FINAL

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Division of Water Resource Management, Bureau of Watershed Management

SOUTHWEST DISTRICT • TAMPA BAY BASIN

TMDL Report

Total Coliform and Fecal Coliform TMDL for Lower Sweetwater Creek (WBID 1570A)

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Acknowledgments

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Chapter 1: INTRODUCTION

1.1 Purpose of Report

This report presents the Total Maximum Daily Load (TMDL) for total and fecal coliform bacteria for the tidal segment of Lower Sweetwater Creek (LSC). The creek was verified as impaired for total coliforms and fecal coliforms and was included on the Verified List of impaired waters for the Tampa Bay Basin that was adopted by Secretarial Order on August 28, 2002. The TMDL process quantifies the amount of a pollutant that can be assimilated in a waterbody, identifies the sources of the pollutant, and provides water quality targets needed to achieve compliance with applicable water quality standards based on the relationship between pollution sources and instream water quality conditions. This TMDL establishes the allowable loadings to the tidal stream segment of LSC that would restore the waterbody so that it meets its applicable water quality criteria for total and fecal coliform bacteria.

1.2 Identification of Waterbody

The LSC watershed is located northwestern Hillsborough County, just west of the city of Tampa **(Figure 1.1).** The watershed covers approximately 9.4 square miles. The headwaters are located at Egypt Lake, and the main channel flows southwest for approximately 6.5 miles before discharging into Old Tampa Bay. The watershed is generally bordered on the east by Armenia Avenue, on the west by Webb Road, on the north by Sligh Avenue, and on the south by Tampa Bay Boulevard, Memorial Highway, and Old Tampa Bay.

The watershed receives runoff from portions of the Town ‘n Country area of Hillsborough County, portions of Tampa International Airport (TIA), the Town ‘n Country Hospital, and portions of Al Lopez Park and the Drew Park area of the City of Tampa. Hillsborough Avenue divides the basin in an east-west direction roughly into two halves. Veteran's Expressway, Dale Mabry Highway, Anderson Road, and Eisenhower Boulevard are other major roads that pass through the watershed (Hillsborough County Public Works Department, September 2002).

The climate in Hillsborough County is subtropical. The average annual rainfall from 1995 to 2003 was approximately 49.5 inches (National Weather Service, 2004). The wet season is approximately 4 months long during the summer, which usually begins in June and ends in September. The summer is generally hot and humid, with daily high temperatures in the 90s. Afternoon thunderstorms of high intensity and short duration are common during the wet season.

The topography of the LSC watershed is relatively flat, with gentle slopes. Areas adjacent to Old Tampa Bay and the Town ‘n Country area are relatively flat, while some of the interior regions near Egypt Lake have somewhat more relief. In the Town 'n Country area, ground elevations range from 6 to 13 feet (NGVD), while north of Egypt Lake the elevations are as high as 40 feet above sea level (Hillsborough County Public Works Department, September 2002).

Most of the soils in the LSC watershed are not well drained. However, due primarily to the effects of development, many of these soils are in a "drained" condition. For instance, in the

Town 'n Country area and in the residential areas farther south towards Old Tampa Bay, the natural soils have been "drained" through the lowering of surficial ground water levels. The lower water table levels in these areas have resulted from the construction of storm sewer systems and drainage ditches associated with site development. The soils in the areas along and around the Henry Street Canal (HSC) are in a similar condition. The soils farther to the east, around Egypt Lake, range from well drained to poorly drained, as do the soils in the southeastern portion of the watershed (Hillsborough County Public Works Department, September 2002).

The LSC watershed is one of the most heavily urbanized areas in Hillsborough County. Approximately 62.7 percent of land use is urban and built-up, a category that includes high-density residential, commercial, and industrial development. Approximately 15 percent of the land use is transportation and utilities related. These four attributes account for 77.2 percent of land use in the watershed. Land use attributes are based on 1999 land use coverage (scale 1:40,000) contained in the Department's geographic information system (GIS) library (Florida Department of Environmental Protection Web site, June 2004). There are no individual permitted wastewater facilities in the LSC watershed. Urban and suburban stormwater runoff are major contributors to the verified impairment.

Significant residential areas are located in the southwestern, western, and eastern portions of the watershed. These tend to be older neighborhoods, mostly comprising lots less than a quarter-acre in size. The watershed contains no traditional agricultural areas. The largest concentration of commercial/industrial land use is located at TIA and in areas immediately adjacent to the airport property. The Drew Park area, located east of the airport in the jurisdictional boundaries of the city of Tampa, has the largest extent of commercial land cover. The areas adjacent to Hillsborough Avenue, Dale Mabry Highway, Anderson Road, Benjamin Road, and Memorial Highway also contain intensive commercial development (Hillsborough County Public Works Department, September 2002).

Land use around Egypt Lake includes more single-family residences. However, there are a few rather large apartment complexes adjacent to the lake. The area contains very little open space. Horizon Park and the Rocky Point Golf Course, in addition to county-owned property at Westgate Park and land adjacent to Occident Street, are among the largest land cover features containing open space. Tidal marshes are located in the south and southeastern portions of the watershed, along Old Tampa Bay, but this area also contains a dense residential neighborhood (Hillsborough County Public Works Department, September 2002).

For assessment purposes, the Florida Department of Environmental Protection (Department) has divided the LSC watershed into water assessment polygons with a unique **w**ater**b**ody **id**entification (WBID) number for each watershed or stream reach. The LSC watershed, which is located in the Coastal Old Tampa Bay Planning Unit, has been divided into four segments (shown in **Figure 1.2** and listed below). The LSC watershed includes WBIDs 1570, 1570A, 1570Y, and 1570Z. This TMDL addresses the total and fecal coliform impairment in the tidal segment only, WBID 1570A.

WBIDs in the Coastal Old Tampa Bay Planning Unit:

- WBID 1570 – Sweetwater Creek,
- WBID 1570A – Lower Sweetwater Creek (LSC),
- WBID 1570Y – Egypt Lake, and
- WBID 1570Z – Egypt Lake Drainage Area.

Figure 1.1. Location of LSC and Major Geopolitical Features in the Coastal Old Tampa Bay Planning Unit

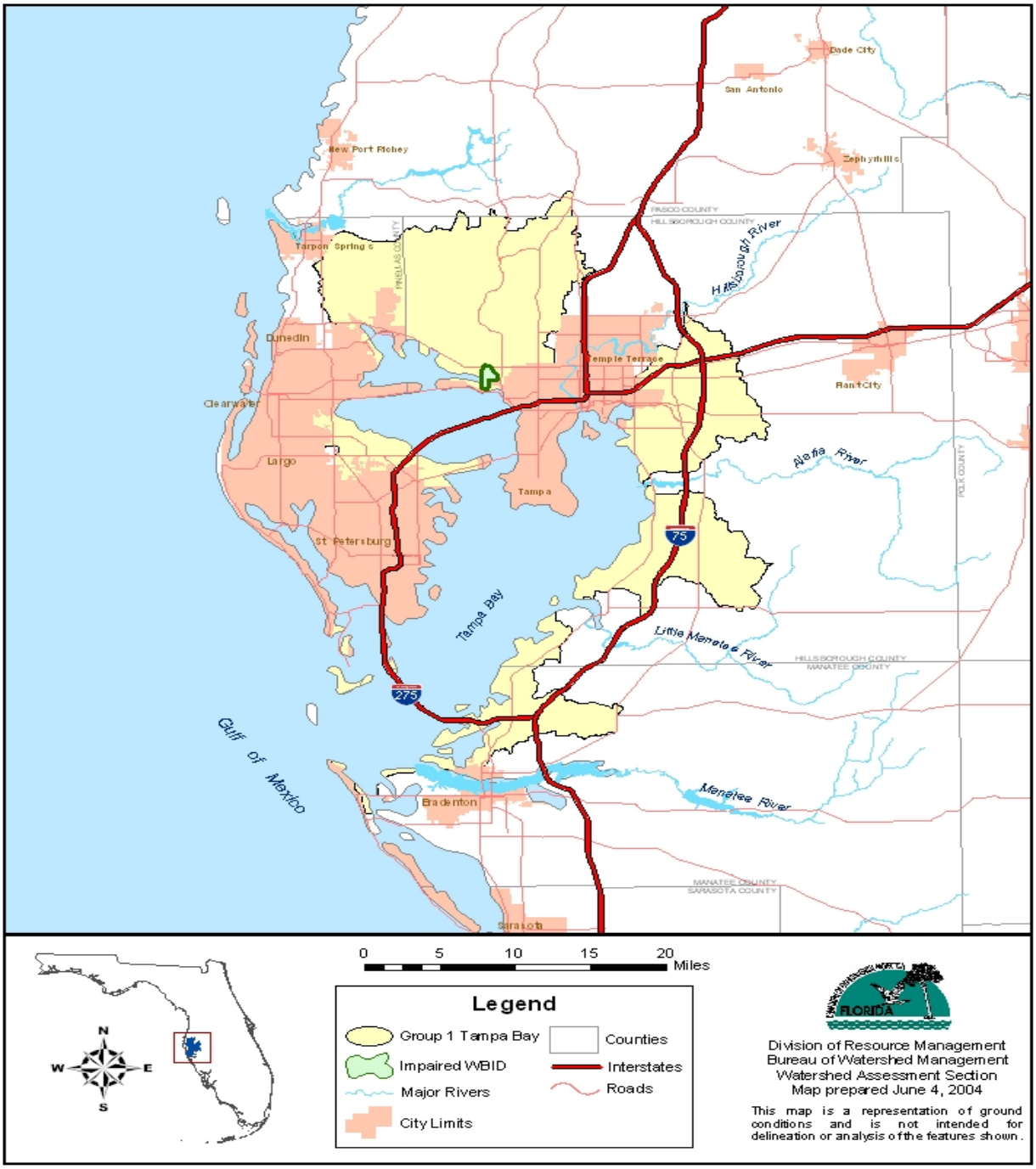
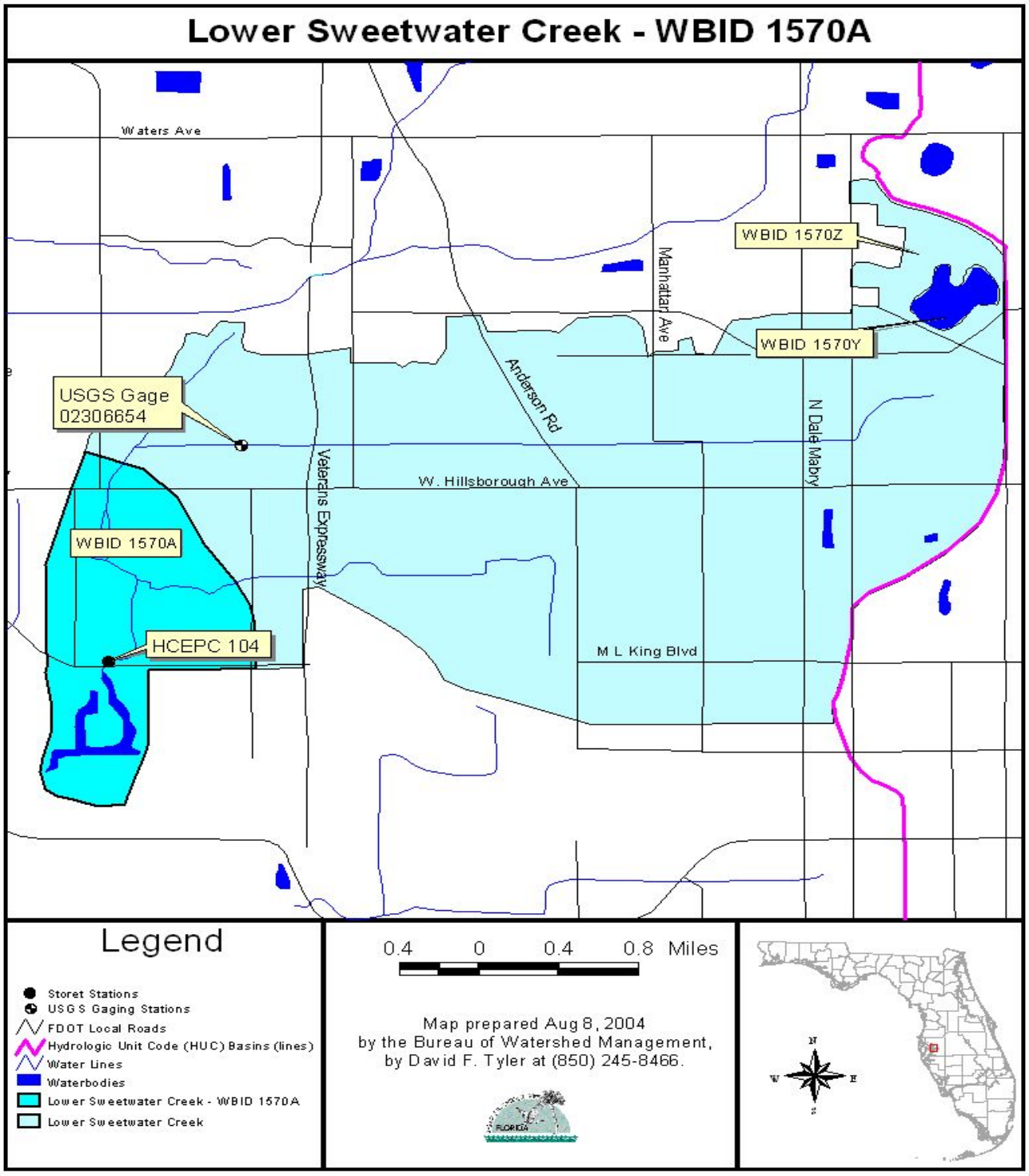


Figure 1.2. LSC Watershed, Showing WBIDs and Monitoring Stations



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. TMDLs provide important water quality restoration goals that will guide restoration activities.

This TMDL Report will be followed by the development and implementation of a Basin Management Action Plan, or BMAP, to address coliform impairment in the LSC watershed. The action plan activities will depend heavily on the active participation of Hillsborough County, the Southwest Florida Water Management District (SWFWMD), businesses, and other stakeholders. The Department will work with these organizations and individuals to undertake or continue reductions in the discharge of pollutants and achieve the established TMDLs for impaired waterbodies.

Chapter 2: DESCRIPTION OF WATER QUALITY PROBLEM

2.1 Statutory Requirements and Rulemaking History

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

Florida's 1998 303(d) list identified 47 waterbodies (or WBIDs) in the Tampa Bay Basin, including LSC. 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. The Environmental Regulation Commission adopted the new methodology as Chapter 62-303, Florida Administrative Code (F.A.C.) (Identification of Impaired Surface Waters Rule, or IWR), in April 2001.

2.2 Information on Verified Impairment

The Department used the IWR to assess water quality impairments in LSC and verified impairments for total and fecal coliforms, nutrients, and dissolved oxygen (DO) **(Table 2.1).** However, this TMDL addresses only total and fecal coliforms. Nutrients are addressed in a separate TMDL report. The total coliform impairment was verified based on the observation that 52 out of 84 samples (a 61.9 percent exceedance rate) collected during the verified period (January 1995 to June 2002) exceeded the state total coliform criterion. The fecal coliform impairment was verified based on the observation that 51 out of 90 samples (a 56.7 percent exceedance rate) collected during the verified period exceeded the state fecal coliform criterion. **Appendices B** and **C** summarize the monitoring results for total and fecal coliforms, respectively, during the verified period and through 2003 for fecal coliform. Data collected from Station 21FLHILL24040101/21FLHILL104 (known as Hillsborough County Environmental Protection Commission [HCEPC] Station HCEPC104) from 1995 to 2001 were used in developing the total coliform TMDL **(Figure 2.1a).** Data from Station HCEPC 104 from 1995 to 2003 were used in developing the fecal coliform TMDL **(Figure 2.1b).** For total coliform, no data were available after December 2001. **Appendix B** provides total coliform monitoring results from 1995 to 2001, and **Appendix C** provides fecal coliform monitoring results from 1995 to 2003.

Table 2.1. Verified Impairments in LSC, WBID 1570A

Parameters of Concern	Priority for TMDL Development	Projected Year for TMDL Development*
Total Coliform	High	2003
Fecal Coliform	High	2003
Nutrients	High	2003
DO	High	2003

Note: The parameters listed in **Table 2.1** provide a complete picture of the impairment in the tidal segment; the TMDLs in this report only address impairment due to total and fecal coliform bacteria.
*These TMDLs were scheduled to be completed by December 31, 2003, based on a Consent Decree between the EPA and EarthJustice, but the Consent Decree allows a 9-month extension for completing the TMDLs.

Figure 2.1a. LSC Total Coliform Monitoring Results, 1995 to 2001

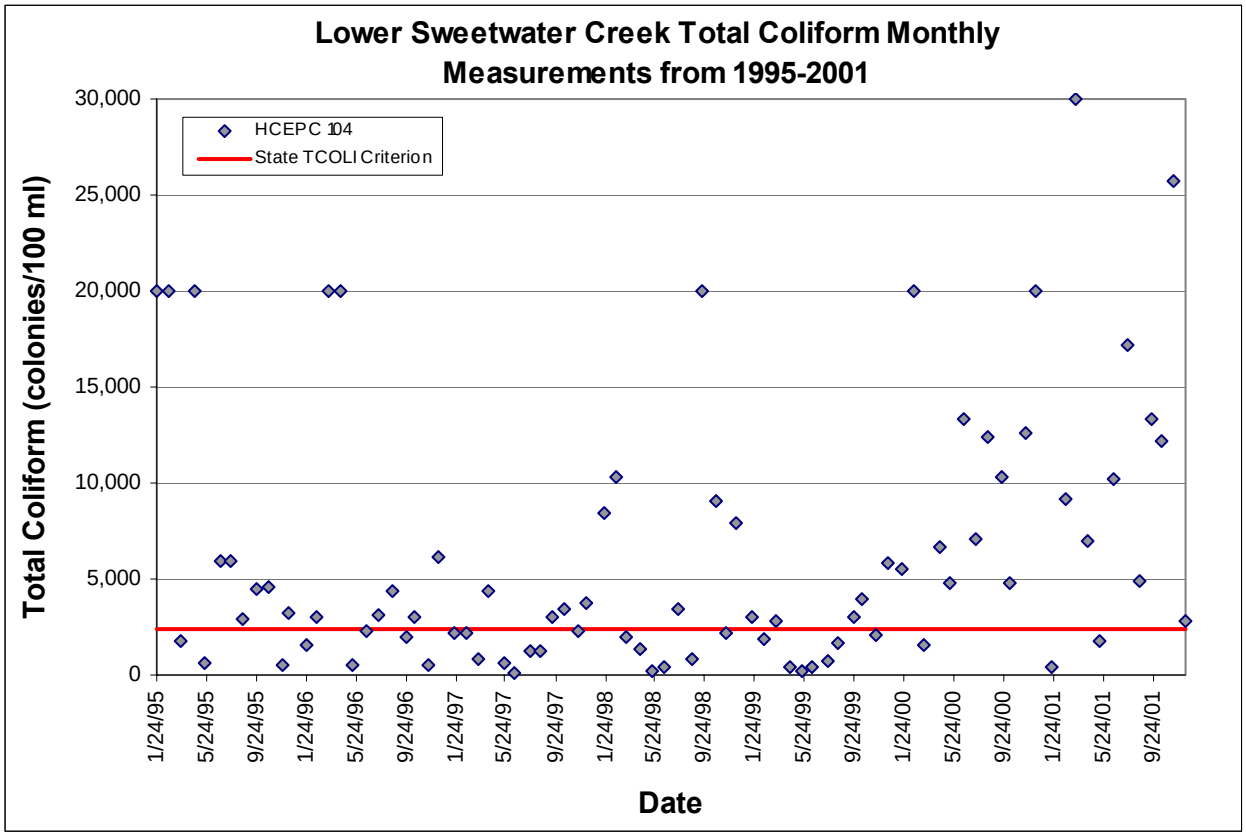
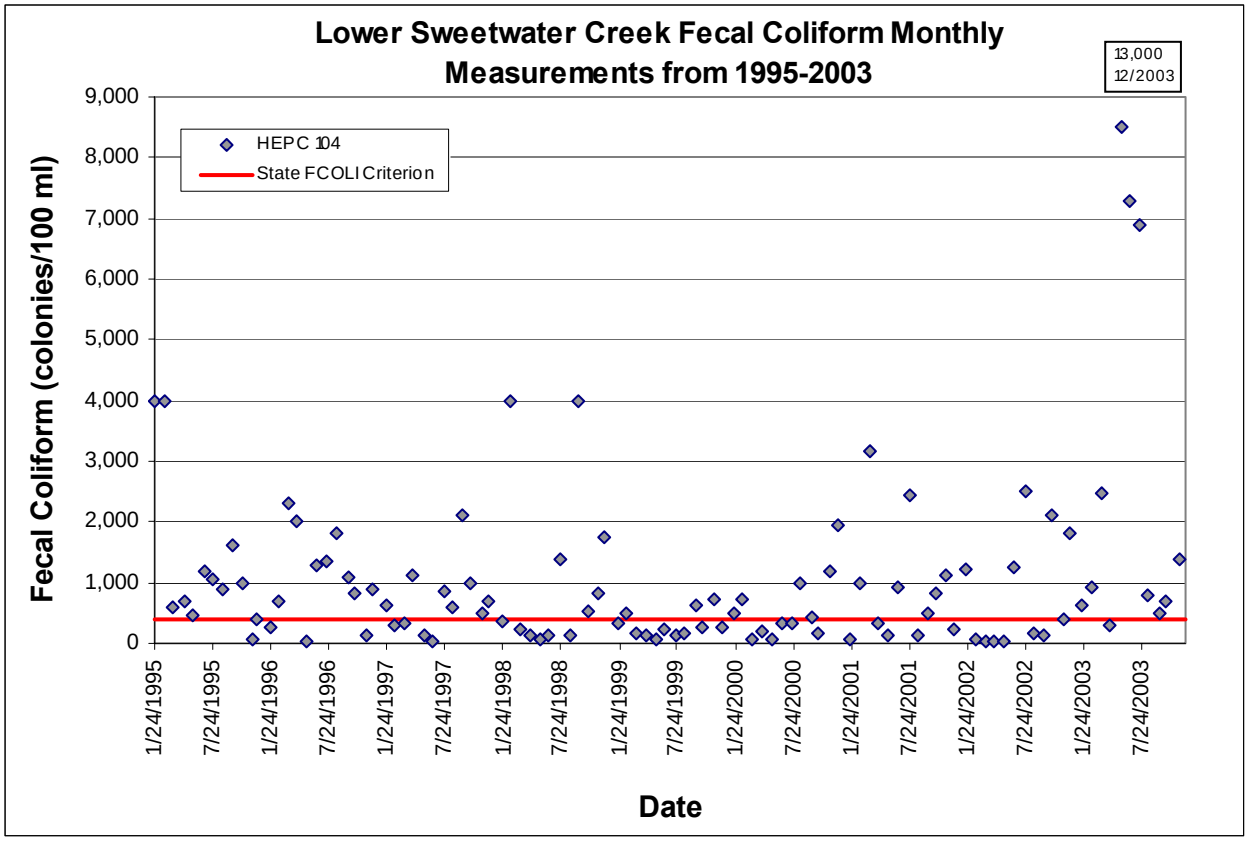


Figure 2.1b. LSC Fecal Coliform Monitoring Results, 1995 to 2003



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)**

LSC is a Class III tidal stream segment, with a designated use of recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife. The Class III water quality criteria applicable to the impairment addressed by this TMDL are the total and fecal coliform criteria.

3.2 Applicable Water Quality Standards and Numeric Water Quality Target

Numeric criteria for bacterial quality are expressed in terms of total coliform bacteria and fecal coliform bacteria concentrations. The water quality criteria for protection of Class III waters, as established by Chapter 62-302, F.A.C., states the following:

> ***Total Coliform Bacteria:***
> *The most probable number (MPN) of counts per 100 milliliters (mL) shall be less than or equal to 1,000 as a monthly average nor exceed 1,000 in more than 20 percent of the samples examined during any month; and less than or equal to 2,400 at any time.*
>
> ***Fecal Coliform Bacteria:***
> *The MPN or membrane filter (MF) counts per 100 mL of fecal coliform bacteria shall not exceed a monthly average of 200, nor exceed 400 in 10 percent of the samples, nor exceed 800 on any one day.*

For both parameters, the criteria state 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 percent reduction loads for the impaired tidal segment (as described in subsequent chapters), there were insufficient data (fewer than 10 samples in a given month) available to evaluate the geometric mean criterion for either total coliform or fecal coliform bacteria. Therefore, the component of the total coliform criterion selected for the TMDL is the

1-day maximum of 2,400 counts/100 mL, and the component of the fecal coliform criterion selected for the TMDL is that values are not to exceed 400 counts/100 mL in 10 percent of the samples. The 10 percent exceedance allowed by the water quality criterion was not used directly in estimating the target load, but was included in the TMDL margin of safety (described in **Section 6.4**).

Chapter 4: ASSESSMENT OF SOURCES

4.1 Types of Sources

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

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

4.2.1 Point Sources

There are no permitted wastewater treatment facilities or industrial facilities that discharge coliform bacteria loads either directly or indirectly into the LSC watershed.

Municipal Separate Storm Sewer System Permittees

Municipal separate storm sewer systems (MS4s) may also discharge pollutants to waterbodies in response to storm events. To address stormwater discharges, the EPA developed the NPDES stormwater permitting program in two phases. Phase I, promulgated in 1990, addresses large and medium-size MS4s located in incorporated areas and counties with populations of 100,000 or more. Phase II permitting began in 2003. Regulated Phase II MS4s

are defined in Section 62-624.800, F.A.C., and typically cover urbanized areas serving jurisdictions with a population of at least 10,000 or discharging into Class I or Class II waters, or into Outstanding Florida Waters.

The stormwater collection systems in the LSC watershed, which are owned and operated by Hillsborough County in conjunction with the Florida Department of Transportation, are covered by a Phase I MS4 permit. The LSC watershed is also included in the Phase II NPDES stormwater permitting program. Currently, there are 5 ongoing stormwater Capital Improvement Projects (CIPs) in the watershed (WBIDs 1570A and 1570). One stormwater improvement project, Lake View Park Sub Drive Phase II (CIP # 41054), was completed in November 2003. Ongoing stormwater CIPs include the Lower Sweetwater Master Plan Implementation (CIP # 40038), Town 'n Country Drive Stormwater Improvement Plan (CIP # 41078), Town 'n Country Drive Pump Station (CIP # 41099), Tanglewood Phase II (CIP # 41124), and Sligh Avenue Phase III (CIP # 47344) (Hillsborough County and University of South Florida, 2003)

4.2.2 Land Uses and Nonpoint Sources

Because no point source dischargers were identified in the LSC watershed, the loadings of total and fecal coliforms are generated from nonpoint sources. Nonpoint sources of coliform bacteria typically involve the accumulation of coliform bacteria on land surfaces that wash off as a result of storm events. Additional contributions may come from ground water contaminated by sources such as flooding, failed septic tanks, leaking central sewer lines, and the improper land application of domestic wastewater residuals. For coliforms, an extended dry period followed by a storm event is usually the critical period when coliform levels in waterbodies exceed water quality criteria. Typical nonpoint sources of coliform bacteria include the following:

- Wildlife,
- Agricultural animals,
- Pets in residential areas,
- Onsite sewage treatment and disposal systems (septic tanks),
- Land application of domestic wastewater residuals,
- Urban development (outside of Phase I or II MS4 discharges), and
- Leaking/failing central sanitary sewer lines.

Wildlife on open land, wetlands, and wooded areas in the watershed may contribute to the presence of coliform bacteria in the creek. However, there are no rangelands, pastureland, or livestock in the tidal segment of the watershed, so their contribution is considered to be negligible or zero.

Land Uses

As part of the northwestern Hillsborough County area, the LSC watershed has undergone extensive urbanization, with high-density residential and commercial areas accounting for the majority of land use in the impaired tidal segment of the creek (**Figure 4.1**). Land use

categories in the watershed were aggregated using the simplified Level 1 through Level 3 codes.

The spatial distribution and acreage of different land use categories were identified using the 1999 land use coverage (scale 1:40,000) contained in the Department's GIS library (Florida Department of Environmental Protection Web site, June 2004). The dominant land use category, high-density residential, accounts for 34.6 percent of land use in the watershed. Commercial and services, transportation, and industrial areas account for 42.6 percent of land use. These four categories account for 77.2 percent of land use in the watershed. Institutional, open land, recreation, and mixed forested make up the majority of the remaining land uses. **Table 4.1** tabulates the Level 1 through 3 distribution of land cover for the LSC watershed.

Population

According to the U.S Census Bureau, the population density in and around WBIDs 1570A and 1570 in the year 2000 was at or less than 950 people per square mile of land area. The Bureau reports that the total population for Hillsborough County for 2000 was 998,948, with 425,962 housing units. For all of Hillsborough County, the Bureau reported a housing density of 405 houses per square mile, meaning that Hillsborough County ranked among the highest in housing densities in Florida in 2000. The county ranks 6th out of 67 counties in the state (U.S. Census Bureau, 2004). This is also supported by land use coverage information, which shows that 36 percent of land use watershed is dedicated to residences.

Septic Tanks

Onsite sewage treatment and disposal systems (OSTDSs), including septic tanks, are commonly used where providing central sewer is not cost-effective or practical. When properly sited, designed, constructed, maintained, and operated, OSTDSs are a safe means of disposing of domestic waste. The effluent from a well-functioning OSTDS is comparable to secondarily treated wastewater from a sewage treatment plant. When not functioning properly, OSTDSs can be a source of coliforms, pathogens, and other pollutants to both ground water and surface water. As of 2001, Hillsborough County had roughly 100,483 septic systems (Florida Department of Health Web site, 2004). Data for septic tanks are based on 1970 to 2001 Census results, with year-by-year additions based on new septic tank construction. The data do not reflect septic tanks that have been removed going back to 1970. From fiscal years 1993 to 2002, 9,140 permits for repairs were issued (Florida Department of Health Web site, 2004). Based on the number of permitted septic tanks and housing units located in the county, approximately 76 percent of the housing units are connected to a wastewater treatment facility, with the remaining 24 percent utilizing septic tank systems.

Figure 4.1. LSC Land Use Profile for WBIDs 1570, 1570A, 1570Y, and 1570Z (1999)

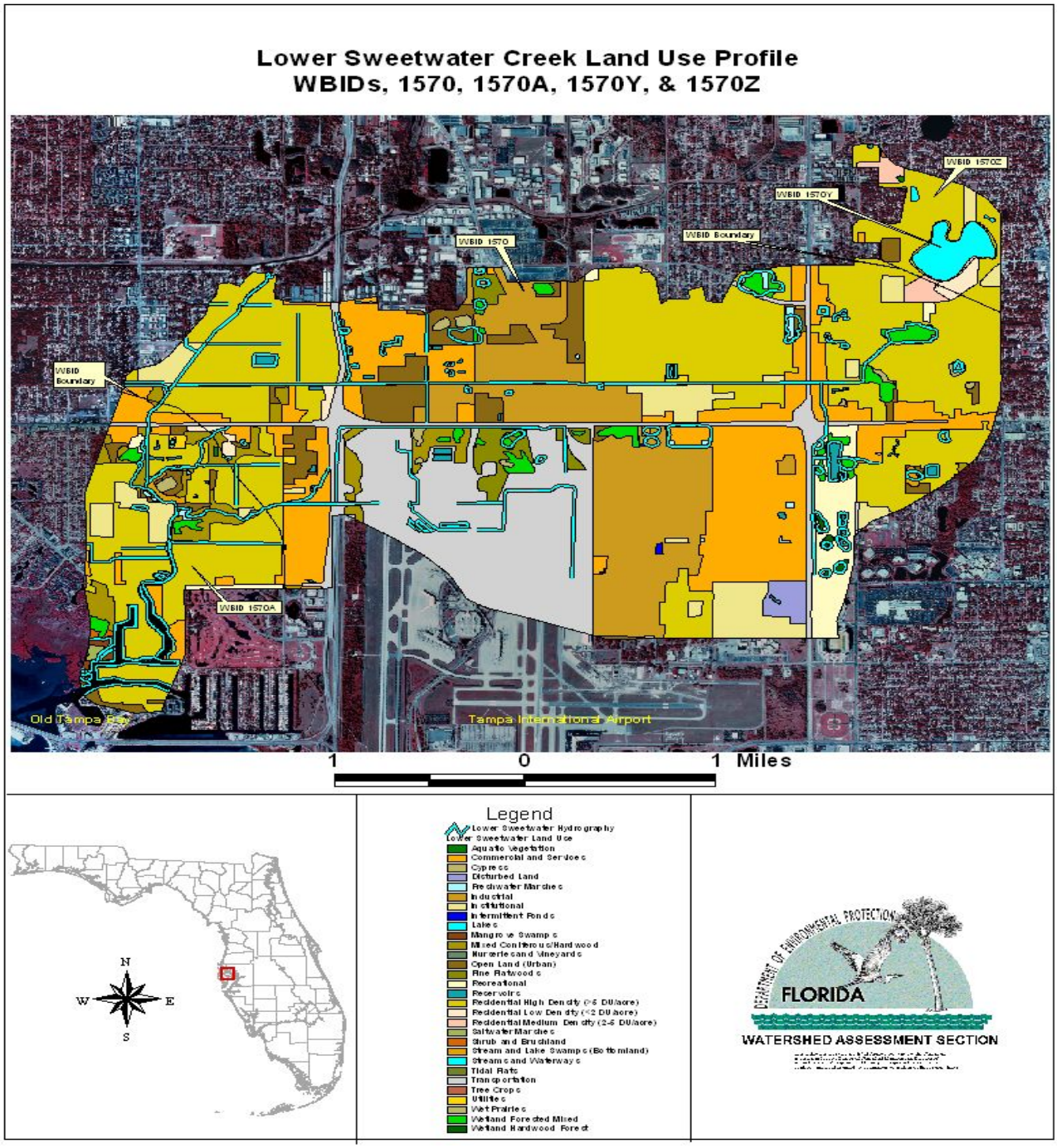


Table 4.1. Classification of Land Use Categories in the LSC Watershed, WBIDs 1570, 1570A, 1570Y, and 1570Z (1999)

Level 1	Level 2	Level 3	Land Use Category	Acres	Square Miles	Percent
1000	1300	1300	Residential High Density	2,095.7	3.274	34.607%
1000	1400	1400	Commercial and Services	961.5	1.502	15.878%
8000	8100	8100	Transportation	880.0	1.375	14.531%
1000	1500	1500	Industrial	740.2	1.156	12.222%
1000	1700	1700	Institutional	268.2	0.419	4.428%
1000	1900	1900	Open Land	260.1	0.406	4.296%
1000	1800	1800	Recreational	187.8	0.293	3.102%
4000	4300	4340	Hardwood Conifer Mixed	134.9	0.211	2.228%
6000	6300	6300	Wetland Forested Mixed	103.1	0.161	1.703%
4000	4100	4110	Pine Flatwoods	74.1	0.116	1.223%
5000	5200	5200	Lakes	67.6	0.106	1.116%
5000	5300	5300	Reservoirs	51.1	0.080	0.844%
5000	5400	5400	Bays And Estuaries	49.5	0.077	0.817%
1000	1200	1200	Residential Medium Density	43.2	0.068	0.714%
6000	6400	6430	Wet Prairies	23.5	0.037	0.389%
6000	6400	6410	Freshwater Marshes	22.8	0.036	0.376%
1000	1100	1100	Residential Low Density	17.8	0.028	0.294%
6000	6100	6150	Stream and Lake Swamps	14.9	0.023	0.246%
5000	5100	5100	Streams and Waterways	13.9	0.022	0.229%
8000	8300	8300	Utilities	10.6	0.017	0.174%
6000	6100	6120	Mangrove Swamps	10.1	0.016	0.166%
6000	6100	6100	Wetland Hardwood Forests	7.6	0.012	0.125%
6000	6400	6420	Saltwater Marshes	4.4	0.007	0.072%
3000	3200	3200	Shrub and Brush Land	2.9	0.005	0.048%
6000	6500	6530	Intermittent Ponds	2.5	0.004	0.041%
6000	6500	6510	Tidal Flats	2.3	0.004	0.037%
6000	6400	6440	Emergent Aquatic Vegetation	1.9	0.003	0.032%
6000	6200	6210	Cypress	1.8	0.003	0.030%
6000	6400	6440	Aquatic Vegetation	0.7	0.001	0.012%
2000	2200	2200	Tree Crops	0.6	0.001	0.009%
2000	2400	2400	Nurseries and Vineyards	0.5	0.001	0.008%
Land Use Summation				**6,055.8**	**9.46**	**100%**

Chapter 5: DETERMINATION OF ASSIMILATIVE CAPACITY

5.1 Method Used to Determine the Loading Capacity

The total and fecal coliform TMDLs for LSC are based on the "percent reduction" methodology. Under this method, the percent reduction needed to meet the applicable criterion is calculated for each measured value above the criterion, and then the median of the percent reductions is calculated. As described in Chapter 3, criterion concentrations of 2,400 counts/100 mL for total coliform and 400 counts/100 mL for fecal coliform were utilized, as specified in Florida's Surface Water Quality Standards.

5.2 Data Used in the Determination of the TMDL

Data from HCEPC Station 21FLHILL24040101/21FLHILL104 (shown as HCEPC 104 in **Figure 1.2**) were used to assess the status of the tidal segment of LSC during the IWR verified period (January 1995 to June 2002) **(Figure 1.2).** Note that Stations 21FLHILL24040101 and 21FLHILL104 are the same station. HCEPC changed the nomenclature of the station at the end of 1999. Total and fecal coliform exceedances at Station HCEPC 104 are the reason for including the tidal segment of LSC on the Verified List of impaired waterbodies under the IWR. **Appendices B** and **C** provide the monthly water quality monitoring results for total and fecal coliforms, respectively. **Tables 5.1a** and **5.1b** provide statistical summaries of the coliform data used in developing the total and fecal coliform TMDLs for LSC.

Table 5.1a. Summary Statistics for Total Coliform Monitoring Data in LSC, WBID 1570A, 1995 to 2001

Total Number of Samples	30-Day Geometric Mean	Percent Samples > 2,400 counts/ 100 mL	Minimum Concentration (counts/ 100 mL)	Maximum Concentration (counts/ 100 mL)	Mean Concentration (counts/ 100 mL)
84	N/A	61.9	100	30,000	6,280

N/A – Not applicable because an insufficient number of samples from a given station per month.

Table 5.1b. Summary Statistics of Fecal Coliform Monitoring Data, LSC, WBID 1570A, 1995 to 2003

Total Number of Samples	30-Day Geometric Mean	Percent Samples > 400 counts/ 100 mL	Minimum Concentration (counts/ 100 mL)	Maximum Concentration (counts/ 100 mL)	Mean Concentration (counts/ 100 mL)
108	N/A	60.1	20	13,300	1,162

N/A – Not applicable because an insufficient number of samples from a given station per month.

5.3 Calculation of Reduction Needed To Meet Criteria

5.3.1 Attempts To Use the Load Duration Method

Coliform TMDLs are commonly developed using load duration curves. However, this method requires daily flow data (typically a U.S. Geological Survey [USGS] gaged site in the watershed) to calculate coliform loads. However, continuous flow data were not available for the tidal segment of LSC, WBID 1570A, for the period when coliform data were collected. The data used to determine impairment of LSC and used to calculate the coliform TMDLs came from Station HCEPC 104, which is located in the tidal segment of LSC. A USGS gage (#02306654) is located in the freshwater segment (WBID 1570) of the watershed. However, very few data were collected from the freshwater segment during the IWR planning and verified periods (1989 through 1998, and 1995 through 2002, respectively) to estimate a coliform load allocation. As a result of tidal influences and the load fluctuations that would occur, the freshwater segment gage would not adequately represent the conditions at Station HCEPC 104, and as a result it was not utilized to estimate loadings. When flow data are not available, the approach used to estimate a TMDL is based on the percent reduction required to reduce the coliform count exceedances to the water quality criterion.

Note that according to USGS methods, flows can be estimated at ungaged sites using drainage area ratios to a nearby gaged stream when the weighted drainage ratios of the two sites are within 0.5 to 1.5 square miles (Ries and Friesz, 2000; U.S. Environmental Protection Agency, 2004). No topographical or geographically similar tidal gaged sites or flow records at a nearby long-term site were determined to adequately represent the location of Station HCEPC 104.

5.3.2 Calculation of Required Percent Reduction

To calculate the required percent reduction in coliforms needed to meet the water quality criteria, the state's criteria for total coliforms (2,400 counts/100 mL) and fecal coliforms (400 counts/100 mL) were subtracted from each total and fecal coliform sample exceedance, respectively, divided by the sample result, and then multiplied by 100. This value provides the percent reduction required to achieve the instream concentration criterion established for total

and fecal coliform, respectively. The median value of the percent reduction values for each sample exceedance for total and fecal coliform was then calculated and used as an overall percent reduction required for that variable to meet water quality standards.

As shown in **Tables 5.2a** and **5.2b,** respectively, a 62.4 percent reduction in total coliforms is required to achieve an instream concentration of 2,400 counts/100 mL, and a 62.3 percent reduction in fecal coliforms is required to achieve an instream concentration of 400 counts/100 mL.

Table 5.2a. Summary of Total Coliform Sample Exceedances for LSC, WBID 1570A (HUC 3100206), from January 24, 1995, to December 11, 2001

Station ID	Date	Time	Total Coliform (counts/100 mL)	Percent Reduction
21FLHILL24040101	1/24/1995	850	20,000	88.0%
21FLHILL24040101	2/21/1995	915	20,000	88.0%
21FLHILL24040101	4/25/1995	840	20,000	88.0%
21FLHILL24040101	6/27/1995	855	5,900	59.3%
21FLHILL24040101	7/25/1995	840	5,900	59.3%
21FLHILL24040101	8/22/1995	850	2,900	17.2%
21FLHILL24040101	9/26/1995	905	4,500	46.7%
21FLHILL24040101	10/24/1995	850	4,600	47.8%
21FLHILL24040101	12/12/1995	857	3,200	25.0%
21FLHILL24040101	2/20/1996	850	3,000	20.0%
21FLHILL24040101	3/19/1996	840	20,000	88.0%
21FLHILL24040101	4/16/1996	845	20,000	88.0%
21FLHILL24040101	7/16/1996	850	3,100	22.6%
21FLHILL24040101	8/20/1996	837	4,400	45.5%
21FLHILL24040101	10/15/1996	905	3,000	20.0%
21FLHILL24040101	12/10/1996	925	6,100	60.7%
21FLHILL24040101	4/15/1997	854	4,400	45.5%
21FLHILL24040101	9/16/1997	855	3,000	20.0%
21FLHILL24040101	10/14/1997	845	3,400	29.4%
21FLHILL24040101	12/9/1997	840	3,800	36.8%
21FLHILL24040101	1/20/1998	845	8,400	71.4%
21FLHILL24040101	2/17/1998	845	10,300	76.7%
21FLHILL24040101	7/21/1998	835	3,400	29.4%
21FLHILL24040101	9/15/1998	855	20,000	88.0%
21FLHILL24040101	10/20/1998	840	9,100	73.6%
21FLHILL24040101	12/8/1998	845	7,900	69.6%
21FLHILL104	1/19/1999	845	3,000	20.0%
21FLHILL104	3/16/1999	845	2,800	14.3%

Station ID	Date	Time	Total Coliform (counts/100 mL)	Percent Reduction
21FLHILL104	9/22/1999	902	3,000	20.0%
21FLHILL104	10/12/1999	900	4,000	40.0%
21FLHILL104	12/14/1999	830	5,800	58.6%
21FLHILL104	1/18/2000	852	5,500	56.4%
21FLHILL104	2/15/2000	826	20,000	88.0%
21FLHILL104	4/18/2000	833	6,700	64.2%
21FLHILL104	5/16/2000	845	4,800	50.0%
21FLHILL104	6/20/2000	845	13,300	82.0%
21FLHILL104	7/18/2000	840	7,100	66.2%
21FLHILL104	8/15/2000	830	12,400	80.6%
21FLHILL104	9/19/2000	845	10,300	76.7%
21FLHILL104	10/10/2000	850	4,800	50.0%
21FLHILL104	11/14/2000	900	12,600	81.0%
21FLHILL104	12/12/2000	840	20,000	88.0%
21FLHILL104	2/20/2001	849	9,200	73.9%
21FLHILL104	3/20/2001	833	30,000	92.0%
21FLHILL104	4/17/2001	902	7,000	65.7%
21FLHILL104	6/19/2001	900	10,200	76.5%
21FLHILL104	7/24/2001	837	17,200	86.0%
21FLHILL104	8/21/2001	903	4,900	51.0%
21FLHILL104	9/18/2001	854	13,300	82.0%
21FLHILL104	10/16/2001	836	12,200	80.3%
21FLHILL104	11/13/2001	851	25,700	90.7%
21FLHILL104	12/11/2001	850	2,800	14.3%
Median Percent Reduction TMDL for Total Coliform				**62.4%**

Table 5.2b. Summary of Fecal Coliform Sample Exceedances for LSC, WBID 1570A (HUC 3100206), from January 24, 1995, to December 9, 2003

Station ID	Date	Time	Fecal Coliform (counts/100 mL)	Percent Reduction
21FLHILL24040101	1/24/1995	850	4,000	90.0%
21FLHILL24040101	2/21/1995	915	4,000	90.0%
21FLHILL24040101	3/21/1995	840	600	33.3%
21FLHILL24040101	4/25/1995	840	700	42.9%
21FLHILL24040101	5/23/1995	848	460	13.0%
21FLHILL24040101	6/27/1995	855	1,200	66.7%
21FLHILL24040101	7/25/1995	840	1,060	62.3%
21FLHILL24040101	8/22/1995	850	900	55.6%
21FLHILL24040101	9/26/1995	905	1,620	75.3%
21FLHILL24040101	10/24/1995	850	980	59.2%
21FLHILL24040101	2/20/1996	850	700	42.9%
21FLHILL24040101	3/19/1996	840	2,300	82.6%
21FLHILL24040101	4/16/1996	845	2,020	80.2%
21FLHILL24040101	6/18/1996	840	1,300	69.2%
21FLHILL24040101	7/16/1996	850	1,360	70.6%
21FLHILL24040101	8/20/1996	837	1,820	78.0%
21FLHILL24040101	9/24/1996	842	1,100	63.6%
21FLHILL24040101	10/15/1996	905	840	52.4%
21FLHILL24040101	12/10/1996	925	880	54.5%
21FLHILL24040101	1/21/1997	828	640	37.5%
21FLHILL24040101	4/15/1997	854	1,120	64.3%
21FLHILL24040101	7/22/1997	925	860	53.5%
21FLHILL24040101	8/19/1997	855	600	33.3%
21FLHILL24040101	9/16/1997	855	2,100	81.0%
21FLHILL24040101	10/14/1997	845	1,000	60.0%
21FLHILL24040101	11/18/1997	855	500	20.0%
21FLHILL24040101	12/9/1997	840	700	42.9%
21FLHILL24040101	2/17/1998	845	4,000	90.0%
21FLHILL24040101	7/21/1998	835	1,400	71.4%
21FLHILL24040101	9/15/1998	855	4,000	90.0%
21FLHILL24040101	10/20/1998	840	520	23.1%
21FLHILL24040101	11/17/1998	855	840	52.4%
21FLHILL24040101	12/8/1998	845	1,740	77.0%
21FLHILL104	2/16/1999	855	480	16.7%
21FLHILL104	9/22/1999	902	640	37.5%

Station ID	Date	Time	Fecal Coliform (counts/100 mL)	Percent Reduction
21FLHILL104	11/16/1999	845	720	44.4%
21FLHILL104	1/18/2000	852	480	16.7%
21FLHILL104	2/15/2000	826	740	45.9%
21FLHILL104	8/15/2000	830	1,000	60.0%
21FLHILL104	9/19/2000	845	440	9.1%
21FLHILL104	11/14/2000	900	1,200	66.7%
21FLHILL104	12/12/2000	840	1,960	79.6%
21FLHILL104	2/20/2001	849	980	59.2%
21FLHILL104	3/20/2001	833	3,180	87.4%
21FLHILL104	6/19/2001	900	920	56.5%
21FLHILL104	7/24/2001	837	2,440	83.6%
21FLHILL104	9/18/2001	854	500	20.0%
21FLHILL104	10/16/2001	836	840	52.4%
21FLHILL104	11/13/2001	851	1,120	64.3%
21FLHILL104	1/15/2002	849	1,220	67.2%
21FLHILL104	6/18/2002	850	1,240	67.7%
21FLHILL104	7/23/2002	839	2,500	84.0%
21FLHILL104	10/15/2002	840	2,120	81.1%
21FLHILL104	12/10/2002	840	1,820	78.0%
21FLHILL104	1/14/2003	826	620	35.5%
21FLHILL104	2/18/2003	827	920	56.5%
21FLHILL104	3/18/2003	843	2,480	83.9%
21FLHILL104	5/20/2003	840	8,500	95.3%
21FLHILL104	6/17/2003	808	7,300	94.5%
21FLHILL104	7/15/2003	830	6,900	94.2%
21FLHILL104	8/12/2003	811	800	50.0%
21FLHILL104	9/16/2003	813	500	20.0%
21FLHILL104	10/7/2003	836	700	42.9%
21FLHILL104	11/18/2003	832	1,400	71.4%
21FLHILL104	12/9/2003	846	13,300	97.0%
Median Percent Reduction TMDL for Fecal Coliform				**62.3%**

5.4 Critical Conditions

The critical condition for the coliform loading from nonpoint sources is typically an extended dry period followed by a rainfall runoff event. Nonpoint sources of coliform bacteria generally, but not always, involve the accumulation of coliform bacteria on land surfaces that wash off as a result of storm events. Wildlife and surface and ground water polluted by sources such as failed septic tanks and central sewer system leaks/breaks may also contribute additional bacteria. Due to the lack of flow data, a correlation between flow and coliform loading could not be made. While the critical conditions are not known, the determination of the required percent reduction is sufficiently protective because the method analyzed all of the exceedances. Further, the approach is considered conservative because only the exceedances were used, which excludes conditions when the criteria are met in the stream.

5.5 Seasonal Variations

Seasonality was accounted for by assessing water quality data associated with the impaired tidal segment of LSC based on long-term average conditions (i.e., water quality data were collected during all 4 seasons over a 6-year period [1995 to 2001] for total coliforms and over an 8-year period [1995 to 2003] for fecal coliforms), which addressed the monthly and quarterly conditions and as a result, the temporal fluctuations necessary for TMDL development.

Chapter 6: DETERMINATION OF THE TMDL

6.1 Expression and Allocation of the TMDL

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

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

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

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

It should be noted that the various components of the revised TMDL equation may not sum up to the value of the TMDL because (a) the WLA for NPDES stormwater is typically based on the percent reduction needed for nonpoint sources and is also accounted for within the LA, and (b) TMDL components can be expressed in different terms (for example, the WLA for stormwater is typically expressed as a 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]) (U.S. Environmental Protection Agency, 2003), which state that TMDLs can be expressed in terms of mass per time (e.g., pounds per day), toxicity, or other appropriate measure. TMDLs for total and fecal coliforms for the tidal segment of LSC are expressed in terms of the median percent reduction required to achieve the coliform water quality criteria **(Table 6.1).**

Table 6.1. TMDL Components for LSC, WBID 1570A

Parameter	TMDL (counts/100 mL)	WLA		LA (percent reduction)	MOS
		Wastewater (counts/day)	NPDES Stormwater (percent reduction)		
Total Coliform	2,400	NA	62.4	62.4	Implicit
Fecal Coliform	400	NA	62.3	62.3	Implicit

NA – Not applicable.

6.2 Load Allocation

Based on the percent reduction approach, a total coliform reduction of 62.4 percent and a fecal coliform reduction of 62.3 percent are needed from nonpoint sources. It should be noted that the LA includes loading from stormwater discharges regulated by the Department and the SWFWMD 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-permitted wastewater or industrial facilities that discharge coliform bacteria to surface waters in the LSC watershed. Thus, the WLA for discharges is not applicable. Any future wastewater and/or industrial facility permitted to discharge coliform bacteria in the LSC watershed will be required to meet permit limits based on the applicable coliform criterion.

6.3.2 NPDES Stormwater Discharges

The WLA for stormwater discharges with an MS4 permit is a 62.4 percent reduction and 62.3 percent reduction in current total and fecal coliform loading, respectively, from the MS4, which are the same percent reductions required for nonpoint sources. It should be noted that any MS4 permittee will only be responsible for reducing the loads associated with stormwater outfalls that it owns or otherwise has responsible control over, and it is not responsible for reducing other nonpoint source loads in its jurisdiction.

6.4 Margin of Safety

Consistent with the recommendations of the Allocation Technical Advisory Committee (Florida Department of Environmental Protection, February 2001), an implicit MOS was used in the development of this TMDL. An implicit MOS was provided by the conservative decisions associated with the analytical assumptions and the development of assimilative capacity.

An additional MOS was included in the TMDL by not allowing any exceedances of state criteria, even though intermittent natural exceedances of the criteria would be expected and would be taken into account when determining impairment.

Chapter 7: NEXT STEPS: IMPLEMENTATION PLAN DEVELOPMENT AND BEYOND

7.1 Basin Management Action Plan

Following the adoption of this TMDL by rule, the next step in the TMDL process is to develop an implementation plan for the TMDL, which will be a component of the Basin Management Action Plan (BMAP) for the Tampa Bay Basin. This document will be developed over the next year in cooperation with local stakeholders and will attempt to reach consensus on more detailed allocations and on how load reductions will be accomplished. The BMAP will include the following:

- Appropriate allocations among the affected parties,
- A description of the load reduction activities to be undertaken,
- Timetables for project implementation and completion,
- Funding mechanisms that may be utilized,
- Any applicable signed agreement,
- Local ordinances defining actions to be taken or prohibited,
- Local water quality standards, permits, or load limitation agreements, and
- Monitoring and follow-up measures.

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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 Chapter 62-40, F.A.C.

The rule requires the state's water management districts (WMDs) to establish stormwater pollutant load reduction goals (PLRGs) and adopt them as part of a 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. No PLRG had been developed for Newnans Lake at the time this report was developed.

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 stormwater permitting program to designate certain stormwater discharges as "point sources" of pollution. 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 municipal separate storm sewer systems (MS4s). However, because the master drainage systems of most local governments in Florida are interconnected, the EPA has implemented Phase I of the MS4 permitting program on a countywide basis, which brings 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.

An important difference between the federal and state stormwater permitting programs is that the federal program covers both new and existing discharges, while the state program focuses on new discharges. Additionally, Phase II of the NPDES Program will expand the need for these permits to construction sites between 1 and 5 acres, and to local governments with as few as 10,000 people. These revised rules require that the additional activities obtain permits by 2003. While these urban stormwater discharges are now technically referred to as "point sources" for the purpose of regulation, they are still diffuse sources of pollution that cannot be easily collected and treated by a central treatment facility, as are other point sources of pollution, such as domestic and industrial wastewater discharges. The Department recently accepted delegation from the EPA for the stormwater part of the NPDES Program. It should be noted that most MS4 permits issued in Florida include a reopener clause that allows permit revisions to implement TMDLs once they are formally adopted by rule.

Appendix B: Summary of Monitoring Results for Total Coliform in the LSC Watershed, WBID 1570A (HUC 3100206), January 24, 1995, December 11, 2001

Station	Date	Time	Total Coliform (counts/100 mL)	Remark Code
21FLHILL24040101	1/24/1995	850	**20,000**	L
21FLHILL24040101	2/21/1995	915	**20,000**	L
21FLHILL24040101	3/21/1995	840	1,800	-
21FLHILL24040101	4/25/1995	840	**20,000**	L
21FLHILL24040101	5/23/1995	848	600	-
21FLHILL24040101	6/27/1995	855	**5,900**	-
21FLHILL24040101	7/25/1995	840	**5,900**	-
21FLHILL24040101	8/22/1995	850	**2,900**	-
21FLHILL24040101	9/26/1995	905	**4,500**	-
21FLHILL24040101	10/24/1995	850	**4,600**	-
21FLHILL24040101	11/28/1995	905	500	-
21FLHILL24040101	12/12/1995	857	**3,200**	-
21FLHILL24040101	1/23/1996	830	1,600	-
21FLHILL24040101	2/20/1996	850	**3,000**	-
21FLHILL24040101	3/19/1996	840	**20,000**	L
21FLHILL24040101	4/16/1996	845	**20,000**	L
21FLHILL24040101	5/14/1996	845	500	-
21FLHILL24040101	6/18/1996	840	2,300	-
21FLHILL24040101	7/16/1996	850	**3,100**	-
21FLHILL24040101	8/20/1996	837	**4,400**	-
21FLHILL24040101	9/24/1996	842	2,000	-
21FLHILL24040101	10/15/1996	905	**3,000**	-
21FLHILL24040101	11/19/1996	845	500	-
21FLHILL24040101	12/10/1996	925	**6,100**	-
21FLHILL24040101	1/21/1997	828	2,200	-
21FLHILL24040101	2/18/1997	840	2,200	-
21FLHILL24040101	3/18/1997	905	800	-
21FLHILL24040101	4/15/1997	854	**4,400**	-
21FLHILL24040101	5/20/1997	850	600	-
21FLHILL24040101	6/17/1997	926	100	K
21FLHILL24040101	7/22/1997	925	1,200	-
21FLHILL24040101	8/19/1997	855	1,200	-
21FLHILL24040101	9/16/1997	855	**3,000**	-
21FLHILL24040101	10/14/1997	845	**3,400**	-
21FLHILL24040101	11/18/1997	855	2,300	-

Station	Date	Time	Total Coliform (counts/100 mL)	Remark Code
21FLHILL24040101	12/9/1997	840	**3,800**	-
21FLHILL24040101	1/20/1998	845	**8,400**	
21FLHILL24040101	2/17/1998	845	**10,300**	-
21FLHILL24040101	3/17/1998	840	2,000	-
21FLHILL24040101	4/21/1998	840	1,400	-
21FLHILL24040101	5/19/1998	925	200	-
21FLHILL24040101	6/16/1998	832	400	-
21FLHILL24040101	7/21/1998	835	**3,400**	-
21FLHILL24040101	8/25/1998	840	800	-
21FLHILL24040101	9/15/1998	855	**20,000**	L
21FLHILL24040101	10/20/1998	840	**9,100**	-
21FLHILL24040101	11/17/1998	855	2,200	-
21FLHILL24040101	12/8/1998	845	**7,900**	-
21FLHILL104	1/19/1999	845	**3,000**	-
21FLHILL104	2/16/1999	855	1,900	-
21FLHILL104	3/16/1999	845	**2,800**	-
21FLHILL104	4/20/1999	845	400	-
21FLHILL104	5/18/1999	849	200	-
21FLHILL104	6/15/1999	834	400	-
21FLHILL104	7/20/1999	840	700	-
21FLHILL104	8/17/1999	853	1,700	-
21FLHILL104	9/22/1999	902	**3,000**	-
21FLHILL104	10/12/1999	900	**4,000**	-
21FLHILL104	11/16/1999	845	2,100	-
21FLHILL104	12/14/1999	830	**5,800**	-
21FLHILL104	1/18/2000	852	**5,500**	-
21FLHILL104	2/15/2000	826	**20,000**	L
21FLHILL104	3/14/2000	840	1,600	-
21FLHILL104	4/18/2000	833	**6,700**	-
21FLHILL104	5/16/2000	845	**4,800**	-
21FLHILL104	6/20/2000	845	**13,300**	-
21FLHILL104	7/18/2000	840	**7,100**	-
21FLHILL104	8/15/2000	830	**12,400**	-
21FLHILL104	9/19/2000	845	**10,300**	-
21FLHILL104	10/10/2000	850	**4,800**	-
21FLHILL104	11/14/2000	900	**12,600**	-
21FLHILL104	12/12/2000	840	**20,000**	L
21FLHILL104	1/16/2001	830	400	-
21FLHILL104	2/20/2001	849	**9,200**	-
21FLHILL104	3/20/2001	833	**30,000**	L

Station	Date	Time	Total Coliform (counts/100 mL)	Remark Code
21FLHILL104	4/17/2001	902	**7,000**	-
21FLHILL104	5/15/2001	855	1,800	-
21FLHILL104	6/19/2001	900	**10,200**	-
21FLHILL104	7/24/2001	837	**17,200**	-
21FLHILL104	8/21/2001	903	**4,900**	-
21FLHILL104	9/18/2001	854	**13,300**	-
21FLHILL104	10/16/2001	836	**12,200**	-
21FLHILL104	11/13/2001	851	**25,700**	-
21FLHILL104	12/11/2001	850	**2,800**	-

Note: Bold numbers represent measurements that exceeded the state water quality criterion.

Remark Code Legend:
- : No remark code.
K: Off-scale low. Actual value is known to be less than the value given. This code shall be used if:
1. The value is less than the lowest calibration standard and the calibration curve is known to be non-linear; or
2. The value is known to be less than the reported value based on sample size, dilution.

L: Off-scale high. Actual value is known to be greater than value given. To be used when the concentration of the analyte is above the acceptable level for quantitation (exceeds the linear range or highest calibration standard) and the calibration curve is known to exhibit a negative deflection.

Appendix C: Summary of Monitoring Results for Fecal Coliform in the LSC Watershed, WBID 1570A (HUC 3100206), January 24, 1995 to December 9, 2003

Station	Date	Time	Fecal Coliform (counts/100 mL)	Remark Code
21FLHILL24040101	1/24/1995	850	**4,000**	L
21FLHILL24040101	2/21/1995	915	**4,000**	L
21FLHILL24040101	3/21/1995	840	**600**	-
21FLHILL24040101	4/25/1995	840	**700**	-
21FLHILL24040101	5/23/1995	848	**460**	-
21FLHILL24040101	6/27/1995	855	**1,200**	-
21FLHILL24040101	7/25/1995	840	**1,060**	-
21FLHILL24040101	8/22/1995	850	**900**	-
21FLHILL24040101	9/26/1995	905	**1,620**	-
21FLHILL24040101	10/24/1995	850	**980**	-
21FLHILL24040101	11/28/1995	905	60	-
21FLHILL24040101	12/12/1995	857	380	-
21FLHILL24040101	1/23/1996	830	280	-
21FLHILL24040101	2/20/1996	850	**700**	-
21FLHILL24040101	3/19/1996	840	**2,300**	-
21FLHILL24040101	4/16/1996	845	**2,020**	-
21FLHILL24040101	5/14/1996	845	40	-
21FLHILL24040101	6/18/1996	840	**1,300**	-
21FLHILL24040101	7/16/1996	850	**1,360**	-
21FLHILL24040101	8/20/1996	837	**1,820**	-
21FLHILL24040101	9/24/1996	842	**1,100**	-
21FLHILL24040101	10/15/1996	905	**840**	-
21FLHILL24040101	11/19/1996	845	140	-
21FLHILL24040101	12/10/1996	925	**880**	-
21FLHILL24040101	1/21/1997	828	**640**	-
21FLHILL24040101	2/18/1997	840	300	-
21FLHILL24040101	3/18/1997	905	340	-
21FLHILL24040101	4/15/1997	854	**1,120**	-
21FLHILL24040101	5/20/1997	850	140	-
21FLHILL24040101	6/17/1997	926	40	-
21FLHILL24040101	7/22/1997	925	**860**	-
21FLHILL24040101	8/19/1997	855	**600**	-
21FLHILL24040101	9/16/1997	855	**2,100**	-
21FLHILL24040101	10/14/1997	845	**1,000**	-

Station	Date	Time	Fecal Coliform (counts/100 mL)	Remark Code
21FLHILL24040101	11/18/1997	855	**500**	-
21FLHILL24040101	12/9/1997	840	**700**	-
21FLHILL24040101	1/20/1998	845	360	-
21FLHILL24040101	2/17/1998	845	**4,000**	L
21FLHILL24040101	3/17/1998	840	220	-
21FLHILL24040101	4/21/1998	840	140	-
21FLHILL24040101	5/19/1998	925	80	-
21FLHILL24040101	6/16/1998	832	120	-
21FLHILL24040101	7/21/1998	835	**1,400**	-
21FLHILL24040101	8/25/1998	840	140	-
21FLHILL24040101	9/15/1998	855	**4,000**	L
21FLHILL24040101	10/20/1998	840	**520**	-
21FLHILL24040101	11/17/1998	855	**840**	-
21FLHILL24040101	12/8/1998	845	**1,740**	-
21FLHILL104	1/19/1999	845	340	-
21FLHILL104	2/16/1999	855	**480**	-
21FLHILL104	3/16/1999	845	160	-
21FLHILL104	4/20/1999	845	120	-
21FLHILL104	5/18/1999	849	60	-
21FLHILL104	6/15/1999	834	220	-
21FLHILL104	7/20/1999	840	120	-
21FLHILL104	8/17/1999	853	180	-
21FLHILL104	9/22/1999	902	**640**	-
21FLHILL104	10/12/1999	900	260	-
21FLHILL104	11/16/1999	845	**720**	-
21FLHILL104	12/14/1999	830	260	-
21FLHILL104	1/18/2000	852	**480**	-
21FLHILL104	2/15/2000	826	**740**	-
21FLHILL104	3/14/2000	840	80	-
21FLHILL104	4/18/2000	833	200	-
21FLHILL104	5/16/2000	845	80	-
21FLHILL104	6/20/2000	845	320	-
21FLHILL104	7/18/2000	840	340	-
21FLHILL104	8/15/2000	830	**1,000**	-
21FLHILL104	9/19/2000	845	**440**	-
21FLHILL104	10/10/2000	850	180	-
21FLHILL104	11/14/2000	900	**1,200**	-
21FLHILL104	12/12/2000	840	**1,960**	-
21FLHILL104	1/16/2001	830	60	-

Station	Date	Time	Fecal Coliform (counts/100 mL)	Remark Code
21FLHILL104	2/20/2001	849	**980**	-
21FLHILL104	3/20/2001	833	**3,180**	-
21FLHILL104	4/17/2001	902	340	-
21FLHILL104	5/15/2001	855	120	-
21FLHILL104	6/19/2001	900	**920**	-
21FLHILL104	7/24/2001	837	**2,440**	-
21FLHILL104	8/21/2001	903	120	-
21FLHILL104	9/18/2001	854	**500**	-
21FLHILL104	10/16/2001	836	**840**	-
21FLHILL104	11/13/2001	851	**1,120**	-
21FLHILL104	12/11/2001	850	220	-
21FLHILL104	1/15/2002	849	**1,220**	-
21FLHILL104	2/19/2002	858	60	-
21FLHILL104	3/19/2002	853	40	-
21FLHILL104	4/16/2002	846	40	-
21FLHILL104	5/14/2002	830	20	-
21FLHILL104	6/18/2002	850	**1,240**	-
21FLHILL104	7/23/2002	839	**2,500**	-
21FLHILL104	8/20/2002	845	160	-
21FLHILL104	9/17/2002	838	120	-
21FLHILL104	10/15/2002	840	**2,120**	-
21FLHILL104	11/19/2002	815	400	-
21FLHILL104	12/10/2002	840	**1,820**	-
21FLHILL104	1/14/2003	826	**620**	-
21FLHILL104	2/18/2003	827	**920**	-
21FLHILL104	3/18/2003	843	**2,480**	-
21FLHILL104	4/15/2003	938	300	-
21FLHILL104	5/20/2003	840	**8,500**	-
21FLHILL104	6/17/2003	808	**7,300**	-
21FLHILL104	7/15/2003	830	**6,900**	-
21FLHILL104	8/12/2003	811	**800**	-
21FLHILL104	9/16/2003	813	**500**	-
21FLHILL104	10/7/2003	836	**700**	-
21FLHILL104	11/18/2003	832	**1,400**	-
21FLHILL104	12/9/2003	846	**13,300**	-

Note: Bold numbers represent measurements that exceeded the state water quality criterion.
Remark Code Legend:
- : No remark code.
L: Off-scale high. Actual value is known to be greater than value given. To be used when the concentration of the analyte is above the acceptable level for quantitation (exceeds the linear range or highest calibration standard) and the calibration curve is known to exhibit a negative deflection.

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