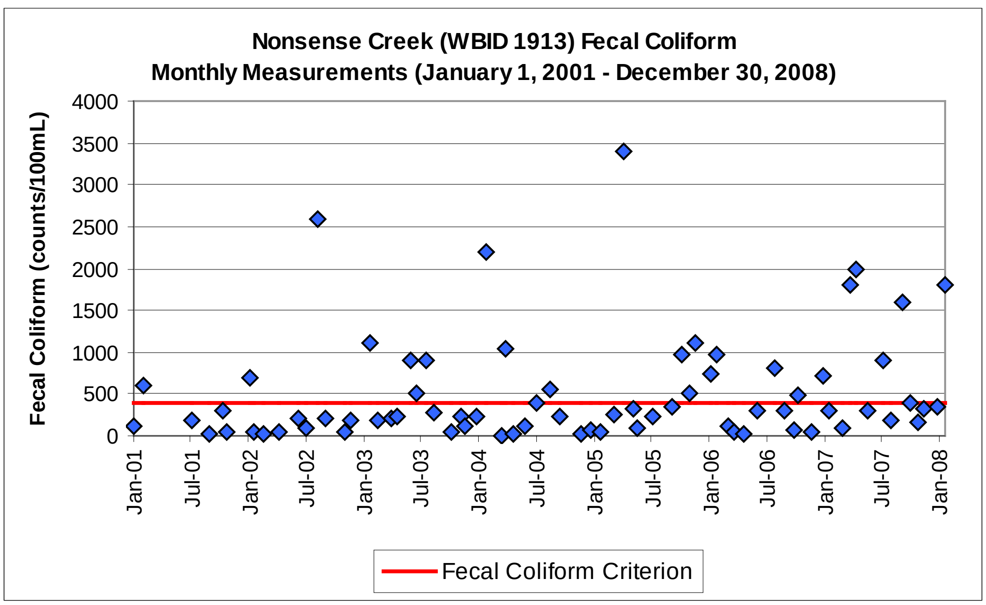


Figure 2.1b. Fecal Coliform Measurements for Nonsense Creek (WBID 1913) During the Verified Period (January 1, 2001–June 30, 2008)

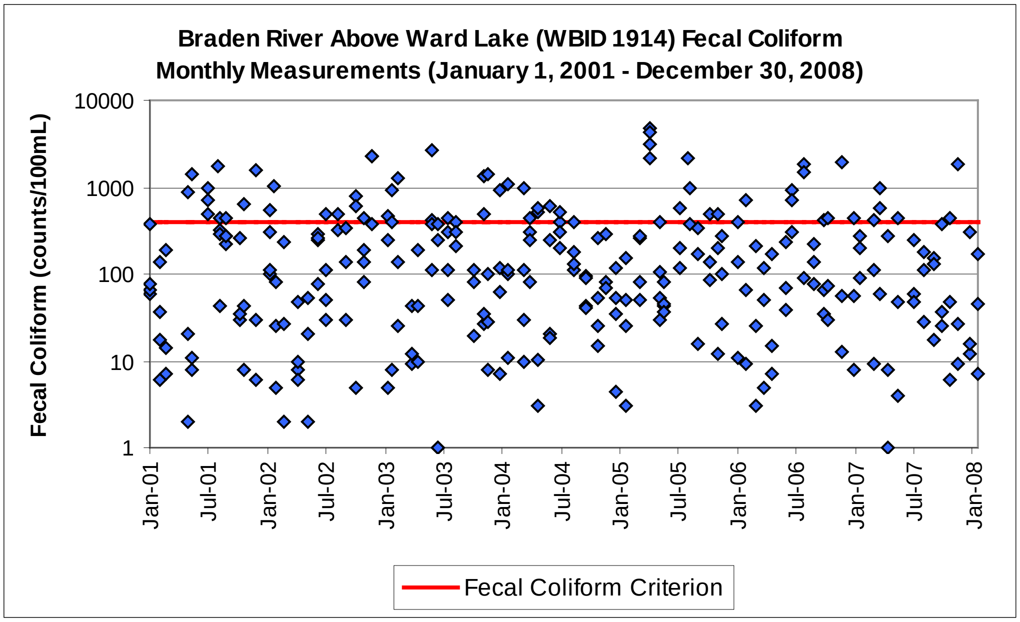


Figure 2.1c. Fecal Coliform Measurements for Braden River AWL (WBID 1914) During the Verified Period (January 1, 2001–June 30, 2008)

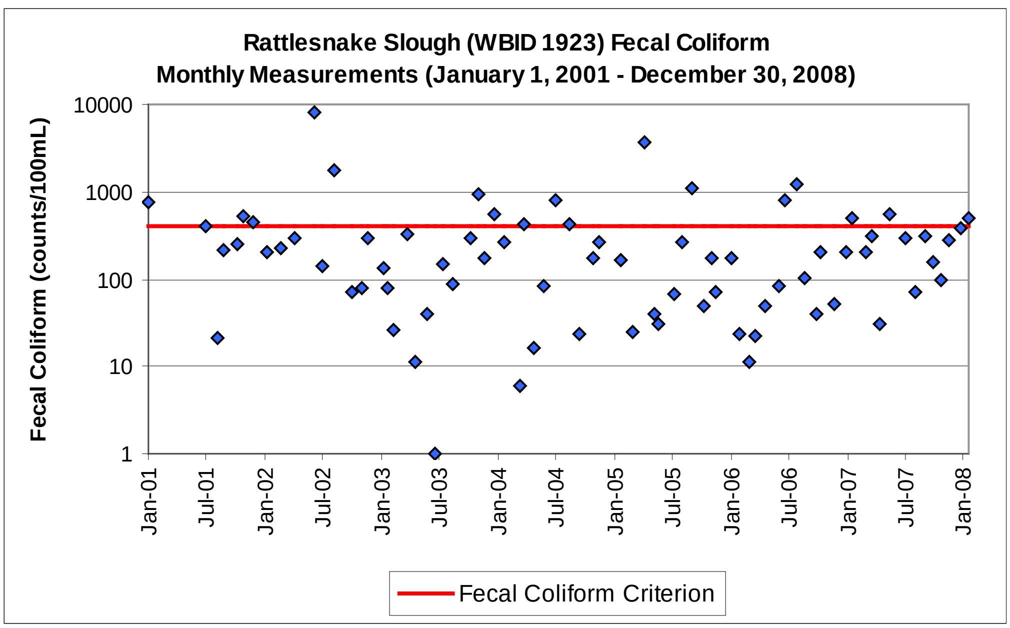


Figure 2.1d. Fecal Coliform Measurements for Rattlesnake Slough (WBID 1923) During the Verified Period (January 1, 2001–June 30, 2008)

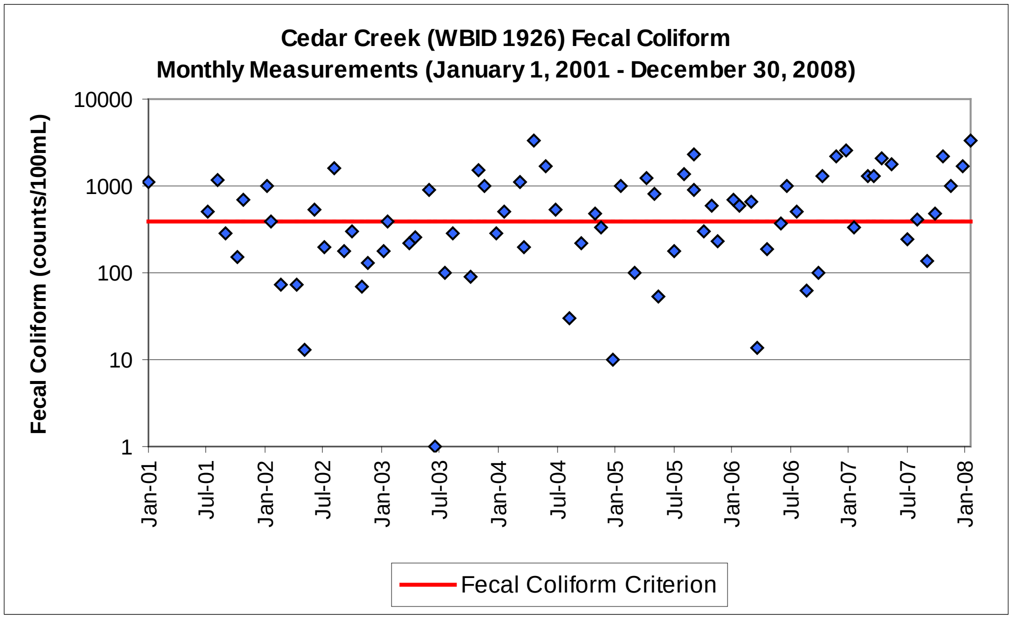


Figure 2.1e. Fecal Coliform Measurements for Cedar Creek (WBID 1926) During the Verified Period (January 1, 2001–June 30, 2008)

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)**

Gilly Creek (WBID 1840), Nonsense Creek (WBID 1913), Braden River AWL (WBID 1914), Rattlesnake Slough (WBID 1923), and Cedar Creek (WBID 1926) are Class I waterbodies, with a designated use of potable water supply. The criterion applicable to this TMDL is the Class I criterion for fecal coliform.

3.2 Applicable Water Quality Standards and Numeric Water Quality Target

Numeric criteria for bacterial quality are expressed in terms of fecal coliform bacteria concentration. The water quality criterion for the protection of Class I 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 5 samples taken over a 30-day period. During the development of the TMDLs (as described in subsequent sections), 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 TMDLs 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 target load, but was included in the TMDLs' 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, such as 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 Gilly Creek, Nonsense Creek, Braden River AWL, Rattlesnake Slough, and Cedar Creek Watersheds

4.2.1 Point Sources

There are no NPDES-permitted facilities discharging fecal coliform bacteria directly or indirectly into any of the waterbodies.

Municipal Separate Storm Sewer System Permittees

The stormwater collection systems owned and operated by Manatee County and co-permittee (Florida Department of Transportation [FDOT] District 1) are covered by a Phase I NPDES municipal separate storm sewer system (MS4) permit (FLS000036). There is one Phase II NPDES MS4 permittee (FLR04E107 – Lakewood Ranch Community Development Center) in the Braden River watershed (WBID 1914). Also, the Tara and University Place Community Development Districts (CDDs) are potential Phase II MS4 contributors to the Braden River.

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.

Table 4.6 provides a summary of estimated fecal coliform loadings from dogs, septic tanks, and sanitary sewer overflows (SSOs) for the Nonsense Creek, Braden River AWL, Rattlesnake Slough, and Cedar Creek watersheds. (The Gilly Creek watershed is not included in this table because it mainly comprises agricultural land (cropland and pastureland) and rangeland; therefore, urban activities such as fecal coliform from pets, septic tank leakage, and SSOs are unlikely to have any major influence on the overall fecal coliform counts in the creek.) The information provided for septic tanks and sewers in this section is for information purposes only, and is designed to give a rough estimate of the fecal coliform counts/day from septic tank leakage and SSOs.

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. Agricultural land (croplands and pasturelands; row and tree crops) occupies 37, 26, and 5.7% of the total land area for the Gilly Creek, Braden River AWL, and Rattlesnake Slough watersheds, respectively (the Nonsense Creek and Cedar Creek watersheds contain little or no agricultural land). **Table 4.1** lists 2002 livestock data for Manatee County (U.S. Department of Agriculture [USDA], 2002).

Table 4.1. Livestock Distribution for Manatee County in 2002

Source: USDA, 2002.

Livestock Distribution	Manatee County (number of livestock)
Cattle/Calves	61,937
Poultry Layers > 20 weeks	3,721
Horses and Ponies	1,565

Land Uses

The spatial distribution and acreage of different land use categories were identified using the 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 **Tables 4.2a** through **4.2e**. **Figures 4.1a** and **4.1b** show the acreage of the principal land uses in each of the watersheds.

As shown in **Tables 4.2a** through **4.2e,** the Gilly Creek, Nonsense Creek, Braden River AWL, Rattlesnake Slough, and Cedar Creek watersheds drain about 6,799, 1,524, 10,917, 2,688, and 1,241 acres of land, respectively. The dominant land use categories for the Gilly Creek watershed are agriculture and rangeland, which account for 37 and 46% of the watershed's total area, respectively. Furthermore, it is likely that agricultural activities heavily influence the fecal coliform loadings in the watershed.

The dominant land use in the Nonsense Creek, Braden River AWL, Rattlesnake Slough, and Cedar Creek watersheds is urban land (urban and built-up; low-, medium-, and high-density residential; and transportation, communication, and utilities), which accounts for 76, 41, 72, and 78 percent of these watersheds' total areas, respectively. Natural land uses in the Gilly Creek, Nonsense Creek, Braden River AWL, Rattlesnake Slough, and Cedar Creek watersheds—including water/wetlands, upland forest, and barren land—occupy about 17, 24, 30, 21, and 21 percent of these watersheds' total areas, respectively.

Table 4.2a. Classification of Land Use Categories for the Gilly Creek Watershed (WBID 1840)

- = Empty cell

Level 1 Code	Land Use	Acreage	% Acreage
1100	Low-Density Residential	14	0.21%
2000	Agriculture	2,510	36.92%
3000	Rangeland	3,100	45.59%
4000	Forest/Rural Open	476	7.00%
5000	Water	5	0.07%
6000	Wetlands	664	9.77%
8000	Transportation, Communication, and Utilities	30	0.44%
-	**Total:**	**6,799**	**100.00%**

Table 4.2b. Classification of Land Use Categories for the Nonsense Creek Watershed (WBID 1913)

- = Empty cell

Level 1 Code	Land Use	Acreage	% Acreage
1000	Urban and Built-Up	653	42.85%
1200	Medium-Density Residential	219	14.37%
1300	High-Density Residential	116	7.61%
2000	Agriculture	1	0.07%
3000	Rangeland	1	0.07%
4000	Forest/Rural Open	122	8.01%
5000	Water	116	7.61%
6000	Wetlands	128	8.40%
8000	Transportation, Communication, and Utilities	168	11.02%
-	**Total:**	**1,524**	**100.00%**

Table 4.2c. Classification of Land Use Categories for the Braden River AWL Watershed, WBID 1914

\- = Empty cell

Level 1 Code	Land Use	Acreage	% Acreage
1000	Urban and Built-Up	1,082	9.91%
1100	Low-Density Residential	1,361	12.47%
1200	Medium-Density Residential	1,718	15.74%
1300	High-Density Residential	156	1.43%
2000	Agriculture	2,839	26.01%
3000	Rangeland	322	2.95%
4000	Forest/Rural Open	1,157	10.60%
5000	Water	650	5.95%
6000	Wetlands	1,355	12.41%
7000	Barren Land	94	0.86%
8000	Transportation, Communication, and Utilities	183	1.68%
-	**Total:**	**10,917**	**100.00%**

Table 4.2d. Classification of Land Use Categories for the Rattlesnake Slough Watershed, WBID 1923

\- = Empty cell

Level 1 Code	Land Use	Acreage	% Acreage
1000	Urban and Built-Up	474	17.63%
1100	Low-Density Residential	118	4.39%
1200	Medium-Density Residential	364	13.54%
1300	High-Density Residential	907	33.74%
2000	Agriculture	154	5.73%
3000	Rangeland	4	0.15%
4000	Forest/Rural Open	49	1.82%
5000	Water	239	8.89%
6000	Wetlands	311	11.57%
7000	Barren Land	0	0.00%
8000	Transportation, Communication, and Utilities	68	2.53%
-	**Total:**	**2,688**	**100.00%**

Table 4.2e. Classification of Land Use Categories for the Cedar Creek Watershed (WBID 1926)

- = Empty cell

Level 1 Code	Land Use	Acreage	% Acreage
1000	Urban and Built-Up	268	21.60%
1100	Low-Density Residential	2	0.16%
1200	Medium-Density Residential	389	31.35%
1300	High-Density Residential	290	23.37%
4000	Forest/Rural Open	52	4.19%
5000	Water	133	10.72%
6000	Wetlands	84	6.77%
8000	Transportation, Communication, and Utilities	23	1.85%
-	**Total:**	**1,241**	**100.00%**

Urban Development

Pets (especially dogs) could be a significant source of coliform pollution through surface runoff in the Nonsense Creek, Braden River AWL, Rattlesnake Slough, and Cedar Creek watersheds. In addition to pets, other animal fecal coliform contributors commonly seen in urban areas include rats, pigeons, and sometimes raccoons.

As discussed earlier, the Gilly Creek watershed is mainly composed of agricultural land (cropland and pastureland) and rangeland; therefore, it is unlikely that urban activities (i.e., fecal coliform from pets, septic tank leakage, and SSOs) have any major influence on overall fecal coliform counts in the creek. Furthermore, the Department believes that agricultural activities are potentially the main source of fecal coliform loadings in this watershed.

Studies report that up to 95 percent of the fecal coliform found in urban stormwater can come from nonhuman origins (Alderiso et al., 1996; Trial et al., 1993). The most important nonhuman fecal coliform contributors appear to be dogs and cats. In a highly urbanized Baltimore catchment, Lim and Olivieri (1982) found that dog feces were the single greatest source for fecal coliform and fecal streptococcus bacteria. Trial et al. (1993) also reported that cats and dogs were the primary source of fecal coliform in urban watersheds. Using bacteria source tracking techniques, Watson (2002) found that the amount of fecal coliform bacteria contributed by dogs in Stevenson Creek in Clearwater, Florida, was as important as that from septic tanks.

According to the American Pet Products Manufacturers Association (APPMA), about 4 out of 10 U.S. households include at least one dog. A single gram of dog feces contains about 23 million fecal coliform bacteria (Van der Wel, 1995). Unfortunately, statistics show that about 40 percent of American dog owners do not pick up their dogs’ feces.

Table 4.3 shows the fecal coliform concentrations of surface runoff measured in two urban areas (Bannerman et al., 1993; Steuer et al., 1997). While bacteria levels were widely different in the two studies, both indicated that residential lawns, driveways, and streets were the major source areas for bacteria.

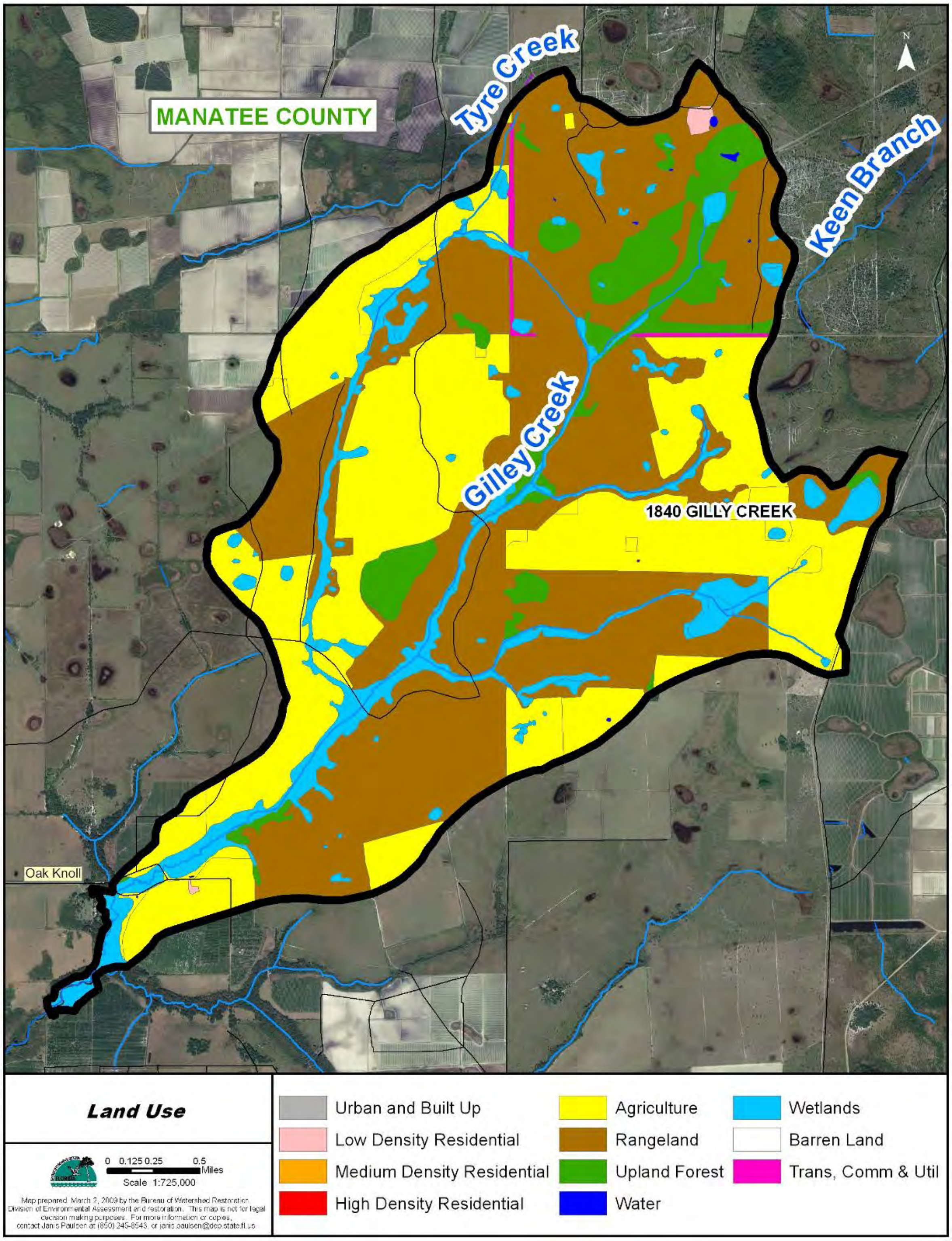


Figure 4.1a.Principal Land Uses in the Gilly Creek Watershed in 2006

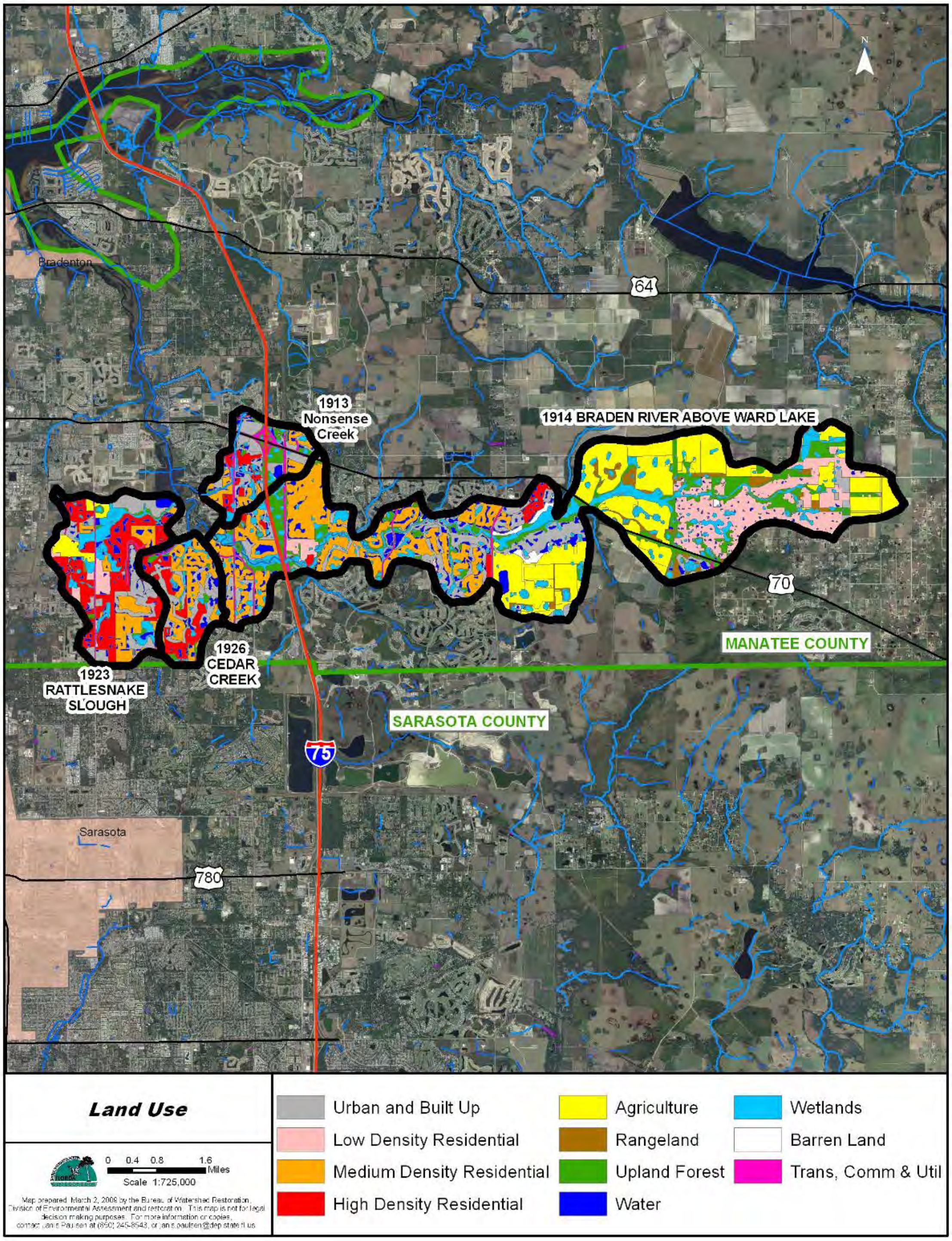


Figure 4.1b. Principal Land Uses in the Nonsense Creek, Braden River AWL, Rattlesnake Slough, and Cedar Creek Watersheds in 2006

Table 4.3. Concentrations (Geometric Mean Colonies/100mL) of Fecal Coliform from Urban Source Areas (Steuer et al., 1997; Bannerman et al., 1993)

Geographic Location	Marquette, Michigan	Madison, Wisconsin
Number of storms sampled	12	9
Commercial parking lot	4,200	1,758
High-traffic street	1,900	9,627
Medium-traffic street	2,400	56,554
Low-traffic street	280	92,061
Commercial rooftop	30	1,117
Residential rooftop	2,200	294
Residential driveway	1,900	34,294
Residential lawns	4,700	42,093
Basin outlet	10,200	175,106

The number of dogs in the Nonsense Creek, Braden River AWL, Rattlesnake Slough, and Cedar Creek watersheds is not known. Therefore, this analysis used the APPMA statistics to estimate the possible fecal coliform loads contributed by dogs. The human population in the Nonsense Creek, Braden River AWL, Rattlesnake Slough, and Cedar Creek watersheds calculated from the census track using Tiger Track 2000 data (in the Department's GIS library) was approximately 1,266, 4,735, 7,066, and 1,647, respectively. According to the U.S. Census Bureau, there were 2.32 people per household in Manatee County in 2007. This results in an estimated 546, 2,041, 3,046, and 710 households in the Nonsense Creek, Braden River AWL, Rattlesnake Slough, and Cedar Creek watersheds, respectively. Assuming that 40 percent of households have 1 dog, the total number of dogs in the Nonsense Creek, Braden River AWL, Rattlesnake Slough, and Cedar Creek watersheds is about 218, 816, 1,218, and 284, respectively.

According to the waste production rate for dogs and the fecal coliform counts per gram of dog wastes listed in **Table 4.4**, and assuming that 40 percent of dog owners do not pick up dog feces, the total waste produced by dogs and left on the land surface of residential areas is 577,080 grams/day. The total fecal coliform produced by dogs in the Nonsense Creek, Braden River AWL, Rattlesnake Slough, and Cedar Creek watersheds is 8.64×10^{10} counts/day, 3.23×10^{11} counts/day, 4.82×10^{11} counts/day, and 1.12×10^{11} counts/day, respectively.

It should be noted that this load only represents the fecal coliform load created in each watershed and is not intended to be used to represent a part of the existing load that reaches the receiving waterbodies. The fecal coliform load that eventually reaches the receiving waterbodies could be significantly less than this value due to attenuation in overland transport.

Table 4.4. Dog Population Density, Wasteload, and Fecal Coliform Density

* Number from APPMA.
Source: Weiskel et al., 1996.

Type	Population density (an/household)	Wasteload (grams/an-day)	Fecal coliform density (fecal coliform/gram)
Dog	0.4*	450	2,200,000

Septic Tanks

Septic tanks are another potentially important source of coliform pollution in urban watersheds. When properly installed, most of the coliform from septic tanks should be removed within 50 meters of the drainage field (Minnesota Pollution Control Agency, 1999). However, in areas with a relatively high ground water table, the drainage field can be flooded during the rainy season, and coliform bacteria can pollute surface water through storm runoff.

Septic tanks may also cause coliform pollution when they are built too close to irrigation wells. Any well that is installed in the surficial aquifer system will cause a drawdown. 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, coliform bacteria may reach the land surface and wash into surface waters during the rainy season.

A rough estimate of fecal coliform loads from failed septic tanks in each watershed can be made using **Equation 4.1**:

$$L = 37.85 * N * Q * C * F \qquad \textbf{Equation 4.1}$$

Where,

L is the fecal coliform daily load (counts/day);
N is the total number of septic tanks in the watershed (septic tanks);
Q is the discharge rate for each septic tank;
C is the fecal coliform concentration for the septic tank discharge, and
F is the septic tank failure rate.

Based on 2007 Florida Department of Health (FDOH) onsite sewage GIS coverage (http://www.doh.state.fl.us/environment/programs/EhGis/EhGisDownload.htm), about 21, 293, 36, and 2 housing units (*N*) were identified as being on septic tanks in the Nonsense Creek, Braden River AWL, Rattlesnake Slough, and Cedar Creek watersheds, respectively (**Figure 4.2**). There were no septic tanks reported (FDOH coverage) in the Gilly Creek watershed, which is a highly rural area composed mainly of agricultural land and rangeland, with a small amount of low-density residential land use (0.21% of the total land area). The discharge rate from each septic tank (*Q*) was calculated by multiplying the average household size by the per capita wastewater production rate per day. Based on the information published by the U.S. Census Bureau, the average household size for Manatee County is about 2.32 people/household. The same population density was assumed for the Nonsense Creek, Braden River AWL, Rattlesnake Slough, and Cedar Creek watersheds. A commonly cited value for per capita wastewater production rate is 70 gallons/day/person (EPA, 2001). The commonly cited concentration (*C*) for septic tank discharge is 1×10^6 counts/100mL for fecal coliform (EPA, 2001).

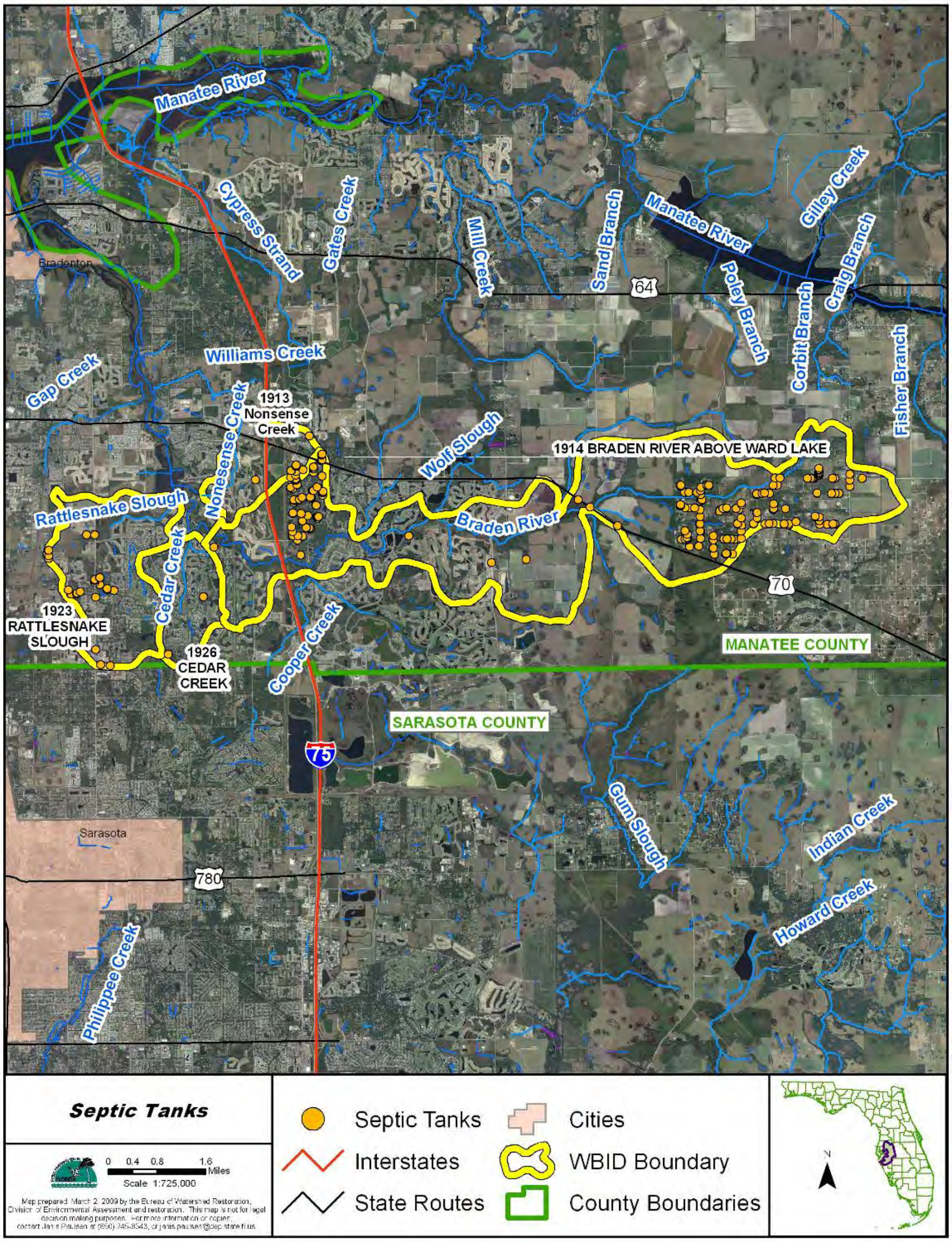


Figure 4.2. Distribution of Onsite Sewage Systems (Septic Tanks) in the Nonsense Creek, Braden River AWL, Rattlesnake Slough, and Cedar Creek Watersheds

No measured septic tank failure rate data were available for the Nonsense Creek, Braden River AWL, Rattlesnake Slough, and Cedar Creek watersheds when this TMDL analysis was conducted. Therefore, the failure rate was derived from the number of septic tank and septic tank repair permits for Manatee County published by FDOH (http://www.doh.state.fl.us/environment/OSTDS/statistics/ostdsstatistics.htm). The number of septic tanks in the county was calculated assuming that none of the installed septic tanks will be removed after being installed (**Table 4.5**). The reported number of septic tank repair permits was also obtained from the FDOH Website (**Table 4.5**).

Based on this information, a discovery rate of failed septic tanks for each year between 2002 and 2007 was calculated and listed in **Table 4.5**. Using the table, the average annual septic tank failure discovery rate for Hillsborough County is about 0.06 percent. Assuming that failed septic tanks are not discovered for about 5 years, the estimated annual septic tank failure rate is about 5 times the discovery rate, or 0.3 percent. Based on **Equation 4.1**, the estimated fecal coliform loading from failed septic tanks in the Nonsense Creek, Braden River AWL, Rattlesnake Slough, and Cedar Creek watersheds is approximately 3.96×10^8, 5.52×10^9, 6.78×10^8, and 3.77×10^7 counts/day, respectively.

Table 4.5. Estimated Septic Numbers and Septic Failure Rates for Manatee County, 2002–07

- = Empty cell
* The failure rate is 5 times the failure discovery rate.

-	2002	2003	2004	2005	2006	2007	Average
New installation (septic tanks)	438	400	333	296	231	67	294
Accumulated installation (septic tanks)	34,492	34,930	35,330	35,663	35,959	36,190	35,427
Repair permit (septic tanks)	25	22	27	22	22	12	22
Failure discovery rate (%)	0.07%	0.06%	0.08%	0.06%	0.06%	0.03%	0.06%
Failure rate (%)*	0.4%	0.3%	0.4%	0.3%	0.3%	0.2%	0.3%

Sanitary Sewer Overflows

SSOs can also be a potential source of fecal bacteria 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.

Fecal coliform loading from sewer line leakage can be calculated, based on the number of people in the watershed, typical per household generation rates, and the typical fecal coliform concentration in domestic sewage, assuming a leakage rate of 0.5 percent (Culver et al., 2002). Based on this assumption, a rough estimate of fecal coliform loads from leaks and overflows of sanitary sewer in the Nonsense Creek, Braden River AWL, Rattlesnake Slough, and Cedar Creek watersheds can be made using **Equation 4.2**:

$$L = 37.85 * N * Q * C * F \qquad \text{Equation 4.2}$$

Where,

- L is the fecal coliform daily load (counts/day);
- N is the number of households using sanitary sewer in the watershed;
- Q is the discharge rate for each household;
- C is the fecal coliform concentration for the domestic wastewater discharge, and
- F is the sewer line leakage rate.

The number of households (*N*) in Nonsense Creek, Braden River AWL, Rattlesnake Slough, and Cedar Creek watersheds that use the sewer line are 525, 1,748, 3,010, and 708 (total households minus septic tank households), respectively. Gilly Creek is a highly rural area, and it is unlikely that sewer lines are linked in the watershed.

The discharge rate through the sewer line from each household (*Q*) was calculated by multiplying the average household size (2.32 people) by the per capita wastewater production rate per day (70 gallons). The commonly cited concentration (*C*) for domestic wastewater is $1x10^6$ counts/100mL for fecal coliform (EPA, 2001). Of the total number of households using the sewer line, 0.5 percent (*F*) was assumed as the sewer line leakage rate (Culver et al., 2002). Based on **Equation 4.2**, the estimated fecal coliform loading from sewer line leakage in the Nonsense Creek, Braden River AWL, Rattlesnake Slough, and Cedar Creek watersheds is about 1.61×10^{10}, 5.37×10^{10}, 9.25×10^{10}, and 2.18×10^{10} counts/day, respectively.

Nonpoint Source Summary

Table 4.6 summarizes the loading estimates from various sources. It is important to note that this is not a complete list (wildlife, for example, is missing) and represents estimates of potential loadings. Proximity to each waterbody, rainfall frequency and magnitude, soil types, drainage features, and temperature are just a few of the factors that could influence and determine the actual loadings from these sources that reach Gilly Creek, Nonsense Creek, Braden River AWL, Rattlesnake Slough, and Cedar Creek.

Table 4.6. Summary of Estimated Fecal Coliform Loadings from Dogs, Septic Tanks, and SSOs in the Nonsense Creek, Braden River AWL, Rattlesnake Slough, and Cedar Creek Watersheds

Waterbody	Dogs (counts/day)	Septic Tanks (counts/day)	SSOs (counts/day)
Nonsense Creek	8.64×10^{10}	3.96×10^{8}	1.61×10^{10}
Braden River AWL	3.23×10^{11}	5.52×10^{9}	5.37×10^{10}
Rattlesnake Slough	4.82×10^{11}	6.78×10^{8}	9.25×10^{10}
Cedar Creek	1.12×10^{11}	3.77×10^{7}	2.18×10^{10}

Chapter 5: DETERMINATION OF ASSIMILATIVE CAPACITY

5.1 Determination of Loading Capacity

The fecal coliform TMDL calculation was developed using the "percent reduction" approach for Gilly Creek, Nonsense Creek, Braden River AWL, Rattlesnake Slough, and Cedar Creek. 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 provided by Manatee County and the Department's Southwest District and Ambient Monitoring Program (AMP). **Table 5.1** lists the stations with fecal coliform data used in this analysis. **Figures 5.1a** and **5.1b** show the locations of the water quality stations where fecal coliform data were collected.

Table 5.1. Gilly Creek, Nonsense Creek, Braden River AWL, Rattlesnake Slough, and Cedar Creek Water Quality Stations

WBID	Waterbody	Station	Data Provider
1840	Gilly Creek	21FLGW 11189	Department (AMP)
1840	Gilly Creek	21FLGW 11195	Department (AMP)
1840	Gilly Creek	21FLGW 11198	Department (AMP)
1840	Gilly Creek	21FLTPA 273019608217258	Department Southwest District
1840	Gilly Creek	21FLTPA 273048608217027	Department Southwest District
1913	Nonsense Creek	21FLMANATS7	Manatee County
1914	Braden River AWL	21FLGW 26894	Department (AMP)
1914	Braden River AWL	21FLGW 11197	Department (AMP)
1914	Braden River AWL	21FLMANABR2	Manatee County
1914	Braden River AWL	21FLMANABR3	Manatee County
1914	Braden River AWL	21FLMANALL1	Manatee County
1914	Braden River AWL	21FLMANATS6	Manatee County
1923	Rattlesnake Slough	21FLMANATS1	Manatee County
1926	Cedar Creek	21FLGW 26911	Department (AMP)
1926	Cedar Creek	21FLMANATS2	Manatee County

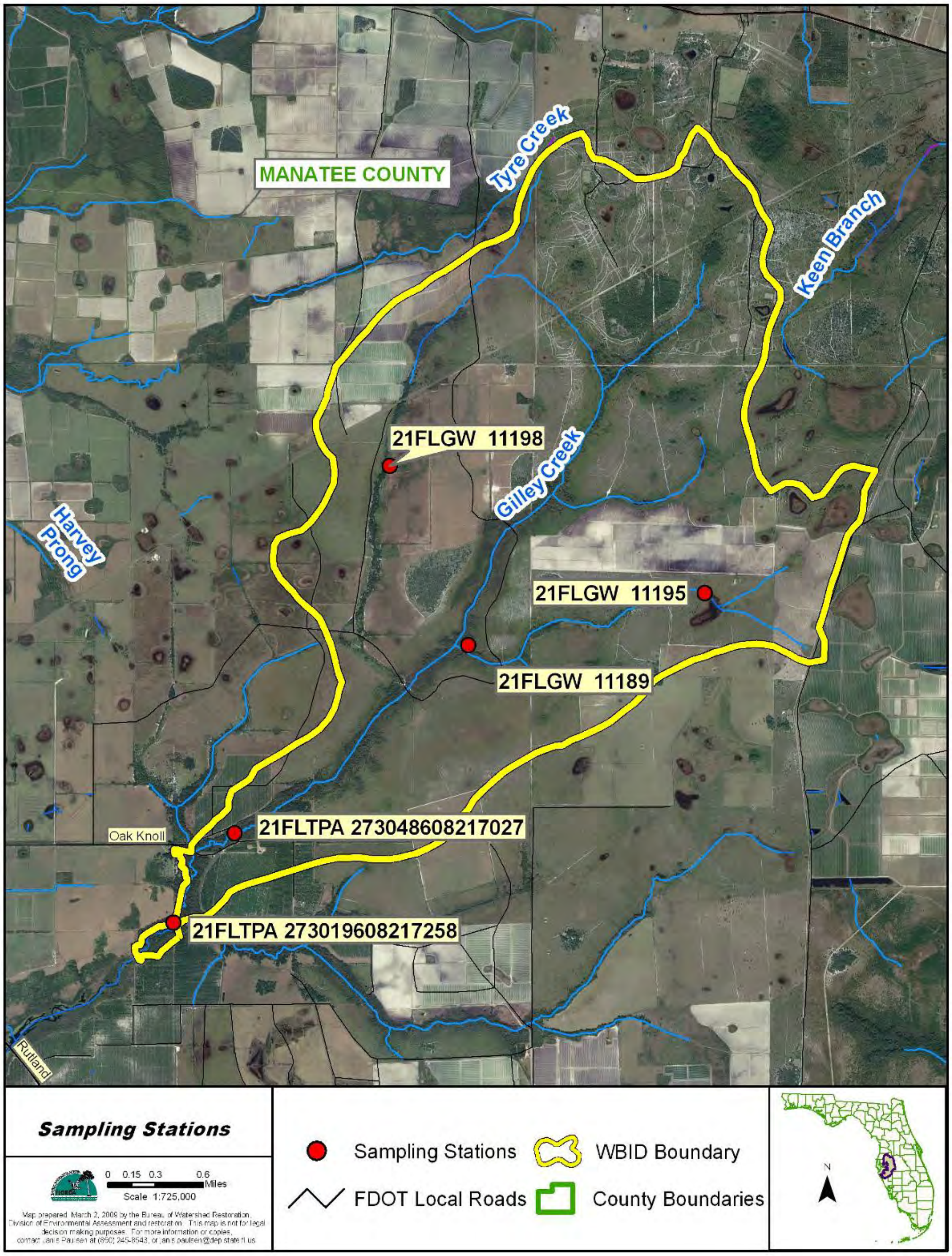


Figure 5.1a. Locations of Water Quality Stations for Gilly Creek (WBID 1840)

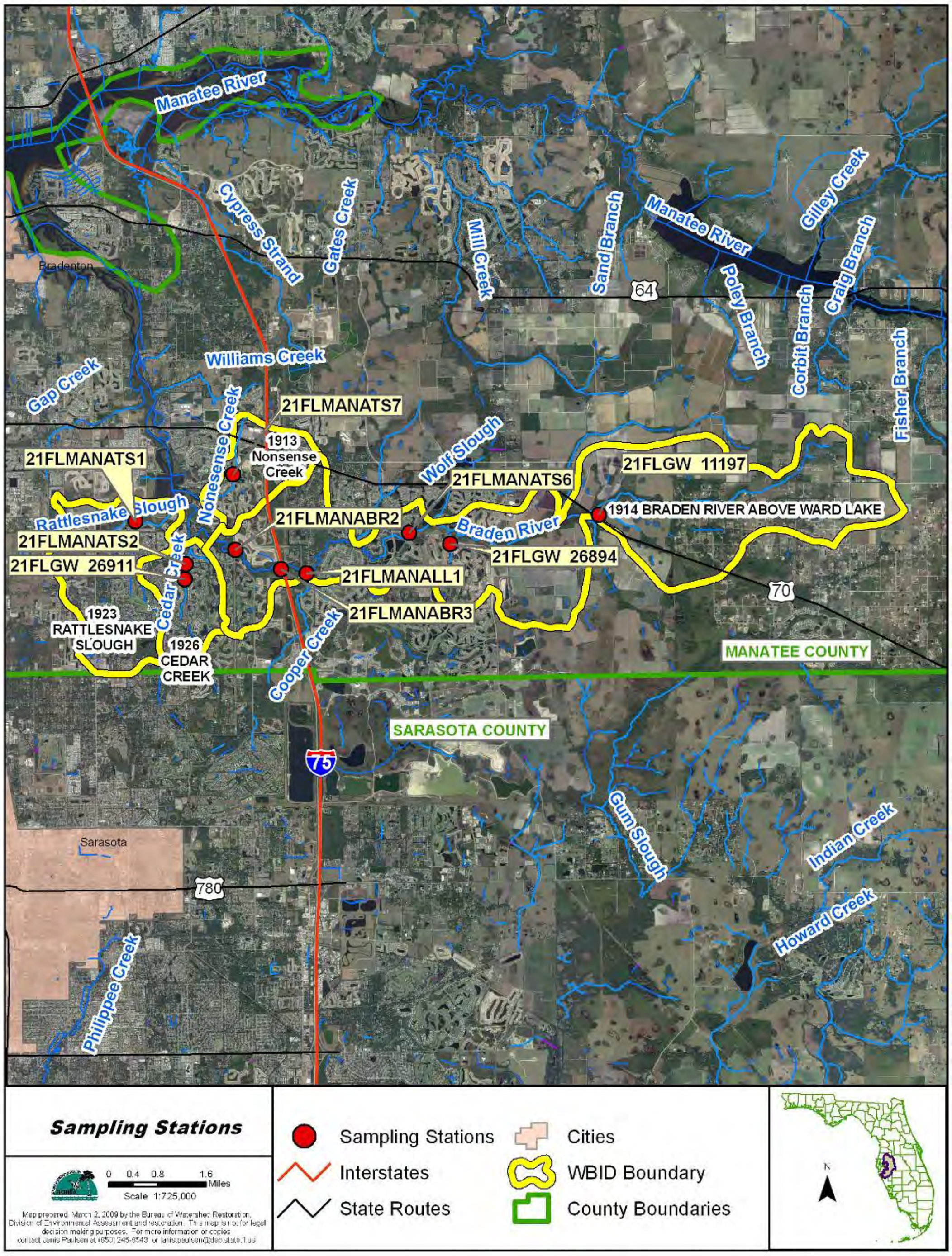


Figure 5.1b. Locations of Water Quality Stations for Nonsense Creek (WBID 1913), Braden River above Ward Lake (WBID 1914), Rattlesnake Slough (WBID 1923), and Cedar Creek (WBID 1926)

5.1.2 TMDL Development Process

As described in **Section 5.1**, the percent reduction needed to meet the fecal coliform criterion was determined for each individual exceedance using **Equation 5.1**, as follows:

$$\frac{[\text{measured exceedance} - \text{criterion}]*100}{\text{measured exceedance}} \qquad \textbf{Equation 5.1}$$

The fecal coliform TMDLs for each impaired waterbody discussed in this report were calculated as the median of the percent reductions needed over the data range where exceedances occurred (see **Tables 5.2a** through **5.2e** for data). As noted in the next section, exceedances occurred throughout the data period for Gilly Creek, Nonsense Creek, Braden River AWL, Rattlesnake Slough, and Cedar Creek, and the median percent reductions for this period were 56, 57, 43, 48, and 61%, respectively.

Table 5.2a. Calculation of Percent Reduction in Fecal Coliform Necessary To Meet the Water Quality Standard of 400 Colonies/100mL in Gilly Creek (WBID1840)

\- = Empty cell
[1] Coliform counts are #/100mL.

Date	Station	Fecal Coliform Exceedances[1]	Fecal Coliform Target[1]	% Reduction
10/30/2007	21FLTPA 273048608217027	530	400	24.53%
1/29/2008	21FLTPA 273048608217027	530	400	24.53%
8/28/2001	21FLGW 11198	600	400	33.33%
9/12/2007	21FLTPA 273048608217027	626	400	36.10%
10/9/2007	21FLTPA 273048608217027	645	400	37.98%
11/14/2007	21FLTPA 273048608217027	845	400	52.66%
9/12/2007	21FLTPA 273019608217258	858	400	53.38%
3/15/2007	21FLTPA 273019608217258	961	400	58.38%
3/15/2007	21FLTPA 273048608217027	1,077	400	62.86%
11/14/2007	21FLTPA 273019608217258	1,182	400	66.16%
12/12/2007	21FLTPA 273048608217027	1,282	400	68.80%
1/16/2008	21FLTPA 273019608217258	2,100	400	80.95%
1/16/2008	21FLTPA 273048608217027	3,500	400	88.57%
12/12/2007	21FLTPA 273019608217258	3,700	400	89.19%
-	-	-	**Median:**	**55.88**%

Table 5.2b. Calculation of Percent Reduction in Fecal Coliform Necessary To Meet the Water Quality Standard of 400 Colonies/100mL in Nonsense Creek, WBID 1913

- = Empty cell
[1] Coliform counts are #/100mL.

Date	Station	Fecal Coliform Exceedances[1]	Fecal Coliform Target[1]	% Reduction
11/1/2006	21FLMANATS7	480	400	16.67%
11/22/2005	21FLMANATS7	500	400	20.00%
7/9/2003	21FLMANATS7	520	400	23.08%
9/2/2004	21FLMANATS7	566	400	29.33%
2/20/2001	21FLMANATS7	600	400	33.33%
1/28/2002	21FLMANATS7	690	400	42.03%
1/17/2007	21FLMANATS7	709	400	43.58%
1/24/2006	21FLMANATS7	745	400	46.31%
8/15/2006	21FLMANATS7	800	400	50.00%
6/18/2003	21FLMANATS7	900	400	55.56%
8/6/2003	21FLMANATS7	900	400	55.56%
7/25/2007	21FLMANATS7	900	400	55.56%
2/16/2006	21FLMANATS7	960	400	58.33%
10/27/2005	21FLMANATS7	963	400	58.46%
4/14/2004	21FLMANATS7	1,036	400	61.39%
2/12/2003	21FLMANATS7	1,100	400	63.64%
12/7/2005	21FLMANATS7	1,100	400	63.64%
9/25/2007	21FLMANATS7	1,600	400	75.00%
4/12/2007	21FLMANATS7	1,800	400	77.78%
2/7/2008	21FLMANATS7	1,800	400	77.78%
5/3/2007	21FLMANATS7	2,000	400	80.00%
2/11/2004	21FLMANATS7	2,200	400	81.82%
8/27/2002	21FLMANATS7	2,600	400	84.62%
4/27/2005	21FLMANATS7	3,400	400	88.24%
-	-	-	**Median:**	**56.94%**

Table 5.2c. Calculation of Percent Reduction in Fecal Coliform Necessary To Meet the Water Quality Standard of 400 Colonies/100mL in Braden River AWL, WBID 1914

- = Empty cell
[1] Coliform counts are #/100mL.

Date	Station	Fecal Coliform Exceedances[1]	Fecal Coliform Target[1]	% Reduction
6/18/2003	21FLMANABR2	420	400	4.76%
10/19/2006	21FLMANATS6	420	400	4.76%
3/22/2007	21FLMANATS6	425	400	5.88%
9/18/2001	21FLMANATS6	430	400	6.98%
11/1/2006	21FLMANATS6	430	400	6.98%
8/6/2003	21FLMANATS6	440	400	9.09%
4/14/2004	21FLMANATS6	440	400	9.09%
1/17/2007	21FLMANATS6	440	400	9.09%
6/6/2007	21FLMANATS6	440	400	9.09%
8/27/2001	21FLMANATS6	445	400	10.11%
11/20/2002	21FLMANATS6	448	400	10.71%
11/14/2007	21FLMANATS6	450	400	11.11%
1/29/2003	21FLMANATS6	460	400	13.04%
10/27/2005	21FLMANATS6	480	400	16.67%
11/22/2005	21FLMANATS6	480	400	16.67%
11/24/2003	21FLMANABR3	500	400	20.00%
7/24/2001	21FLMANALL1	500	400	20.00%
8/27/2002	21FLMANALL1	500	400	20.00%
7/24/2002	21FLMANATS6	500	400	20.00%
5/12/2004	21FLMANABR3	520	400	23.08%
7/21/2004	21FLMANALL1	527	400	24.10%
1/28/2002	21FLMANATS6	535	400	25.23%
4/12/2007	21FLMANALL1	560	400	28.57%
5/12/2004	21FLMANATS6	560	400	28.57%
7/27/2005	21FLMANATS6	560	400	28.57%
6/16/2004	21FLMANATS6	600	400	33.33%
10/23/2002	21FLMANATS6	620	400	35.48%
11/13/2001	21FLMANATS6	625	400	36.00%
2/16/2006	21FLMANATS6	691	400	42.11%
7/24/2001	21FLMANABR2	700	400	42.86%
7/11/2006	21FLMANATS6	700	400	42.86%
10/23/2002	21FLMANALL1	800	400	50.00%
5/21/2001	21FLMANATS6	855	400	53.22%
7/11/2006	21FLMANALL1	900	400	55.56%
2/12/2003	21FLMANATS6	900	400	55.56%
1/14/2004	21FLMANATS6	900	400	55.56%
3/31/2004	21FLMANATS6	990	400	59.60%
8/24/2005	21FLMANABR2	1,000	400	60.00%
7/24/2001	21FLMANABR3	1,000	400	60.00%
4/12/2007	21FLMANATS6	1,000	400	60.00%
2/9/2002	21FLMANATS6	1,025	400	60.98%

Date	Station	Fecal Coliform Exceedances[1]	Fecal Coliform Target[1]	% Reduction
2/11/2004	21FLMANATS6	1,100	400	63.64%
3/5/2003	21FLMANATS6	1,300	400	69.23%
11/24/2003	21FLMANATS6	1,320	400	69.70%
6/4/2001	21FLMANATS6	1,400	400	71.43%
12/10/2003	21FLMANATS6	1,400	400	71.43%
8/15/2006	21FLMANATS6	1,500	400	73.33%
12/17/2001	21FLMANATS6	1,590	400	74.84%
8/20/2001	21FLGW 11197	1,750	400	77.14%
8/15/2006	21FLMANALL1	1,800	400	77.78%
12/5/2007	21FLMANATS6	1,800	400	77.78%
12/13/2006	21FLMANATS6	1,900	400	78.95%
4/27/2005	21FLMANALL1	2,200	400	81.82%
8/18/2005	21FLGW 26894	2,210	400	81.90%
12/11/2002	21FLMANABR2	2,300	400	82.61%
12/11/2002	21FLMANALL1	2,300	400	82.61%
6/18/2003	21FLMANATS6	2,700	400	85.19%
4/27/2005	21FLMANABR3	3,200	400	87.50%
4/27/2005	21FLMANATS6	4,300	400	90.70%
4/27/2005	21FLMANABR2	4,800	400	91.67%
-	-	-	**Median**	**42.86%**

Table 5.2d. Calculation of Percent Reduction in Fecal Coliform Necessary To Meet the Water Quality Standard of 400 Colonies/100mL in Rattlesnake Slough, WBID 1923

- = Empty cell
[1] Coliform counts are #/100mL.

Date	Station	Fecal Coliform Exceedances[1]	Fecal Coliform Target[1]	% Reduction
9/2/2004	21FLMANATS1	420	400	4.76%
4/14/2004	21FLMANATS1	435	400	8.05%
12/17/2001	21FLMANATS1	450	400	11.11%
2/7/2008	21FLMANATS1	500	400	20.00%
2/6/2007	21FLMANATS1	505	400	20.79%
11/13/2001	21FLMANATS1	525	400	23.81%
6/6/2007	21FLMANATS1	540	400	25.93%
1/14/2004	21FLMANATS1	550	400	27.27%
1/23/2001	21FLMANATS1	770	400	48.05%
7/11/2006	21FLMANATS1	800	400	50.00%
7/21/2004	21FLMANATS1	804.5	400	50.28%
11/24/2003	21FLMANATS1	950	400	57.89%
9/22/2005	21FLMANATS1	1,073	400	62.72%
8/15/2006	21FLMANATS1	1,250	400	68.00%
8/27/2002	21FLMANATS1	1,800	400	77.78%
4/27/2005	21FLMANATS1	3,600	400	88.89%
6/26/2002	21FLMANATS1	8,000	400	95.00%
-	-	-	**Median:**	**48.05%**

Table 5.2e. Calculation of Percent Reduction in Fecal Coliform Necessary To Meet the Water Quality Standard of 400 Colonies/100mL in Cedar Creek, WBID 1926

- = Empty cell
[1] Coliform counts are #/100mL.

Date	Station	Fecal Coliform Exceedances[1]	Fecal Coliform Target[1]	% Reduction
8/22/2007	21FLMANATS2	410	400	2.44%
11/17/2004	21FLMANATS2	480	400	16.67%
10/17/2007	21FLMANATS2	480	400	16.67%
7/24/2001	21FLMANATS2	500	400	20.00%
2/11/2004	21FLMANATS2	500	400	20.00%
8/15/2006	21FLMANATS2	500	400	20.00%
7/21/2004	21FLMANATS2	520	400	23.08%
6/26/2002	21FLMANATS2	530	400	24.53%
11/22/2005	21FLMANATS2	590	400	32.20%
2/16/2006	21FLMANATS2	590	400	32.20%
3/22/2006	21FLMANATS2	654	400	38.84%
1/24/2006	21FLMANATS2	680	400	41.18%
11/13/2001	21FLMANATS2	700	400	42.86%
5/25/2005	21FLMANATS2	827	400	51.63%
6/18/2003	21FLMANATS2	880	400	54.55%
9/22/2005	21FLMANATS2	891	400	55.11%
12/10/2003	21FLMANATS2	1,000	400	60.00%
7/11/2006	21FLMANATS2	1,000	400	60.00%
12/5/2007	21FLMANATS2	1,000	400	60.00%
2/9/2005	21FLMANATS2	1,009	400	60.36%
1/28/2002	21FLMANATS2	1,020	400	60.78%
3/31/2004	21FLMANATS2	1,100	400	63.64%
1/23/2001	21FLMANATS2	1,120	400	64.29%
8/27/2001	21FLMANATS2	1,200	400	66.67%
4/27/2005	21FLMANATS2	1,250	400	68.00%
11/1/2006	21FLMANATS2	1,300	400	69.23%
3/22/2007	21FLMANATS2	1,300	400	69.23%
4/12/2007	21FLMANATS2	1,300	400	69.23%
8/24/2005	21FLMANATS2	1,400	400	71.43%
11/24/2003	21FLMANATS2	1,520	400	73.68%
8/27/2002	21FLMANATS2	1,600	400	75.00%
6/16/2004	21FLMANATS2	1,682	400	76.22%
1/16/2008	21FLMANATS2	1,700	400	76.47%
6/6/2007	21FLMANATS2	1,800	400	77.78%
5/3/2007	21FLMANATS2	2,100	400	80.95%
12/13/2006	21FLMANATS2	2,200	400	81.82%
11/14/2007	21FLMANATS2	2,200	400	81.82%
9/22/2005	21FLGW 26911	2,300	400	82.61%
1/17/2007	21FLMANATS2	2,500	400	84.00%
5/12/2004	21FLMANATS2	3,300	400	87.88%
2/7/2008	21FLMANATS2	3,400	400	88.24%
-	-	-	**Median:**	**60.78%**

5.1.3 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. Livestock 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.

In this report, rainfall data were compared with the measured fecal coliform data for each waterbody. 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 Ft Green 12 WSW (083153) were obtained and analyzed for Gilly Creek, while monthly rainfall data from Bradenton (080945) were obtained and analyzed for Nonsense Creek, Braden River AWL, Rattlesnake Slough, and Cedar Creek. **Tables 5.3a** through **5.3j** present summary statistics by month and season, respectively, for fecal coliform measurements in each watershed (*Winter*: January–March; *Spring*: April–June; *Summer*: July–September; *Fall*: October–December) from 2001 through 2008. Fecal coliform exceedances occur throughout all seasons in these waterbodies, implying the existence of potential fecal coliform bacteria sources during both baseflow and surface runoff events. **Figures 5.2a** through **5.2e** show this information graphically.

Table 5.3a. Summary Statistics of Fecal Coliform Data for Gilly Creek (WBID 1840) by Month, 2001–08

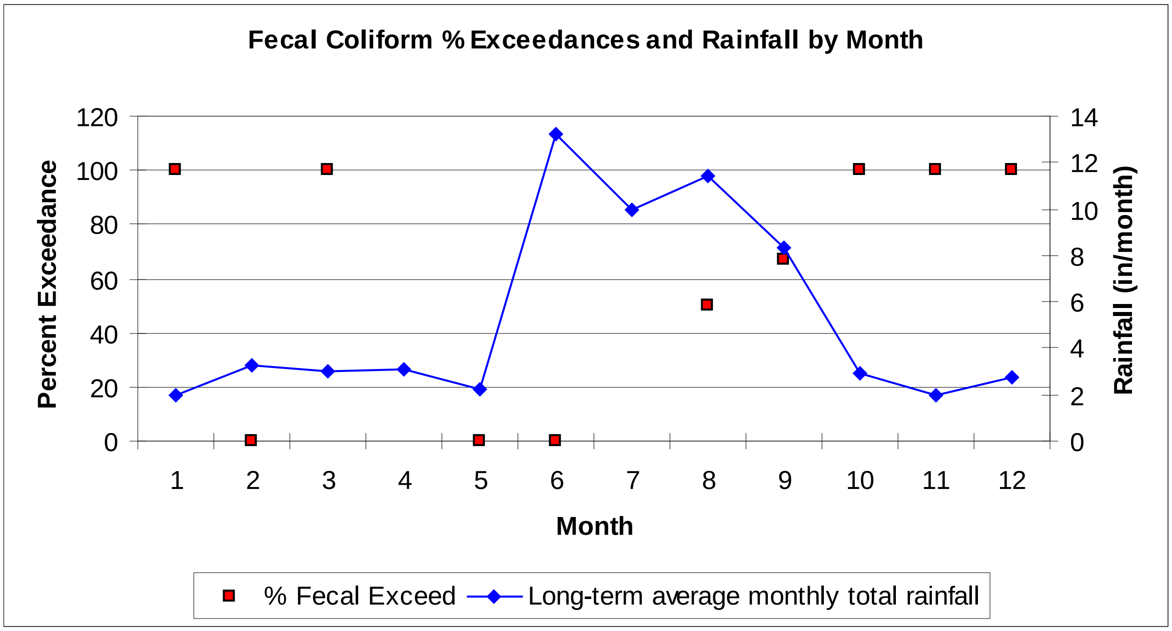
- = No data
[1] Coliform counts are #/100mL.
[2] Rainfall is in inches.

Month	Number of Cases	Minimum[1]	Maximum[1]	Median[1]	Mean[1]	Number of Exceedances	% Exceedances of Cases	Rainfall Mean[2]
1	3	530	3,500	2,100	2,043	3	100.00%	1.99
2	1	0.5	0.5	1	1	0	0.00%	3.24
3	2	961	1,077	1,019	1,019	2	100.00%	3.04
4	0	-	-	-	-	-	-	3.11
5	2	120	130	125	125	0	0.00%	2.21
6	1	200	200	200	200	0	0.00%	13.25
7	0	-	-	-	-	-	-	9.94
8	2	120	600	360	360	1	50.0%0	11.42
9	3	28	858	626	504	2	66.67%	8.34
10	2	530	645	588	588	2	100.00%	2.91
11	2	845	1,182	1,014	1,014	2	100.00%	1.96
12	2	1,282	3,700	2,491	2,491	2	100.00%	2.77

Table 5.3b. Summary Statistics of Fecal Coliform Data for Gilly Creek (WBID 1840), by Season, 2001–08

[1] Coliform counts are #/100mL.
[2] Rainfall is in inches.

Season	Number of Cases	Minimum[1]	Maximum[1]	Median[1]	Mean[1]	Number of Exceedances	% Exceedances of Cases	Total Rainfall Mean[2]
1	6	0.5	3,500	1,019	1,021	5	66.67%	8.27
2	3	120	200	162.5	163	0	0.00%	18.57
3	5	28	858	493	432	3	58.33%	29.70
4	6	530	3,700	1,014	1,364	6	100.00%	7.64



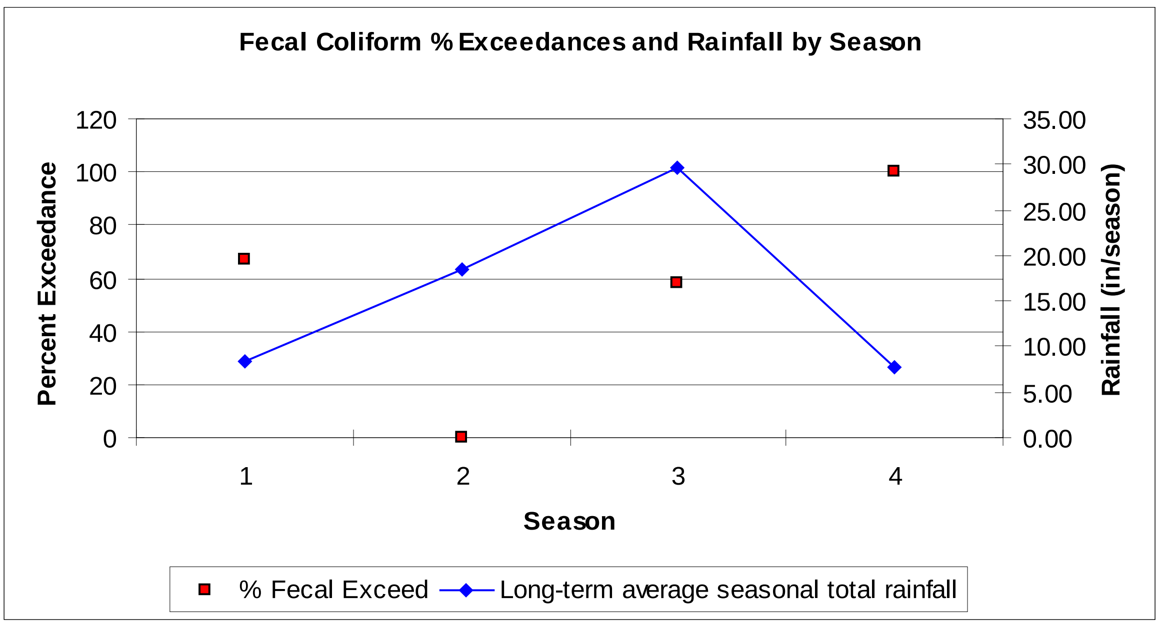


Figure 5.2a. Fecal Coliform Exceedances and Rainfall for Gilly Creek (WBID 1840), by Month and Season, 2001–08

Table 5.3c. Summary Statistics of Fecal Coliform Data for Nonsense Creek (WBID 1913) by Month, 2001–08

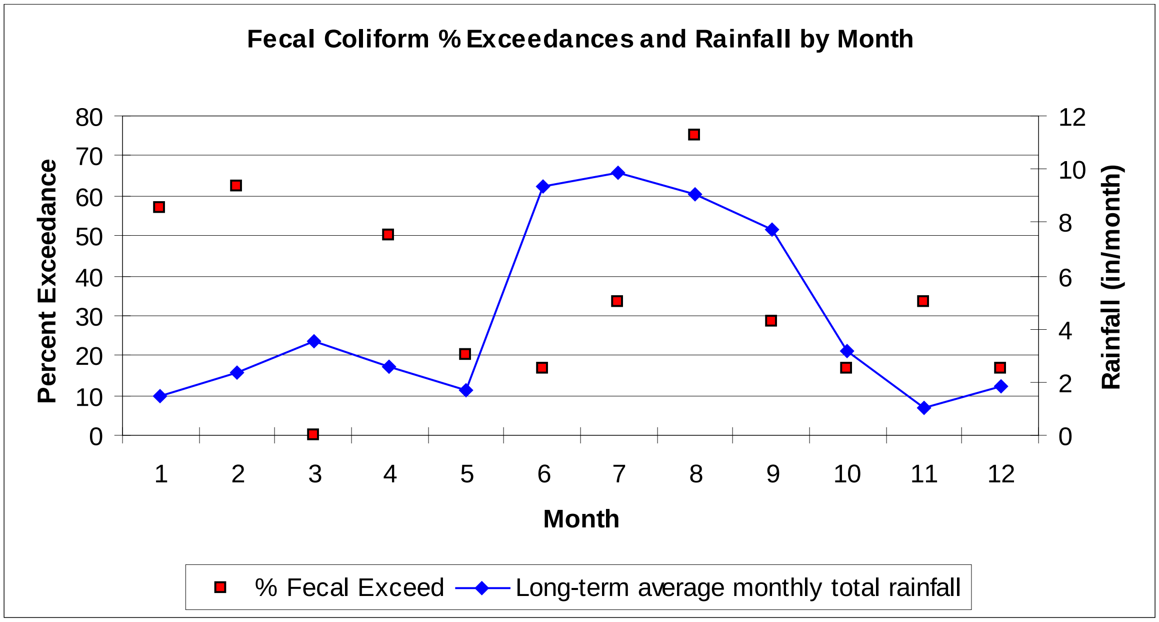
[1] Coliform counts are #/100mL.
[2] Rainfall is in inches.

Month	Number of Cases	Minimum[1]	Maximum[1]	Median[1]	Mean[1]	Number of Exceedances	% Exceedances of Cases	Rainfall Mean[2]
1	7	70	745	350	413	4	57.14%	1.48
2	8	53	2,200	780	882	5	62.50%	2.35
3	6	10	260	100	113	0	0.00%	3.51
4	6	45	3,400	618	1,089	3	50.00%	2.54
5	5	18	2,000	225	517	1	20.00%	1.73
6	6	104	900	250	322	1	16.67%	9.33
7	6	100	900	310	387	2	33.33%	9.85
8	4	191	2,600	850	1123	3	75.00%	9.05
9	7	26.5	1,600	300	475	2	28.57%	7.73
10	6	40	963	270	335	1	16.67%	3.15
11	6	35	500	270	245	2	33.33%	1.06
12	6	20	1,100	150	298	1	16.67%	1.82

Table 5.3d. Summary Statistics of Fecal Coliform Data for Nonsense Creek (WBID 1913) by Season, 2001–08

[1] Coliform counts are #/100mL.
[2] Rainfall is in inches.

Season	Number of Cases	Minimum[1]	Maximum[1]	Median[1]	Mean[1]	Number of Exceedances	% Exceedances of Cases	Total Rainfall Mean[2]
1	21	10	2,200	350	469	9	39.88%	7.34
2	17	18	3,400	250	642	5	28.89%	13.60
3	17	27	2,600	310	661	7	45.63%	26.63
4	18	20	1,100	270	292	4	22.22%	6.03



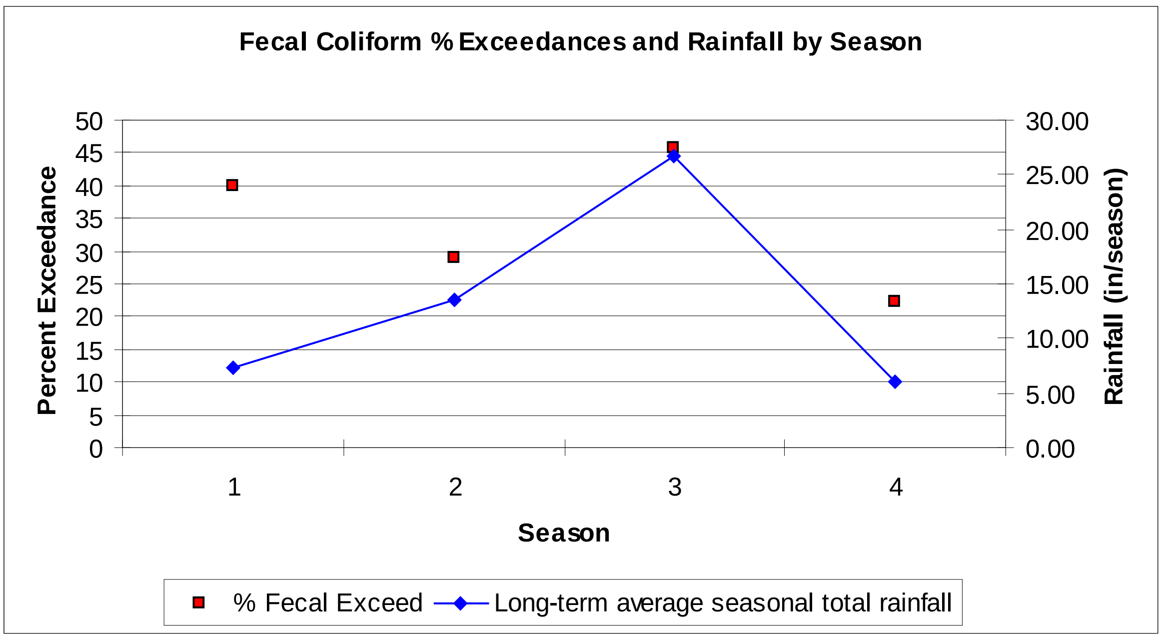


Figure 5.2b. Fecal Coliform Exceedances and Rainfall for Nonsense Creek (WBID 1913), by Month and Season, 2001–08

Table 5.3e. Summary Statistics of Fecal Coliform Data for Braden River AWL (WBID 1914) by Month, 2001–08

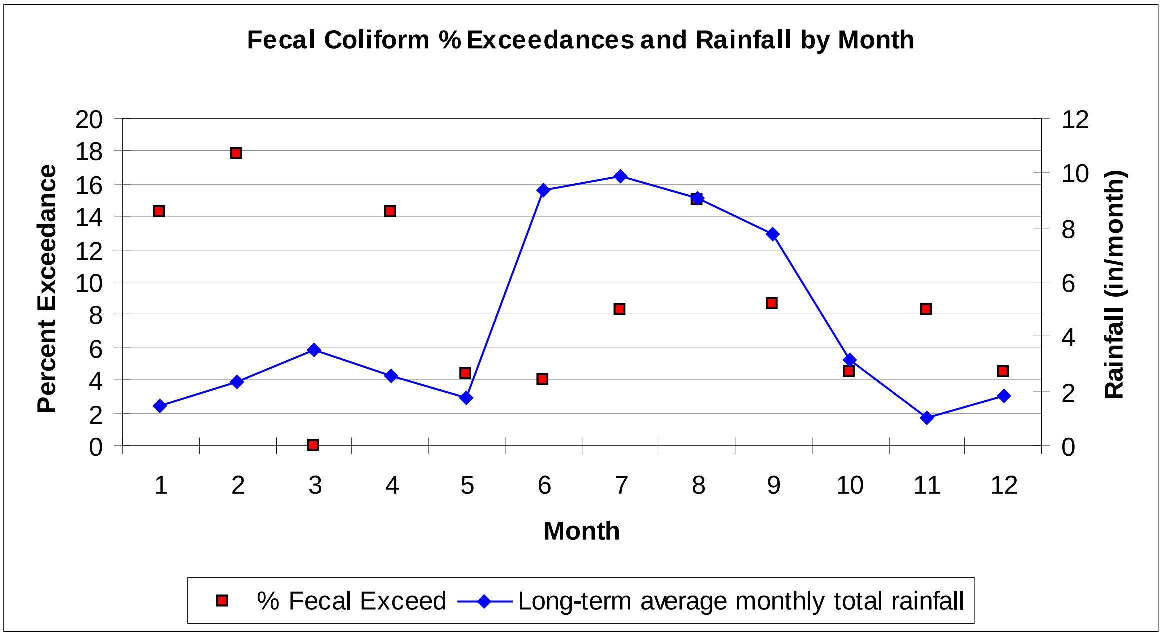
[1] Coliform counts are #/100mL.
[2] Rainfall is in inches.

Month	Number of Cases	Minimum[1]	Maximum[1]	Median[1]	Mean[1]	Number of Exceedances	% Exceedances of Cases	Rainfall Mean[2]
1	28	4.5	900	88	179	4	14.29%	1.48
2	28	3	1,100	2	205	5	17.86%	2.35
3	23	2	1,300	81	197	0	0.00%	3.51
4	21	5	4,800	82	833	3	14.29%	2.54
5	23	1	855	30	146	1	4.35%	1.73
6	25	4	2,700	82	312	1	4.00%	9.33
7	24	1	1,000	270	336	2	8.33%	9.85
8	20	28	2,210	319	593	3	15.00%	9.05
9	23	16	430	182	204	2	8.70%	7.73
10	22	5	800	83	177	1	4.55%	3.15
11	24	6	1,320	77	229	2	8.33%	1.06
12	22	6	2,300	92	581	1	4.55%	1.82

Table 5.3f. Summary Statistics of Fecal Coliform Data for Braden River AWL (WBID 1914) by Season, 2001–08

[1] Coliform counts are #/100mL.
[2] Rainfall is in inches.

Season	Number of Cases	Minimum[1]	Maximum[1]	Median[1]	Mean[1]	Number of Exceedances	% Exceedances of Cases	Total Rainfall Mean[2]
1	79	2	1,300	81	194	9	10.71%	7.34
2	69	1	4,800	82	430	5	7.54%	13.60
3	67	1	2,210	270	378	7	10.68%	26.63
4	68	5	2,300	83	329	4	5.81%	6.03



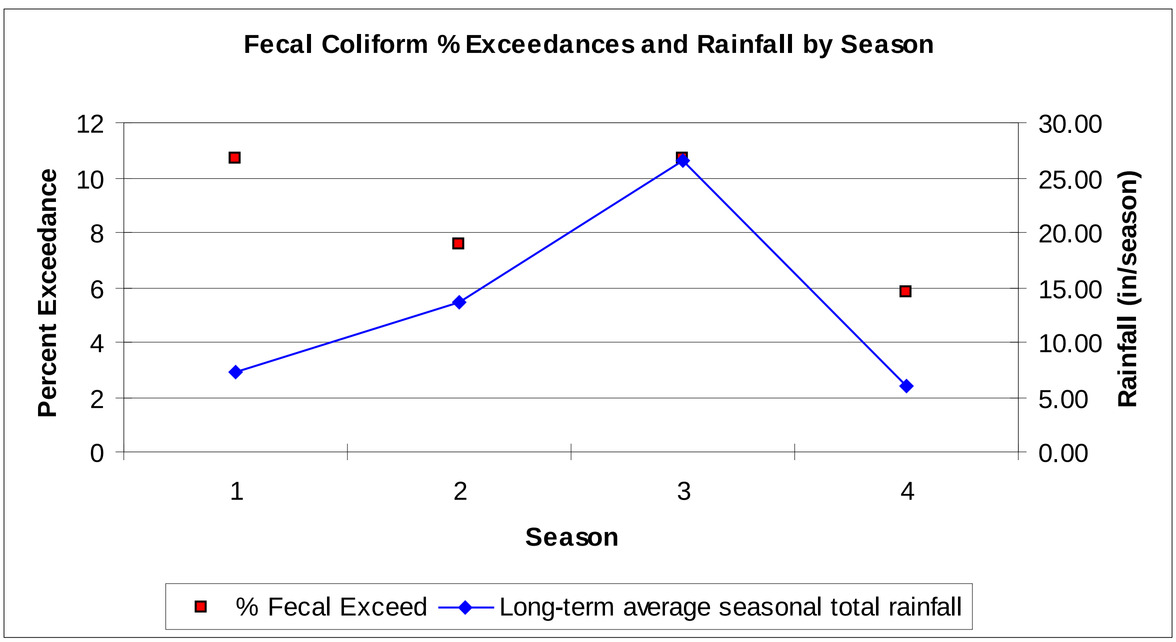


Figure 5.2c. Fecal Coliform Exceedances and Rainfall for Braden River AWL (WBID 1914), by Month and Season, 2001–08

Table 5.3g. Summary Statistics of Fecal Coliform Data for Rattlesnake Slough (WBID 1923) by Month, 2001–08

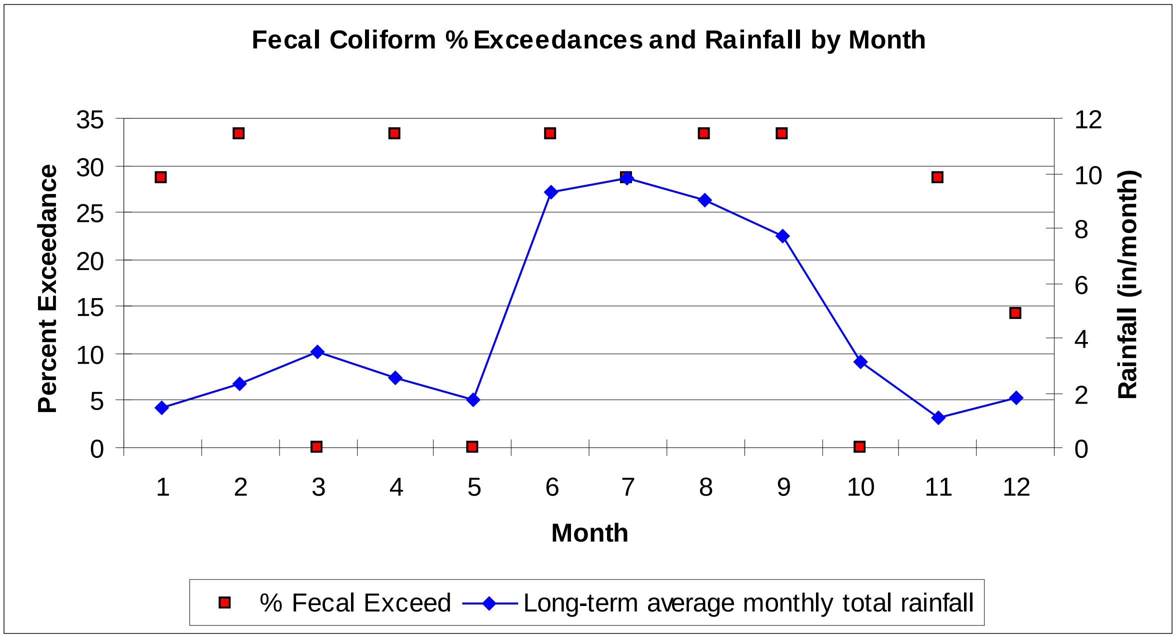
[1] Coliform counts are #/100mL.
[2] Rainfall is in inches.

Month	Number of Cases	Minimum[1]	Maximum[1]	Median[1]	Mean[1]	Number of Exceedances	% Exceedances of Cases	Rainfall Mean[2]
1	7	132	770	207	346	2	28.57%	1.48
2	6	24	505	212	256	2	33.33%	2.35
3	6	6	223	26	82	0	0.00%	3.51
4	6	22	3,600	320	833	2	33.33%	2.54
5	5	11	48.5	30	29	0	0.00%	1.73
6	6	30	8,000	84	1,463	2	33.33%	9.33
7	7	1	805	300	359	2	28.57%	9.85
8	6	21	1,800	205	592	2	33.33%	9.05
9	6	90	1,073	265	370	2	33.33%	7.73
10	7	24	300	72	127	0	0.00%	3.15
11	7	80	950	173	314	2	28.57%	1.06
12	7	52	450	270	227	1	14.29%	1.82

Table 5.3h. Summary Statistics of Fecal Coliform Data for Rattlesnake Slough (WBID 1923) by Season, 2001–08

[1] Coliform counts are #/100mL.
[2] Rainfall is in inches.

Season	Number of Cases	Minimum[1]	Maximum[1]	Median[1]	Mean[1]	Number of Exceedances	% Exceedances of Cases	Total Rainfall Mean[2]
1	19	6	770	207	228	4	20.63%	7.34
2	17	11	8,000	83.5	775	4	22.22%	13.60
3	19	1	1,800	265	440	6	31.75%	26.63
4	21	24	950	173	223	3	14.29%	6.03



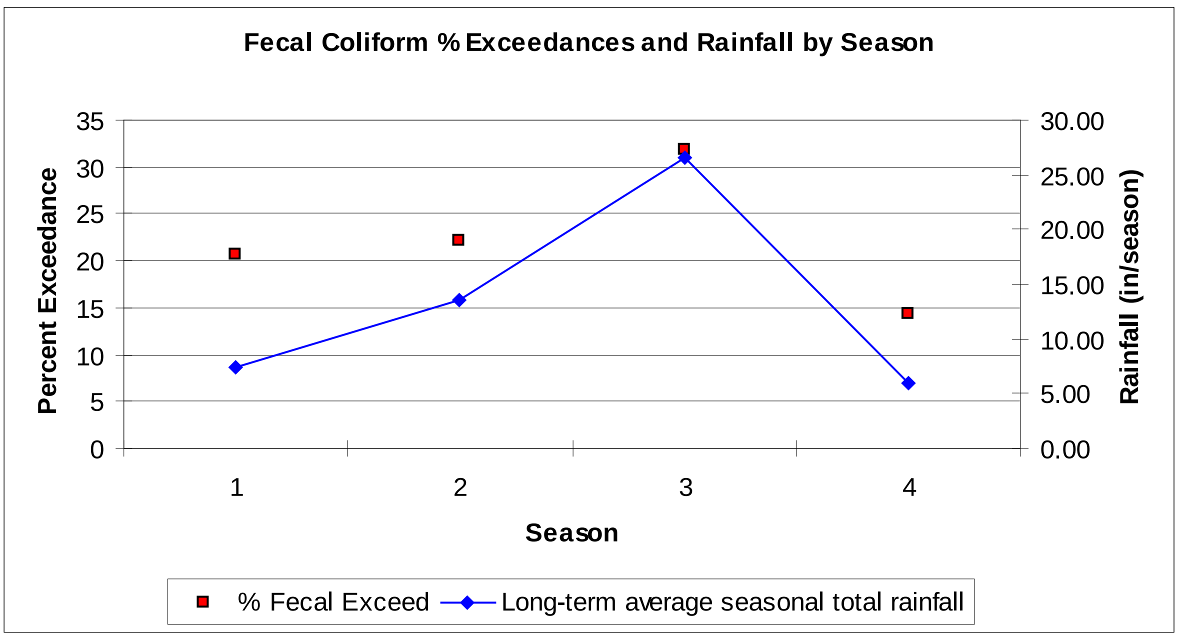


Figure 5.2d. Fecal Coliform Exceedances and Rainfall for Rattlesnake Slough (WBID 1923), by Month and Season, 2001–08

Table 5.3i. Summary Statistics of Fecal Coliform Data for Cedar Creek (WBID 1926) by Month, 2001–08

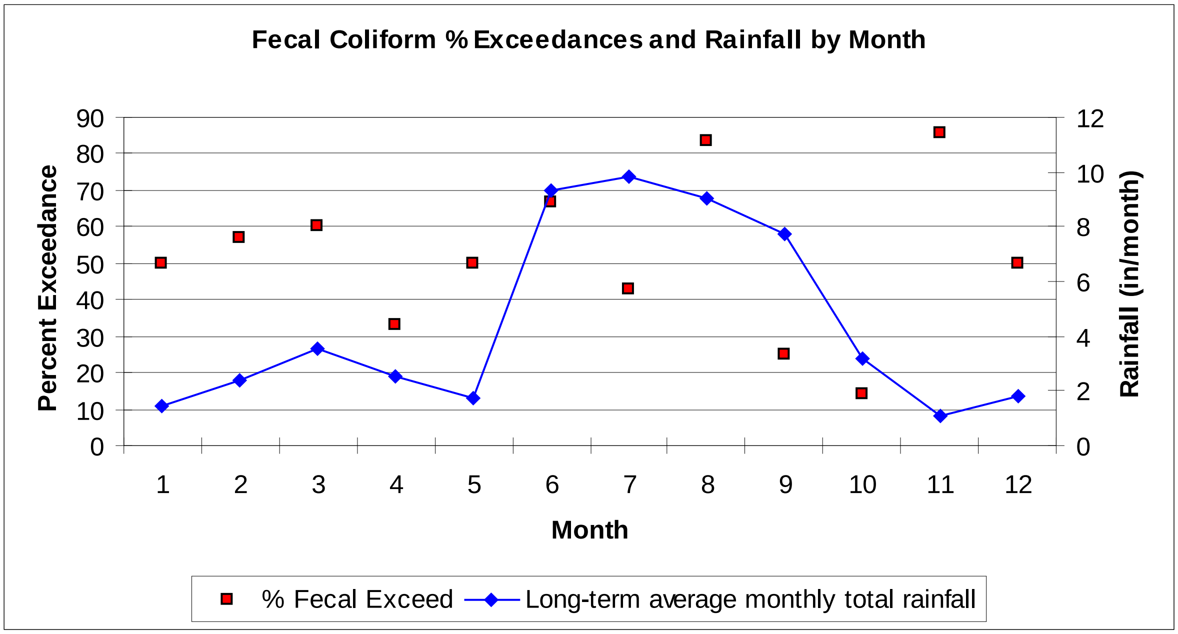
[1] Coliform counts are #/100mL.
[2] Rainfall is in inches.

Month	Number of Cases	Minimum[1]	Maximum[1]	Median[1]	Mean[1]	Number of Exceedances	% Exceedances of Cases	Rainfall Mean[2]
1	8	10	2,500	850	938	4	50.00	1.48
2	7	340	3,400	500	946	4	57.14	2.35
3	5	72	1,300	654	645	3	60.00	3.51
4	6	14	1,300	210	510	2	33.33	2.54
5	6	13	3,300	544	1,115	3	50.00	1.73
6	6	54	1,800	705	886	4	66.67	9.33
7	7	1	1,000	245	378	3	42.86	9.85
8	6	100	1,600	850	868	5	83.33	9.05
9	8	30	2,300	230	521	2	25.00	7.73
10	7	90	480	220	235	1	14.29	3.15
11	7	70	2,200	700	980	6	85.71	1.06
12	6	130	2,200	665	815	3	50.00	1.82

Table 5.3j. Summary Statistics of Fecal Coliform Data for Cedar Creek (WBID 1926) by Season, 2001–08

[1] Coliform counts are #/100mL.
[2] Rainfall is in inches.

Season	Number of Cases	Minimum[1]	Maximum[1]	Median[1]	Mean[1]	Number of Exceedances	% Exceedances of Cases	Total Rainfall Mean[2]
1	20	10	3,400	654	843	11	55.71	7.34
2	18	13	3,300	544	837	9	50.00	13.60
3	21	1	2,300	245	589	10	50.40	26.63
4	20	70	2,200	665	677	10	50.00	6.03



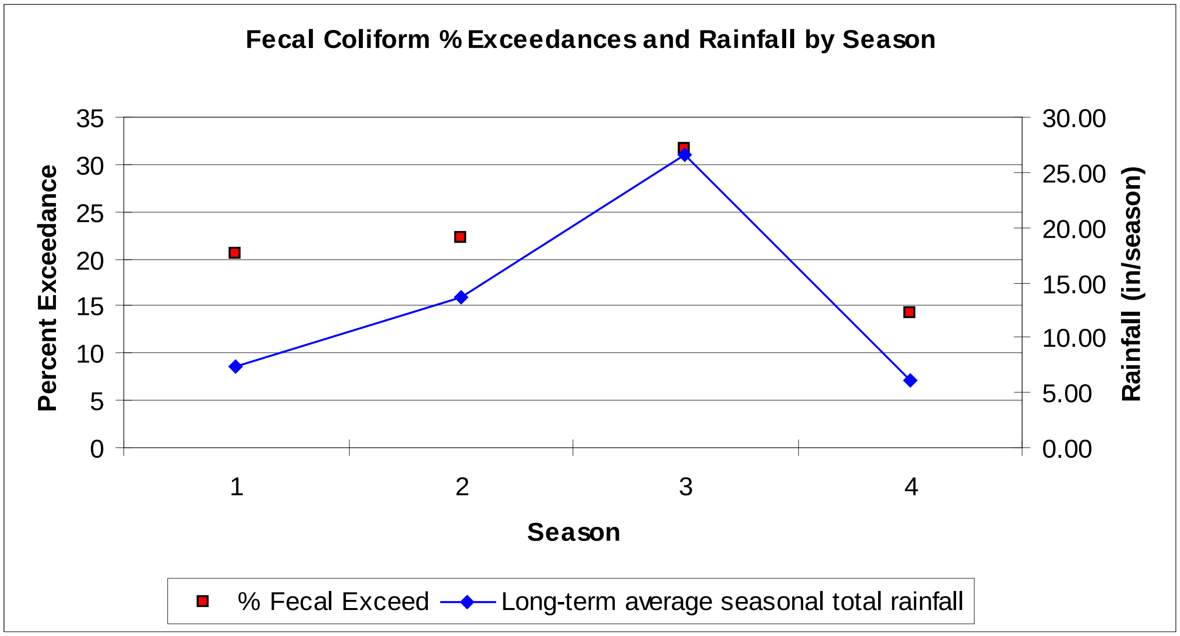


Figure 5.2e. Fecal Coliform Exceedances and Rainfall for Cedar Creek (WBID 1926), by Month and Season, 2001–08

5.1.4 Spatial Patterns

No major spatial pattern could be found for Gilly Creek, Nonsense Creek, Rattlesnake Slough, and Cedar Creek due to the lack of fecal coliform data from multiple stations (see **Table 5.4**).

For Braden River AWL, Station 21FLMANATS6 (located in the middle portions of the river just above Lakewood Ranch Blvd.) shows a relatively high fecal coliform percentage exceedance rate compared with the downstream stations in this waterbody. The higher fecal coliform values could be explained by the increase in agricultural land in the upstream portion of the Braden River AWL watershed.

Table 5.4. Station Summary Statistics of Fecal Coliform Data for Gilly Creek, Nonsense Creek, Braden Rive AWL, Rattlesnake Slough, and Cedar Creek

[1] Coliform counts are #/100mL.

WBID	Station	# Samples	# Exceedances	% Exceedances	Average[1]	Min[1]	Max[1]
1840	21FLGW 11189	1	0	0	120	120	120
1840	21FLGW 11195	1	0	0	28	28	28
1840	21FLGW 11198	1	1	100	600	600	600
1840	21FLTPA 273019608217258	7	5	71	1,276	1	3,700
1840	21FLTPA 273048608217027	10	8	80	936	120	3,500
1913	21FLMANATS7	73	24	33	508	10	3,400
1914	21FLGW 11197	1	1	100	1,750	1,750	1,750
1914	21FLGW 26894	1	1	100	2,210	2,210	2,210
1914	21FLMANABR2	80	5	6	161	1	4,800
1914	21FLMANABR3	37	4	11	262	7	3,200
1914	21FLMANALL1	82	9	11	211	1	2,300
1914	21FLMANATS6	82	40	49	573	36	4,300
1923	21FLMANATS1	76	17	22	412	173	8,000
1926	21FLGW 26911	1	1	100	2,300	2,300	2,300
1926	21FLMANATS2	78	40	51	704	1	3,400

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:

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

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

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

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 TMDLs for Gilly Creek, Nonsense Creek, Braden River AWL, Rattlesnake Slough, and Cedar Creek are expressed in terms of a percent reduction; these TMDLs represent the maximum daily fecal coliform loads the streams can assimilate and maintain the fecal coliform criterion (**Table 6.1**).

Table 6.1. TMDL Components for Fecal Coliform in Gilly Creek (WBID 1840), Nonsense Creek (WBID 1913), Braden River AWL (WBID 1914), Rattlesnake Slough (WBID 1923), and Cedar Creek (WBID 1926)

[1] N/A – Not applicable.

WBID	Parameter	TMDL (counts/100mL)	Wasteload Allocation for Wastewater (counts/day)[1]	Wasteload Allocation for NPDES Stormwater (% reduction)[1]	LA (% reduction)	MOS
1840	Fecal Coliform	400	N/A	N/A	56	Implicit
1913	Fecal Coliform	400	N/A	57	57	Implicit
1914	Fecal Coliform	400	N/A	43	43	Implicit
1923	Fecal Coliform	400	N/A	48	48	Implicit
1926	Fecal Coliform	400	N/A	61	61	Implicit

6.2 Load Allocation

A fecal coliform percent reduction of 56, 57, 43, 48, and 61 is needed from nonpoint sources in the Gilly Creek, Nonsense Creek, Braden River AWL, Rattlesnake Slough, and Cedar Creek watersheds, respectively. 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

No NPDES-permitted wastewater facilities with fecal coliform limits were identified in Gilly Creek, Nonsense Creek, Braden River AWL, Rattlesnake Slough, or Cedar Creek. The state already requires all NPDES point source dischargers to meet bacteria criteria at the end of the pipe. It is the Department's current practice not to allow mixing zones for bacteria. Any point sources that may discharge in the watershed in the future will also be required to meet end-of-pipe standards for coliform bacteria.

6.3.2 NPDES Stormwater Discharges

The WLA for stormwater discharges with an MS4 permit is a 56, 57, 43, 48, and 61 percent reduction in current fecal coliform for Gilly Creek, Nonsense Creek, Braden River AWL, Rattlesnake Slough, and Cedar Creek, respectively. 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, 2001), an implicit MOS was used in the development of this 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

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.

References

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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 FDOT 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.

Appendix B: Response to Comments

Comment from Rob C. Brown (ERDM – NRD – Manatee County)

2) The draft TMDLs for both Nonsense Creek (WBID 1913) and Braden River (WBID 1914) do not acknowledge the Tara, Lakewood Ranch, and University Place Community Development Districts (CDDs) that lie within these watersheds (see Figure 1). These CDDs are responsible for discharges from their stormwater collection systems under a Phase II MS4 permit.

Response from David Tyler (WAS – FDEP)

2) We agree that the Lakewood Ranch should be included in the MS4 section for the Braden River (WBID 1914) under Permit FLR04E107. Also, the Tara and University Place CDDs will be acknowledged in our TMDL report as potential contributors even though they currently do not have an NPDES MS4 permit (http://www.dep.state.fl.us/water/stormwater/npdes/MS4_1.htm).

Comment from Rob C. Brown (ERDM – NRD – Manatee County)

3) The draft Fecal Coliform TMDLs for the Little Manatee River (WBID 1742A), the South Fork Little Manatee River (WBID 1790) and Gilly Creek (WBID 1840) assign Waste Load Allocations (WLAs) to Phase I NPDES Municipal Separate Storm Sewer Systems (MS4s), including Manatee County (NPDES Permit FLS000036). The Stormwater Management Program (SWMP) of Manatee County's NPDES MS4 permit was designed for, and is implemented in, the urbanized areas (UA) of the county. As shown on Figure 1, WBIDs 1742A, 1790, and 1840 lie entirely outside of Manatee County's UA, and therefore are not considered part of Manatee County's SWMP.

Response from David Tyler (WAS – FDEP)

3) We agree that Gilly Creek (WBID 1840) should not be considered as part of Manatee County's SWMP, and thus will not be included as an MS4 allocation in the TMDL report.

Comment from Rob C. Brown (ERDM – NRD – Manatee County)

4) Rattlesnake Slough (WBID 1923), Cedar Creek (WBID 1926), Nonsense Creek (WBID 1913) and Braden River (WBID 1914) lie within the Evers Reservoir Watershed Overlay District, and Gilly Creek (WBID 1840) lies within the Lake Manatee Watershed Overlay District. Section 604 of the Manatee County Land Development Code imposes restrictions and requirements designed to be protective of water quality in these potable-source watersheds. Stormwater systems within the overlay districts must meet Outstanding Florida Waters (OFW) design criteria, and septic tank locations are subject to additional setback criteria.

5) Data back to 1990 indicate that fecal coliform bacteria concentrations in the Braden River subwatersheds have fluctuated greatly over time, with no evident trends. Meanwhile, as shown in Figure 2, a substantial increase in urban development has occurred in these subwatersheds over the same period. As these increases in urban development are subject to the watershed overlay restrictions (see comment #4 above), we feel that the source of the fecal coliform bacteria is not anthropogenic.

Response from David Tyler (WAS – FDEP)

4 and 5) We understand that Manatee County has measures in place to help protect water quality in the Braden River subwatersheds; however, we believe that the high percentange of anthropogenic land uses types within these watersheds could potentially be contributing to high fecal coliform bacteria values.

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