FINAL

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Division of Water Resource Management, Bureau of Watershed Management

SOUTH DISTRICT • EVERGLADES WEST COAST BASIN

TMDL Report

Dissolved Oxygen TMDL for the Gordon River Extension, WBID 3278K (formerly 3259C)

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Websites

Florida Department of Environmental Protection, Bureau of Watershed Management

Total Maximum Daily Load (TMDL) Program

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

Identification of Impaired Surface Waters Rule

https://www.flrules.org/gateway/chapterhome.asp?chapter=62-303

STORET Program

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

2006 305(b) Report

http://www.dep.state.fl.us/water/tmdl/docs/2006_Integrated_Report.pdf

Criteria for Surface Water Quality Classifications

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

Basin Status Reports

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

Water Quality Assessment Reports

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

U.S. Environmental Protection Agency

Region 4: Total Maximum Daily Loads in Florida

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

National STORET Program

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

Chapter 1: INTRODUCTION

1.1 Purpose of Report

This report presents the Total Maximum Daily Load (TMDL) for the pollutant contributing to low dissolved oxygen (DO) concentrations in the Gordon River Extension (referred to as the Gordon River throughout the report), located in the Everglades West Coast Basin, on Florida's southwest coast. The river was verified as impaired for DO based on the results of sampling and analysis carried out between January 1, 1995, and June 30, 2002, during the verified period for the first basin assessment cycle. These results revealed that 67 percent of the DO values measured during the planning period and 68 percent of the DO values measured during the verified period were below the Class III freshwater DO criterion of 5 milligrams per liter (mg/L). During this period, 46 surface water samples were analyzed for total nitrogen (TN) and 58 surface water samples were analyzed for total phosphorus (TP), with median values of 0.755 and 0.07 mg/L, respectively. TN was considered the causative pollutant for the low DO. The Gordon River was subsequently included on the Verified List of impaired waters (impaired for DO) that was adopted by Secretarial Order in May 2004 and scheduled for TMDL development in 2007.

During the second basin assessment cycle, further sampling revealed that 92 percent of the DO values measured during the planning period (January 1, 1995, through June 30, 2004) and 97 percent of the DO values measured during the verified period (January 1, 2000, through June 30, 2007) were below the Class III DO criterion of 5 mg/L. The TMDL for the Gordon River establishes the allowable loadings that would restore the waterbody so that it meets its applicable water quality criterion for DO.

1.2 Identification of Waterbody

The Gordon River watershed is located in southwest Florida, encompassing portions of the city of Naples, North Naples, and Pine Ridge (**Figure 1.1**). A significant portion of the watershed's hydrography consists of a network of canals, tidal streams, and lakes (**Figure 1.2**). The Gordon River, which is located in Collier County, drains an area of approximately 8 square miles (5,153 acres). The river is approximately 3 miles long, originating near the center of the watershed as a drainage canal for several large golf courses. It then flows southward into a wetland region, eventually reaching the confluence with the Golden Gate Canal.

Portions of the river system are considered natural approximately 0.3 miles below the Gordon control structure at Golden Gate Parkway. One purpose of the the control structure is to limit the flow from tidal exchange to prevent saltwater intrusion to the city of Naples Coastal Ridge wells. Above the control structure, channels are maintained as a dredged stormwater conveyance system to maintain an adequate flow regime. The main network of drainage canals extends approximately 3 miles north of the structure and connects with an additional 13 miles of drainage canals and ditches. The major population areas in the Gordon River watershed include eastern Naples in the southern portions and North Naples, Pelican Bay, and Pine Ridge in the northwest corner.

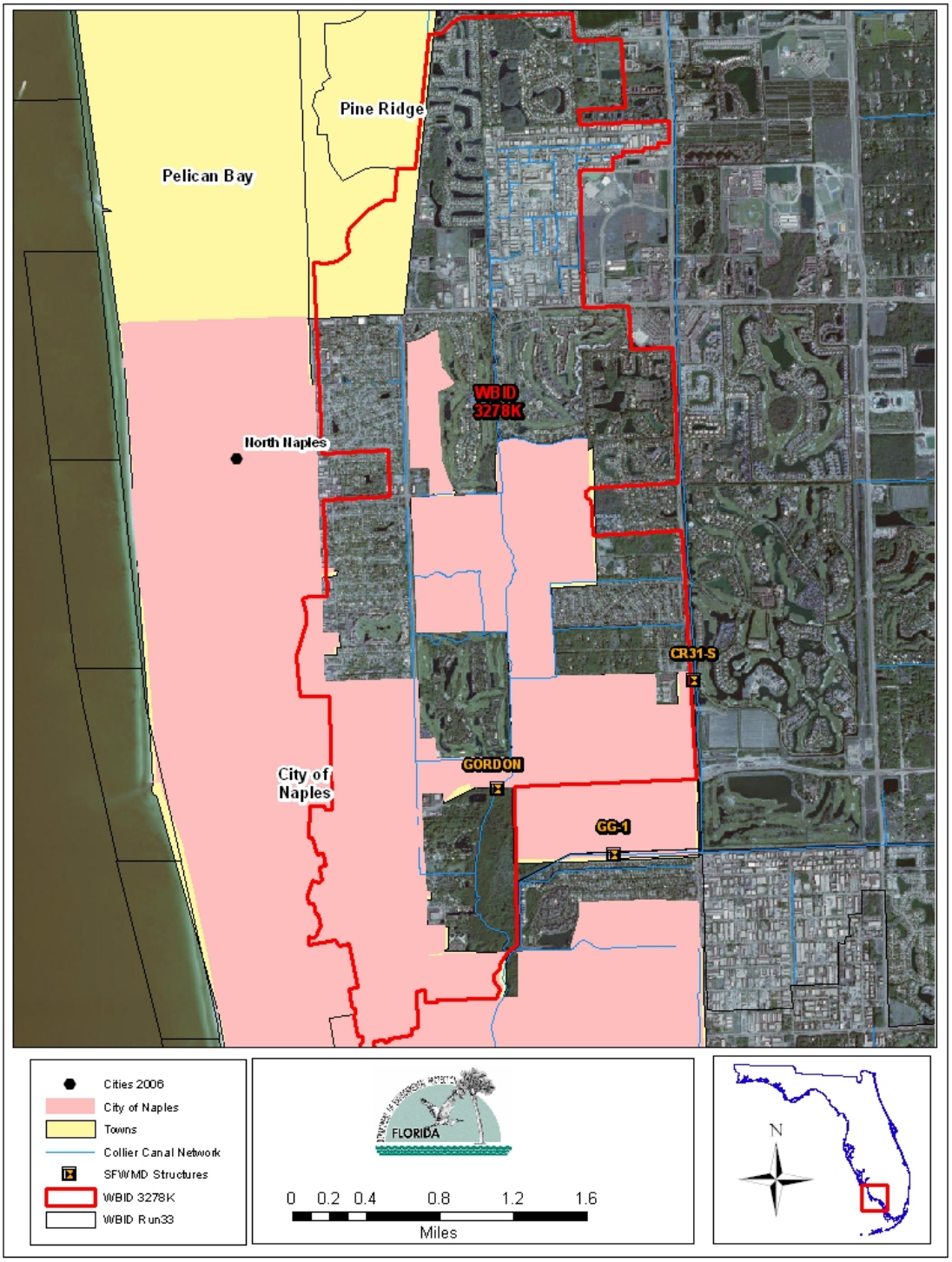

Figure 1.1. Gordon River Watershed, WBID 3278K, with Cities and Towns in Region

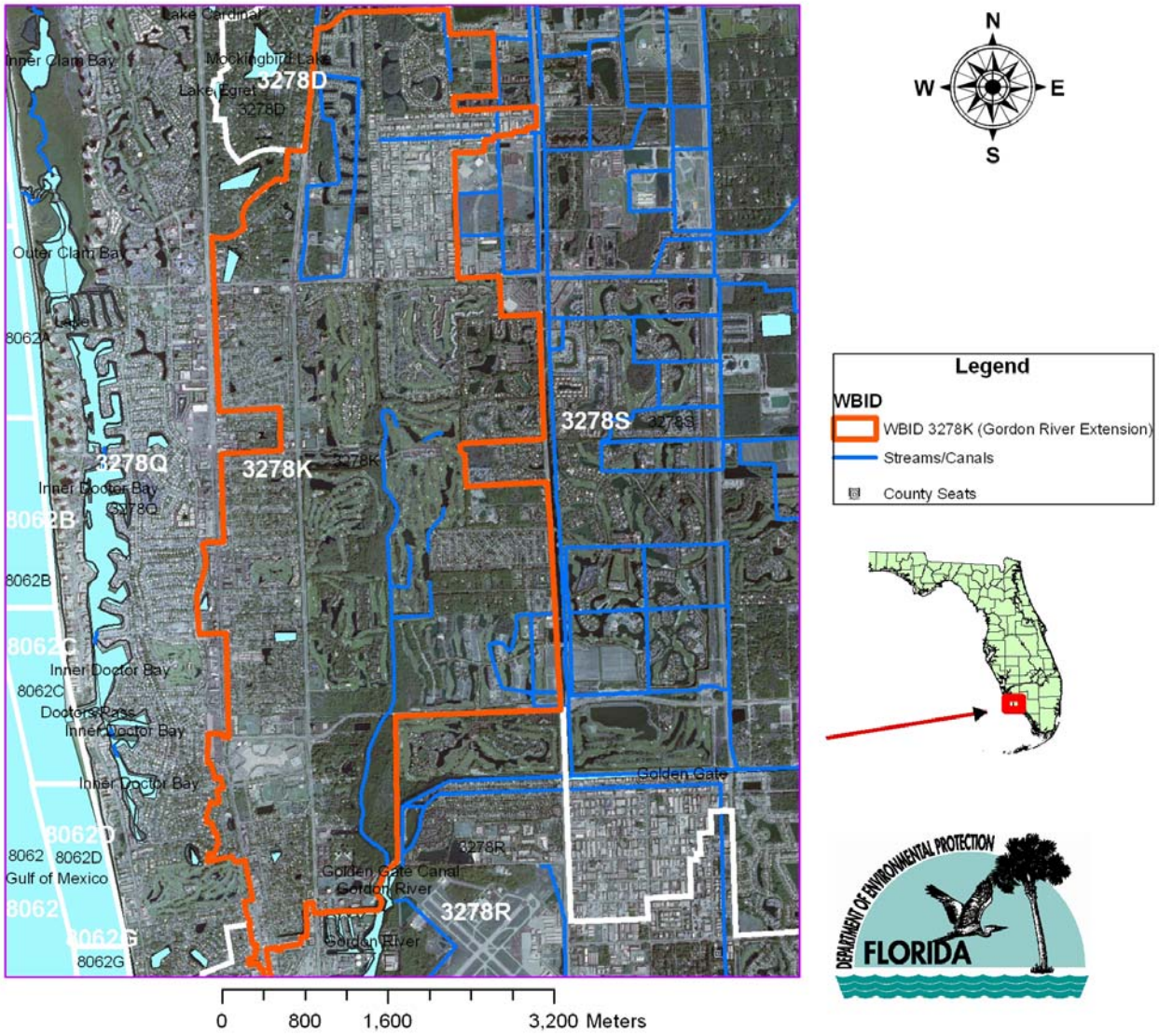

Figure 1.2. Aerial Photograph of the Gordon River Watershed, WBID 3278K

For assessment purposes, the Florida Department of Environmental Protection (Department) has divided the Everglades West Coast Basin into assessment polygons with a unique **w**ater**b**ody **id**entification (WBID) number for each watershed or stream reach. The Gordon River is one of 49 WBIDs in the Southwest Coast Planning Unit within the Everglades West Coast Basin, which has a total of 80 WBIDs. The boundaries of several WBIDs located in Collier County, including the Gordon River (WBID 3278K), were revised in 2007 based on local knowledge of the region's hydrology and water quality monitoring stations. The Gordon River (WBID 3278K) was previously delineated and known as the Gordon River (WBID 3259C) prior to the 2007 revisions (**Figure 1.3**). Another portion of what was previously WBID 3259C, now known as Naples Bay Coastal (WBID 3278R), is also impaired for DO (see **Table 1.1**), but is not addressed here. This TMDL report addresses **WBID 3278K**, **Gordon River,** for low DO.

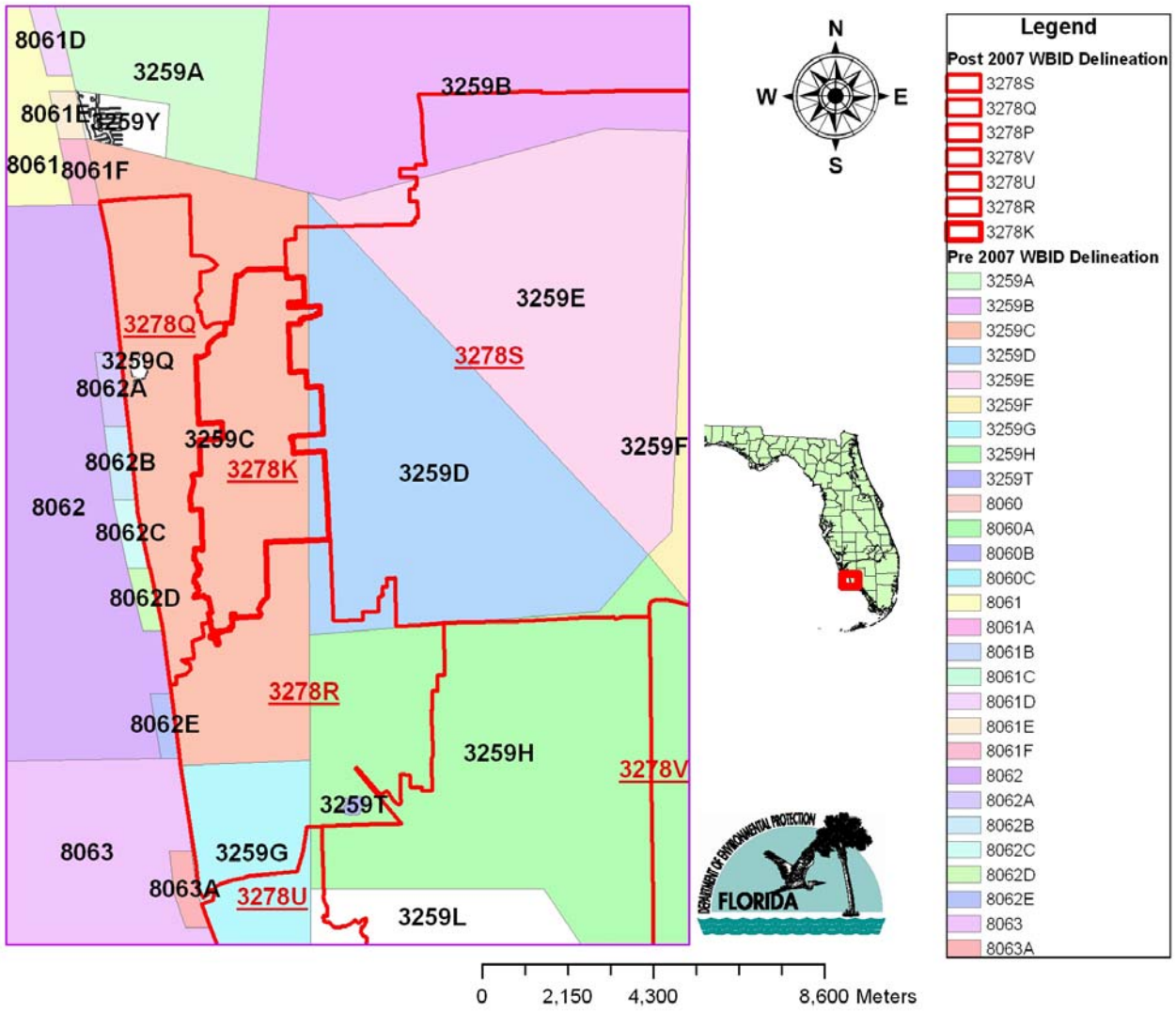

Figure 1.3. WBID Delineation for the Gordon River Watershed, WBID 3278K, Pre- and Post-2007

Table 1.1. Verified Impaired Segments in the Everglades West Coast Basin

Planning Unit	WBID	Waterbody Segment	Area (acres)	Impairment
Estero Bay	3258B	Hendry Creek	533	DO
	3258B1	Hendry Creek Marine	6,920	Fecal Coliform, DO
	3258C	Estero Bay Drainage	109,510	Fecal Coliform, DO
	3258C1	Estero Bay Drainage Marine	4,602	DO, Iron
	3258D	Estero River	5,737	DO, Fecal Coliform
	3258D1	Estero River Marine	5,472	DO
	3258E	Imperial River	5,873	Fecal Coliform, DO
	3258E1	Imperial River Marine	4,270	Nutrients (chlorophyll *a* [chl-*a*]), Fecal Coliform, DO
	3258G	Tenmile Canal	9,595	DO
Interdrainage Area	3261C	Barron River Canal	33,368	Iron
	3278T	Okaloacoochee	143,596	DO
	3278W	Silver Strand	53,834	DO
Southwest Coast	3259A	Cocohatchee River	3,087	Fecal Coliform
	3259W	Lake Trafford	1,490	Unionized Ammonia, Nutrients (Trophic State Index [TSI]), DO
	3278D	Cocohatchee Inland	25,836	DO
	3278F	Corkscrew Marsh	52,915	DO
	3278G	Fakahatchee Strand	94,500	DO, Fecal Coliform
	3278K (3259C)	Gordon River Extension	5,153	DO
	3278L	Immokalee Basin	8,745	DO
	3278R (3259G)	Naples Bay Coastal	9,581	DO, Iron, Fecal Coliform, Copper
	3278S (3259D+E)	North Golden Gate	72,773	DO, Iron
	3278U	Rookery Bay Coastal	38,632	Fecal Coliform, Nutrients (chl-*a*), DO

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 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 water quality standards. They provide important water quality restoration goals that will guide restoration activities.

This TMDL report will be followed by the development and implementation of a Basin Management Action Plan, or BMAP, to reduce the TN concentrations that caused the verified impairment for low DO for the Gordon River (WBID 3278K). These activities will depend heavily on the active participation of the South Florida Water Management District (SFWMD), Collier County, city of Naples, local governments, businesses, and other stakeholders. The Department will work with these organizations and other individuals to implement the pollutant reductions required to achieve the established TMDL for this waterbody.

1.3.1 Development of TMDL

This TMDL was developed in cooperation with the SFWMD, Collier County, and the city of Naples. The process included meetings and teleconference discussions between Collier County and the Department's Watershed Planning and Coordination Section. Regular meetings also took place between Department officers, city of Naples officials, Lee County public officials, Collier County public officials, environmental advocacy groups, consultants, and other stakeholders who volunteered to participate, or whose participation was requested.

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 source in each of these impaired waters on a schedule. The Department has developed these 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 13 waterbodies in the Everglades West Coast Basin. However, the FWRA (Section 403.067, F.S.) stated that all previous Florida 303(d) lists were for planning purposes only and directed the Department to develop, and adopt by rule, a new science-based methodology to identify impaired waters. After a long rulemaking process, the Environmental Regulation Commission adopted the new methodology as Rule 62-303, Florida Administrative Code (F.A.C.) (Identification of Impaired Surface Waters Rule, or IWR), in April 2001; the rule was modified in 2006 and 2007. The list of waters for which impairments have been verified using the IWR methodology is referred to as the Verified List.

2.2 Information on Verified Impairment

The Department used the IWR to assess water quality impairments in the Gordon River (WBID 3278K) and verified the impairment for low DO, with TN as the causative pollutant. **Tables 2.1** and **2.2** summarize DO and potential causative pollutant concentrations based on sampling during the first and second basin assessment cycles. The Gordon River was verified as impaired for DO based on an analysis of results showing there is at least a 90 percent confidence that the exceedance rate is greater than or equal to 10 percent. Cycle 1 verified period data are based on samples collected between January 1, 1995, and June 30, 2002 (**Table 2.1**). In the Cycle 2 verified period, the impairment for low DO was verified for the Gordon River based on samples collected between January 1, 2000, and June 30, 2007. Sample data from the Cycle 2 verified period show a higher rate of exceedances above impairment criteria (**Table 2.2**).

Table 2.1. Summary of DO, BOD, TP, and TN Data from Cycle 1 Verified Period Sampling (1995–2002) for the Gordon River, WBID 3278K

Parameter of Concern	Number of Samples	IWR Required Exceedances (for impairment)	Actual Number of Exceedances	Median
DO	116	17	76	3.89
BOD	6	*	*	1.05
TP	86	*	*	0.05
TN	95	*	*	0.75

Note: Data results are from IWR Run 18.
BOD – Biological oxygen demand.
* – No nutrient criterion exists for these parameters.

Table 2.2. Summary of DO, BOD, TP, and TN Data from Cycle 2 Verified Period Sampling (2000–07) for the Gordon River, WBID 3278K

Parameter of Concern	Number of Samples	IWR Required Exceedances (for impairment)	Actual Number of Exceedances	Median
DO	72	12	70	2.53
BOD	17	*	*	2.0
TP	66	*	*	0.07

Note: Data results are from IWR Run 32.
* – No nutrient criterion exists for these parameters.

Chapter 3. DESCRIPTION OF APPLICABLE WATER QUALITY STANDARDS AND TARGETS

3.1 Classification of the Waterbody and Criterion Applicable to the TMDL

Florida's surface waters are protected for five designated use classifications, as follows:

Class I **Potable water supplies**
Class II **Shellfish propagation or harvesting**
Class III **Recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife**
Class IV **Agricultural water supplies**
Class V **Navigation, utility, and industrial use (there are no state waters currently in this class)**

The Gordon River (WBID 3278K) is considered a Class III waterbody, with a designated use of recreation, propagation, and the maintenance of a healthy, well-balanced population of fish and wildlife. The Class III freshwater quality criterion applicable to the impairment addressed by this TMDL report is for DO.

3.2 Applicable Water Quality Standards and Numeric Water Quality Target

3.2.1 Interpretation of Narrative BOD and Nutrient Criteria

Florida's Surface Water Quality Standard (Rule 62-302, F.A.C.) states that, for Class III freshwater waterbodies, the DO concentration

> *Shall not be less than 5.0 (mg/L). Normal daily and seasonal fluctuations above these levels shall be maintained.*

BOD shall not be increased to exceed values that would cause DO to be depressed below the established DO limit, and in no case shall it be great enough to produce nuisance conditions. Florida's narrative nutrient criteria state that the discharge of nutrients shall continue to be limited as needed to prevent violations of other standards contained in Rule 62-302, F.A.C. It also states that in no case shall nutrient concentrations of a body of water be altered so as to cause an imbalance in natural populations of aquatic flora and fauna (Section 62-302.530, F.A.C.).

3.2.2 Identification of Causative Pollutants

After verification of the low DO in the Gordon River, 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 streams is 2.0 mg/L for BOD5, 1.6 mg/L for TN, and 0.22 mg/L for TP.

The next step in assessing the data on the potential causative pollutants is to determine if there is a correlation between those values. **Figure 3.1** shows a plot of the relationship between DO and TN medians, using only those stations where the number of samples is high enough to prevent undue bias of the median. The R^2 is 0.44, which is not unusual when considering the other variables (not included in this linear equation) that typically affect DO concentrations. **Appendix A** lists the stations used to develop this graph.

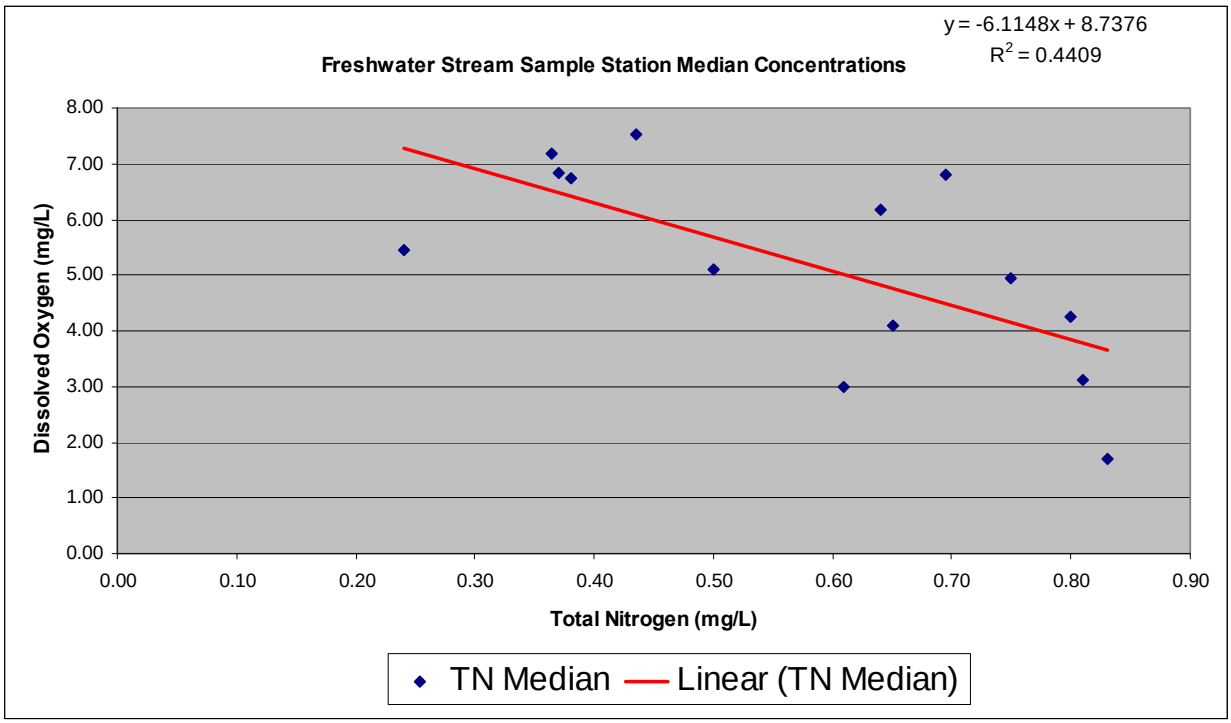

Figure 3.1. Relationship between Sample Station Median DO and TN in the Gordon River, WBID 3278K

3.2.3 Calculating Reference Concentrations for Causative Pollutants for Low DO

As stated earlier, for most of the state the threshold value for potential causative pollutants for low DO is determined at the statewide 70th percentile concentrations. However, the Everglades West Coast Basin's hydrology is unique, and the statewide threshold guidelines appear less useful. Thus, another approach is used here to develop reference target concentrations. In this TMDL analysis, thresholds for causative pollutants were developed through the calculation of a region-based reference concentration.

Preferably, the reference concentration should be based on similar sites in the watershed that represent "natural conditions." However, because of the difficulty in matching DO-impaired waterbodies (with hydrology similar to that observed in the Everglades West Coast Basin) to those with no or low anthropogenic land uses, it was determined that this approach would not be practical.

Instead, the 75th percentile of the medians from freshwater WBIDs in the Southwest Coast Planning Unit is used as the reference concentration target. Sample statistics were completed for TN data for freshwater stations with land use characteristics that demonstrated relatively low impacts from urban development. These stations are located in WBIDs that are representative of "natural condition" waterbodies. The reference concentration targets are 0.74 mg/L for TN, 0.04 mg/L for TP, and 1.85 mg/L for BOD (**Table 3.1**). **Table 3.2** lists the stations used to develop the reference concentration targets. **Table 3.3** shows land use statistics for the WBIDs used to develop the reference concentrations.

Table 3.1. Class IIIF Region-based Reference Concentration Thresholds for Causative Pollutants in the Everglades West Coast Basin

75th Percentile Reference Value			
Waterbody Class	**TN (mg/L)**	**TP (mg/L)**	**BOD (mg/L)**
IIIF	0.74	0.04	1.85

Note: IIIF – Class III freshwater.

Table 3.2. Statistical Summary of Freshwater Sample Stations for WBIDS in the Southwest Coast Planning Unit

WBID	Station Number	Number of Samples	Minimum	Maximum	Median
3278G	21FLSFWMBC12	59	0.005	1.260	0.240
3278G	21FLSFWMBC18	60	0.005	5.320	0.610
3278G	21FLSFWMBC19	59	0.005	4.230	0.810
3278G	21FLSFWMBC21	59	0.005	4.520	0.800
3278G	21FLSFWMCHKMATE	15	0.005	2.000	0.830
3278H	21FLFTM 28030070FTM	5	0.588	0.839	0.695
3278H	21FLSFWMFAKA858	56	0.008	1.240	0.750
3278I	21FLSFWMBC10	57	0.010	1.300	0.370
3278I	21FLSFWMBC20	59	0.005	5.030	0.650
3278I	21FLSFWMBC7	58	0.010	1.360	0.435
3278I	21FLSFWMBC8	60	0.005	1.470	0.365
3278I	21FLSFWMBC9	57	0.010	1.540	0.500
3278I	21FLSFWMFAKA	58	0.010	2.700	0.380
3278V	21FLSFWMBC22	57	0.010	1.800	0.640
				75th Percentile of Medians =	**0.74**

Table 3.3. Summary of Reference WBIDs with Land Use Data

Land Use Code and Description	Acres	% Total
WBID 3278I		
6000: Wetland	56,313.0	94.72%
4000: Upland Forests	1,151.6	1.94%
3000: Rangeland	1,117.3	1.88%
5000: Water	628.4	1.06%
1000: Urban and Built-up	97.3	0.16%
8000: Transportation, Communication, and Utilities	93.9	0.16%
2000: Agriculture	50.1	0.08%
Total	**59,451.70**	**100.00%**
WBID 3278V		
6000: Wetland	35,737.3	66.19%
2000: Agriculture	7,532.9	13.95%
4000: Upland Forests	4,939.7	9.15%
3000: Rangeland	3,199.6	5.93%
1000: Urban and Built-up	1,588.4	2.94%
8000: Transportation, Communication, and Utilities	478.6	0.89%
5000: Water	355.6	0.66%
7000: Barren Land	159.4	0.30%
Total	**53,991.5**	**100.00%**
WBID 3278G		
6000: Wetland	92,282.2	97.65%
4000: Upland Forests	1,091.4	1.15%
5000: Water	335.2	0.35%
2000: Agriculture	239.7	0.25%
3000: Rangeland	213.5	0.23%
8000: Transportation, Communication, and Utilities	198.7	0.21%
1000: Urban and Built-up	114.8	0.12%
7000: Barren Land	24.6	0.03%
Total	**94,500.0**	**100.00%**
WBID 3278H		
6000: Wetland	12,569.1	45.79%
3000: Rangeland	7,770.7	28.31%
4000: Upland Forests	4,381.2	15.96%
1000: Urban and Built-up	1,473.3	5.37%
2000: Agriculture	860.5	3.13%
5000: Water	243.0	0.89%
8000: Transportation, Communication, and Utilities	100.3	0.37%
7000: Barren Land	51.6	0.19%
Total	**27,449.6**	**100.00%**

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 BOD and Low DO in the Gordon River Watershed

4.2.1 Point Sources

Estimating Point Source Loads

There are no permitted wastewater facilities located in the Gordon River watershed.

Municipal Separate Storm Sewer System Permittees

Within the Gordon River watershed, there are two Phase II municipal separate storm sewer system (MS4) permits. One is for the city of Naples (Permit Number FLR04E080) and the other is for Collier County (Permit Number FLR04E037).

4.2.2 Land Uses and Nonpoint Sources

In the Gordon River watershed, which covers 5,154 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. The watershed has a limited amount of agriculture, with only 58 acres devoted to cropland and pasture.

Land Uses

Land use categories in the Gordon River watershed were aggregated using the simplified Level 1 codes (**Table 4.1**). By far the largest Level 1 land use is urban and built-up (80 percent). When looking at Level 2, which is a more detailed categorization of land use (**Table 4.2**), urban and built-up land uses comprise (from highest to lowest) medium-density residential (36.1 percent), high-density residential (10.7 percent), industrial (9.3 percent), commercial (9 percent), recreational (4.5 percent), institutional (3.1 percent), and low-density residential (2.8 percent). If the Level 1 category of transportation, communication, and utilities (4.1 percent) is added to the urban and built-up category, human land uses constitute more than 80 percent of the watershed area. After urban and built-up, the second largest land use category is wetlands. These are generally wetland hardwood forests (345 acres) and wetland coniferous forests (140 acres).

Table 4.1. Level 1 Land Uses in the Gordon River Watershed, WBID 3278K

Land Use Code and Description	Acres	% Total
1000: Urban and Built-up	3,602.1	69.89
6000: Wetland	486.4	9.44
4000: Upland Forests	452.7	8.78
5000: Water	193.5	3.75
3000: Rangeland	192.6	3.74
8000: Transportation, Communication, and Utilities	146.7	2.85
2000: Agriculture	57.7	1.12
7000: Barren Land	21.9	0.43
Total	**5,153.7**	**100**

Table 4.2. Classification of Level 2 Land Use Categories in the Gordon River Watershed, WBID 3278K

Land Use Code and Description	Acres	% Total
1200: Residential, Medium Density	1,279.0	24.82
1800: Recreation	743.8	14.43
1500: Industrial	385.3	7.48
1300: Residential, High Density	378.0	7.33
1400: Commercial	374.1	7.26
6100: Wetland Hardwood Forests	345.3	6.70
4100: Upland Coniferous	272.8	5.29
1100: Residential, Low Density	272.5	5.29
5300: Reservoirs	191.4	3.71
1700: Institutional	169.3	3.29
6200: Wetland Coniferous Forests	139.5	2.71
8100: Transportation	136.0	2.64
4200: Upland Hardwood	117.4	2.28
3300: Mixed Rangeland	84.1	1.63
3200: Shrub and Brushland	70.8	1.37
4300: Upland Mixed Forest	62.5	1.21
2100: Cropland and Pastureland	57.7	1.12
3100: Herbaceous	37.7	0.73
7400: Disturbed Land	21.9	0.43
8300: Utilities	10.7	0.21
5100: Streams and Waterways	2.1	0.04
6400: Vegetated Nonforested Wetlands	1.6	0.03
Total	**5,153.7**	**100**

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 the Gordon River watershed is based on impervious area (Harper, 2003; Duncan, 1995), as shown in **Table 4.3**. The nutrient contributions are determined by combining the runoff information for each land use with the corresponding event mean concentration (EMC) (**Table 4.4**). 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 4.3. Land Use Categories and Corresponding Runoff, 2000–07

Land Use	Area (acres)	% Impervious	Pervious Runoff Coefficient	Runoff (acre-feet)	Runoff (million gallons)
Forest/Rural Open	1,389	2.0%	0.159	1,132.3	369.0
Urban Open	22	2.0%	0.041	6.1	2.0
Agriculture/Pasture	58	4.0%	0.317	92.1	30.0
Low Density/Residential	273	14.0%	0.150	333.4	108.6
Medium Density/Residential	1,279	33.0%	0.088	2,219.9	723.4
High Density/Residential	378	33.0%	0.120	694.1	226.2
Commercial	543	72.0%	0.120	2,117.7	690.0
Industrial	396	55.0%	0.120	964.8	314.4
Highways	136	36.0%	0.542	283.0	92.2
Wetland	678	30.0%	0.230	1,409.5	459.3
Water	2	3.8%	0.000	0.3	0.1
Total	**5,154**			**9,253.22**	**3,015.17**

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

Table 4.4. 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	3,356.2	141.6	6.8%	1.8%
Urban Open	1.12	0.18	18.6	3.0	0.0%	0.0%
Agriculture/Pasture	2.32	0.344	581.2	86.2	1.2%	1.1%
Low Density/Residential	1.64	0.191	1,487.0	173.2	3.0%	2.2%
Medium Density/Residential	2.18	0.335	13,160.0	2,022.3	26.8%	25.2%
High Density/Residential	2.42	0.49	4,568.1	924.9	9.3%	11.5%
Commercial	2.42	0.49	13,936.0	2,821.8	28.4%	35.2%
Industrial	2.42	0.49	6,349.2	1,285.6	12.9%	16.0%
Highways	2.23	0.27	1,716.1	207.8	3.5%	2.6%
Wetland	1.01	0.09	3,871.2	345.0	7.9%	4.3%
Water	1.01	0.09	1.0	0.1	0.2%	0.1%
Total			**49,044.4**	**8,011.4**	**100%**	**100%**

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

Two stations located in the Gordon River (WBID 3278K) have DO and TN observations. Data providers include the Department and Collier County, which maintains a routine sampling site. **Table 5.1** shows data collection information for each of the stations. **Figure 5.1** shows the locations of the sample sites.

Table 5.1. Data Collectors and Station List for the Gordon River, WBID 3278K

Station Description	STORET ID	Data Provider	First Year Sampled	Last Year Sampled	Total # of Samples in Verified Period
Gordon River Ext. at mouth of canal leading to Main Post Office	21FLSFWMBC3	Collier County	2000	2006	2,183
Gordon River above Weir at GG Parkway	21FLFTM 28030047	Department	2000	2002	148

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

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 natural loading conditions.

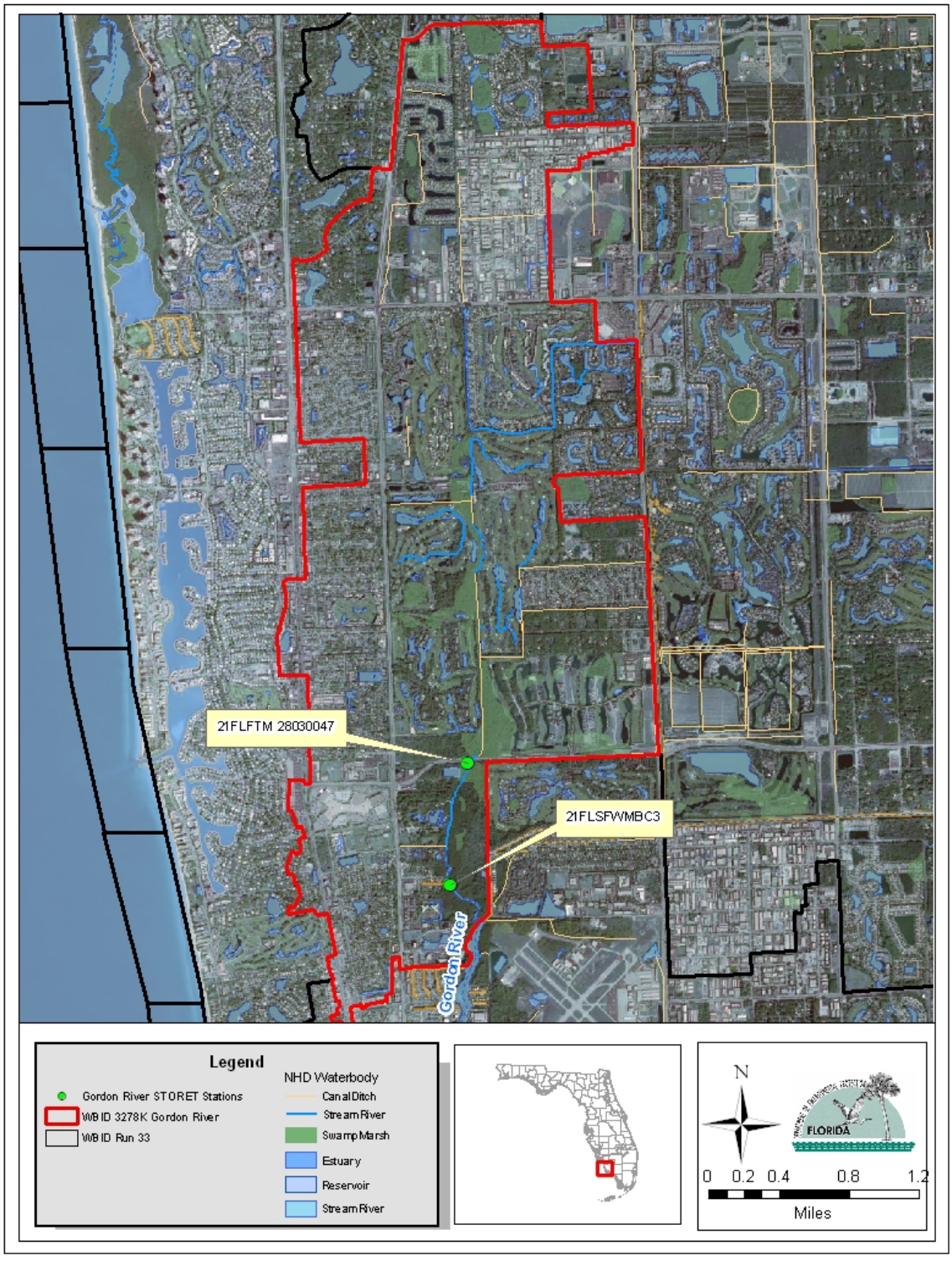

Figure 5.1. Gordon River Watershed, WBID 3278K, and Sample Stations

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 watershed, resulting in the most conservative estimated reduction that will restore the Gordon River. The 75th percentile was used to develop a reference target concentration of 0.74 mg/L for TN.

5.3 TMDL Development Process

Exceedances in the Gordon River occur throughout the year and because of the lack of matching flow data are assumed to happen under all flow conditions. Exceedances of the state criterion were compared with the water quality target. For each individual exceedance, an individual required reduction was calculated using the following:

$$\frac{\text{[(observed value) – (water quality target)]}}{\text{(observed value)}} \times 100$$

After each individual exceedance was calculated, the median of all the individual values was calculated because there was no single critical condition. The median reduction for TN is 29 percent (**Table 5.2**).

Table 5.2. TN Percent Reduction Table, 2000–06

Sample Date	Sample Location	Observed Value	TN Target (mg/L)	% Reduction
9/13/2000	21FLFTM 28030047	1.16	0.74	36.21
10/3/2000	21FLFTM 28030047	2.88	0.74	74.31
12/5/2000	21FLSFWMBC3	0.92	0.74	19.57
4/16/2001	21FLSFWMBC3	1.12	0.74	33.93
7/10/2001	21FLSFWMBC3	1	0.74	26.00
8/8/2001	21FLSFWMBC3	1.31	0.74	43.51
9/11/2001	21FLSFWMBC3	1.24	0.74	40.32
9/19/2001	21FLFTM 28030047	1.12	0.74	33.93
10/8/2001	21FLSFWMBC3	1.05	0.74	29.52
12/5/2001	21FLSFWMBC3	0.81	0.74	8.64
1/22/2002	21FLSFWMBC3	1.15	0.74	35.65
2/20/2002	21FLSFWMBC3	0.95	0.74	22.11
4/23/2002	21FLFTM 28030047	1.257	0.74	41.13
5/21/2002	21FLSFWMBC3	1.15	0.74	35.65
6/19/2002	21FLSFWMBC3	1	0.74	26.00
7/8/2002	21FLFTM 28030047	1.41	0.74	47.52
7/17/2002	21FLSFWMBC3	1.02	0.74	27.45
8/20/2002	21FLFTM 28030047	0.96	0.74	22.92
9/11/2002	21FLFTM 28030047	1.47	0.74	49.66
9/12/2002	21FLSFWMBC3	1.01	0.74	26.73
11/13/2002	21FLSFWMBC3	0.91	0.74	18.68
12/12/2002	21FLSFWMBC3	1	0.74	26.00
1/27/2003	21FLSFWMBC3	0.95	0.74	22.11
2/24/2003	21FLSFWMBC3	0.77	0.74	3.90
4/10/2003	21FLSFWMBC3	0.82	0.74	9.76
6/24/2003	21FLSFWMBC3	0.9	0.74	17.78
8/21/2003	21FLSFWMBC3	1.13	0.74	34.51
10/16/2003	21FLSFWMBC3	1.79	0.74	58.66
11/17/2003	21FLSFWMBC3	0.88	0.74	15.91
12/18/2003	21FLSFWMBC3	1.07	0.74	30.84
8/25/2004	21FLSFWMBC3	1.09	0.74	32.11
1/18/2005	21FLSFWMBC3	1.04	0.74	28.85
10/31/2005	21FLSFWMBC3	0.878	0.74	15.72
11/9/2005	21FLSFWMBC3	0.8252	0.74	10.32
5/18/2006	21FLSFWMBC3	2.01	0.74	63.18
6/19/2006	21FLSFWMBC3	1.13	0.74	34.51
			Median Percent Reduction =	**29**

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 Gordon River (WBID 3278K) 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 Gordon River, WBID 3278K

WBID	Parameter	TMDL (mg/L)	WLA		LA (% reduction)	MOS
			Wastewater (mg/L)	NPDES Stormwater (% reduction)		
3278K	TN	0.74	N/A	29%	29%	Implicit

N/A – Not applicable.

6.2 Wasteload Allocation

6.2.1 NPDES Wastewater Discharges

There are currently no wastewater facilities in the Gordon River watershed.

6.2.2 NPDES Stormwater Discharges

The WLAs for stormwater discharges with an MS4 permit (the city of Naples) is a 29 percent reduction in TN load. It should be noted that any MS4 permittee is only responsible for reducing the anthropogenic loads associated with stormwater outfalls that it owns or otherwise has responsible control over, and it is not responsible for reducing other nonpoint source loads in its jurisdiction.

6.3 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. The TMDL is a 29 percent reduction of TN, all of which is allocated to the categories of LA and WLA stormwater.

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 background 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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Florida Department of Environmental Protection. February 1, 2001. *A report to the Governor and the Legislature on the allocation of total maximum daily loads in Florida.* Tallahassee, Florida: Bureau of Watershed Management, Division of Water Resource Management.

Harper, H. 2003. *Evaluation of alternative stormwater regulations for southwest Florida: Draft final report (*Table 26: Summary of literature-based runoff concentrations for selected land use categories in southwest Florida). Water Enhancement & Restoration Coalition, Inc.

U.S. Environmental Protection Agency. 2000. *Ambient water quality criteria recommendations: Information supporting the development of state and tribal nutrient criteria for rivers and streams in Nutrient Ecoregion III.* EPA 822-B-00-016. Washington, D.C.

Appendices

Appendix A: Sample Stations and Median Concentration Data

Table A.1. Freshwater Sample Stations in the Southwest Coast Planning Unit Used in the TN–DO Correlation

WBID	Station	Latitude	Longitude	DO Median	TN Median	Observations
3278G	21FLSFWMBC12	26.00883	-81.45811	5.44	0.240	59
3278G	21FLSFWMBC18	25.91867	-81.39096	3	0.610	60
3278G	21FLSFWMBC19	25.92696	-81.41765	3.13	0.810	59
3278G	21FLSFWMBC21	25.96047	-81.50022	4.24	0.800	59
3278G	21FLSFWMCHKMATE	26.14361	-81.38929	1.71	0.830	15
3278H	21FLFTM 28030070FTM	26.29331	-81.52947	6.8	0.695	3
3278H	21FLSFWMFAKA858	26.29288	-81.52964	4.96	0.750	56
3278I	21FLSFWMBC10	26.10314	-81.05234	6.82	0.370	57
3278I	21FLSFWMBC20	25.96104	-81.51664	4.11	0.650	59
3278I	21FLSFWMBC7	25.99276	-81.52181	7.525	0.435	58
3278I	21FLSFWMBC8	25.99330	-81.49038	7.18	0.365	60
3278I	21FLSFWMBC9	26.15317	-81.55526	5.1	0.500	57
3278I	21FLSFWMFAKA	25.96051	-81.50951	6.755	0.380	58
3278V	21FLSFWMBC22	26.05711	-81.68396	6.18	0.640	57

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.

Appendix C: Public Comments and FDEP Responses

Appendix C.1: Kevin Carter / SFWMD

The below comments were received by email from Mr. Kevin Carter of the South Florida Water Management District (SFWMD) on July 18, 2008

Comment 1.: Our major comments focus on the setting of the total nitrogen (TN) threshold of 0.74 mg/l in order for the water body to meet the state of Florida's (Florida Administrative Code 62-302 http://www.dep.state.fl.us/legal/Rules/shared/62-302/302-Table.pdf) dissolved oxygen (DO) water quality criteria of 5.0 mg/l (note the TN value of 0.74 mg/l was stated at Public Workshop on 07/11/2008 and differs very slightly from what is written in the DRAFT TMDL report which is 0.76 mg/l).

FDEP Response: All of the dissolved oxygen TMDL reports for freshwater will be revised to state the correct TN threshold of 0.74 mg/L, which was used in the TMDL presentation.

Comment 2: We would like the FDEP to consider the following District observations based on our brief data investigation of the DRAFT TMDL report's "Appendix B. Water Quality Measurements Used in the Verified Period Assessment."

• Overall, this table has 171 observations of TN and DO measurements taken concurrently in the Imperial River between January 2000 to March 2007.
• Of those 171 observations, the TN concentrations were less than the 0.74 mg/l threshold proposed by the DRAFT TMDL report 47 times (27.5%).
• Of those 47 observations where TN concentrations were less than 0.74 mg/l, dissolved oxygen concentrations failed the state of Florida's 5.0 mg/l DO criteria 41 times (87.2%).

Based solely on the historical ambient data, the occurrence of TN values less than 0.74 mg/l does not regularly ensure DO values will achieve water quality criteria compliance. Some variability is to be expected with instream DO concentrations because of the many diverse reasons for low DO values (e.g., groundwater inputs). However, the relatively high percentage of failures (87.2%) should be considered carefully as the FDEP moves forward with its TMDL process for this WBID. In addition, the FDEP should review the other DO TMDLs within this round for the EWC (Hendry Creek WBIDs 3258B and 3258B1; Gordon River WBID 3278K) to determine if a similar TN and DO dynamic exists across the watershed.

FDEP Response: The Department agrees there are other significant factors affecting the dissolved oxygen concentration within the Imperial River, such as groundwater inputs, atmospheric deposition, and hydrologic modifications. The TMDL report focused on the total nitrogen threshold since it had the best relationship with DO and it exceeded the reference concentrations, which was not the case for total phosphorus and BOD. Thus, reducing total nitrogen to a median value of 0.74 mg/L (using the 75th percentile of the medians from freshwater WBIDs in the Southwest Coast Planning Unit) was used as the reference concentration target. Applying this target to reduce total nitrogen, the Department believes the anthropogenic affects would be captured, which would result in dissolved oxygen improvement. As was noted in your comments, the Everglades West Coast has uniquely high number of waterbodies with naturally low dissolved oxygen. This was the reason for utilizing waterbodies in the Everglades West Coast as reference conditions. An observation of the relatively lower TN in these reference waterbodies, as well as the correlation between DO and TN in the entire region, indicate that a decrease in the TN can result an increase in the dissolved oxygen. The FDEP does not predict a final dissolved oxygen concentration after the anthropogenic activities have been modified to reduce total nitrogen.
The FDEP agrees with your comment that more work remains to be done to understand the local hydrology and positively affect change through a collaborative effort between local stakeholders and FDEP, which can occur during the Basin Management Action Plan (BMAP) development phase of the TMDL process.

Appendix C.2: Mac Hatcher/Collier County Environmental Services Dept.

The below comments were received by email from Mr. Mac Hatcher of the Collier County Environmental Services Department July 8, 2008

Comment 1.
Figure 1.1 mixes sub-divisions and city boundaries and the canals are incorrect. I can provide GIS data for the city boundary and the canals.

FDEP Response: Figure 1.1 will be revised to better delineate local hydrologic conditions, city boundaries, and other relevant geographic features. The Department would gladly incorporate any local information available into the TMDL to more accurately reflect local conditions.

Comment 2.
You mention contributions from Charlotte Harbor NEP on page 10?

FDEP Response: Although the Charlotte Harbor NEP was very helpful in other TMDLs in region, they did not play a role in the development of this TMDL and the reference will be removed.

Comment 3.
You identify the Collier County Storm Water Management Division and in the other reports the Collier County Pollution Control Department. It would be cleaner to simply identify us all Collier County.

FDEP Response: The naming convention for Collier County government will be revised to initially read Collier County Pollution Control Department and subsequently shortened in later parts of the document to "Collier County".

Comment 4.
In Section 3.2 the group of WIBIDs utilized to determine the 75th percentile reference target used WIBID 3259I which is 39.56 % agricultural. You also utilized 21FLSFWMBC22 which is in the Henderson Creek canal. Although the basin is only 2.94 % urban most of it is along CR 951 and the canal directly upstream of the WQ station. The WIBIDs in Big Cypress were not used. Why not include samples from WIBID 3261B here?

FDEP Response: The FDEP agrees that 39.56% agricultural land use is unacceptable for a reference waterbody and thus WBID 3259I will be removed from the list of reference WBIDs.
WBID 3261B (Tamiami Canal) was not used as a reference WBID for two reasons: First, it was initially listed as impaired for DO, and only after subsequent further assessment of sample stations was it moved to category 4C (natural conditions). During this assessment it was pointed out that problems associated with sample sites might be responsible for high nutrient and low DO concentrations. The second reason is that there was an attempt to utilize WBIDs as close to the population of WBIDs being assessed. Because WBID 3261B is in not in the Southwest Coast Planning Unit, it would not have been used unless absolutely necessary.

Comment 5.
You identified a BOD target of 1.85, when the method procedure recommends a practical quantification limit of 2.0 mg/l.

FDEP Response: The thresholds for identifying a causative pollutant were developed using a region based reference concentration. Stations data (including BOD, TN, and TP) from waterbodies that met the reference criteria were used to calculate the 75th percentile of the medians. These values are found in Table 3.1 on page 15 of the report. The BOD value of 1.85 mg/L was used only as reference value to

compare with existing data for the Gordon River Extension and not used to calculate the actual percent reduction.

Comment 6.
On page 16 you include Land Use data for WIBID 3278Y which did not have any stations used to calculate the reference target, and you omitted WIBID 3278I.

FDEP Response: The land use statistics in Table 3.3 will be revised so that WBID 3278I will be used and not WBID 3278Y.

Comment 7.
On page 18 you identify the City of Naples MS4 permit but you don't include the County's MS4 permit.

FDEP Response: On page 18 Table 4.2.1 Point Sources under MS4s, the text will be revised to include the Collier County MS4 Permit # FLR04E037.

Comment 8.
In Table 5.1 the FDEP station description should be Gordon R above Weir GG Prkwy. (The weir is just below Golden Gate Parkway not 951.)

FDEP Response: The station description for STORET station 21FLFTM 28030047 will need to be revised to accurately identify its location in relation to the Golden Gate Parkway. The station latitude and longitude were confirmed to be in the correct location and appropriately assigned to WBID 3278K.

Comment 9.
On page 21 in the last paragraph you indicate that "Dissolved oxygen can also be impacted or lowered by instream modifications such as dredging and channelization". Please note that this WIBID above the Golden Gate Parkway weir is a dredged stormwater conveyance channel and the weir which limits flow from tidal exchange is necessary to prevent salt water intrusion to the City of Naples Coastal Ridge wells.

FDEP Response: This comment was included in the paragraph to explain some of the processes, whether natural or man-induced, that may affect dissolved oxygen concentrations. The Department recognizes that some hydrologic modifications need to occur and be maintained for the benefit of other water resource activities. These factors will need to taken into consideration during the restoration (BMAP) process to establish attainable water quality goals for this waterbody.

The below comments were received by email from Mr. Mac Hatcher on July 18, 2008

Comment 1: The natural portion of the system is about 0.3 miles below the control structure at Golden Gate Parkway. The main drainage canal extends approximately 3 miles north of the structure and connects with an additional 13 miles of drainage canals and ditches.

FDEP Response: The additional information on the waterbody description and canals will be incorporated into the text.

Comment 2: In the land use and loading tables in chapter 4 some of the loading rates seem high and you used a pervious runoff coefficient of 0.000 for industrial uses. Did you convert the loads to concentrations and compare with reported values?

FDEP Response: The loads were not converted into concentrations because of a lack of data on stream flow rates, which will be obtained prior to TMDL implementation. The non point source loads shown in Chapter 4, will then be combined with the stream flow and the impact on the stream concentrations can be estimated. The table provided, thus cannot be converted into concentrations and was provided to give a general idea of relative loads. The pervious runoff coefficient of 0.00 for Industrial was an error; that has been corrected (new runoff coefficient is 0.120).

Appendix C.3: Dr. Ananta Nath/SFWMD

The below comments were received by email from Dr. Ananta Nath of the South Florida Water Management District (SFWMD) on July 28, 2008

Comment 1: The CRE is the receiving waters of a watershed much larger than 4.82 sq. miles. It receives direct discharge from the Cocohatchee canal which drains a watershed of approximately 186 sq. miles. It doesn't get any runoff from the city of Bonita Springs; hence, you may state that the watershed encompasses parts of northwest collier and southwest Lee counties. Thus the report's assessment of sources (land use, population and estimation of daily fecal coliform) is not reflective of the watershed.

FDEP Response: The drainage area is used to reference the area of WBID 3259A and is not intended to be reflective of the entire Cocohatchee River watershed. The majority of the watershed originates within WBID 3278D, the Cocohatchee Inland.

Comment 2: Some earlier coliform data to the estuary may represent wet weather effluents from the North Collier Wastewater Treatment plant through west branch Cocohatchee stream, although this situation no longer exists.

FDEP Response: All data used in the impaired waters assessment and TMDL development for the Cocohatchee River estuary are from ambient water quality sites and not from point source monitoring.

Comment 3: In addition to the three mile section mentioned under section 1.2, the Gordon River extension basin receives channelized urban flow, primarily industrial runoff from the area north of Pine Ridge Road. Impaired DO can also be contributed to runoff from that segment.

FDEP Response: The local information provided in the comment above will be incorporated into the TMDL as appropriate.

Comment 4: Pelican Bay area is not a part of the GRE basin.

FDEP Response: The TMDL text will be revised as appropriate.

Comment 5: The source assessment of low DO in Gordon River can not just be attributed to GRE only; the present Gordon River receives drainage also from an ~120 square mile urbanizing watershed of the Golden Gate Canal and its tributaries.

FDEP Response: The Golden Gate Canal is also a contributor to low dissolved oxygen and is presently on the verified list of D.O. impaired water bodies. It is presently planned to address this impairment in a future.

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