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FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Division of Environmental Assessment and Restoration,
Bureau of Watershed Restoration

SOUTHWEST DISTRICT • TAMPA BAY

TMDL Report

Dissolved Oxygen TMDLs for Brushy Creek (WBID 1498) and Sweetwater Creek (WBID 1516), and for DO and Nutrients in Lower Rocky Creek (WBID 1563)

Nathan Bailey Ph.D.
Rhonda Peets

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For additional information on the watershed management approach and impaired waters in the Tampa Bay Basin, contact:

Terry Hansen
Florida Department of Environmental Protection
Bureau of Watershed Restoration
Watershed Planning and Coordination Section
2600 Blair Stone Road, Mail Station 3565
Tallahassee, FL 32399-2400
Email: terry.hansen@dep.state.fl.us
Phone: (850) 245–8561
Fax: (850) 245–8434

Access to all data used in the development of this report can be obtained by contacting:

Nathan Bailey, Ph.D.
Florida Department of Environmental Protection
Bureau of Watershed Restoration
Watershed Evaluation and TMDL Section
2600 Blair Stone Road, Mail Station 3555
Tallahassee, FL 32399-2400
Email: nathan.bailey@dep.state.fl.us
Phone: (850) 245–8465
Fax: (850) 245–8536

Kevin Petrus
Florida Department of Environmental Protection
Bureau of Watershed Restoration
Watershed Evaluation and TMDL Section
2600 Blair Stone Road, Mail Station 3555
Tallahassee, FL 32399-2400
Email: kevin.petrus@dep.state.fl.us
Phone: (850) 245–8459
Fax: (850) 245–8536

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2008 Integrated Report

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Basin Status Report for the Tampa Bay Basin

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Chapter 1: INTRODUCTION

1.1 Purpose of Report

This report presents the Total Maximum Daily Loads (TMDL) for Dissolved Oxygen (DO) for the Brushy Creek (WBID 1498), Sweetwater Creek (WBID 1516), and the DO and nutrients in Lower Rocky Creek (WBID 1563), all waterbodies in the Tampa Bay Basin. These waterbodies were verified as impaired for low DO and therefore were included on the Verified List of impaired waters for the Tampa Bay Basin that was adopted by Secretarial Order on June 3, 2008. The TMDL establishes the allowable nutrient loadings to Brushy Creek, Sweetwater Creek, and Lower Rocky Creek that would restore the waterbody so that it meets its applicable water quality criterion for DO and, for Lower Rocky Creek, DO and nutrients.

1.2 Identification of Waterbody

Brushy Creek, Sweetwater Creek, and Lower Rocky Creek are located in the northwest portion of Hillsborough County along the I-275 corridor (**Figure 1.1**). There are no major city limits overlapping these waterbodies. The City of Tampa (~336,823 people) located just south of Lower Rocky Creek and southwest of Sweetwater Creek. There are seven incorporated areas (CDP – Census Designated Place) intersecting these watersheds. These include Citrus Park (20,226 people), Town 'n' Country (72,523), Greater Northdale (20,461 people), Greater Carrollwood (33,519 people), Egypt Lake-Leto (32,782 people), Lake Magdalene (28,755 people), and Westchase (11,116 people). Brushy Creek (~5.41 miles in length) flows in a southwesterly direction, feeding into the upstream portion of Rocky Creek. Rocky Creek (~7.94 miles) flows in a southwesterly direction feeding into Lower Rocky Creek. Lower Rocky Creek (~5.07 miles) flows in a southwesterly direction into Tampa Bay and is located within Town 'n' Country. Sweetwater Creek (~9.06 miles) flows in a south-westerly direction, feeding into the downstream portion of Rocky Creek, with its upstream portion stemming from Lake Magdalene. Additional information about all these rivers' hydrology and geology are available in the Tampa Bay Basin Status Report (Florida Department of Environmental Protection [Department], 2001).

For assessment purposes, the Department has divided the Tampa Bay Basin into water assessment polygons with a unique **w**ater**b**ody **id**entification (WBID) number for each watershed or stream reach. Brushy Creek, Sweetwater Creek, and Lower Rocky Creek are WBIDs 1498, 1516, and 1563, respectively (**Figure 1.2**).

1.3 Background

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

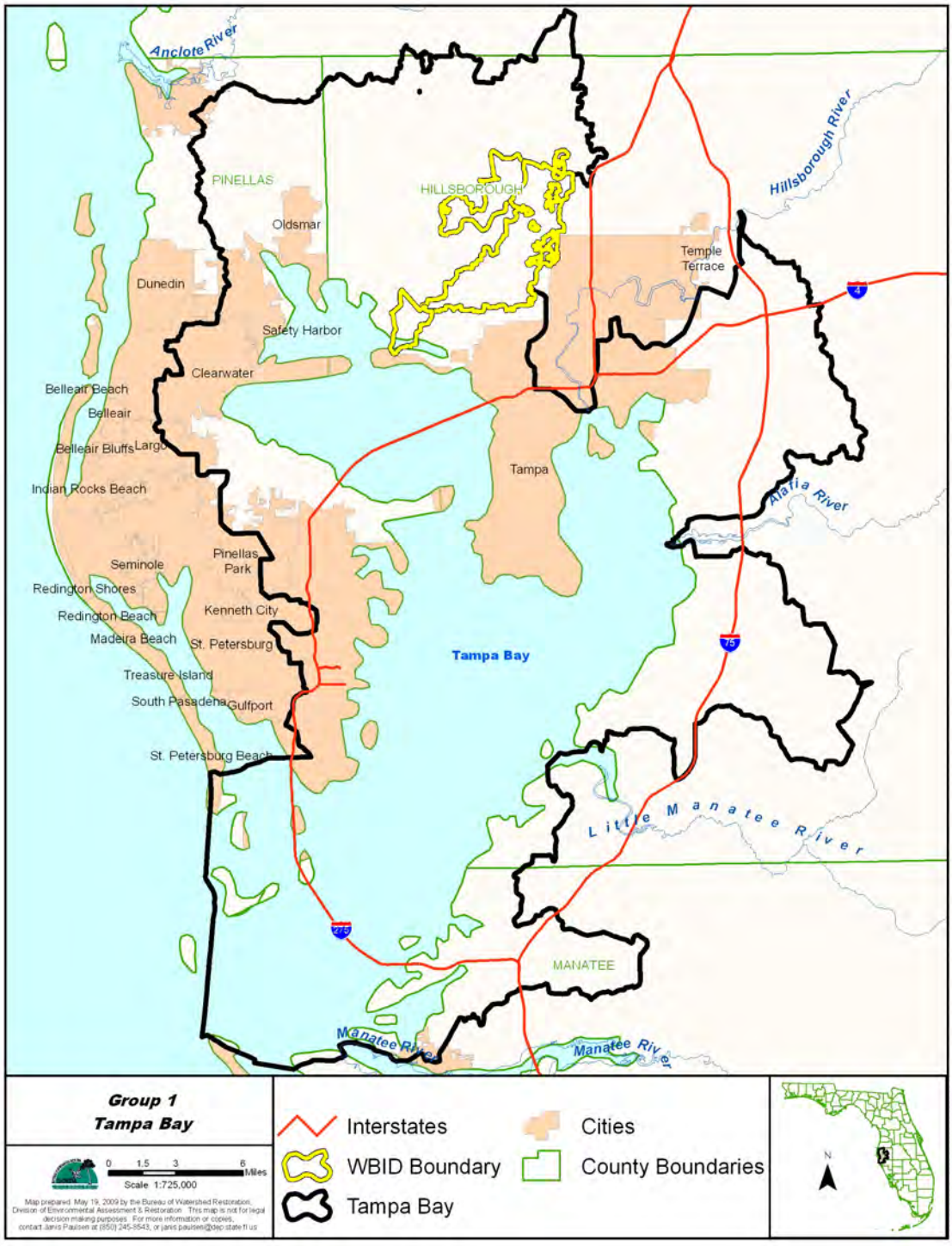

Figure 1.1. Location of Brushy Creek, Sweetwater Creek, and Lower Rocky Creek in Hillsborough County and Major Geopolitical Features in the Area

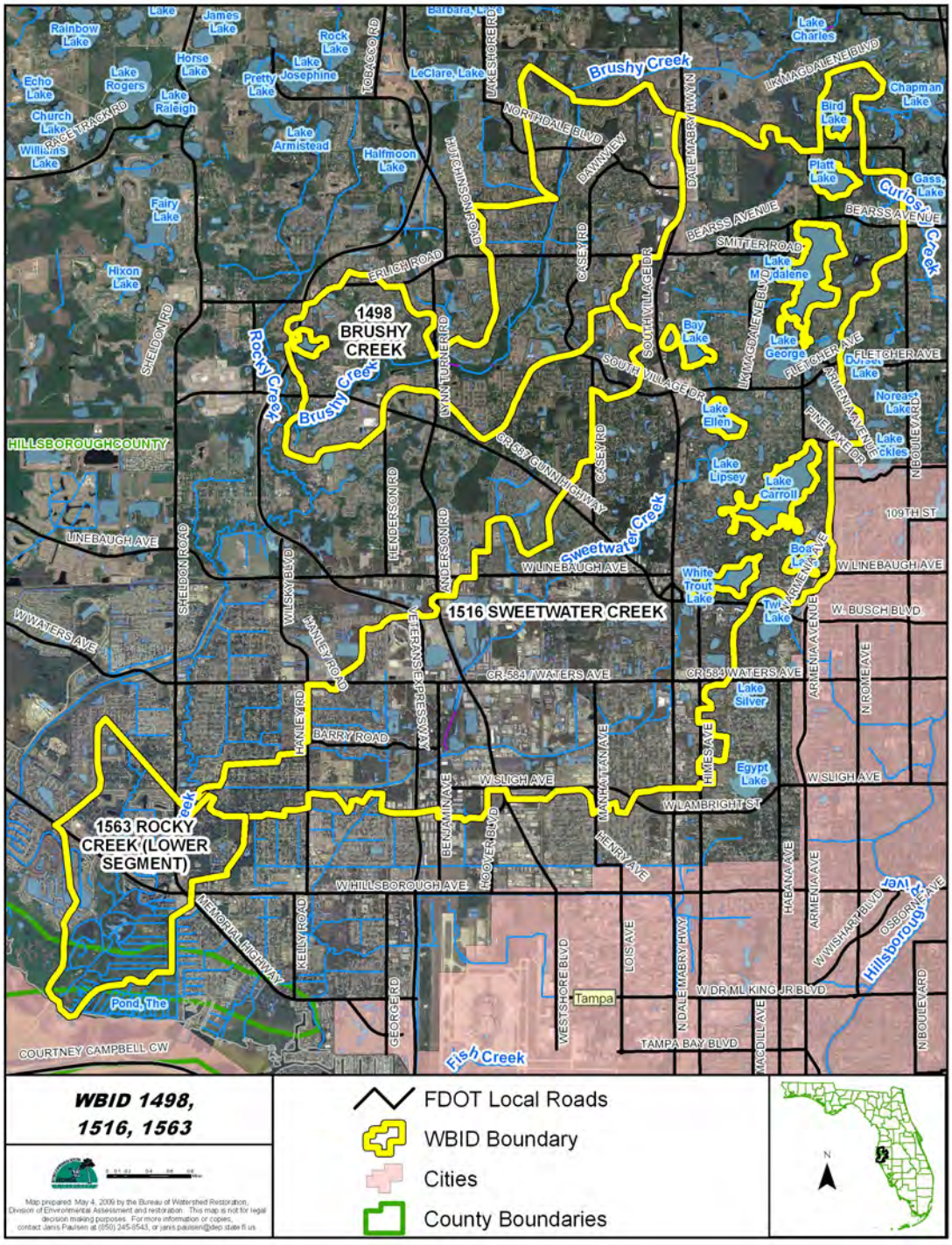

Figure 1.2. Location of Brushy Creek (WBID 1498), Sweetwater Creek (WBID 1516), and Lower Rocky Creek (WBID 1563)

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

This TMDL Report will be followed by the development and implementation of a Basin Management Action Plan, or BMAP, designed to reduce the amount of Dissolved Oxygen and Nutrients that caused the verified impairment of Brushy Creek (WBID 1498), Sweetwater Creek (WBID 1516), and Lower Rocky Creek (WBID 1563). These activities will depend heavily on the active participation of the Southwest Florida Water Management District (SWFWMD), Hillsborough County's Environmental Protection Commission (HEPC), 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 impairment of listed waters on a schedule. The Department has developed such lists, commonly referred to as 303(d) lists, since 1992. The list of impaired waters in each basin, referred to as the Verified List, is also required by the FWRA (Subsection 403.067[4], Florida Statutes [F.S.]); the state's 303(d) list is amended annually to include basin updates.

Florida's 1998 303(d) list included 47 waterbodies in the Tampa Bay Basin. However, the FWRA (Section 403.067, F.S.) stated that all previous Florida 303(d) lists were for planning purposes only and directed the Department to develop, and adopt by rule, a new science-based methodology to identify impaired waters. After a long rulemaking process, the Environmental Regulation Commission adopted the new methodology as Rule 62-303, Florida Administrative Code (F.A.C.) (Identification of Impaired Surface Waters Rule, or IWR), in April 2001; the rule was modified in 2004 and 2007.

2.2 Information on Verified Impairment

The Department used the IWR to assess water quality impairments in the Brushy Creek (WBID 1498), Sweetwater Creek (WBID 1516), and Lower Rocky Creek (WBID 1563) watersheds and verified the impairments during the second cycle of the TMDL program (**Table 2.1**). These waterbodies are spatially and hydrologically connected, thus we are including all three WBIDs in this report to address the DO impairments. **Table 2.2** summarizes the Dissolved Oxygen data collected during the verification period (January 1, 2000, through June 30, 2007). The projected year for the [1998 303(d) listed] Dissolved Oxygen TMDL for Brushy Creek (WBID 1498), Sweetwater Creek (WBID 1516), and Lower Rocky Creek (WBID 1563) was 2008, but the Settlement Agreement between 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 EPA by September 30, 2009.

The verified impairments were based on data collected by Pinellas County and the DEP's Southwest District, WBID location and STORET stations are shown in **Figure 5.1**. **Figures 2.1.A**,**B,and C** display the median monthly measurement of Dissolved Oxygen data collected during the verified period (January 1, 2000 – June 30, 2007) for Brushy Creek (WBID 1498), Sweetwater Creek (WBID 1516), and Lower Rocky Creek (WBID 1563).

Table 2.1. Verified Impairments for Brushy Creek (WBID 1498), Sweetwater Creek (WBID 1516), and Lower Rocky Creek (WBID 1563)

WBID	Waterbody Segment	Waterbody Type	Waterbody Class	1998 303(d) Parameters of Concern	Parameter Causing Impairment
1498	Brushy Creek	Stream	3F	Dissolved Oxygen	Nutrients
1516	Sweetwater Creek	Stream	3F	Dissolved Oxygen	Nutrients
1563	Lower Rocky Creek	Estuary	3M	Dissolved Oxygen	Nutrients

Table 2.2. Summary of Dissolved Oxygen Data for Brushy Creek (WBID 1498), Sweetwater Creek (WBID 1516), and Lower Rocky Creek (WBID 1563), (January 1, 2000–June 30, 2007)

WBID	Total Number of Samples	IWR-required number of exceedances for the Verified List	Number of observed exceedances	Number of seasons data were collected	Mean	Median	Min	Max
1498	60	10	16	4	6.07	6.1	1.94	9.5
1516	107	16	65	4	5.1	5.1	0.4	9.85
1563	81	13	19	4	3.68	3.4	0.01	8.16

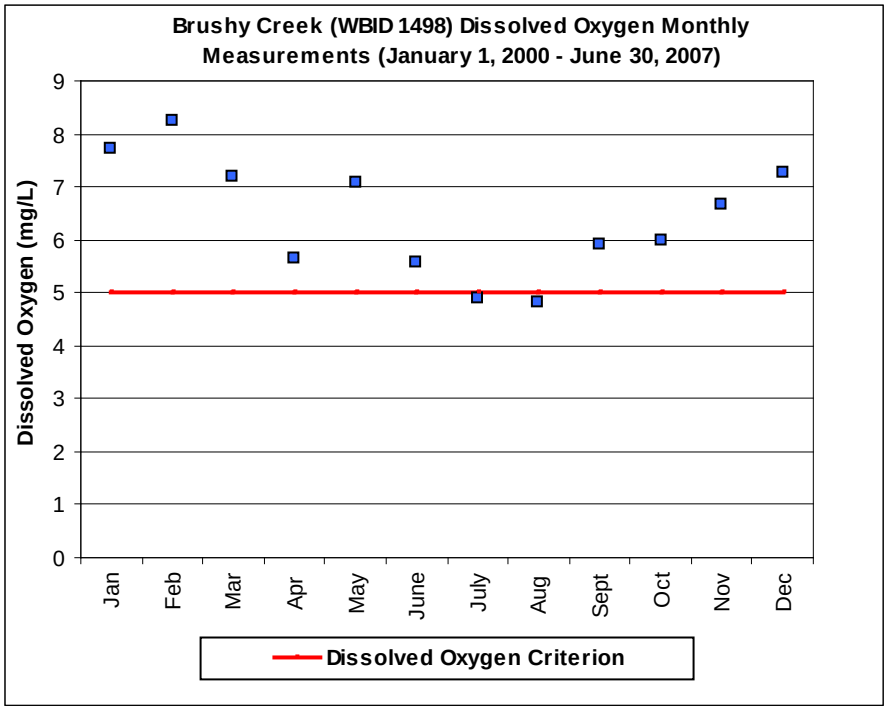

Figure 2.1A. Dissolved Oxygen Measurements for Brushy Creek, WBID 1498 (January 2000 – June 2007)

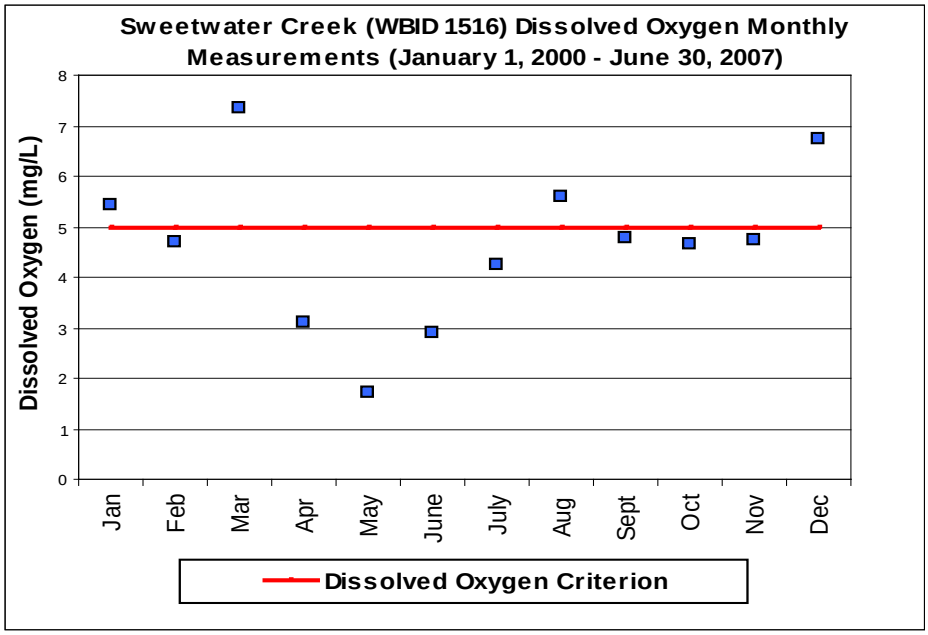

Figure 2.1B. Dissolved Oxygen Measurements for Sweetwater Creek, WBID 1516 (January 2000 – June 2007)

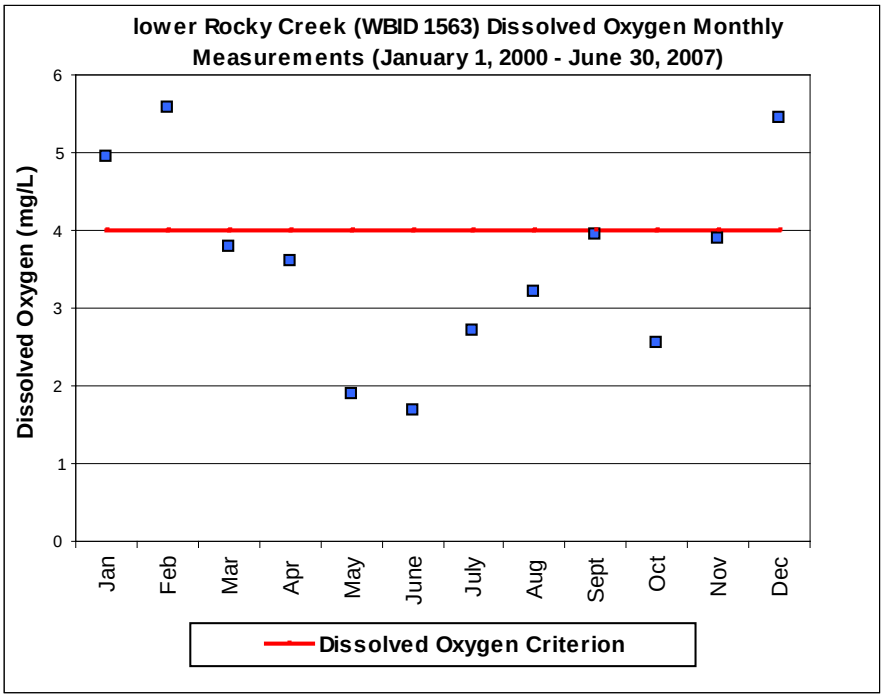

Figure 2.1C. Dissolved Oxygen Measurements for the Lower Rocky Creek, WBID 1563 (January 2000 – June 2007)

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)**

Brushy Creek (WBID 1498), Sweetwater Creek (WBID 1516), and Lower Rocky Creek (WBID 1563) are Class III waterbodies, with a designated use of recreation, propagation, and the maintenance of a healthy, well-balanced population of fish and wildlife. The criterion applicable to this TMDL is the Class III criterion for DO and narrative criteria for nutrients.

3.2 Applicable Water Quality Standards and Numeric Water Quality Target

3.2.1 Dissolved Oxygen Criteria

The Class III marine criteria for DO as established by Rule 62-302,530(30), F.A.C., states the following: Dissolved Oxygen shall not average les than 5.0 mg/L in a 24-hour period and shall not be less than 4 mg/L, and that normal daily and seasonal fluctuations above these levels shall be maintained.

Florida's Nutrient Criterion is narrative only, i.e., nutrient concentrations of a body of water shall not be altered so as to cause imbalance in natural populations of aquatic flora or fauna. Accordingly, a nutrient-related target was needed to represent levels at which an imbalance in flora or fauna is expected to occur. While the IWR provides a threshold fro nutrient impairment for estuaries based on annual average chlorophyll a levels, these thresholds are not standards and need not be used as the nutrient-related water quality target for TMDLs. It should be recognized that the IWR thresholds were developed using statewide average conditions, the IWR (Section 62-303.450, F.A.C.) specifically allows the use of alternative site-specific thresholds that more accurately reflect conditions beyond which an imbalance in flora or fauna occurs in the waterbody.

3.2.2 Identification of Causative Pollutants

After verification of the low DO in Brushy Creek (WBID 1498), Sweetwater Creek (WBID 1516), and Lower Rocky Creek (WBID 1563) watershed, the Department identified the causative

pollutants by investigating those parameters typically responsible for depressed DO. These include nutrients (nitrogen and phosphorus) and BOD. One method of identifying causative pollutants is to use statewide screening level concentrations set at the 70th percentile of all STORET data across the state from 1970 to 1987. This approach is useful if there are no significant regional differences in what is defined as a waterbody meeting its intended designated uses. The Department's statewide screening level for freshwater streams is 2.0 mg/L for BOD5, 1.6 mg/L for TN, and 0.22 mg/L for TP, and for estuaries is 2.1 mg/L BOD5, 1.0 mg/L TN, and .18 mg/L for TP. But, the Department has noted that there are significantly lower nutrient levels leading to impairment in south Florida than the statewide screening levels indicated. Other required considerations include the restrictions or nutrient targets of the receiving waters of the surface waters being analyzed. In the case of those waters in old Tampa Bay Planning area, there are Chlorophyll-A Targets that must be met. For Tampa Bay these targets are as stated below in **Table 3.1**.

Table 3.1 Tampa Bay Estuary Program Targets

Tampa Bay Segments	Tampa Bay Estuary Program Targets
Lower Tampa Bay	**5.1 ug/L**
Middle Tampa Bay	**8.5 ug/L**
Old Tampa Bay	**9.3 ug/L**
Hillsborough Bay	**15 ug/L**

The Chorophyll-a target relevant to the estuary Lower Rocky Creek (WBID 1516) is that for Old Tampa Bay (9.3 ug/L). The Old Tampa Bay Target, developed by the Tampa Bay Estuary Program, is thus used to set the total nitrogen target for Lower Rocky Creek. To determine the Total Nitrogen consistent with 9.3 mg/L, these values were investigated for the WBID during the verified period. **Table 3.2** shows the Chla concentrations and the corresponding Total Nitrogen concentrations for Lower Rocky Creek.

Table 3.2 Lower Rocky Creek TN and Chlorophyll-A

YEAR	Lower Rocky Creek (WBID 1563)	
	Chl-a	TN
2000	27.23	1.645
2001	13.03	1.135
2002	18.61	1.15
2003	21.44	1.097
2004	9.85	1.125
2005	12.21	1.01
2006	11.66	0.992

Figure 3.1 displays the graph and regression equation of the Chla-TN relationships of Lower Rocky Creek

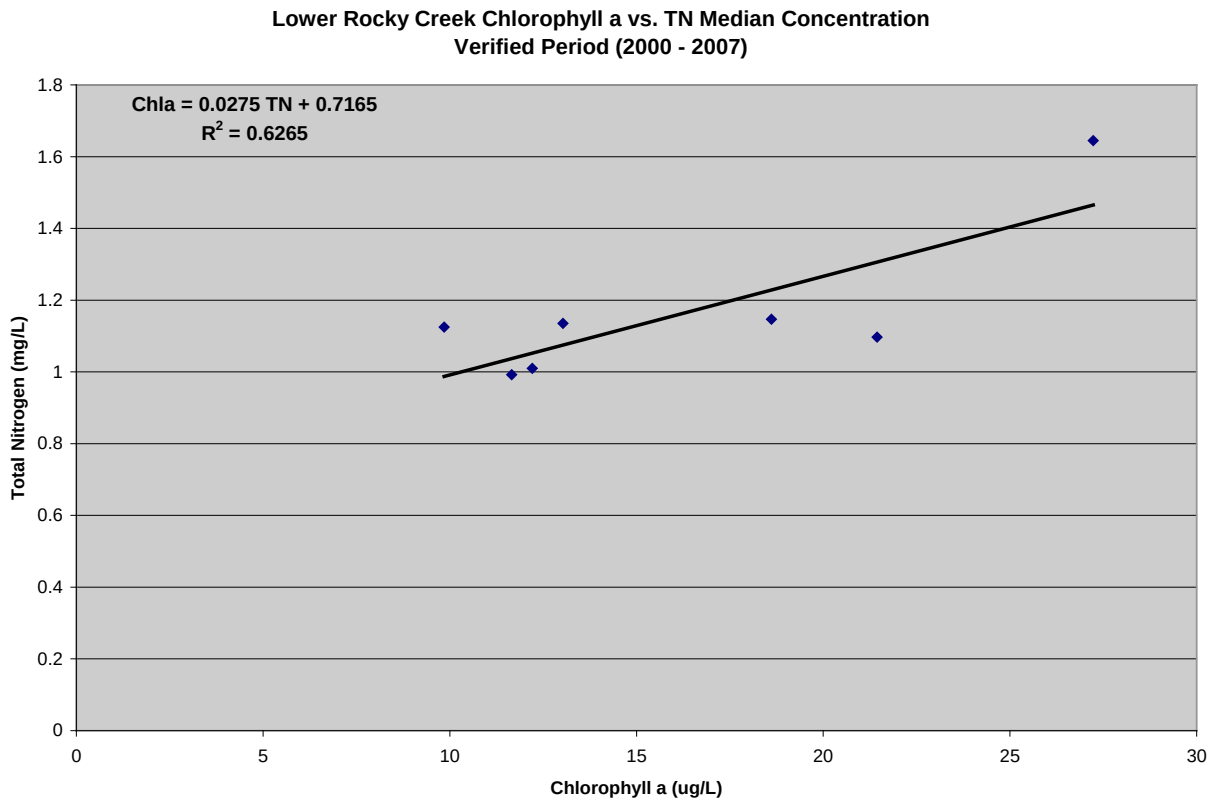

Figure 3.1 Chlorophyll_a vs. TN Lower Rocky Creek during Verified Period

When solving the above regression equation for TN when Chla is 9.3 mg/L one obtains TN=0.962 mg/L. Although this assessment may demonstrate that a 0.962 mg/L TN concentration is protective of the Old Tampa Bay 9.3 ug/L Chla criteria, it does not demonstrate that it is protective of the Dissolved Oxygen Criteria of 4.0 mg/L.

To insure meeting DO criteria, a reference body approach was also utilized. Preferably, the reference concentration should be based on similar sites in the watershed that represent "natural conditions" or, in a case where natural conditions (areas almost completely void of anthropogenic activity) are not readily available, an area where the negative impacts of anthropogenic activity are largely mitigated.

In the case of Brushy Creek and Sweetwater Creek, reference concentrations in the Tampa Bay Area (Group 1 and Group 2 of the FDEP Southwest District) were developed by focusing on sample stations. Two approaches were examined. The first approach summarizes the nutrient concentrations of those stations in Tampa Bay and Tampa Bay Tributaries that have a low Landscape Development Index (a landuse intensity measurement also known as the LDI (Brown and Vivas, 2005)). An LDI of less than 2.0 is an indication of low anthropogenic impact.

Thus, the first approach determines the annual median TN concentrations during the verified period for these low LDI sample stations and proposes these as a reduction targets. The second approach focuses on sample stations in Tampa Bay or Tampa Bay tributary WBIDs already determined to be "not impaired", based on FDEP Impaired Waters Rule assessment methodology (Chapter 62-303, FAC). A statistical summary of these observations is shown in **Table 3.2,** where **(1)** is the LDI method results and **(2)**, **(3), and (4)** are variations of the second method, involving the "not impaired WBIDs." Method 2 provides equal weight to each sample, regardless of year (the distributions of this method are shown in Figures 3.1, 3.2, and 3.3), whereas Method 3 calculates a single annual average station median and provides an average of these 7 annual values. Method 4 is the same as Method 2, but applied to Tampa Bay Tributaries (adjacent Group 2) instead of Tampa Bay.

Table 3.2 Reference Concentrations for Tampa Bay from 4 Approaches.

Summary of Potential Freshwater Reference Based Targets

Average Annual Station Median during VP

		TN mg/L		CHLA ug/L	
		Median	**75 Percentile**	**Median**	**75 Percentile**
1	**All Tampa Bay and Tampa Bay Trib. Stations Annual Medians with an LDI less than or Equal to 2**	*1.09*	*1.34*	*3.71*	*6.72*
2	**Tampa Bay Stations in Not Impaired WBIDs with 4 or more samples annually, giving equal weight to all station medians**	*0.86*	*1.00*	*2.44*	*3.98*
3	**Tampa Bay Stations in Not Impaired WBIDs with 4 or more samples annually, equal weight to Single Annual Value (2000, 2001,etc.)**	*0.97*		*2.53*	
4	**Tampa Bay Tributary Stations in Not Impaired WBIDs with 4 or more samples annually**	*1.55*	*1.82*	*1.71*	*2.47*

Of the four methods for determining a reference concentration, Method 2 resulted in the most conservative and protective target for freshwater (Brushy Creek and Sweetwater Creek). Table 3.4 displays an expansion of Method 3 to include Marine as well as Freshwater references. It is important to note that the besides demonstrating that the Total Nitrogen levels consistent with and local waterbodies meeting not impaired standards, but also one that meets the requirements of the receiving waterbody, Tampa Bay.

Table 3.4 shows that for "Not Impaired" WBIDs in Marine Estuary Tampa Bay WBIDs have an average median sample station TN concentration of 0.62 mg/L, the annual median Dissolved Oxygen concentration is 6.11 mg/L, and a mean Chlorophyll a concentration of 7.58 mg/L. In the nearby Tampa Bay Tributaries Group, the median sample station D.O. for non Impaired WBIDs is 0.88 mg/L, and although there were not enough Chlorophyll a samples to obtain a median corresponding concentration we have already established that that TN level is protective of the Tampa Bay Chlorophyll a criteria. The DO median for these WBIDs is 6.39 mg/L, also well above the 4.0 mg/L Florida criteria, Thus, the TN target selected is the average of these two sets of 'Not Impaired' WBIDs, or 0.75 mg/L. A target of 0.75 mg/L should be both protective

of the Old Tampa Bay Chlorophyll-a limit, be protective of the dissolved oxygen criteria, and meet reasonable expectations of attainability when compared to standards of local WBIDs impaired neither for DO nor Nutrients.

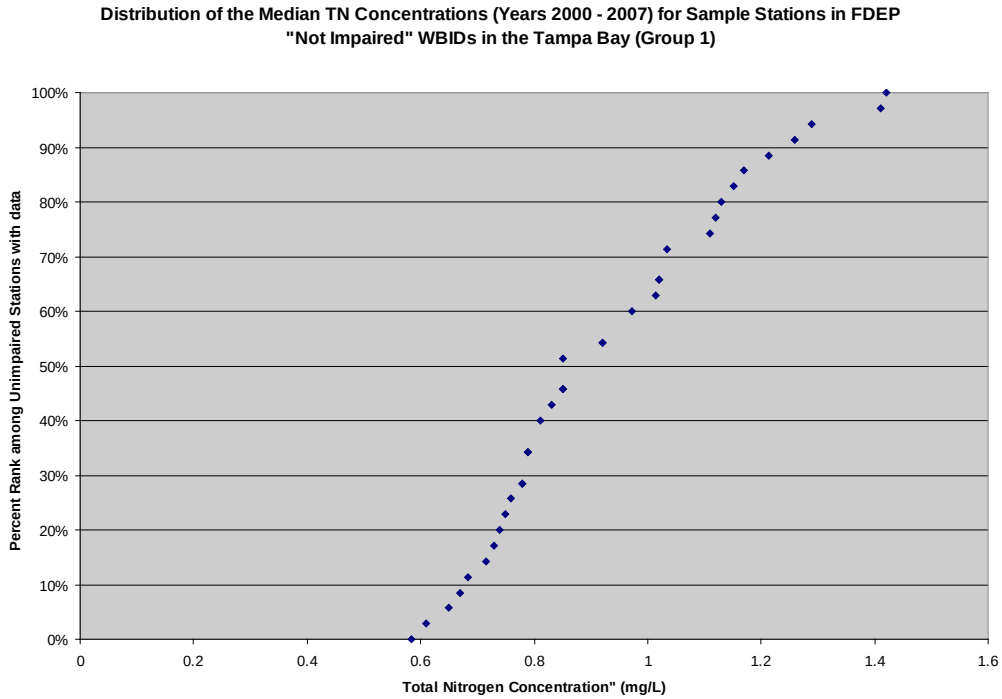

Figure 3.1. Median Sample Station Total Nitrogen Concentration Distribution (Stations with 4+ Samples in "Not Impaired" Tampa bay WBIDs(2000 – 2007)

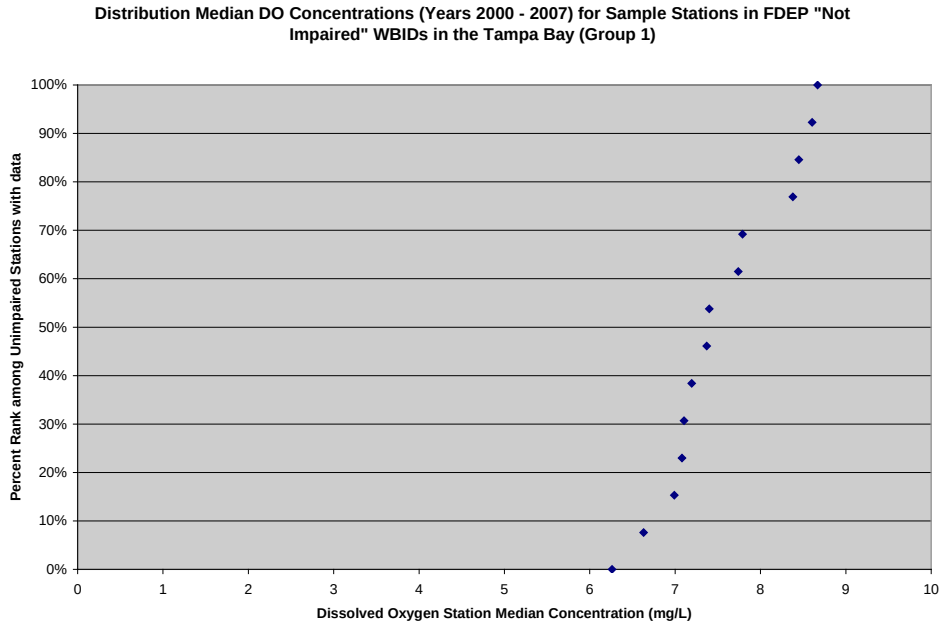

Figure 3.2. Median Sample Station D.O. Concentration Distribution (Stations with 4+ Samples in "Not Impaired" Tampa bay WBIDs(2000 – 2007)

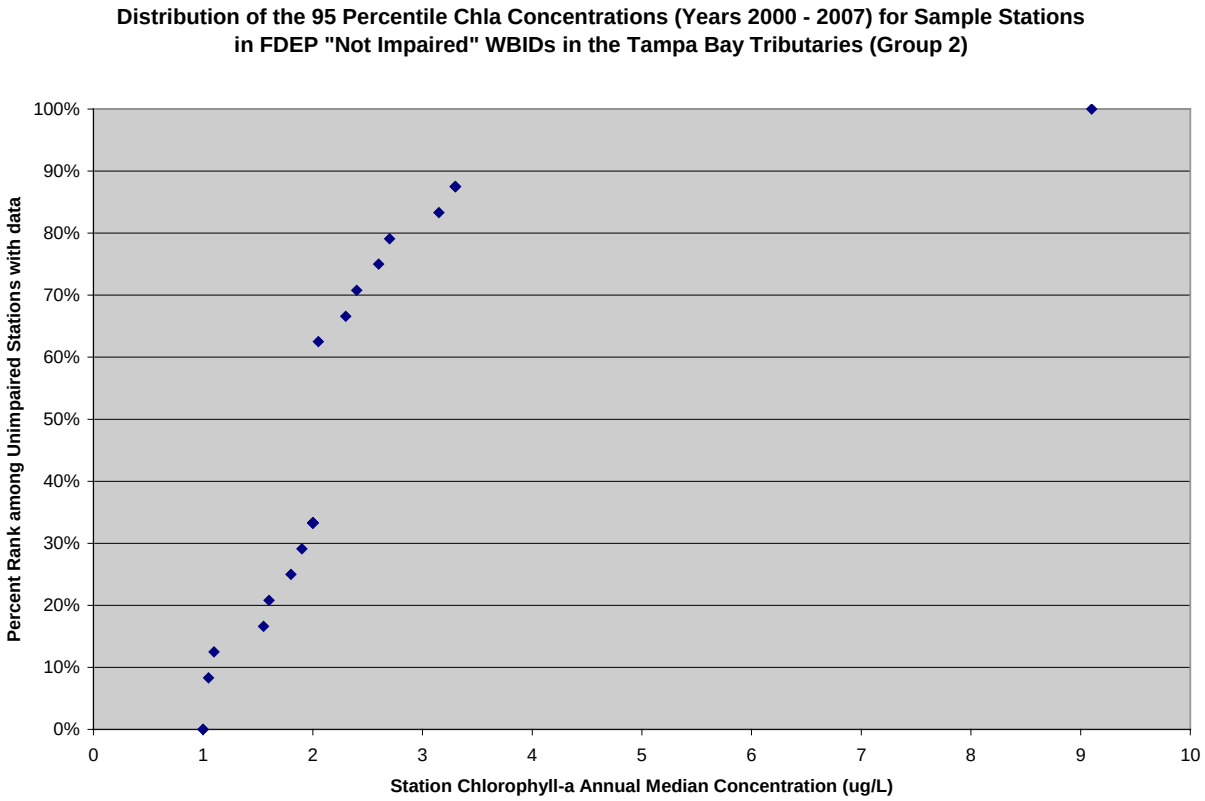

Figure 3.3. Median Sample Station Chlorophyll-a Concentration Distribution (Stations with 4+ Samples in "Not Impaired" Tampa bay WBIDs(2000 – 2007)

Finally, the fact that Brushy and Sweetwater is upstream of Lower Rocky Creek, the nutrient target of the former is limited by the latter. Although the referenced concentration of 0.85 mg/L would be protective of the stream, it would not be protective of the stream target. Thus, a target of 0.75 mg/L will be pursued for upstream Brushy and Sweetwater Creeks, based on the downstream estuary target. A look at Figure 3.2 shows that the 0.75 mg/L level is equivalent to the 40 percentile of not-impaired Tampa Bay freshwater stations, thus within reason.

Table 3.4 Verified Period Summary of Median Concentrations for Sample Stations in Fresh and Marine WBIDs. (2000 – 2007)

Table 2

Abbreviations: TB = Tampa Bay (Group 1); TBT = Tampa Bay Tribs (Group 2); NI = WBID NOT Impaired for DO or Nutr(chl-a); IM=WBID Impaired for DO & Nutr(chl-a)		Sample Station Average Annual Median Concentration (Average = sum of yearly medians from table to left divided by # of years)				
		Total Nitrogen (mg/L)	Total Phosphorus (mg/L)	BOD - 5 Day (mg/L)	Chlorophyll-a (mg/L)	Dissolved Oxygen (mg/L)
Freshwater Streams (3F)	TB NI	0.97	0.202	1.63	2.53	7.53
	TBT NI	1.57	0.950	1.19	1.33	6.81
	TB IM	1.12	0.157	2.44	6.46	3.59
	TBT IM	1.53	0.512	1.85	15.91	4.58
Freshwater Lakes (3F)	TB NI	0.83	0.024	2.50	3.24	6.79
	TBT NI					
	TB IM	1.81	0.238		46.75	4.87
	TBT IM	2.59	0.344	6.33	136.85	10.57
Freshwater Class 1	TB NI					
	TBT Stream NI	0.90	0.308	1.99	4.96	6.81
	TBT Lake NI	0.93	0.263	2.31		7.10
	TB IM					
	TBT IM	1.06	0.248	2.59		5.51
Marine 3M	TB NI	0.62	0.181	1.50	7.58	6.11
	TBT NI	0.88	0.224	2.32		6.39
	TB IM	1.29	0.218	2.51	7.73	4.87
	TBT IM	0.97	0.243	1.32	8.41	4.80
Marine 2	TB NI	0.52	0.114	1.22	4.82	6.35
	TBT NI					
	TB either DO or Nutr. IM	0.61	0.107	1.58	6.80	6.53
	TBT IM					

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 low DO 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 five acres, and a wide variety of industries (see **Appendix B** for background information on the federal and state stormwater programs).

To be consistent with Clean Water Act definitions, the term "point source" is 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. 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 Low DO in Brushy Creek, Sweetwater Creek, and Lower Rocky Creek Watershed

4.2.1 Point Sources

Estimating Point Source Loads

There are no permitted wastewater facilities located in the Lower Rocky Creek. Both Brushy Creek and Sweetwater Creek have 3 facilities each. Brushy Creek has, as it's only NPDES permitted facility, the Hillsborough County Dale Mabry AWWTF (FL0036820), a domestic wastewater treatment plant with a design capacity: 6 MGD. Sweetwater Creeks only NPDES permitted plant is the CEMEX Construction Materials Plant (**Table 4.1**). Although the Dale Mabry AWWTF is permitted to discharge it's effluent to Brushy Creek, a large percentage of the effluent is either reused within the facility or transferred to the Hillsborough County Northwest Master Reuse System. **Table 4.2** displays details concerning the TN and TP effluent load from the Dale Mabry AWWTF.

Table 4.1 Permitted Wastewater Facilities in WBIDs 1516 and 1498

Wastewater Facilities	
WBID	**Facility Description**
Sweetwater Creek (1516)	CEMEX Construction Materials Florida LLC - Waters Plant. FLG110315 Type:CBP Status:Y NPDES:Yes
Sweetwater Creek (1516)	Sparkling Waters Car Wash FLA012377 Type:Industrial Wastewater Status:Active NPDES:No
Sweetwater Creek (1516)	Bearss Park, FLA012164 Type:Domestic Wastewater Status:Active NPDES:No Design Capacity: 0.015 MGD
Brushy Creek (1498)	Hillsborough County Dale Mabry AWWTF FL0036820 Type:Domestic Wastewater Status:Active NPDES:Yes Design Capacity: 6 MGD
Brushy Creek (1498)	NorthDale Golf LLC FLA573710 Type:Industrial Wastewater Status:Active NPDES:No
Brushy Creek (1498)	Ray Mar Mobile Home Park FLA012193 Type:Domestic Wastewater Status:Active NPDES:No Design Capacity 0.0062 MGD

Table 4.2 Permitted Wastewater Facilities TN and TP Loading

Facility	NPDES Permit	Discharge Point	Permitted Flow (MGD)	Actual Average Flow (MGD)	TN Effluent Permit Limit, mg/L (Annual Av.)	TP Effluent Permit Limit, mg/L (Annual Av.)	Maximum Annual TN Load (LBs/Year)	Maximum Annual TN Load (LBs/Year)
Dale Mabry AWWTP	FL0036820	29171 DOO1 - SURFACE WATER DISCHARGE TO BRUSHY CREEK	6	3	3	1	54,794	18,265

Municipal Separate Storm Sewer System Permittees

Within Sweetwater Creek, Brushy Creek, and Lower Rocky Creek there is the same single Phase I municipal separate storm sewer system (MS4) permits (FLS000006, Hillsborough County and co-permittees). The responsible co-permittee for all three WBIDs is Hillsborough County.

4.2.2 Land Uses and Nonpoint Sources

In Sweetwater Creek (11,171 acres), Brushy Creek (3,666 acres), and Lower Rock Creek (1,696 acres), a number of land uses affect water quality through nonpoint source runoff. The most significant nonpoint sources include runoff and erosion from developed areas, small-scale construction, residential and commercial fertilizer use, pets, residential septic tank failure, or poorly designed septic tanks. These watersheds have only a limited amount of agriculture.

Land Uses

Land use categories in the Sweetwater Creek, Brushy Creek, and Lower Rock Creek watershed were aggregated using the simplified Level 1 codes (**Table 4.3a, 4.3b, and 4.3c**). By far the largest Level 1 land use is urban and built-up (77 percent of Sweetwater Creek, 78.8% of Brushy Creek, and 53.4% of Lower Rocky Creek). When looking at Level 2, which is a more detailed categorization of land use (**Table 4.4a, 4.4b, and 4.4c**), urban and built-up land uses is comprised mainly of high density residential, medium density residential, low density residential and commercial. After urban and built-up, the second largest land use category is wetland, and water.

Table 4.3a. Level 1 Land Uses in the Sweetwater Creek Watershed, WBID 1516

Landuse Code and Description (WBID 1516)	Acres	% Total
1000: Urban and Built up	8,649.3	77.4%
6000: Wetland	1,008.2	9.0%
5000: Water	683.5	6.1%
8000: Transportation, Communication, & Utilities	417.2	3.7%
4000: Upland Forests	142.5	1.3%
3000: Rangeland	142.0	1.3%
2000: Agriculture	118.2	1.1%
7000: Barren Land	10.3	0.1%
Total	**11,171.3**	**100.0%**

Table 4.3b.Level 1 Land Uses in the Brushy Creek Watershed, WBID 1498

Landuse Code and Description (WBID 1498)	Acres	% Total
1000: Urban and Built up	2,889.5	78.8%
6000: Wetland	456.9	12.5%
5000: Water	169.3	4.6%
8000: Transportation, Communication, & Utilities	92.4	2.5%
2000: Agriculture	30.7	0.8%
4000: Upland Forests	22.9	0.6%
3000: Rangeland	4.5	0.1%
Total	**3,666.2**	**100.0%**

Table 4.3c.Level 1 Land Uses in the Lower Rocky Creek, WBID 1563

Landuse Code and Description (WBID 1563)	Acres	% Total
1000: Urban and Built up	905.4	53.4%
6000: Wetland	462.8	27.3%
5000: Water	229.1	13.5%
4000: Upland Forests	59.8	3.5%
8000: Transportation, Communication, & Utilities	38.8	2.3%
Total	**1,695.9**	**100.0%**

Table 4.4a.Classification of Level 2 Land Use Categories in Sweetwater Creek Watershed, WBID 1516

Landuse Code and Description (WBID 1516)	Acres	% Total
1300: Residential, High Density	3,663.3	32.8%
1200: Residential, Medium Density	1,724.9	15.4%
1400: Commercial	1,175.6	10.5%
1500: Industrial	925.2	8.3%
5300: Reservoirs	491.1	4.4%
8100: Transportation	410.2	3.7%
6300: Wetland Forest Mixed	399.9	3.6%
1100: Residential, Low Density	391.1	3.5%
1900: Openland	346.3	3.1%
6200: Wetland Coniferous Forests	303.2	2.7%
6400: Vegetated Nonforested Wetlands	294.0	2.6%
1700: Institutional	239.1	2.1%
1800: Recreation	183.9	1.6%
5200: Lakes	161.9	1.4%
4300: Upland Mixed Forest	127.9	1.1%
2200: Treecrops	87.1	0.8%
3300: Mixed Rangeland	78.4	0.7%
3200: Shrub and Brushland	63.6	0.6%
5100: Streams and Waterways	30.3	0.3%
2400: Nurseries and Vineyards	25.0	0.2%
4400: Tree Plantations	13.0	0.1%
7400: Disturbed land	10.3	0.1%
6100: Wetland hardwood forests	8.8	0.1%
8300: Utilities	7.0	0.1%
2600: Other Open Lands	6.1	0.1%
6500: Non Vegetated Wetlands	2.4	0.0%
4100: Upland Coniferous	1.7	0.0%
5400: Bays and Estruaries	0.1	0.0%
Total	**11,171.3**	**100.0%**

Table 4.4b. Level 2 Land Use in Brushy Creek, WBID 1498

Landuse Code and Description (WBID 1498)	Acres	% Total
1300: Residential, High Density	2,063.5	56.29%
6100: Wetland hardwood forests	211.3	5.76%
1400: Commercial	194.3	5.30%
5300: Reservoirs	166.9	4.55%
1200: Residential, Medium Density	163.7	4.46%
1800: Recreation	160.2	4.37%
1100: Residential, Low Density	159.9	4.36%
6200: Wetland Coniferous Forests	128.9	3.52%
1700: Institutional	93.7	2.55%
6400: Vegetated Nonforested Wetlands	68.5	1.87%
8100: Transportation	55.0	1.50%
1900: Openland	54.2	1.48%
6300: Wetland Forest Mixed	44.1	1.20%
8300: Utilities	37.4	1.02%
2100: Cropland and Pastureland	24.9	0.68%
4300: Upland Mixed Forest	22.9	0.62%
2600: Other Open Lands	5.8	0.16%
3200: Shrub and Brushland	4.5	0.12%
6500: Non Vegetated Wetlands	4.0	0.11%
5200: Lakes	2.4	0.06%
Total	**3,666.2**	**100.0%**

Table 4.4c. Level 2 Land Use in Lower Rocky Creek, WBID 1563

Landuse Code and Description (WBID 1563)	Acres	% Total
1300: Residential, High Density	532.9	31.4%
1200: Residential, Medium Density	237.9	14.0%
5400: Bays and Estruaries	200.0	11.8%
6400: Vegetated Nonforested Wetlands	195.1	11.5%
6100: Wetland hardwood forests	149.7	8.8%
6300: Wetland Forest Mixed	104.8	6.2%
1400: Commercial	64.0	3.8%
4300: Upland Mixed Forest	44.1	2.6%
8100: Transportation	34.9	2.1%
5300: Reservoirs	26.6	1.6%
1700: Institutional	25.7	1.5%
1900: Openland	22.2	1.3%
1100: Residential, Low Density	18.4	1.1%
4100: Upland Coniferous	15.8	0.9%
6600	13.1	0.8%
1800: Recreation	4.3	0.3%
8300: Utilities	3.8	0.2%
5200: Lakes	2.5	0.1%
Total	**1,695.9**	**100.0%**

The primarily nonurban land uses include wetland forest (345 acres), upland coniferous (273 acres), wetland coniferous (140 acres), upland hardwood (117 acres), and upland mixed forests (63 acres), for a total of approximately 940 acres in wetland or upland forest.

The runoff from Brushy Creek, Sweetwater Creek, and Lower Rocky Creek watershed is based on impervious area (Harper, 2003; Duncan, 1995), as shown in **Table 4.5a, 4.5b,** and **4.5c**. The nutrient contributions are determined by combining the runoff information for each land use with the corresponding event mean concentration (EMC) (**Tables 4.6a, 4.6b,** and **4.6c**). These tables show that the top three land use contributors of TN are commercial, medium-density residential, and industrial, in order of decreasing contribution.

Table 4.5a. Sweetwater Creek Land Use Categories and Corresponding Runoff, 2000–07

Land Use		Area (acres)	Percent Impervious	Impervious Runoff Coeff.	Pervious Runoff Coeff.	Avg Precip. "/yr	Runoff (Acre-feet)	Runoff Million Gallons
A. Forest/Rural Open		736.48	27.0%	0.95	0.159	50.12	1,145.0	373.1
B. Urban Open		410.19	0.4%	0.95	0.041	50.12	77.7	25.3
C. Agriculture/Pasture		87.12	1.1%	0.95	0.317	50.12	117.9	38.4
D. Low Density/Residential		391.11	5.3%	0.95	0.150	50.12	314.9	102.6
E. Medium Density/Residential		1724.86	24.8%	0.95	0.088	50.12	2,173.6	708.3
F. High Density/Residential		3663.33	7.3%	0.95	0.120	50.12	2,767.6	901.8
G. Commercial		1414.65	10.5%	0.95	0.120	50.12	1,226.2	399.6
H. Industrial		925.18	7.7%	0.95	0.120	50.12	710.2	231.4
I. Highways		0.00	2.6%	0.95	0.542	50.12	0.0	0.0
J. Wetland		1008.23	9.4%	0.95	0.230	50.12	1,254.8	408.9
K. Water		683.49	3.8%	0.95	0.000	50.12	101.8	33.2
Other [2]		0.00	0.0%	0.95	0.000	50.12	0.0	0.0
Total		**11044.64**					**9,889.67**	**3,222.6**

Note: Based on effective rainfall of 55.95 inches per year. All impervious R.O. coefficients are 0.95.

Table 4.5b. Brushy Creek Land Use Categories and Corresponding Runoff, 2000–07

Land Use	Area (acres)	Percent Impervious	Impervious Runoff Coeff.	Pervious Runoff Coeff.	Avg Precip. "/yr	Runoff (Acre-feet)	Runoff Million Gallons
A. Forest/Rural Open	237.30	27.0%	0.95	0.159	50.12	368.9	120.2
B. Urban Open	92.44	0.4%	0.95	0.041	50.12	17.5	5.7
C. Agriculture/Pasture	30.71	1.1%	0.95	0.317	50.12	41.6	13.5
D. Low Density/Residential	159.91	5.3%	0.95	0.150	50.12	128.7	42.0
E. Medium Density/Residential	163.69	24.8%	0.95	0.088	50.12	206.3	67.2
F. High Density/Residential	2063.52	7.3%	0.95	0.120	50.12	1,558.9	508.0
G. Commercial	287.96	10.5%	0.95	0.120	50.12	249.6	81.3
H. Industrial	0.00	7.7%	0.95	0.120	50.12	0.0	0.0
I. Highways	0.00	2.6%	0.95	0.542	50.12	0.0	0.0
J. Wetland	456.86	9.4%	0.95	0.230	50.12	568.6	185.3
K. Water	169.30	3.8%	0.95	0.000	50.12	25.2	8.2
Other [2]						0.0	0.0
Total	**3661.69**					**3,165.36**	1,031.4

Note: Based on effective rainfall of 55.95 inches per year. All impervious R.O. coefficients are 0.95.

Table 4.5c. Lower Rocky Creek Land Use Categories and Corresponding Runoff, 2000–07

Land Use	Area (acres)	Percent Impervious	Impervious Runoff Coeff.	Pervious Runoff Coeff.	Avg Precip. "/yr	Runoff (Acre-feet)	Runoff Million Gallons
A. Forest/Rural Open	86.31	27.0%	0.95	0.159	50.12	134.2	43.7
B. Urban Open	38.77	0.4%	0.95	0.041	50.12	7.3	2.4
C. Agriculture/Pasture	0.00	1.1%	0.95	0.317	50.12	0.0	0.0
D. Low Density/Residential	18.44	5.3%	0.95	0.150	50.12	14.8	4.8
E. Medium Density/Residential	237.93	24.8%	0.95	0.088	50.12	299.8	97.7
F. High Density/Residential	532.86	7.3%	0.95	0.120	50.12	402.6	131.2
G. Commercial	89.71	10.5%	0.95	0.120	50.12	77.8	25.3
H. Industrial	0.00	7.7%	0.95	0.120	50.12	0.0	0.0
I. Highways	0.00	2.6%	0.95	0.542	50.12	0.0	0.0
J. Wetland	462.77	9.4%	0.95	0.230	50.12	575.9	187.7
K. Water	229.09	3.8%	0.95	0.000	50.12	34.1	11.1
Other [2]	0.00	0.0%	0.95	0.000	50.12	0.0	0.0
Total	**1695.87**					**1,546.57**	504.0

Note: Based on effective rainfall of 55.95 inches per year. All impervious R.O. coefficients are 0.95.

Table 4.6a. Sweetwater Land Use Categories and Corresponding EMC Contributions Based on 2000–07 Rainfall

Land Use	TN Concentration (mg/L)	TP Concentration (mg/L)	TN load (lbs)	TP load (lbs)	Expressed as % of Total TN Watershed Load	Expressed as % of Total TP Watershed Load
A. Forest/Rural Open	1.09	0.046	3,393.9	143.2	6.4	1.6
B. Urban Open	1.12	0.18	236.5	38.0	0.4	0.4
C. Agriculture/Pasture	2.32	0.344	744.1	110.3	1.4	1.2
D. Low Density/Residential	1.64	0.191	1,404.3	163.5	2.6	1.8
E. Medium Density/Residential	2.18	0.335	12,885.6	1,980.1	24.2	21.9
F. High Density/Residential	2.42	0.49	18,213.0	3,687.8	34.1	40.8
G. Commercial	2.42	0.49	8,069.6	1,633.9	15.1	18.1
H. Industrial	2.42	0.49	4,673.8	946.3	8.8	10.5
I. Highways	2.23	0.27	0.0	0.0	0.0	0.0
J. Wetland	1.01	0.09	3,446.3	307.1	6.5	3.4
K. Water	1.01	0.09	279.7	24.9	0.5	0.3
Total	**0.00**	**0.00**	**53,346.7**	**9,035.3**	**100.0**	**100.0**

Table 4.6b. Brushy Creek Land Use Categories and Corresponding EMC Contributions Based on 2000–07 Rainfall

Land Use	TN Concentration (mg/L)	TP Concentration (mg/L)	TN load (lbs)	TP load (lbs)	Expressed as % of Total TN Watershed Load	Expressed as % of Total TP Watershed Load
A. Forest/Rural Open	1.09	0.046	1,093.5	46.1	6.5	1.6
B. Urban Open	1.12	0.18	53.3	8.6	0.3	0.3
C. Agriculture/Pasture	2.32	0.344	262.3	38.9	1.6	1.3
D. Low Density/Residential	1.64	0.191	574.2	66.9	3.4	2.3
E. Medium Density/Residential	2.18	0.335	1,222.8	187.9	7.3	6.5
F. High Density/Residential	2.42	0.49	10,259.2	2,077.3	61.3	71.5
G. Commercial	2.42	0.49	1,642.6	332.6	9.8	11.5
H. Industrial	2.42	0.49	0.0	0.0	0.0	0.0
I. Highways	2.23	0.27	0.0	0.0	0.0	0.0
J. Wetland	1.01	0.09	1,561.6	139.2	9.3	4.8
K. Water	1.01	0.09	69.3	6.2	0.4	0.2
Total	**0.00**	**0.00**	**16,738.8**	**2,903.6**	**100.0**	**100.0**

Table 4.6c. Lower Rocky Creek Land Use Categories and Corresponding EMC Contributions Based on 2000–07 Rainfall

Land Use	TN Concentration (mg/L)	TP Concentration (mg/L)	TN load (lbs)	TP load (lbs)	Expressed as % of Total TN Watershed Load	Expressed as % of Total TP Watershed Load
Forest/Rural Open	1.09	0.046	397.7	16.8	3.8	1.4
Urban Open	1.12	0.18	22.4	3.6	0.2	0.3
Agricultural	2.32	0.344	0.0	0.0	0.0	0.0
Low density residential	1.64	0.191	66.2	7.7	0.6	0.6
Medium density residential	2.18	0.335	1,777.5	273.1	16.8	22.5
High density residential	2.42	0.49	2,649.2	536.4	25.1	44.2
Highways	2.42	0.49	511.7	103.6	4.8	8.5
Water	2.42	0.49	0.0	0.0	0.0	0.0
Rangeland	2.23	0.27	0.0	0.0	0.0	0.0
J. Wetland	1.01	0.09	5,033.6	264.9	47.7	21.8
K. Water	1.01	0.09	93.7	8.4	0.9	0.7
Total	**0.00**	**0.00**	**10,552.0**	**1,214.5**	**100.0**	**100.0**

Chapter 5: DETERMINATION OF ASSIMILATIVE CAPACITY

5.1 Determination of Loading Capacity

The goal of this TMDL analysis is to reduce the anthropogenic TN loads to conditions comparable to those found in surrounding, unimpaired watersheds. The methodology used is a percent reduction approach between the existing condition concentration and the region-based reference concentration.

5.2 Data Used in the Determination of the TMDL

Data providers include the Department, Hillsborough County, and SWFWMD, which maintains routine sampling schedules. **Tables 5.1a, 5.1b, and 5.1c** show verified period sample analyses summaries for the major sample stations in the WBIDs. **Figure 5.1** shows the locations of the WBID's major ambient water sample sites.

Table 5.1a. Station List for the Sweetwater Creek (WBID 1516)

Station ID	Station Name	Total Nitrogen Summary			D.O.		
		Count	Median	75 Percentile	Count	Median	75 Percentile
21FLHILL142	Sweetwater Creek at Anderson Road upstream side	78	0.8495	0.9655	79	3.64	5.11
21FLWQSPHIL548UL	Unnamed (Lake George) middle of lake (WBID 1516	4	0.894	1.0165	8	7.885	8.16
21FLWQSPHIL553US	Tp100 - Sweetwater Creek (WBID 1516)	4	1.32	1.4225	8	5.225	5.89
21FLTPA 24040112	TP100 - SWEETWATER CREEK	3	0.85	0.99			
21FLGW 22072	SW1-SS-2014 SWEETWATER CREEK	1	0.86	0.86			
21FLGW 22088	SW1-SS-2058 SWEETWATER CREEK	1	0.767	0.767			
21FLGW 22094	SW1-SS-2074 SWEETWATER CREEK	1	0.87	0.87			
21FLGW 7628	SWB-SL-1023 UNKNOWN	1	1.205	1.205			
21FLGW 7629	SWB-SL-1024 UNKNOWN	1	1.404	1.404			
21FLGW 7637	SWB-SL-1032 UNKNOWN	1	3.204	3.204			
21FLGW 7658	SWB-SL-1065 UNKNOWN	1	1.251	1.251			

Note: Total number of samples includes data for all parameters assessed in verified period.

Table 5.1b. Station List for the Brushy Creek (WBID 1498)

Station ID	Station Name	Total Nitrogen Summary			D.O.		
		Count	Median	75 Percentile	Count	Median	75 Percentile
21FLHILL161	Brushy Creek at Gunn Hwy	19	1.08	1.1915	21	6.63	7.3
21FLTPA 24030151	TP153 - Brushy Creek	8	1.017	1.1495	10	3.99	4.652
21FLTPA 280503823129	TP358-Brushy Creek	7	1.003	1.069	8	7.405	8.1
21FLTPA 28353823320	TP359-Brushy Creek	7	0.99	1.19	8	6.65	8.302
21FLWQSPHIL545US	Tp153 - Brushy Creek at Gunn Hwy (WBID 1498)	4	1.29	1.35	10	6.33	6.8
21FLGW 22075	SW1-SS-2018 BRUSHY CREEK	1	1.24	1.24			

The approach to calculating DO and nutrient TMDLs depends on the number of water quality samples and the availability of other required datasets. When minimal or no nutrient, BOD, or flow data are available, the existing loads are calculated using the nonpoint source spreadsheet and the TMDL is expressed as a percent reduction to meet a pollutant concentration target based on natural or reference conditions (EPA, 2000). The assumption is that BOD and nutrients (primarily TN and TP) are the major controllable factors for DO. To return DO concentrations to a "naturally" expected condition, unimpaired by pollutants, BOD and nutrient loadings also need to be returned to near natural loading conditions.

Table 5.1c. Station List for the Sweetwater Creek (WBID 1563)

Station ID	Station Name	Total Nitrogen Summary			D.O.			Chlorophll a		
		Count	Median	75 Percentile	Count	Median	75 Percentile	Count	Median	75 Percentile
21FLHILL103	Rocky Creek at SR580 bridge	78	1.097	1.28475	81	3.5	4.38	20	11.45	14.3

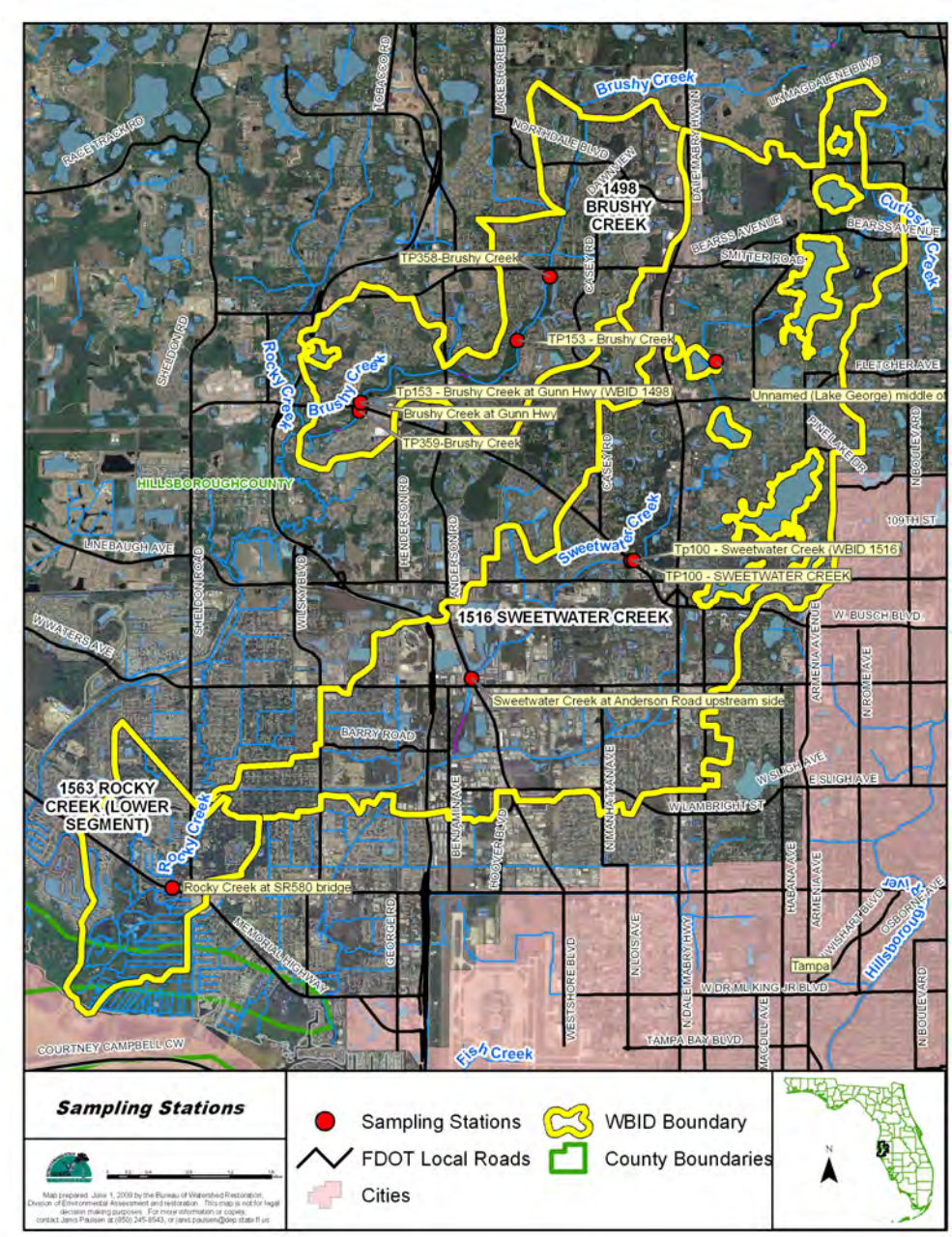

Figure 5.1. Brushy Creek, Sweetwater Creek, and Lower Rocky Creek Watershed and Sample Stations

The approach to calculating DO and nutrient TMDLs depends on the number of water quality samples and the availability of other required datasets. The existing loads here are calculated using the nonpoint source spreadsheet and the TMDL is expressed as a percent reduction to meet a pollutant concentration target based on natural or reference conditions (EPA, 2000). The assumption is that BOD and nutrients (primarily TN and TP) are the major controllable factors for DO. To return DO concentrations to a "naturally" expected condition, unimpaired by pollutants, nutrient loadings also need to be returned to natural loading conditions.

DO can also be affected or lowered by in-stream modifications such as dredging and channelization. These processes slow down water velocity, reduce reaeration, and increase the settling of solids, thus increasing sediment oxygen demand (SOD) and lowering DO concentrations. Further analyses and monitoring must be completed to develop an appropriate, site-specific DO criterion.

The approach used here was to obtain a percent reduction by assessing the data within the basin, resulting in the most conservative estimated reduction that will restore Brushy Creek, Sweetwater Creek, and Lower Rocky Creek. The most conservative and reasonable target has been determined to be the annual median TN concentration from sample stations in WBIDS that have been assessed by FDEP to be not impaired for Nutrients and Not Impaired for D.O. This concentration has been observed to be 0.75 mg/L for Lower Rocky Creek, and to be protective of the downstream estuary, 0.75 mg/L for Brushy Creek and Sweetwater Creek also.

5.3 TMDL Development Process

The percentage reduction was calculated using the following equation, applied to the highest annual median concentration observed in a major sample station during the Verified Period:

$$\frac{[(\text{Max. Median TN Concentration}) - (\text{Ref. water quality target})]}{(\text{Max. Median TN Concentration})} \times 100$$

The Max. Median TN Concentration is the annual median TN concentration observed throughout the Verified Period. **Table 5.2** shows the results of the equation applied to Brushy Creek, Sweetwater Creek, and Lower Rocky Creek.

Table 5.2a. Brushy Creek TN Percent Reduction Table, 2000–07

Major Sample Stations during verified period for BRUSHY CREEK, WBID 1498	VP Sample Count	Sample Station Median Annual Total Nitrogen Concentration								Verified Period Maximum Annual Median
		2000	2001	2002	2003	2004	2005	2006	2007	
21FLHILL161	19						1.08		1.11	1.11
21FLTPA 24030151	8						1.02			1.02
21FLTPA 280503823129	7						1.00			1.00
21FLTPA 28353823320	7						0.99			0.99
Worst Year Median TN to for which reduction is to be applied to (Maximum Annual Station median)										1.11
								Target Concentration (mg/L)		0.75
								Percent Reduction		32.2%

Table 5.2b. Sweetwater Creek TN Percent Reduction Table, 2000–07

Major Sample Stations during verified period for SWEETWATER CREEK, WBID 1516	VP Sample Count	Sample Station Median Annual Total Nitrogen Concentration								Verified Period Maximum Annual Median
		2000	2001	2002	2003	2004	2005	2006	2007	
21FLHILL142	78	0.90	0.76	0.72	0.87	0.97	0.86		0.66	0.97
								Target Concentration (mg/L)		0.75
								Percent Reduction		22.7%

Table 5.2c. Lower Rocky Creek TN Percent Reduction Table, 2000–07

Major Sample Stations during verified period for ROCKY CREEK (LOWER SEGMENT), WBID 1563	VP Sample Count	Sample Station Median Annual Total Nitrogen Concentration								Verified Period Maximum Annual Median
		2000	2001	2002	2003	2004	2005	2006	2007	
21FLHILL103	78	1.65	1.14	1.15	1.10	1.13	1.01		0.86	1.65
Worst Year Median TN to for which reduction is to be applied to (Maximum Annual Station median)										1.65
								Target Concentration (mg/L)		0.75
								Percent Reduction		54.4%

Chapter 6: DETERMINATION OF THE TMDL

6.1 Expression and Allocation of the TMDL

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

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

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

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

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

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

This approach is consistent with federal regulations (40 CFR § 130.2[I]), which state that TMDLs can be expressed in terms of mass per time (e.g., pounds per day), toxicity, or **other appropriate measure**. The TMDL for the Sweetwater Creek (WBID 1516) is expressed in terms of a percent reduction in TN to protect the DO concentration (**Table 6.1**).

Table 6.1 TMDL Components and Current Loadings for the Sweetwater Creek, Brushy Creek, and Lower Rocky Creek.

WBID	Parameter	TMDL (mg/L)	WLA		LA (% reduction)	MOS
			Wastewater (LBs/YR)	NPDES Stormwater (% reduction)		
Brushy Creek (WBID 1498)	TN	0.75	54,794	32.2%	32.2%	Implicit
Sweetwater Creek (1516)	TN	0.75	N/A	22.7%	22.7%	Implicit
Lower Rocky Creek (1563)	TN	0.75	N/A	54.4%	54.4%	Implicit

N/A – Not applicable.

6.2 Wasteload Allocation

6.2.1 NPDES Wastewater Discharges

There are six wastewater facilities distributed among the WBIDs discussed in this TMDL. There are 3 wastewater facilities in Brushy Creek and 3 wastewater facilities in Sweetwater Creek. Brushy Creek has, as it's only NPDES permitted facility, the Hillsborough County Dale Mabry AWWTF (FL0036820), a domestic wastewater treatment plant with a design capacity 6 MGD. Sweetwater Creek's only NPDES permitted plant is the CEMEX Construction Materials Plant (**Table 4.1**) and does not contribute to the nutrient load in any waterbody. Although the Dale Mabry AWWTF is permitted to discharge it's effluent to Brushy Creek, a large percentage of the effluent is either reused within the facility or transferred to the Hillsborough County Northwest Master Reuse System. **Table 4.2** displays details concerning the TN and TP effluent load from the Dale Mabry AWWTF. The TN wastewater TMDL for Brushy Creek shown in Table 6.1 was obtained by using the facility's permitted annual flow at the permitted Total Nitrogen concentration.

6.2.2 NPDES Stormwater Discharges

The WLAs for stormwater discharges with an MS4 permit (FLS000006, Hillsborough County and co-permittees) is a 32.2%, 22.7%, and 54.4% reduction in TN load for Brushy, Sweetwater, and Lower Rocky creeks. 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. The responsible co-permittee for all three WBIDs is Hillsborough County.

6.3 Load Allocation

The LA is the nonpoint source component of the load, which, combined with WLA stormwater discharges, is responsible for 100 percent of the current load as well as the percentage load reduction.

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. An implicit MOS was provided by the conservative decisions associated with a number of modeling assumptions, the development of site-specific alternative water quality targets, and the development of assimilative capacity. An implicit MOS was used by targeting a loading based on reference waterbodies.

Chapter 7: NEXT STEPS: IMPLEMENTATION PLAN DEVELOPMENT AND BEYOND

7.1 Basin Management Action Plan

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

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

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

References

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Appendices

Appendix A: Sample Stations and Median Concentration Data

Appendix B: Background Information on Federal and State Stormwater Programs

In 1982, Florida became the first state in the country to implement statewide regulations to address the issue of nonpoint source pollution by requiring new development and redevelopment to treat stormwater before it is discharged. The Stormwater Rule, as authorized in Chapter 403, F.S., was established as a technology-based program that relies on the implementation of BMPs that are designed to achieve a specific level of treatment (i.e., performance standards) as set forth in Rule 62-40, F.A.C.

The rule 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. No PLRG had been developed for Newnans Lake at the time this analysis was conducted.

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 MS4s. However, because the master drainage systems of most local governments in Florida are interconnected, the EPA has implemented Phase 1 of the MS4 permitting program on a countywide basis, which brings in all cities (incorporated areas), Chapter 298 urban water control districts, and Florida Department of Transportation (FDOT) 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 2 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. The revised rules require that these additional activities obtain permits by 2003. While these urban stormwater discharges are now technically referred to as "point sources" for the purpose of regulation, they are still diffuse sources of pollution that cannot be easily collected and treated by a central treatment facility, as are other point sources of pollution, such as domestic and industrial wastewater discharges. 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.

Florida Department of Environmental Protection
Division of Water Resource Management
Bureau of Watershed Management
2600 Blair Stone Road, Mail Station 3565
Tallahassee, Florida 32399-2400
www2.dep.state.fl.us/water/