Final

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Division of Environmental Assessment Restoration,

Bureau of Watershed Restoration

SOUTHWEST DISTRICT • TAMPA BAY TRIBUTARIES BASIN

TMDL Report

Dissolved Oxygen and Nutrient TMDL for Channelized Stream – Bald Eagle Creek (WBID 1483)

Woo-Jun Kang
Douglas Gilbert

August 2013

Acknowledgments

The Department also recognizes the substantial support and assistance provided by its Tampa District Office, the Southwest Florida Water Management District, Hillsborough County Environmental Protection Commission, and Plant City staff, particularly their contributions towards understanding the issues, history, and processes at work in Tampa Bay watershed.

Editorial assistance provided by Jan Mandrup-Poulsen and Moira Rojas, and technical assistance by Kevin Petrus.

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 Management
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:

Douglas Gilbert, Environmental Manager
Florida Department of Environmental Protection
Bureau of Watershed Management
Watershed Assessment Section
2600 Blair Stone Road, Mail Station 3555
Tallahassee, FL 32399-2400
Email: douglas.gilbert@dep.state.fl.us
Phone: (850) 245-8450; Suncom: 205-8450
Fax: (850) 245-8536

Kevin Petrus, Environmental Manager
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) 245–8444

Contents

List of Tables

List of Figures

Web sites

Florida Department of Environmental Protection, Bureau of Watershed Restoration

TMDL Program

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

Identification of Impaired Surface Waters Rule

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

STORET Program

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

2012 Integrated Report

http://www.dep.state.fl.us/water/docs/2012_integrated_report.pdf

Criteria for Surface Water Quality Classifications

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

Basin Status Report for the Tampa Bay Tributaries Basin

http://waterwebprod.dep.state.fl.us/basin411/tbtribs/status/TampaBayTrib2.pdf

Water Quality Assessment Report for the Tampa Bay Tributaries Basin

http://waterwebprod.dep.state.fl.us/basin411/tbtribs/assessment/TBT-LORES.pdf

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 TMDL for nutrients and dissolved oxygen (DO) for Channelized Stream (now known as Bald Eagle Creek) located in the Tampa Bay Tributaries Basin. This waterbody is a tributary of the Hillsborough River that discharges to the Upper Hillsborough River (**Figures 1.1**). Using the methodology described in the Identification of Impaired Surface Waters Rule (IWR, Rule 62-303, Florida Administrative Code) to identify and verify water quality impairments, the freshwater segment was verified as impaired for DO and nutrients. As per the IWR, the DO and nutrient impairment of Channelized Stream were included on the verified list of impaired waters for the Tampa Bay Tributaries Basin that was adopted by Secretarial Order on May 19, 2009. The TMDL process quantifies the amount of a pollutant that can be assimilated in a waterbody, identifies the sources of the pollutant, and recommends regulatory or other actions to be taken to achieve compliance with applicable water quality standards, based on the relationship between pollution sources and in-stream water quality conditions.

1.2 Identification of Waterbody

For assessment purposes, the Department has divided the Tampa Bay Tributaries Basin into water assessment polygons with a unique **w**ater**b**ody **id**entification (WBID) number for each watershed or stream reach. Channelized Stream is assigned to WBID 1483 (**Figure 1.2**).

Based on station descriptions in the WBID, the identification (name) of the affected waterbody was changed from Channelized Stream to Bald Eagle Creek in the Impaired Surface Waters Rule (IWR) Run 45. From this point forward in the document, Channelized Stream will be referred to as Bald Eagle Creek.

Bald Eagle Creek is one of 131 waterbody segments in the Tampa Bay Tributaries Group 2 Basins, Hillsborough River Basin Planning Unit, and one of 21 waterbody segments in the Hillsborough River Basin included on the initial 1998 303(d) list submitted by the Department to the United States Environmental Protection Agency (EPA). The 1998 303(d) list was incorporated into a 1999 Consent Decree between EPA and Earth Justice.

The initial list used data from stations listed in the Department's 1996 305(b) report. The report used best available information at the time to generally characterize the quality of Florida's waters. Some of the delineations of waterbody areas and locations of sampling stations for the 1998 303(d) list were inaccurate due to technical limitations at that time. With the primary goal of providing more accurate assessments, the Department has revised the delineations over time. EPA has labeled the redrawing of WBID boundaries "resegmentation," as the original stations corresponded to specific WBID areas or segments. Resegmented WBIDs are those WBIDs that have been altered from the initial 1998 303(d) Consent Decree or previous cycle boundaries. As a result of the resegmentation process for the Group 2 Basins, there are currently 28 Consent Decree waterbody segments in the Tampa Bay Tributaries Basin (what used to be the Hillsborough River Basin). This number is based on Impaired Waters Rule (IWR, 62-303, F.A.C) Run 35_3.

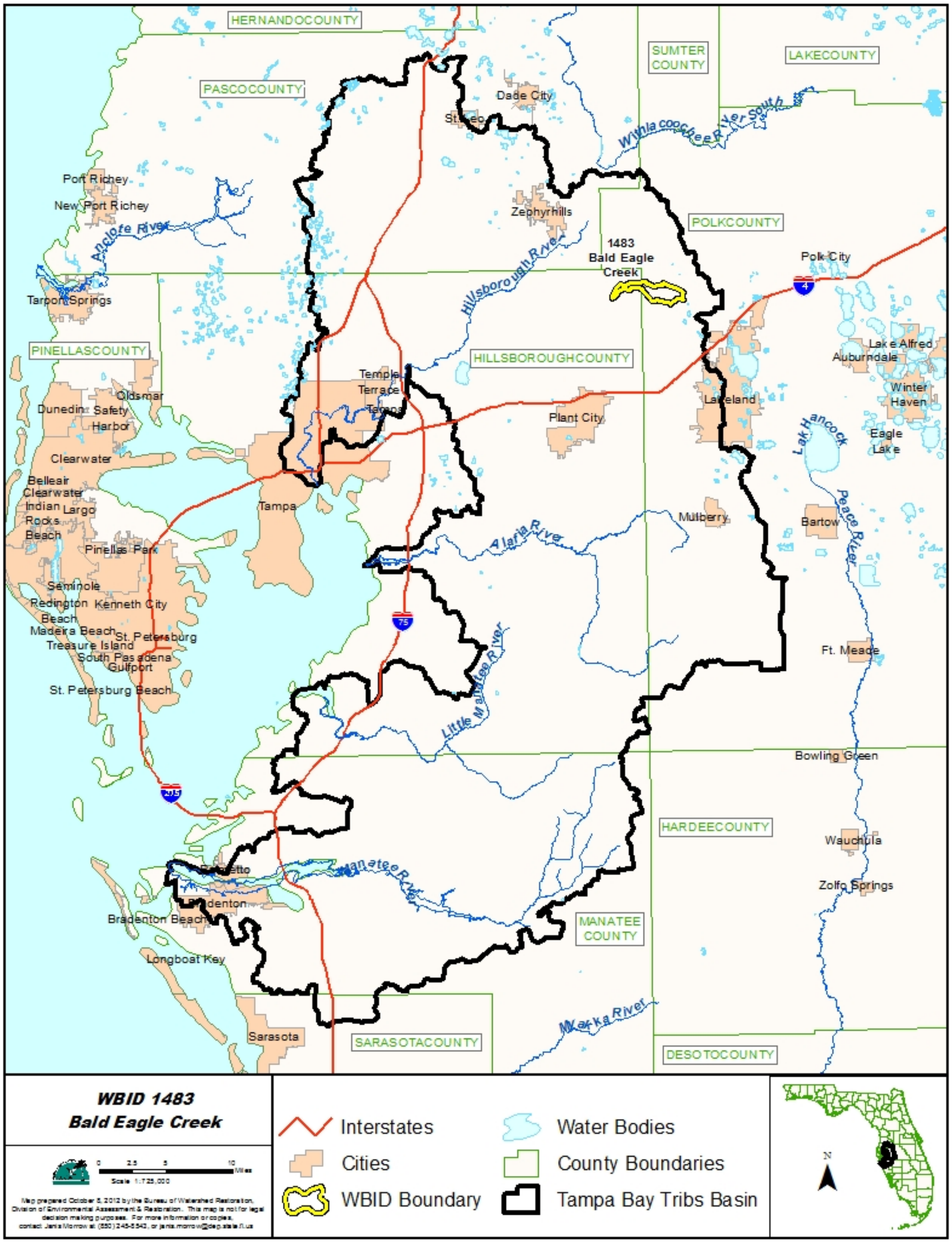
The Hillsborough River begins east-northeast of Zephyrhills in southeastern Pasco and northwestern Polk Counties. Its headwaters originate in the southwestern portion of the Green Swamp, where it also receives overflow from the Withlacoochee River. The river channel is not clearly defined until the river leaves the swamp. From there, it flows southwesterly 54 miles to upper Hillsborough Bay and drains more than 690 square miles. Perennially flowing tributaries to the Hillsborough River are Big Ditch, and Flint Creek. Intermittent streams are Indian Creek, New River, Two Hole Branch, Basset Branch, Hollomans Branch, Clay Gully, Trout Creek, Blackwater Creek, and Cypress Creek. High floodwaters are diverted from the Hillsborough River at the confluence of Trout Creek and upstream of the Tampa Reservoir Dam through the Tampa Bypass Canal to McKay Bay.

Bald Eagle Creek (WBID 1483) is located at the border between northeast Hillsborough County and northwest Polk County, about 6 miles northeast of the city of Lakeland (**Figure 1.2**). The climate in this area is sub-tropical. Based on a weather station located in the City of Lakeland (Latitude 28.02 degree, Longitude -81.92 degree) (available http://acis.sercc.com/), the annual rainfall for the area averages about 49.13 inches for a 30-year period from 1971 through 2000. The average summer temperature is 83.6^{o}F, and the average winter temperature is 63.6^{o}F. The ecoregion of the Bald Eagle Creek watershed reflects its location within the Southwestern Florida Flatwoods or Southern Coastal Plains. Elevations in the downstream portion of the watershed range from around 90 feet above sea level to the upstream portion of the watershed around 150 feet above sea level based on the USGS 1:24,000 Quad Sheet. The predominant soil type is medium fine sand and silt (FDEP, 2008).

1.3 TMDL Background Information

The TMDL report for Bald Eagle Creek is part of the implementation of the Florida Department of Environmental Protection's (Department) watershed management approach for restoring and protecting water resources and addressing Total Maximum Daily Load (TMDL) Program requirements. The watershed approach, which is implemented using a cyclical management process that rotates through the state's fifty-two river basins over a five-year cycle, provides a framework for implementing the requirements of the 1972 federal Clean Water Act and the 1999 Florida Watershed Restoration Act (Chapter 99-223, Laws of Florida). A TMDL represents the maximum amount of a given pollutant that a waterbody can assimilate and still meet the waterbody's designated uses. A waterbody that does not meet its designated uses is defined as impaired. TMDLs must be developed and implemented for each of the state's impaired waters, unless the impairment is documented to be a naturally occurring condition that cannot be abated by a TMDL or unless a management plan already in place is expected to correct the problem.

The development and implementation of a restoration plan to reduce the amount of nutrients that caused the verified impairment will follow this TMDL report. These activities will depend heavily on the active participation of the Southwest Florida Water Management District (SWFWMD), 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 TMDL for impaired waterbody.



Note: FDOT state routes are for illustration purposes only and are not meant to depict roadways for which FDOT is responsible.

Figure 1.1 Bald Eagle Creek Watershed and Major Geopolitical Features in the Tampa Bay Tributaries Basin

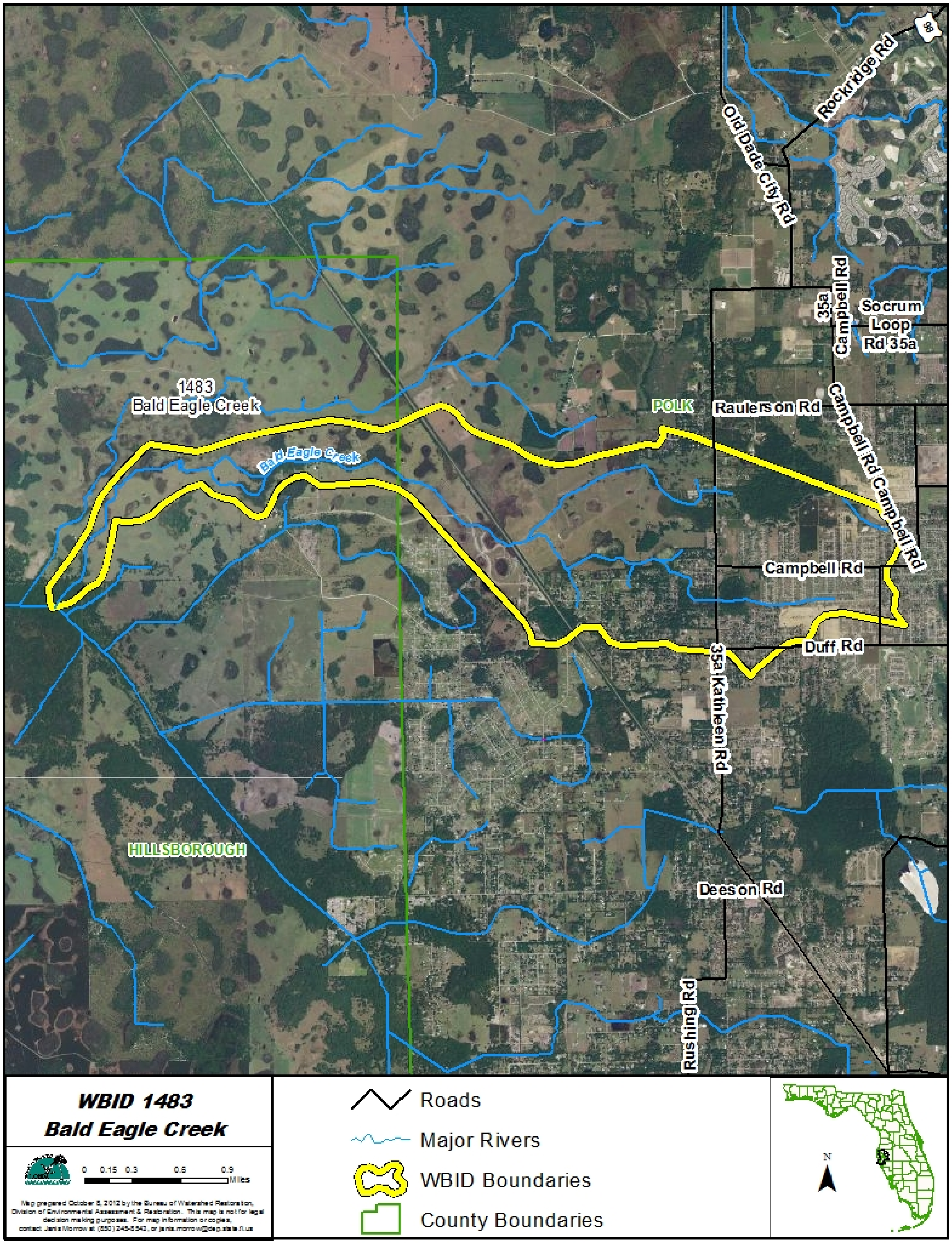


Figure 1.2 Major Geopolitical Features for Bald Eagle Creek in the Tampa Bay Tributaries Basin

Chapter 2: DESCRIPTION OF WATER QUALITY PROBLEM

2.1 Statutory Requirements and Rulemaking History

Section 303(d) of the Federal Clean Water Act requires states to submit to the U.S. Environmental Protection Agency (EPA) a list of surface waters that do not meet applicable water quality standards (impaired waters) and establish a TMDL for each pollutant causing the identified impairment of the listed 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 is also required by the FWRA (Subsection 403.067[4)], Florida Statutes [F.S.]), and the Department is developing basin-specific lists as part of the watershed management cycle.

The 1998 303(d) list included 21 waterbodies (WBIDs) in the Tampa Bay Tributaries Group 2 Basins, Hillsborough River Basin Planning Unit. As a result of the resegmentation process for the Group 2 Basins, there are currently 28 Consent Decree waterbody segments in the Hillsborough River Basin Planning Unit. 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 rule-making process, the Environmental Regulation Commission adopted the new methodology as Chapter 62-303, F.A.C., entitled Identification of Impaired Surface Waters (IWR), in April 2001 and amended in 2006 and 2007. The list of waters for which impairments have been verified using the methodology in the IWR is referred to as the Verified List.

2.2 Information on Verified Impairment

The Department used the IWR to assess water quality impairments of Bald Eagle Creek and verified impairments for DO and nutrients **(Table 2.1).** The main source of data for the IWR assessment is shown in **Table 2.2**. For Bald Eagle Creek, water quality and flow gage stations available for data analyses were limited for the verified period, and no historical water quality data were available. Spatial distribution of sampling stations for WBID 1483 is presented in **Figures 2.1**. The IWR methodology uses chlorophyll-*a* measurements (a measure of algal biomass) to interpret Florida's narrative nutrient criterion, and the number of DO criterion exceedances is evaluated to assess for DO impairment.

The DO and Chla results from 2001 to 2008 (the verified period used for the IWR assessment) for Bald Eagle Creek are shown in **Figures 2.2 and 2.3.** Seasonal and annual average Chla levels only for 2005 were available and presented in **Figures 2.4 and 2.5**, respectively. Bald Eagle Creek is on the Verified List for DO and nutrients because more than 10 percent of the DO results observed from 2001 to 2008 did not meet the freshwater DO criterion of 5 milligrams per liter (mg/L) and exceeded the freshwater Chla threshold of 20 ug/L in 2005. Summary statistics for DO from 2001 to 2008 are provided in **Table 2.2**.

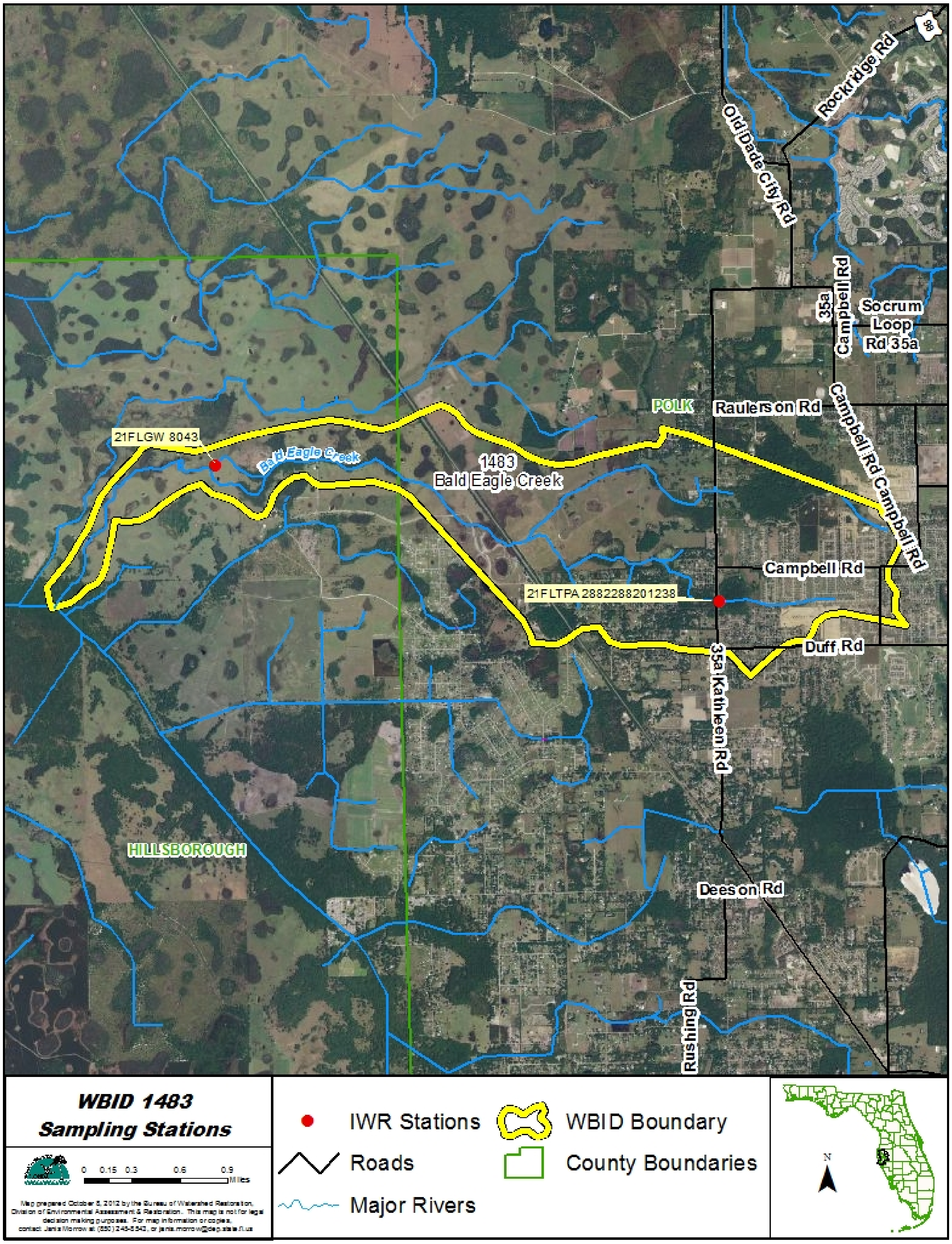
Table 2.1 Verified Impaired Listings for Bald Eagle Creek (WBID 1483)

Parameters of Concern	Priority for TMDL Development	Projected Year for TMDL Development*
Dissolved Oxygen, Nutrients	Medium High	2008

*This TMDL was scheduled to be completed by December 31, 2008, based on a Consent Decree between the EPA and EarthJustice, but the Consent Decree allows a 9-month extension for completing the TMDL.

Table 2.2 DO Summary Statistics for Impaired Bald Eagle Creek (WBID 1483) from 2001 to 2008

Waterbody Name	Station ID	Number of Samples	Min	Max	Mean	Median	Exceed -ances	% Excee- dances
Bald Eagle Creek	21FLTPA 2882288201238	24	0.4	5.1	1.5	1.1	23	95.8



Note: FDOT state routes are for illustration purposes only and are not meant to depict roadways for which FDOT is responsible.

Figure 2.1 Bald Eagle Creek Watershed System and Monitoring Locations

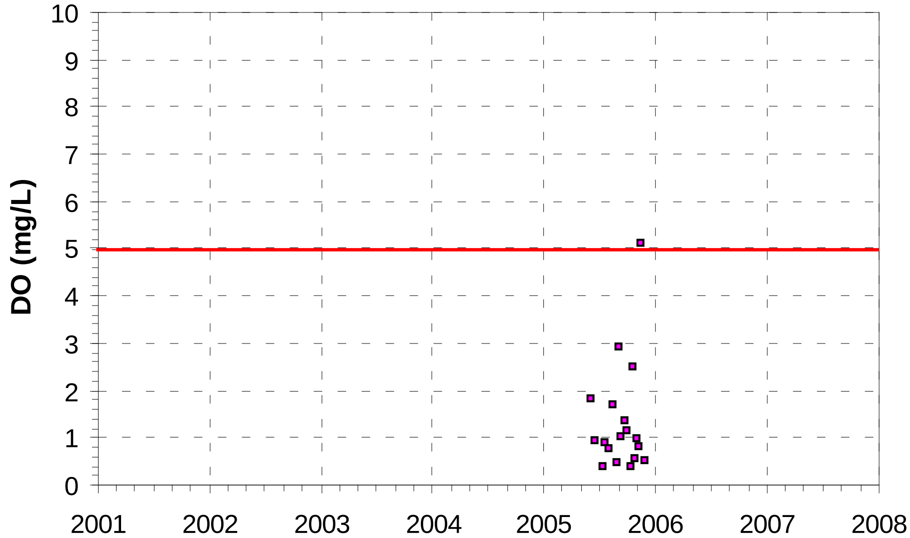


Figure 2.2 Concentrations of Dissolved Oxygen observed from 2001 to 2008 during the Verified Period. Red Line indicates the DO Criteria of 5 mg/L

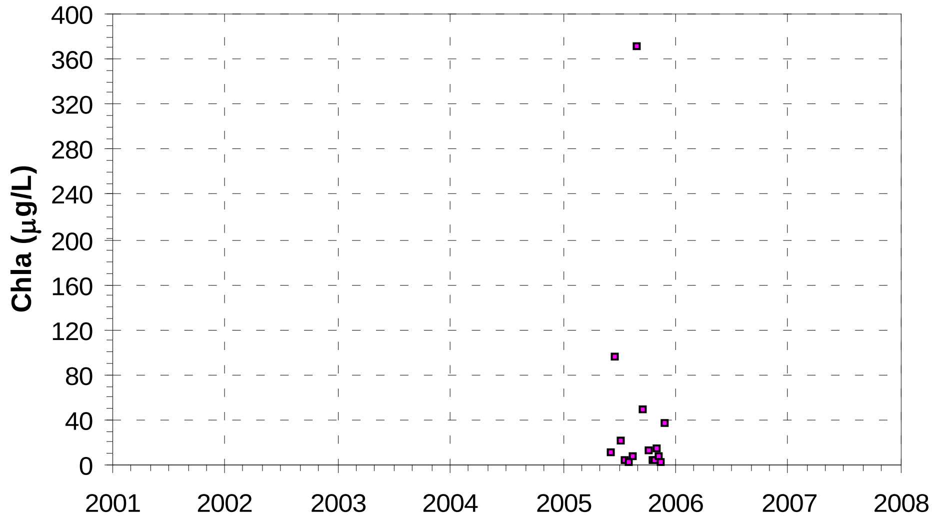


Figure 2.3 Concentrations of Chla observed from 2001 to 2008 at Bald Eagle Creek during the Verified Period

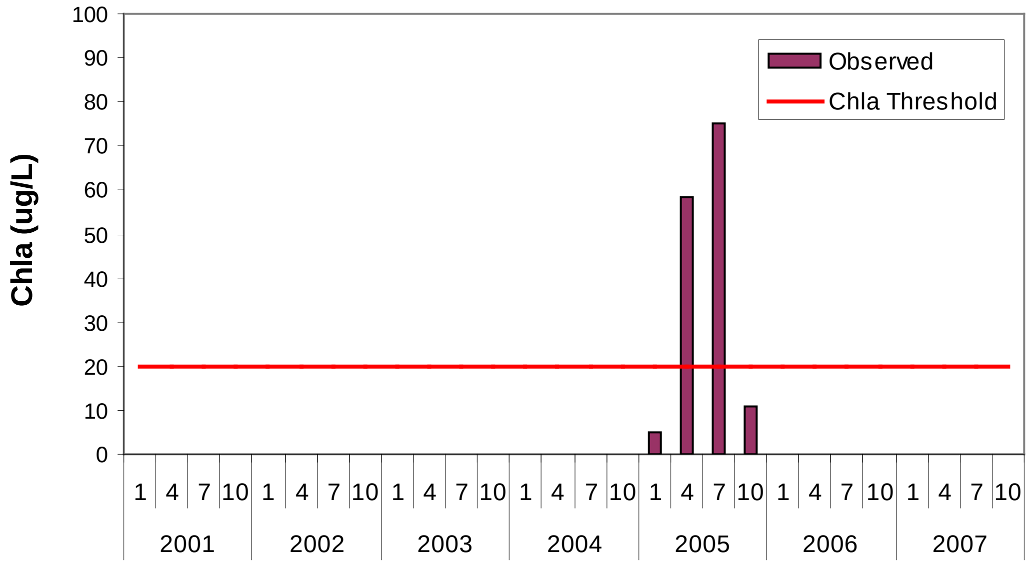


Figure 2.4 Seasonal Variation in Concentrations of Chla observed from 2001 to 2008 during the Verified Period

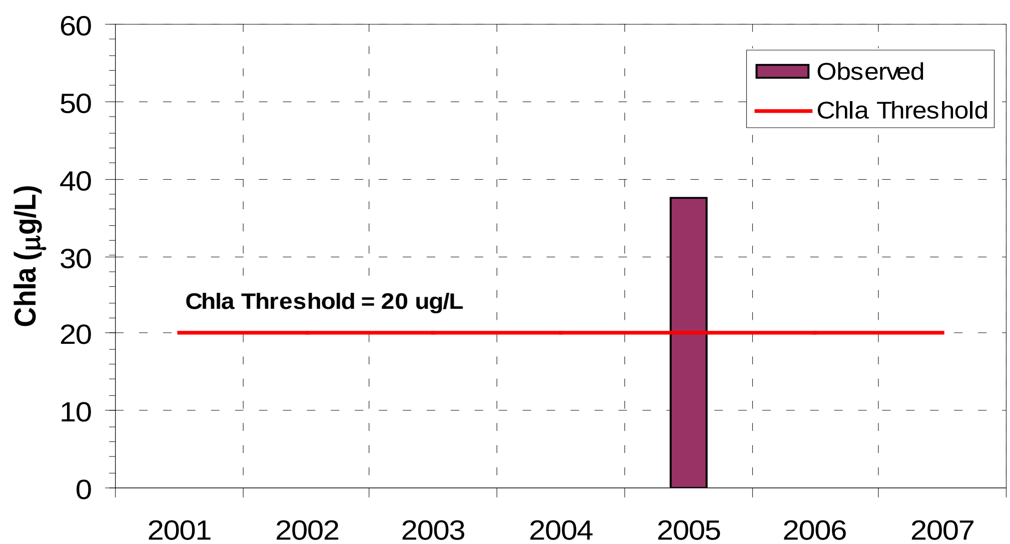


Figure 2.5 Annual Variation in Concentrations of Chla observed from 2001 to 2008 during the Verified Period

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 water is 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)**

Bald Eagle Creek is classified as a Class III freshwater waterbody, with a designated use of recreation, propagation and maintenance of a healthy, well-balanced population of fish and wildlife. The Class III water quality criteria applicable to the observed impairments are DO and nutrients for WBID 1483.

3.2 Applicable Water Quality Standards and Numerical Water Quality Targets

3.2.1 Interpretation of DO Criteria

Florida's DO criterion for Class III fresh waterbodies states that DO "shall not be less than 5.0 mg/L, and the normal daily and seasonal fluctuations above this levels shall be maintained." However, DO concentrations in ambient waters can be controlled by many factors, including the DO solubility, which is controlled by temperature; DO enrichment processes influenced by reaeration, which is controlled by flow velocity and water depth; photosynthesis of phytoplankton, periphyton, and other aquatic plants; DO consumption from the decomposition of organic materials in the water column and sediment and oxidation of some reductants such as ammonia and metals; and respiration by aquatic organisms.

The DO concentration in some seasons could be naturally low because of the high bacteria respiration supported by a large and constant supply of dissolved organic carbon (DOC) originating from the wetland areas that discharge into streams. Although the major portion of the DOC pool is usually recalcitrant to most bacteria species, some bacteria species adapted to living in blackwater systems can readily use this DOC pool to support their growth. Bacteria activities can be significantly stimulated if nitrogen and phosphorus are added into the system because they provide bacteria with nutrients. Further stimulation of bacteria activities can be observed if DOCs of human origin (usually represented with the biochemical oxygen demand – BOD) are added to the system. Human DOCs are usually easy to decompose and can be readily used by bacteria. These DOCs not only can enhance the metabolic activities of bacteria species that use recalcitrant DOCs, but also provide the carbon source to those bacteria species that cannot use recalcitrant DOCs. Therefore, input of human sources of DOC into a blackwater system should be properly controlled to improve the DO condition in these waters.

Another source of DO consumption may originate from the organic materials accumulated in the stream over time. Due to the limited amount of time available to conduct this study, factors that control DO concentration in the streams were not examined by measuring the actual DO consumption rate from each source. One method of identifying causative pollutants for the DO impairment is to use statewide screening level concentrations set at the 70th percentile of all STORET data across the state from 1970 to 1987 (Freidemann and Hand, July 1989). 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. For WBID 1483, median BOD5 concentration during the verified period was observed to be 1.70 mg/L (n = 22). This observed value was much lower than the screening level of BOD, suggesting that BOD may not be a causative pollutant in the Bald Eagle Creek basin. However, the department has noted that there are significantly lower values than the nutrient screening levels leading to impairment in many cases. Therefore, TN, TP, and Chla concentrations were treated as the focus of this study as discusses later sections in this report.

3.2.2 Interpretation of the Narrative Nutrient Criterion

To place a waterbody segment on the Verified List for nutrients, the Department must identify the limiting nutrient or nutrients causing impairment as required by the IWR. The following method is used to identify the limiting nutrient(s) in streams.

The IWR's numeric Chla threshold for rivers and streams is used to represent levels at which an imbalance in flora or fauna is expected to occur. While the IWR provides a threshold for nutrient impairment for streams based on annual average Chla levels, these thresholds are not standards and need not be used as the nutrient-related water quality target for TMDLs. In fact, in recognition that the IWR thresholds were developed using statewide 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.

Under the IWR, nutrient impairment for freshwater streams is assessed by determining if annual average Chla values exceed 20 μg/L, or if there are annual Chla averages more than 50 percent greater than the historical value for at least 2 consecutive years.

According to EPA's Nutrient Criteria Technical Guidance Manual, one of the most defensible approaches for nutrient criteria was to establish cause-effect relationships between nutrients and biological health endpoints for rivers and streams. For this approach, EPA recommended setting nutrient criteria based on an inclusive distribution of values obtained from reference sites in a designated ecoregion. Bald Eagle Creek is located in the Tampa Bay Tributaries Basin in the Bone Valley ecoregion. The use of ecoregional criteria for establishing ecoregional nutrient targets is discussed in **Section 3.2.4.**

3.2.3 Narrative Nutrient Criteria Definitions

Chlorophyll *a*

Chlorophyll is a green pigment found in plants and is an essential component in the process of converting light energy into chemical energy. Chlorophyll a is capable of channeling the energy of sunlight into chemical energy through the process of photosynthesis. In photosynthesis, the energy absorbed by chlorophyll transforms carbon dioxide and water into carbohydrates and oxygen. The chemical energy stored by photosynthesis in carbohydrates drives biochemical reactions in nearly all living organisms. Thus, chlorophyll is at the center of the photosynthetic oxidation-reduction reaction between carbon dioxide and water.

There are several types of chlorophyll; however, the predominant form is chlorophyll *a* (Chla). The measurement of Chla in a water sample is a useful indicator of phytoplankton biomass, especially when used in conjunction with analysis concerning algal growth potential and species abundance. The greater the abundance of Chla, typically the greater the abundance of algae. Algae are the primary producers in the aquatic food web, and thus are very important in characterizing the productivity of lakes and streams.

Total Nitrogen as N (TN)

Total nitrogen is the combined measurement of nitrate (NO_3), nitrite (NO_2), ammonia, and organic nitrogen found in water. Nitrogen compounds function as important nutrients to many aquatic organisms and are essential to the chemical processes that exist between land, air, and water. The most readily bio-available forms of nitrogen are ammonia and nitrate. These compounds, in conjunction with other nutrients, serve as an important base for primary productivity.

The major sources of excessive amounts of nitrogen in surface water are the effluent from municipal treatment plants and runoff from urban and agricultural sites. When nutrient concentrations consistently exceed natural levels, the resulting nutrient imbalance can cause undesirable changes in a waterbody’s biological community and drive an aquatic system into an accelerated rate of eutrophication. Usually, the eutrophication process is observed as a change in the structure of the algal community and includes severe algal blooms that may cover large areas for extended periods. Large algal blooms are generally followed by depletion in dissolved oxygen concentrations as a result of algal decomposition.

Total Phosphorus as P (TP)

Phosphorus is one of the primary nutrients that regulates algal and macrophyte growth in natural waters, particularly in fresh water. Phosphate, the form in which almost all phosphorus is found in the water column, can enter the aquatic environment in a number of ways. Natural processes transport phosphate to water through atmospheric deposition, ground water percolation, and terrestrial runoff. Municipal treatment plants, industries, agriculture, and domestic activities also contribute to phosphate loading through direct discharge and natural transport mechanisms. The very high levels of phosphorus in some of Florida’s streams and estuaries are usually caused by phosphate mining and fertilizer processing activities.

High phosphorus concentrations are frequently responsible for accelerating the process of eutrophication, or accelerated aging, of a waterbody. Once phosphorus and other important nutrients enter the ecosystem, they are extremely difficult to remove. They become tied up in biomass or deposited in sediments. Nutrients, particularly phosphates, deposited in sediments generally are redistributed to the water column. This type of cycling compounds the difficulty of halting the eutrophication process.

3.2.4 Numeric Water Quality Target Development

To address the DO and nutrient impairment in developing the TMDL, a reference waterbody approach was used to establish nutrient concentration targets for total nitrogen and total phosphorus. This approach was used to establish nutrient targets for the impaired stream segments in the Tampa Bay Basin and Hillsborough River Basin with draft dissolved oxygen and nutrient TMDLs proposed by the Department in 2009. The target concentrations were derived by using data from waters not impaired for DO and nutrients in the Tampa Bay watershed that were similar to the impaired waterbodies, in terms of hydrologic conditions and drainage area size. By having applied the EPA recommended TMDL development procedures for non-numeric water quality standards, there is the expectation that the DO and nutrient criteria will be met, if the selected target values are achieved (EPA, 1999).

The methods used to develop the restoration targets are described below. Separate targets were developed for the Tampa Bay watershed stream and estuary segments in both the “Bone Valley” and “Peninsula” ecoregions. Bald Eagle Creek is located within the “Bone Valley” ecoregion.

Setting the Restoration Targets:

1. WBIDs used in this process are WBIDs assessed as “Not Impaired” for both Dissolved Oxygen and Nutrients (based on chlorophyll a) following the Florida Impaired Waters Rule Assessment Methodology. The water quality assessments are based on recent data collected in the Basin Rotation Cycle 2 Verified Periods in the stream and estuary WBIDs of the Tampa Bay watershed.
2. From this set of “Not Impaired” waters, WBIDs were removed from further consideration if a point source discharges to surface waters in the WBID or if the drainage area of the WBID was determined to be appreciably different than that of the impaired WBIDs for which reference target conditions are being developed.
3. For streams, this process resulted in excluding three stream WBIDs because they directly receive point source discharge effluent. An additional four stream WBIDs on the main stem of the rivers flowing to Tampa Bay, (one WBID each along the Hillsborough, Alafia, Little Manatee, and Manatee Rivers) were excluded because their drainage areas are larger than the impaired stream WBIDs for which the nutrient targets are being developed.
4. For estuaries, two WBIDs were excluded because they receive input from point source discharges. Additionally, all the WBIDs located within the major Tampa Bay segments were excluded due to their larger size relative to the tidal streams and embayments for which the nutrient targets are being developed.
5. The stream and estuary WBIDs that that were not excluded in the screening process and were used for nutrient target setting are listed in Table C-1 and displayed in Figure C-1 in Appendix C.

6. For the set of WBIDs used to develop the nutrient targets, the concentrations were calculated using the Cycle 2 verified period nutrient data, obtained from IWR Database Run 35_2, that covers the period of 2000-2007.
7. The data were first analyzed by station and year by calculating annual station medians for total nitrogen and total phosphorus. Station data included in this process had to have a minimum of 8 samples in a calendar year for an annual median to be calculated.
8. Separate annual averages of the station medians were then calculated for the streams and estuaries in both the Bone Valley and Peninsula ecoregions. For each of these four groups the average of the annual averages for all the station medians in each reference group in the verified period were calculated and selected as the nutrient target concentrations (each year of the verified period, where sufficient data were available, provided equal weight). The station medians and averages used to establish the targets are provided in Table C-2 in Appendix C.
9. The resulting nutrient concentration targets from the data analyses are shown in **Table 3.1**.

Table 3.1 Stream and Estuary Target Concentrations by Ecoregion

Parameter	Bone Valley Stream	Bone Valley Estuary	Peninsula Stream	Peninsula Estuary
Total Nitrogen (mg/L)	1.16	1.04	0.87	0.97
Total Phosphorus (mg/L)	0.473	0.309	0.181	0.158

The nutrient targets are used for establishing the TMDL by calculating the reductions needed in existing concentrations to meet the targets. The process for calculating pollutant reductions is described in Chapter 5. Based on the results shown in Table 3.1, the TN and TP TMDL targets for Bald Eagle Creek are 1.16 mg/L for TN and 0.473 mg/L for TP.

Chapter 4: ASSESSMENT OF SOURCES

4.1 Types of Pollutants

TMDL analysis is the identification of pollutant source categories, source subcategories, or individual sources of the pollutant of concern 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 have 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). These nonpoint sources included certain urban stormwater discharges, including those from local government master drainage systems, construction sites over five acres, and a wide variety of industries (see **Appendix A** for background information on the federal and state stormwater programs). To be consistent with Clean Water Act definitions, the term "point source" will be used to describe traditional point sources (such as domestic and industrial wastewater discharges) and stormwater systems requiring an NPDES stormwater permit when allocating pollutant load reductions required by a TMDL. 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 Point Sources in the Watershed

4.2.1 Point Sources

Municipal separate storm sewer systems (MS4s) may discharge nutrients to waterbodies in response to storm events. To address stormwater discharges, the EPA developed the NPDES stormwater permitting program in two phases. Phase I, promulgated in 1990, addresses large and medium MS4s located in incorporated places and counties with populations of 100,000 or more. Phase II permitting began in 2003. Regulated Phase II MS4s, which are defined in Section 62-624.800, F.A.C., typically cover urbanized areas serving jurisdictions with a population of at least 10,000 or discharge into Class I or Class II waters, or Outstanding Florida Waters. The stormwater collection systems of the Bald Eagle Creek watershed are permitted by Hillsborough County (#FLS 000006), and Polk County (#FLS 000015).

In October 2000, Hillsborough County drafted a watershed management plan involving berm construction, channel improvements, and structural upgrades for flood control and some water quality treatment. The Hillsborough Planning and Growth Management Department is in the process of carrying out a septic tank study for the watershed that identifies the location of septic tanks, assesses their impacts on water quality, and recommends management techniques to improve their efficiency.

4.2.2 Nonpoint Sources and Land Uses

Nonpoint source pollution, unlike pollution from industrial and sewage treatment plants, comes from many diffuse sources. Nonpoint pollution is caused by rainfall moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters, and even our underground sources of drinking water.

Nutrient loading from urban areas is most often attributable to multiple sources, including stormwater runoff, leaks and overflows from sanitary sewer systems, illicit discharges of sanitary waste, runoff from improper disposal of waste materials, leaking septic systems, and domestic animals. In agricultural areas, agricultural fertilizing or nutrients from wildlife and agricultural livestock wastes are sources contributing to the pollutant load.

Land Use

The spatial distribution and acreage of different land use categories for the Bald Eagle Creek watershed were identified using 2009 Southwest Florida Water Management District (SWFWMD) land use coverage data (scale 1:40,000) contained in the Department's geographic information system (GIS) library. Within the Tampa Bay Tributaries Basin, land use type varies from dense urban to rural and agricultural. One of the most dominant land uses is cropland/pastureland in agricultural land use in the basin.

Based on 2009 land use coverage data in the Bald Eagle Creek WBID the percentage of anthropogenic land use was about 76.6% of the total acreage of the watershed, including low, medium and high density residential (34.5%), urban built-up (0.5%), and agriculture (41.7%). Natural land uses accounted for about 23.4% of the area (**Table 4.1** and **Figure 4.1**). Land use in the eastern part of the watershed consists primarily of urban land uses, whereas agriculture dominates in the western part (**Figure 4.1**).

Table 4.1 Total Acreage of the Various Land Use Categories in the Bald Eagle Creek Watershed in 2009

FLUCC Code	Land Use	Acreage	% Acreage
1100	Residential Low Density	132.6	5.2%
1200	Residential Medium Density	567.1	22.1%
1300	Residential High Density	185.0	7.2%
1700	Institutional	2.3	0.1%
1900	Open Land	10.3	0.4%
2100	Cropland And Pastureland	998.8	38.9%
2200	Tree Crops	9.8	0.4%
2400	Nurseries and Vineyards	25.5	1.0%
2550	Tropical Fish Farms	6.6	0.3%
2600	Other Open Lands	28.6	1.1%
3200	Shrub and Brushland	36.0	1.4%
4100	Upland Coniferous Forest	3.2	0.1%
4340	Hardwood Conifer Mixed	33.7	1.3%
4400	Tree Plantations	45.1	1.8%
5300	Reservoirs	6.3	0.2%
6150	Stream and Lake Swamps (Bottomland)	194.9	7.6%
6210	Cypress	79.2	3.1%
6300	Wetland and Forested Mixed	8.3	0.3%
6410	Freshwater Marshes	172.2	6.7%
6430	Wet Prairies	7.8	0.3%
6440	Emergent Aquatic Vegetation	7.9	0.3%
6530	Intermittent Ponds	4.5	0.2%
	Total	**2,565.8**	**100.0%**

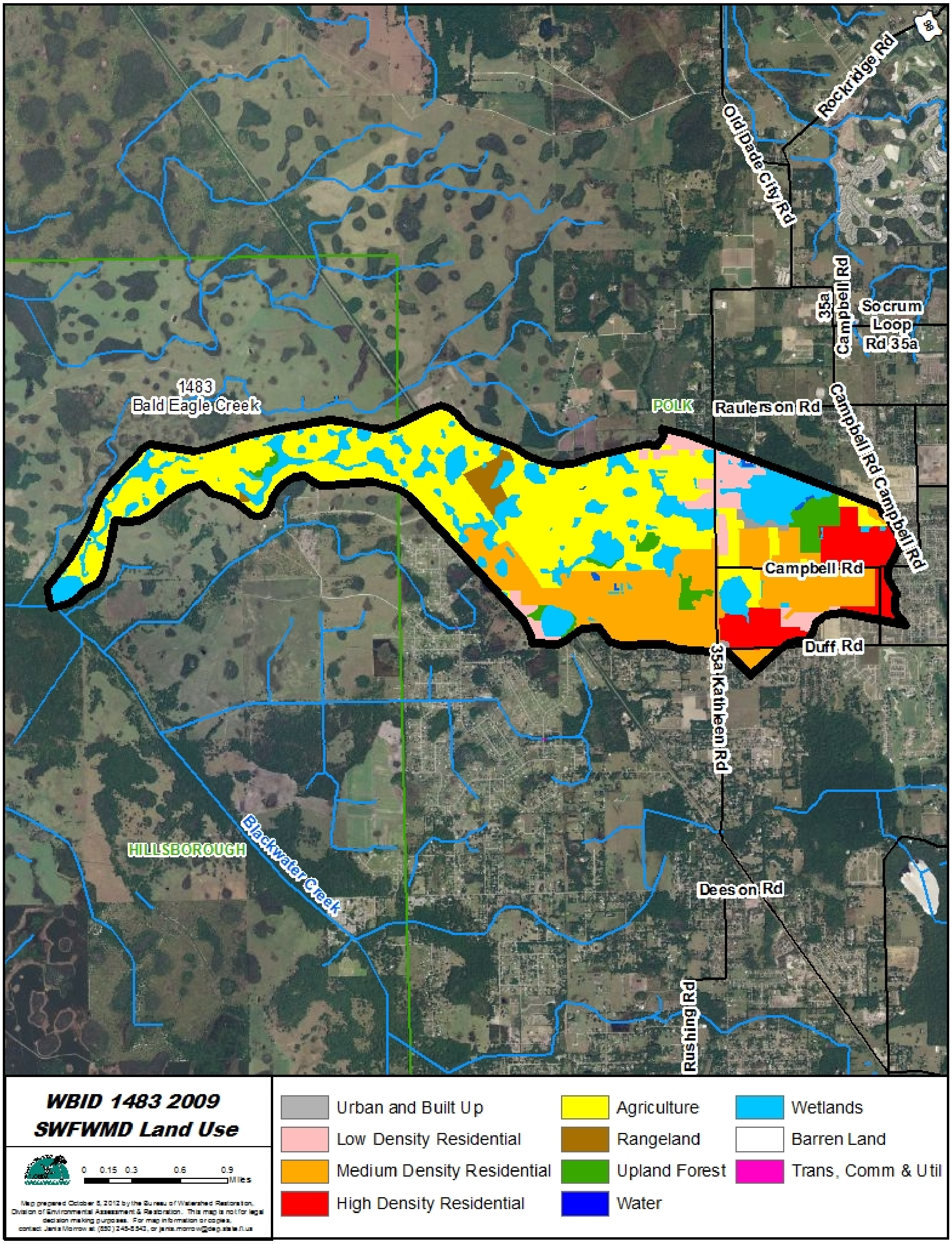


Figure 4.1 2009 Land Use Categories in the Bald Eagle Creek Watershed

Hillsborough and Polk County Population

The Bureau reports that the total population for Hillsborough County for 2012 was 1,277,746, making it the third most populous county in the state. There are 540,190 housing units in the county, with an average density of 405 houses per square mile. There are 2.59 persons per household in Hillsborough Count (U.S. Census Bureau, 2012).

The Bureau reports that the total population for Polk County for 2012 was 616,158, making it the ninth most populous county in the state. There are 281,004 housing units in the county, with an average housing density of 121 houses per square mile. There are 2.63 persons per household in Polk County (U.S. Census Bureau, 2012).

Septic Tanks

Onsite sewage treatment and disposal systems (OSTDSs), including septic tanks, are commonly used where providing central sewer is not cost-effective or practical. When properly sited, designed, constructed, maintained, and operated, OSTDSs are a safe means of disposing of domestic waste. The effluent from a well-functioning OSTDS is comparable to secondarily treated wastewater from a sewage treatment plant. When not functioning properly, however, OSTDSs can be a source of nutrients (nitrogen and phosphorus), pathogens, and other pollutants to both ground water and surface water.

Septic tank effluent (STE) characteristics and loading rates have been reported in several studies (CDM, 1991; UF/IFAS, 1984). STE contains varied concentrations of nitrogen, phosphorus, chloride, sulfate, sodium, detergent surfactants, and pathogenic bacteria and viruses. OSTDS use soil adsorption capabilities to remove nutrients and bacteria from the treated effluent. Removal of TN in soils could vary from 40 to 60 percent (UF/IFAS, 1984) before reaching the water table. Once the nitrogen has reached the form of nitrate (NO_3) in the water table, it remains stable as it is transported to a waterbody. Phosphorus is removed from the STE at a higher rate, 50 to 98 percent (CDM, 1991; UF/IFAS, 1984), and from the ground water by sorption and precipitation. Phosphorus-contaminated waterbodies from OSTDS are indicative of proximity of these systems, usually less than 150 ft (UF/IFAS, 1984). When at least two feet of unsaturated soil exist between the infiltration system and the water table, BOD_5 removals of >90%, TSS removals of >95% and fecal coliform reductions of > 99% can be expected for a functional and properly maintained septic tank. Bacteria and viruses are effectively removed by adsorption and sorption processes in the ground water and are not transported far from the STE source.

UF/IFAS estimated 11 to 18 lb/yr/capita of TN loading factor to the water table; whereas, a 9.2 lb/yr/capita was reported by EPA (2002). Likewise for TP, the estimated per capita loading factors were 0.4 to 1.6 and 1.2 lb/yr, respectively. The difference relies on the decreasing loading rate of nutrients present in the current composition of detergent supplies that were implemented in recent years.

Hillsborough and Polk County Septic Tanks

As of 2012, Hillsborough County had roughly 107,682 septic systems and Polk County had roughly 118,819 septic systems (available: http://www.doh.state.fl.us/ environment/OSTDS/statistics/ostdsstatistics.htm). Data for septic tanks are based on 1970-2012 census results, with year-by-year additions based on new septic tank construction. The data do not reflect septic tanks that have been removed going back to 1970. From fiscal years 1994-2012, an average of 893 permits/year for repairs were issued in Hillsborough County and an average of 1,196 permits/year were issued in Polk County (available: http://www.doh.state.fl.us/ environment/OSTDS/statistics/ostdsstatistics.htm).

Based on Onsite Sewage Treatment Disposal Systems (OSTDS) FDOH data (available: http://www.myfloridaeh.com/programs/EhGis/EhGisDownload.htm) the number of housing units within the Bald Eagle Creek WBID boundary estimated to be using septic tanks to treat their domestic wastewater is 283 (**Figure 4.2**).

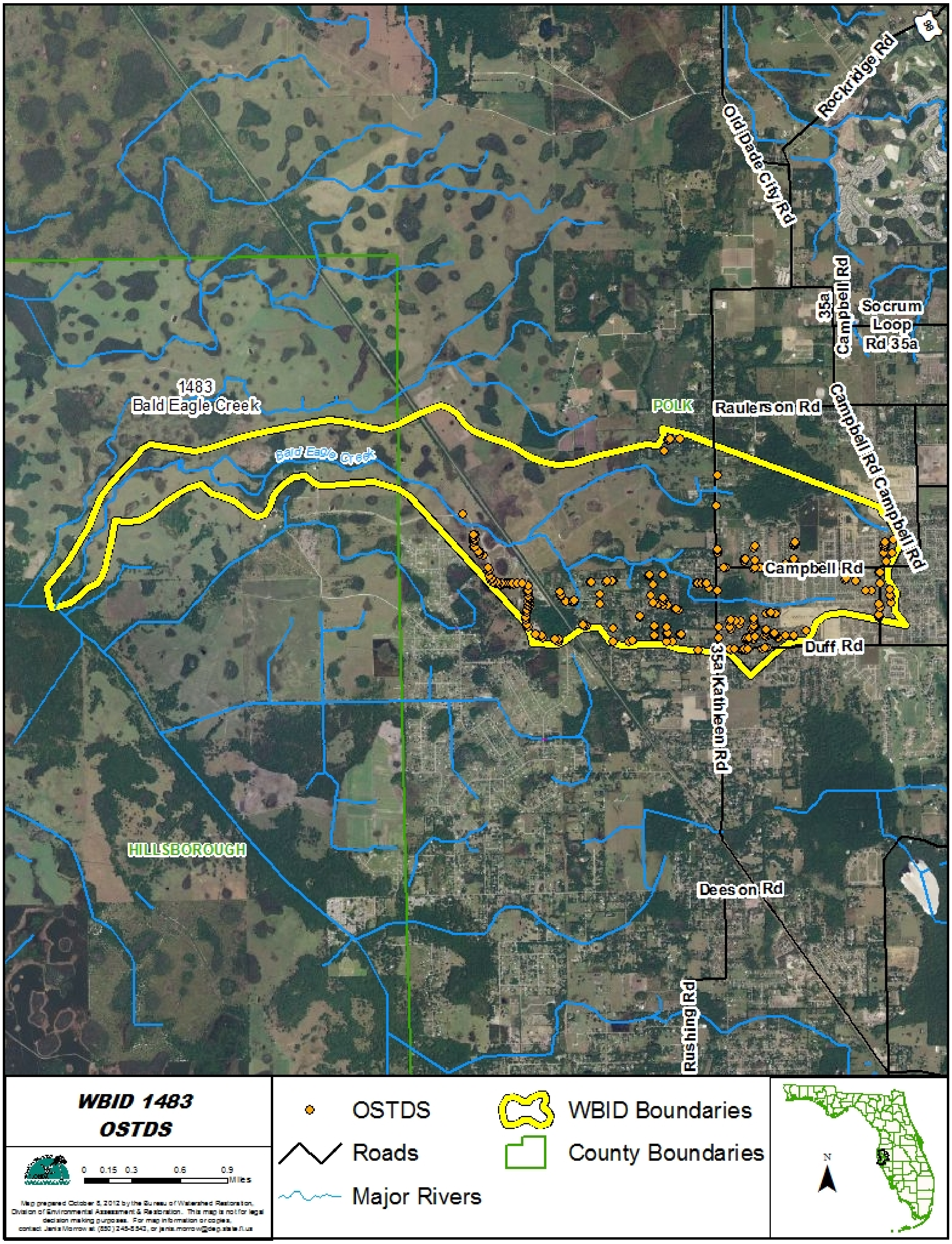


Figure 4.2 Location of OSTDS Based on FDOH Data in the Residential Land Use Areas within the Bald Eagle Creek WBID Boundary

Chapter 5: DETERMINATION OF ASSIMILATIVE CAPACITY

5.1 Determination of Loading Capacity

The goal of this TMDL development is to identify pollutant target concentrations and pollutant reductions for Bald Eagle Creek (WBID 1483) to meet the applicable DO and nutrient criteria, and thereby maintain the WBID's function and designated use as a Class III water. The targets were developed based on an analysis of nutrient data for the streams in the Tampa Bay watershed that are not impaired for DO and nutrients, as described in Chapter 3. The TMDLs were established using a percent reduction approach in existing nutrient concentrations to meet the water quality targets, based on data collected in the Cycle 2 verified period.

5.2 Analysis of Water Quality

Water quality analyses for the impaired waterbody was conducted using the IWR Run 35_2 water quality data. **Table 5.1** shows the list of the water quality stations where water quality data were collected from during the verified period for WBID 1483. To establish the existing concentration in each the waterbody, as most of water quality data were obtained from one or two stations in the WBID waterbody, it was decided that WBID based-daily concentrations of water quality parameter of interest would be used.

Table 5.1 Summary of Sampling Stations for WBID 1483

Waterbody Name	WBID	STA	LAT	LONG	NOBS[1]	BD[2]	ED[3]
Bald Eagle Creek	1483	21FLTPA 2882288201238	28.1397	-82.0233	760	2005	2005
Bald Eagle Creek	1483	21FLGW 8043	28.1528	-82.0750	31	2000	2000

[1] Number of observations
[2] Beginning date
[3] End date

Setting the Existing Conditions

As described in Chapter 3, the restoration targets for TN and TP have been set for the Bone Valley and Peninsula ecoregions. To establish the existing concentration in the impaired WBIDs from which to determine the percent reductions, daily concentration data for each waterbody were examined from January 2000 to June 2008 to obtain the highest WBID annual median. In this assessment, at least one data point of TN or TP in each quarter shall be included for any selected year to represent "a worst condition" of each impaired WBID. If an impaired WBID does not have enough data to represent a quarterly variation of TN or TP, it was determined that all data available from the IWR database during this period were utilized to determine a highest annual median for the WBID.

Tables 5.2 and **5.3** showed a summary of annual TN and TP data for Bald Eagle Creek in the Bone Valley ecoregion. There are limited data available to represent TN and TP medians in each year but annual median values of TN and TP in 2005 were complied with the data assessment criteria (i.e., at least one data point of TN or TP in each quarter of the year) over the assessment period. In the year of 2005, annual median TN and TP for Bald Eagle Creek were calculated to be 2.420 mg/L and 1.200 mg/L, respectively.

Table 5.2 Summary of Statistics on Annual TN Concentrations for Bald Eagle Creek in the Bone Valley Ecoregion

TN	2000	2001	2002	2003	2004	2005	2006	2007
Count	1	0	0	0	0	22	0	0
Median	N/A	N/A	N/A	N/A	N/A	2.420	N/A	N/A
Average	N/A	N/A	N/A	N/A	N/A	2.625	N/A	N/A
Std	N/A	N/A	N/A	N/A	N/A	0.846	N/A	N/A
Min	N/A	N/A	N/A	N/A	N/A	1.104	N/A	N/A
Max	N/A	N/A	N/A	N/A	N/A	5.520	N/A	N/A
CV (%)	N/A	N/A	N/A	N/A	N/A	0.322	N/A	N/A

N/A indicates no data available.
CV (%) indicates coefficient of variation.

Table 5.3 Summary of Statistics on Annual TP Concentrations for Bald Eagle Creek in the Bone Valley Ecoregion

TP	2000	2001	2002	2003	2004	2005	2006	2007
Count	1	0	0	0	0	22	0	0
Median	N/A	N/A	N/A	N/A	N/A	1.200	N/A	N/A
Average	N/A	N/A	N/A	N/A	N/A	1.162	N/A	N/A
Std	N/A	N/A	N/A	N/A	N/A	0.266	N/A	N/A
Min	N/A	N/A	N/A	N/A	N/A	0.540	N/A	N/A
Max	N/A	N/A	N/A	N/A	N/A	1.500	N/A	N/A
CV (%)	N/A	N/A	N/A	N/A	N/A	0.229	N/A	N/A

N/A indicates no data available.
CV (%) indicates coefficient of variation.

5.3 TMDL Development Process for the Impaired WBID

Given the ecoregional TN and TP targets, percent reductions for TMDLs can be estimated for Bald Eagle Creek as follows:

$$\text{TMDL Percent Reduction (\%)} = \{(EC - ET)/EC\} \times 100 \qquad \text{(equation 1)}$$

Where EC is the highest annual median of TN or TP for the existing condition of the impaired WBID, and ET is the ecoregional target of TN or TP. **Table 5.4** shows the calculated percent reductions that were used for TMDLs for WBID 1483.

Table 5.4 Percent Reduction Calculations for TMDLs

Ecoregion	WBID	Waterbody Name	Waterbody Type	TMDL Parameter	Existing Concentration	Ecoregional Targets	Percent Reductions
Bone Valley	1483	Bald Eagle Creek	Stream	TN	2.420	1.16	52.1%
Bone Valley	1483	Bald Eagle Creek	Stream	TP	1.200	0.473	60.5%

5.4 Critical Conditions/Seasonality

The critical conditions for nutrient loadings in a given watershed depend on the existence of point sources, land use patterns, and rainfall in the watershed. Typically, the critical condition for nonpoint sources is an extended dry period, followed by a rainfall runoff event. During wet weather periods, pollutants that have built up on the land surface under dry weather conditions are washed off by rainfall, resulting in wet weather loadings. However, significant nonpoint source contributions could also occur under dry weather conditions without any major surface runoff event. This usually happens when nonpoint sources contaminate the surficial aquifer, and pollutants are brought into the receiving waters through baseflow. Animals with direct access to the receiving water could also contribute to the exceedances during dry weather conditions. The critical condition for point source loading typically occurs during periods of low stream flow, when dilution is minimized.

Chapter 6: DETERMINATION OF THE TMDL

6.1 Expression and Allocation of the TMDL

A TMDL can be 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) that takes into account any uncertainty about the relationship between effluent limitations and water quality:

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

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

It should be noted that the various components of the 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 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 a 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 is also different than 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.

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 Bald Eagle Creek is expressed in terms of percent reductions (**Table 6.1**). This TMDL represents the long-term TN and TP concentrations that the waterbody can assimilate and maintain the Class III narrative nutrient and DO criteria.

Table 6.1 Bald Eagle Creek TMDL Load Allocations

WBID	Parameter	WLA Wastewater (lbs/year)	WLA Stormwater (% reduction)	LA (% reduction)	MOS
1483	TN	N/A	52.1	52.1	Implicit
1483	TP	N/A	60.5	60.5	Implicit

N/A not applicable

6.2 Load Allocation (LA)

The allowable LAs for Bald Eagle Creek are also in **Table 6.1**. It should be noted that the LA may include loading from stormwater discharges regulated by the Department and the Water Management District that are not part of the NPDES Stormwater Program **(see Appendix A).**

6.3 Wasteload Allocation (WLA)

6.3.1 NPDES Wastewater Discharges

There are no NPDES surface water dischargers within the Bald Eagle Creek watershed.

6.3.2 NPDES Stormwater Discharges

The wasteload allocation for stormwater discharges in each watershed is applied by a percent reduction in loadings for TN and TP as indicated in **Tables 6.1**, which is the required percent reduction in nonpoint sources.

It should be noted that any MS4 permittee will only be responsible for reducing the loads associated with stormwater outfalls for which it owns or otherwise has responsible control, and is not responsible for reducing other nonpoint source loads within its jurisdiction.

6.4 Margin of Safety (MOS)

TMDLs must address uncertainty issues by incorporating a MOS into the analysis. The MOS is a required component of a TMDL and accounts for the uncertainty about the relationship between pollutant loads and the quality of the receiving waterbody [Clean Water Act, Section 303(d)(1)(c)]. Considerable uncertainty is usually inherent in estimating nutrient loading from nonpoint sources, as well as predicting water quality response. The effectiveness of management activities (e.g., stormwater management plans) in reducing loading is also subject to uncertainty.

The MOS can either be implicitly accounted for by choosing conservative assumptions about loading or water quality response, or explicitly accounted for during the allocation of loadings. Consistent with the recommendations of the Allocation Technical Advisory Committee (FDEP, 2001), an implicit margin of safety (MOS) was used in the development of the Bald Eagle Creek TMDL. An implicit MOS was used because the TMDLs were based on the conservative decisions associated with a number of the reference approach assumptions.

6.5 Evaluating Effects of the TMDL on DO

Bald Eagle Creek is expected to attain water quality standards for DO and nutrients following the implementation of the TMDL to the required reductions in anthropogenic sources of 52.1% for TN and 60.5% for TP. The nutrient reductions are expected to result in a reduction in CChla (algal biomass) with associated reductions in algal respiration and the algal component of the BOD. These reductions will improve overall water quality in the watershed, including DO levels, by reducing the diurnal fluctuations in DO and increasing the DO concentrations in the creek. The reductions in algal biomass will reduce the DO fluctuations and the BOD that results from the breakdown of algal cells in the watershed by a relative amount. As the total BOD is composed of both a carbonaceous fraction and a nitrogenous fraction, additional reductions in BOD will occur as a result of reducing the mass of TN and TP entering the system from anthropogenic sources.

As described in Chapter 3, the target nutrient concentrations were derived by using data from streams in the Tampa Bay watershed, which are not impaired for DO and nutrients, that were similar to Bald Eagle Creek, in terms of hydrologic conditions and drainage area size. By having applied the EPA recommended TMDL development procedures for non-numeric water quality standards, there is the expectation that the DO and nutrient criteria will be met if the selected target values are achieved (EPA, 1999).

Chapter 7: TMDL IMPLEMENTATION

7.1 Basin Management Action Plan

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

If the Department determines that a BMAP is needed to support the implementation of this TMDL, a BMAP will be developed through a transparent, stakeholder-driven process intended to result in a plan that is cost-effective, technically feasible, and meets the restoration needs of the applicable waterbodies.

Once adopted by order of the Department Secretary, BMAPs are enforceable through wastewater and municipal stormwater permits for point sources and through BMP implementation for nonpoint sources. Among other components, BMAPs typically include the following:

- Water quality goals (based directly on the TMDLs);
- Refined source identification;
- Load reduction requirements for stakeholders (quantitative detailed allocations, if technically feasible);
- A description of the load reduction activities to be undertaken, including structural projects, nonstructural BMPs, and public education and outreach;
- A description of further research, data collection, or source identification needed in order to achieve the TMDLs;
- Timetables for implementation;
- Implementation funding mechanisms;
- An evaluation of future increases in pollutant loading due to population growth;
- Implementation milestones, project tracking, water quality monitoring, and adaptive management procedures; and
- Stakeholder statements of commitment (typically a local government resolution).

BMAPs are updated through annual meetings and may be officially revised every five years. Completed BMAPs in the state have improved communication and cooperation among local stakeholders and state agencies; improved internal communication within local governments; applied high-quality science and local information in managing water resources; clarified the obligations of wastewater point source, MS4, and non-MS4 stakeholders in TMDL implementation; enhanced transparency in the Department's decision making; and built strong relationships between the Department and local stakeholders that have benefited other program areas.

7.2 Other TMDL Implementation Tools

However, in some basins, and for some parameters, particularly those with fecal coliform impairments, the development of a BMAP using the process described above will not be the most efficient way to restore a waterbody, such that it meets its designated uses. This is because fecal coliform impairments result from the cumulative effects of a multitude of potential sources, both natural and anthropogenic. Addressing these problems requires good old-fashioned detective work that is best done by those in the area.

A multitude of assessment tools is available to assist local governments and interested stakeholders in this detective work. The tools range from the simple (such as Walk the WBIDs and GIS mapping) to the complex (such as bacteria source tracking). Department staff will provide technical assistance, guidance, and oversight of local efforts to identify and minimize fecal coliform sources of pollution. Based on work in the Lower St Johns River tributaries and the Hillsborough Basin, the Department and local stakeholders have developed a logical process and tools to serve as a foundation for this detective work. In the near future, the Department will be releasing these tools to assist local stakeholders with the development of local implementation plans to address fecal coliform impairments. In such cases, the Department will rely on these local initiatives as a more cost-effective and simplified approach to identify the actions needed to put in place a road map for restoration activities, while still meeting the requirements of Subsection 403.067(7), F.S.

References

CDM, 1991. *Sarasota Bay National Estuary Program. Point / Nonpoint Source Pollution Loading Assessment. Phase 1*. January 1991.

Florida Department of Environmental Protection (FDEP). 2008, Basin status report: Tampa Bay Tributaries Basin. Division of Water Resource Management, FDEP.

Florida Department of Environmental Protection (FDEP). February 2001. *A report to the Governor and the Legislature on the allocation of Total Maximum Daily Loads in Florida.* Tallahassee, FL: Bureau of Watershed Management.

—, April 2001. Chapter 62-302, *Surface Water Quality Standards,* Florida Administrative Code (*F.A.C.*), Florida Department of Environmental Protection, Division of Water Resource Management, Bureau of Watershed Management, Tallahassee, Florida.

—, April 2001. *Chapter 62-303, Identification of Impaired Surface Waters Rule (IWR), Florida Administrative Code*. Florida Department of Environmental Protection, Division of Water Resource Management, Bureau of Watershed Management, Tallahassee, Florida.

Florida Department of Health, 2012. Florida Department of Health web site. Available at http://www.doh.state.fl.us/; or http://www.doh.state.fl.us/environment/OSTDS/statistics.

U. S. Census Bureau Web Site. 2012. Available at http://quickfacts.census.gov/qfd/states/

U. S. Environmental Protection Agency, 1997. *Compendium of Tools for Watershed Assessment and TMDL Development, USEPA, Office of Water, Washington, DC 20460, EPA841-B-97-006, May 1997.*

U.S. Environmental Protection Agency. 1999. Protocol for Developing Nutrient TMDLs. EPA 841-B-99-007. Washington, DC: Office of Water.

U.S. Environmental Protection Agency, 2002. *Onsite Wastewater Treatment Systems Manual*. EPA /625/R-00/008. http://www.epa.gov/ordntrnt/ORD/NRMRL/Pubs/625R00008/625R00008.htm

University of Florida's Institute of Food and Agricultural Sciences (UF/IFAS), 1984. *Impact of On-Site Sewage Disposal Systems on Surface and Ground Water Quality*, November 1984. Prepared by the Institute of Food and Agricultural Sciences Soil Science Department, University of Florida, Gainesville, FL for Florida Department of Health and Rehabilitative Services (HRS).

Appendices

Appendix A: Background Information on Federal and State Stormwater Programs

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

The rule requires the state's water management districts (WMDs) to establish stormwater pollutant load reduction goals (PLRGs) and adopt them as part of a SWIM plan, other watershed plan, or rule. Stormwater PLRGs are a major component of the load allocation part of a TMDL. To date, stormwater PLRGs have been established for Tampa Bay, Lake Thonotosassa, the Winter Haven Chain of Lakes, the Everglades, Lake Okeechobee, and Lake Apopka.

In 1987, the U.S. Congress established Section 402(p) as part of the federal Clean Water Act Reauthorization. This section of the law amended the scope of the federal NPDES permitting program to designate certain stormwater discharges as "point sources" of pollution. The EPA promulgated regulations and began implementation of the Phase I NPDES stormwater program in 1990. These stormwater discharges include certain discharges that are associated with industrial activities designated by specific Standard Industrial Classification (SIC) codes, construction sites disturbing five or more acres of land, and master drainage systems of local governments with a population above 100,000, which are better known as municipal separate storm sewer systems (MS4s). However, because the master drainage systems of most local governments in Florida are interconnected, the EPA implemented Phase I of the MS4 permitting program on a countywide basis, which brought in all cities (incorporated areas), Chapter 298 urban water control districts, and the Florida Department of Transportation throughout the fifteen counties meeting the population criteria. The Department received authorization to implement the NPDES stormwater program in 2000.

An important difference between the NPDES and other state stormwater permitting programs is that the NPDES program covers both new and existing discharges, while the other state programs focus on new discharges. Additionally, Phase II of the NPDES Program, implemented in 2003, expands the need for these permits to construction sites between one and five acres, and to local governments with as few as 1,000 people. While these urban stormwater discharges are now technically referred to as "point sources" for the purpose of regulation, they are still diffuse sources of pollution that cannot be easily collected and treated by a central treatment facility similar to other point sources of pollution, such as domestic and industrial wastewater discharges. It should be noted that all MS4 permits issued in Florida include a re-opener clause that allows permit revisions to implement TMDLs when the implementation plan is formally adopted.

Appendix B: TN, TP, Chlorophyll a Raw Data used in the TMDL Analysis

All data used to produce the TMDL report are available upon request.

Please Contact:
Douglas Gilbert, Environmental Manager
Florida Department of Environmental Protection
Bureau of Watershed Management
Watershed Assessment Section
2600 Blair Stone Road, Mail Station 3555
Tallahassee, FL 32399-2400
douglas.gilbert@dep.state.fl.us
Phone: (850) 245-8450; Suncom: 205-8450
Fax: (850) 245-8536

Appendix C: Nutrient TMDL Reference Condition Data

Table C-1: Tampa Bay Watershed WBIDs Used for Nutrient Target Setting

PLANNING UNIT	NUTRIENT ECOREGION	WBID	BASIN	WATERBODY TYPE	CLASS	COMMENTS
Alafia River	Bone Valley	1621D	ALAFIA RIVER (NORTH PRONG)	STREAM	3F	Water quality between Sept. 2004 and Oct. 2005 influenced by upstream emergency order discharges. Data from 2004 and 2005 not used in analysis.
Hillsborough River	Bone Valley	1482	BLACKWATER CREEK	STREAM	3F	
Hillsborough River	Bone Valley	1495A	ITCHEPACKASASSA CREEK	STREAM	3F	
Little Manatee River	Bone Valley	1742B	LITTLE MANATEE RIVER (NORTH FORK)	STREAM	3F	OFW
Manatee River	Bone Valley	1819	GAMBLE CREEK	STREAM	3F	
Hillsborough River	Bone Valley	1542	PEMBERTON CREEK	STREAM	3F	
Manatee River	Bone Valley	1930A	COOPER CREEK	STREAM	1	
Manatee River	Bone Valley	1912	UNNAMED DRAIN	STREAM	1	
Manatee River	Bone Valley	1807D	MANATEE RIVER (NORTH FORK)	STREAM	1	
Alafia River	Bone Valley	1583	POLEY CREEK	STREAM	3F	
Alafia River	Bone Valley	1658	FISHHAWK CREEK	STREAM	3F	
Coastal Hillsborough Bay Tributary	Bone Valley	1666	BULLFROG CREEK	STREAM	3F	
Coastal Old Tampa Bay Tributary	Peninsula	1541C	BRIAR CREEK	STREAM	3F	
Coastal Old Tampa Bay Tributary	Peninsula	1569A	BISHOP CREEK	STREAM	3F	
Coastal Old Tampa Bay Tributary	Peninsula	1529	COW BRANCH	STREAM	3F	
Hillsborough River	Peninsula	1454	FISH HATCHERY DRAIN	STREAM	3F	
Manatee River	Bone Valley	1876	BRADEN RIVER BELOW WARD LAKE	ESTUARY	3M	
Manatee River	Bone Valley	1848B	MANATEE RIVER BELOW DAM	ESTUARY	3M	
Coastal Old Tampa Bay Tributary	Peninsula	1603	DIRECT RUNOFF TO BAY	ESTUARY	3M	
Coastal Hillsborough Bay Tributary	Peninsula	1609	DIRECT RUNOFF TO BAY	ESTUARY	3M	
Coastal Middle Tampa Bay Tributary	Peninsula	1709F	FRENCHMANNS CREEK - BASIN U	ESTUARY	3M	

Table C-2: Tampa Bay Watershed Station and Ecoregion Nutrient Results

PLANNING UNIT	NUTRIENT ECOREGION	WBID	BASIN	WATERBODY TYPE	CLASS	COMMENTS
Alafia River	Bone Valley	1621D	ALAFIA RIVER (NORTH PRONG)	STREAM	3F	Water quality between Sept. 2004 and Oct. 2005 influenced by upstream emergency order discharges. Data from 2004 and 2005 not used in analysis.
Hillsborough River	Bone Valley	1482	BLACKWATER CREEK	STREAM	3F	
Hillsborough River	Bone Valley	1495A	ITCHEPACKASASSA CREEK	STREAM	3F	
Little Manatee River	Bone Valley	1742B	LITTLE MANATEE RIVER (NORTH FORK)	STREAM	3F	OFW
Manatee River	Bone Valley	1819	GAMBLE CREEK	STREAM	3F	
Hillsborough River	Bone Valley	1542	PEMBERTON CREEK	STREAM	3F	
Manatee River	Bone Valley	1930A	COOPER CREEK	STREAM	1	
Manatee River	Bone Valley	1912	UNNAMED DRAIN	STREAM	1	
Manatee River	Bone Valley	1807D	MANATEE RIVER (NORTH FORK)	STREAM	1	
Alafia River	Bone Valley	1583	POLEY CREEK	STREAM	3F	
Alafia River	Bone Valley	1658	FISHHAWK CREEK	STREAM	3F	
Coastal Hillsborough Bay Tributary	Bone Valley	1666	BULLFROG CREEK	STREAM	3F	
Coastal Old Tampa Bay Tributary	Peninsula	1541C	BRIAR CREEK	STREAM	3F	
Coastal Old Tampa Bay Tributary	Peninsula	1569A	BISHOP CREEK	STREAM	3F	
Coastal Old Tampa Bay Tributary	Peninsula	1529	COW BRANCH	STREAM	3F	
Hillsborough River	Peninsula	1454	FISH HATCHERY DRAIN	STREAM	3F	
Manatee River	Bone Valley	1876	BRADEN RIVER BELOW WARD LAKE	ESTUARY	3M	
Manatee River	Bone Valley	1848B	MANATEE RIVER BELOW DAM	ESTUARY	3M	
Coastal Old Tampa Bay Tributary	Peninsula	1603	DIRECT RUNOFF TO BAY	ESTUARY	3M	
Coastal Hillsborough Bay Tributary	Peninsula	1609	DIRECT RUNOFF TO BAY	ESTUARY	3M	
Coastal Middle Tampa Bay Tributary	Peninsula	1709F	FRENCHMANNS CREEK - BASIN U	ESTUARY	3M	

Table C-3: Tampa Bay Watershed Station and Total Nitrogen Station Medians Results By Year

WBID	Station Number	Station Name	2000	2001	2002	2003	2004	2005	2006	2007
1529	21FLPDEM06-03	Cow Branch Creek							0.75	
1529	21FLPDEMAMB 06-3	Cow Branch Creek								
1529	21FLTPA 280405408243235	TP 450 - Cow Branch							0.71	
1541C	21FLPDEM11-05	Briar Creek				1.26	0.92	1.04	0.92	
1541C	21FLPDEMAMB 11-5	Briar Creek								
1541C	21FLTPA 2821088242192	TP388-Lake Tarpon Canal						0.97		
1569A	21FLPDEM12-03	Bishop Creek					0.76	0.78	0.73	
1569A	21FLPDEM12-02	Bishop Creek					1.02	0.79	0.83	
1569A	21FLPDEM12-04	Bishop Creek, South Branch								
1454	21FLTPA 281058608200429	TP481 - Fish Hatchery Drain								0.51
		TN Annual Averages				1.26	0.90	0.89	0.79	0.51
		Peninsula Stream Average								0.87

Table C-4: Tampa Bay Watershed Station and Total Phosphorus Station Medians Results By Year

WBID	Station Number	Station Name	2000	2001	2002	2003	2004	2005	2006	2007
1529	21FLPDEM06-03	Cow Branch Creek				0.160			0.070	
1529	21FLPDEMAMB 06-3	Cow Branch Creek								
1529	21FLTPA 280405408243235	TP 450 - Cow Branch							0.100	
1541C	21FLPDEM11-05	Briar Creek				0.220		0.200	0.165	
1541C	21FLPDEMAMB 11-5	Briar Creek								
1541C	21FLTPA 2821088242192	TP388-Lake Tarpon Canal						0.235		
1569A	21FLPDEM12-03	Bishop Creek							0.090	
1569A	21FLPDEM12-02	Bishop Creek							0.215	
1569A	21FLPDEM12-04	Bishop Creek, South Branch								
1454	21FLTPA 281058608200429	TP481 - Fish Hatchery Drain								0.190
		TP Annual Averages				0.190		0.218	0.128	0.190
		Peninsula Stream Average								0.181

Table C-5: Tampa Bay Watershed Station and Total Nitrogen Station Medians Results By Year

WBID	Station Number	Station Name	2000	2001	2002	2003	2004	2005	2006	2007
1666	21FLHILL132	Bullfrog Creek at Symmes Road	1.41	1.11	1.29	1.21	1.42			
1666	21FLHILL167	Bullfrog Creek at Big Bend Rd.						0.67		
1666	21FLTPA 275007208220464	TP 440 - Bullfrog Creek							1.13	
1666	112WRD 02300700	BULLFROG CREEK NR WIMAUMA, FLA.								
1666	21FLTPA 274747808220566	TP 441 - Bullfrog Creek							0.68	
1583	21FLPOLKPOLEY CRK N1	"W on Pipkin; R on S Pipkin Rd 1/4 Mile of R								
1583	21FLPOLKPOLEY CRK S2	"W on Pipkin; R on S Pipkin Rd 1/4 Mile of R								
1583	21FLTPA 27552458201486	Poley Creek @ SR 60					0.88	0.82		
1658	21FLHILL155	Fishhawk Creek at Fishhawk Blvd.						0.79		0.65
1658	21FLWQSPHIL598GS	Alafia River (Long Flat Cr) near Hobson Sim Rd (WBID 1658)								
1658	21FLWQSPHIL596GS	Fishawk Creek at Boyette Rd (WBID 1658)								
1819	21FLMANAGC2	GC2		1.22		1.16	0.96	1.24	1.64	0.93
1621D	21FLHILL115	N Prong Alafia River upstream of confluence w/ S Prong	1.77	1.41	1.35	1.50				1.46
1742B	21FLHILL140	Little Manatee River at CR 579	1.38	1.63	1.90	1.37	1.68	1.46		1.60
1742B	21FLHILL129	Little Manatee River at SR 674	0.88	1.00	1.13	0.93	1.23	1.14		0.96
1742B	21FLIMCALM674	Little Manatee R. at SR674		1.19						
1495A	21FLTPA 24030067	TP43 - ITCHEPACKASASSA CREEK								1.31
1912	21FLMANATS5	TS5		0.87	1.12	1.07	0.73	1.02	1.06	0.87
1807D	21FLMANAD3	D3		0.98	1.16	1.23	0.59	1.16	1.07	0.75
1930A	21FLMANATS4	TS4			0.83	1.20	0.94	1.10	1.38	0.92
1930A	21FLMANATS3	TS3			1.00	1.23	0.93	1.16	1.32	1.21
		Annual Averages	1.36	1.17	1.22	1.21	1.04	1.05	1.18	1.07
		Bone Valley Stream Average								1.16

Table C-6: Tampa Bay Watershed Station and Total Phosphorus Station Medians Results By Year

WBID	Station Number	Station Name:	2000	2001	2002	2003	2004	2005	2006	2007
1666	21FLHILL132	Bullfrog Creek at Symmes Road	0.215	0.280	0.350	0.225	0.190			
1666	21FLHILL167	Bullfrog Creek at Big Bend Rd.						0.190		
1666	21FLTPA 275007208220464	TP 440 - Bullfrog Creek							0.180	
1666	112WRD 02300700	BULLFROG CREEK NR WIMAUMA, FLA.								
1666	21FLTPA 274747808220566	TP 441 - Bullfrog Creek							0.230	
1583	21FLPOLKPOLEY CRK N1	"W on Pipkin; R on S Pipkin Rd 1/4 Mile of R								
1583	21FLPOLKPOLEY CRK S2	"W on Pipkin; R on S Pipkin Rd 1/4 Mile of R								
1583	21FLTPA 27552458201486	Poley Creek @ SR 60					0.795	0.660		
1658	21FLHILL155	Fishhawk Creek at Fishhawk Blvd.						0.480		0.456
1658	21FLWQSPHIL598GS	Alafia River (Long Flat Cr) near Hobson Sim Rd (WBID 1658)								
1658	21FLWQSPHIL596GS	Fishawk Creek at Boyette Rd (WBID 1658)								
1819	21FLMANAGC2	GC2		0.386	0.362	0.382	0.390	0.380	0.270	0.220
1621D	21FLHILL115	N Prong Alafia River upstream of confluence w/ S Prong		3.280	3.045	2.965				1.848
1742B	21FLHILL140	Little Manatee River at CR 579		0.350	0.430	0.495	0.610	0.385		0.297
1742B	21FLHILL129	Little Manatee River at SR 674		0.580	0.580	0.650	0.750	0.635		0.761
1742B	21FLIMCALM674	Little Manatee R. at SR674		0.600						
1495A	21FLTPA 24030067	TP43 - ITCHEPACKASASSA CREEK								0.460
1912	21FLMANATS5	TS5		0.311		0.081	0.110	0.105	0.056	0.056
1807D	21FLMANAD3	D3		0.434	0.334	0.381	0.390	0.360	0.335	0.415
1930A	21FLMANATS4	TS4		0.172		0.134	0.190	0.083	0.120	0.110
1930A	21FLMANATS3	TS3				0.112	0.200	0.145	0.056	0.056
		Annual Averages	0.215	0.710	0.850	0.603	0.403	0.342	0.178	0.468
		Bone Valley Stream Average								0.471

Table C-7: Tampa Bay Watershed Station and Total Nitrogen Station Medians Results By Year

WBID	Station Number	Station Name	2000	2001	2002	2003	2004	2005	2006	2007
1609	21FLHILL36	Old Tampa Bay			0.73					
1709F	21FLPDEM48-03	Frenchman's Creek								
1603	21FLPDEMAMB 21-1	Coastal Zone 3	0.78	1.14	1.26					
		Annual Averages	0.78	1.14	0.99					
		Peninsula Estuaries Average								0.97

Table C-8: Tampa Bay Watershed Station and Total Phosphorus Station Medians Results By Year

WBID	Station Number	Station Name	2000	2001	2002	2003	2004	2005	2006	2007
1609	21FLHILL36	Old Tampa Bay			0.140					
1709F	21FLPDEM48-03	Frenchman's Creek								
1603	21FLPDEMAMB 21-1	Coastal Zone 3	0.145	0.170	0.180					
		Annual Averages	0.145	0.170	0.160					

Table C-9: Tampa Bay Watershed Station and Total Nitrogen Station Medians Results By Year

WBID	Station Number	Station Name	2000	2001	2002	2003	2004	2005	2006	2007
1848B	21FLMANALM4	LM4		1.25		0.86	0.81	1.42	1.14	0.71
1848B	21FLMANALM5	LM5							1.19	0.77
1876	21FLMANALM3	LM3		1.35		0.82	0.92	1.33	1.09	0.75
		Annual Averages		1.30		0.84	0.87	1.37	1.14	0.74
		Bone Valley Estuaries Average								1.04

Table C-10: Tampa Bay Watershed Station and Total Phosphorus Station Medians Results By Year

WBID	Station Number	Station Name	2000	2001	2002	2003	2004	2005	2006	2007
1848B	21FLMANALM4	LM4		0.426	0.327	0.275	0.345	0.300	0.270	0.260
1848B	21FLMANALM5	LM5							0.370	0.355
1876	21FLMANALM3	LM3		0.356	0.304	0.291	0.215	0.270	0.305	0.285
		Annual Averages		0.391		0.283	0.280	0.285	0.315	0.300
		Bone Valley Estuaries Average								0.309

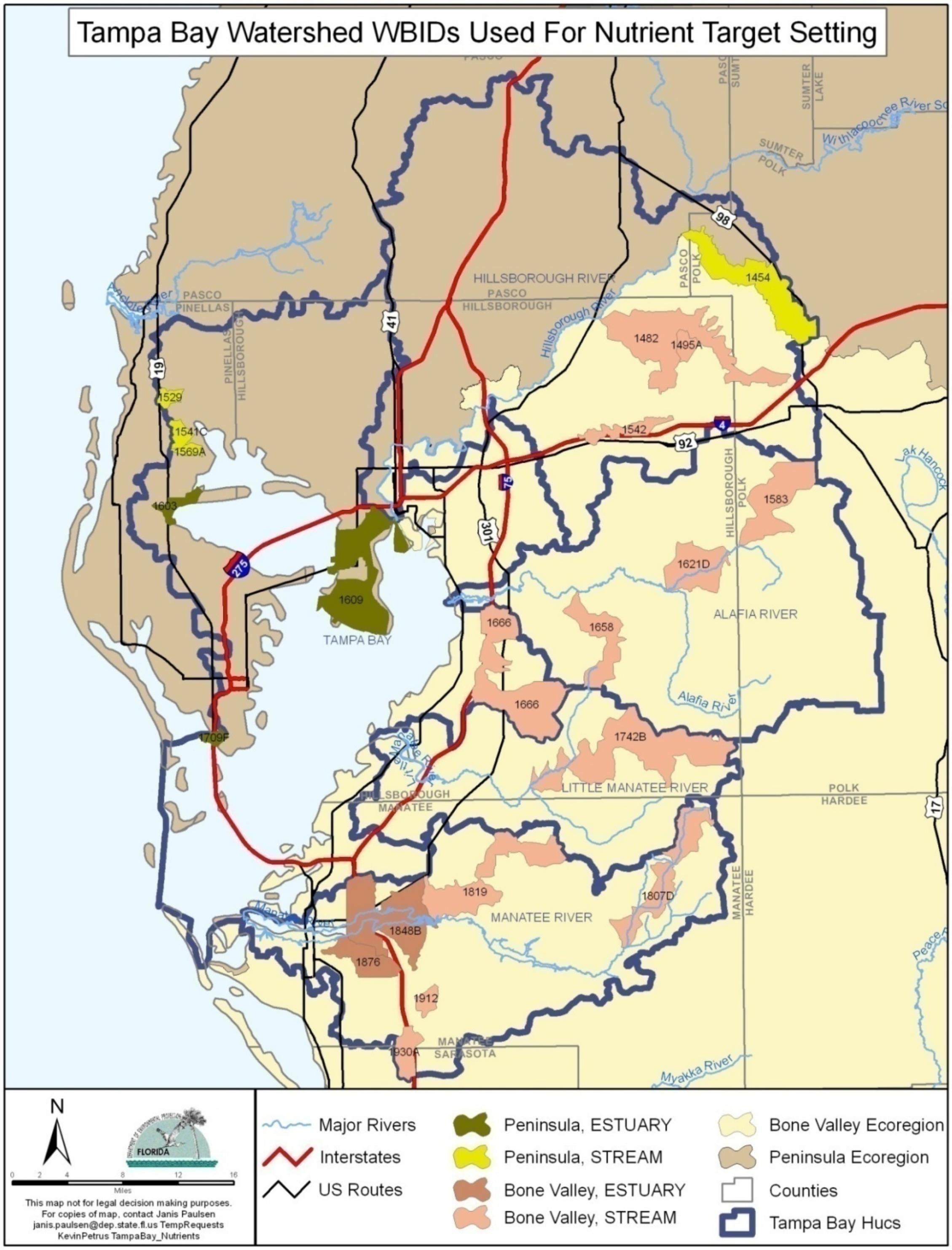


Figure C-1 Waterbodies in the Tampa Bay Watershed Used to Develop Nutrient Targets.

Appendix D: Public Comments and FDEP Responses

Please contact Douglas Gilbert (see contacts in front of document) for copies of the actual letter.

Below are questions and concerns made by the Florida Department of Transportation District 7 with FDEP responses edited to include only waters in the Hillsborough River Basin (Trout Creek, Channelized Stream (Bald Eagle Creek), Big Ditch, and Two Hole Branch).

August 18, 2009

Ms. Susan C. Moore
Maintenance Environmental Coordinator
Florida Department of Transportation
11201 N. McKinley Drive, MS 1200
Tampa, FL 33612

Dear Ms. Moore:

Thank you for your time and effort in reviewing the TMDLs that the Department recently proposed for impaired waters in the Tampa Bay basin. We appreciate your detailed review and the well thought-out questions that you presented in your comments.

In the order in which they were presented, what follows are the comments from FDOT District 7and our responses (shown in blue).

GENERAL COMMENTS

The following comments relate to multiple TMDLs where specific comments are provided below for each of the TMDL documents.

1. The figures that show the WBIDs and also identify the "FDOT Local Roads" are not an accurate depiction of the roadways that FDOT is responsible for. Please isolate out those roads that are part of FDOT's responsibility from those controlled by the Cities and Counties. In the alternative, simply identify roads as "Local Roads" in the legend.

   Response: Footnote will be added to all such figures to note that roads are for illustration purposes only and are not meant to be an accurate depiction of roadways for which FDOT is responsible.

2. The load reductions determined for the non-point sources, which include the WLA for the stormwater (under the MS4 permit) and the LA, have not been allocated but simply applied evenly between the WLA for Stormwater and the LA. Sufficient studies have not been completed to determine if an even distribution of the load reductions is justified, therefore some language acknowledging this should be put into both the TMDL documents and ultimately the rules to allow the ability to finalize (and therefore change the assigned reductions) under the BMAP. The concern exists that once the $WLA_{stormwater}$ percent reductions are put into the adopted TMDL document and the rule, the language in the MS4 permits would tie those reductions to the permit, and to not implement those reductions may put the permittees in violation. This also provides opportunities for third parties to challenge. [This comment applies to all TMDLs reviewed in which there was an WLA-MS4 allocation specified.]

   Response: In 2001, the Department submitted to the Governor and Legislature a document outlining the intended process for the allocation of loads under the TMDL Program. One key provision of the proposal was to level the "playing field," such that once stakeholders had the opportunity to meet and discuss what steps needed to be taken and to get appropriate credit for those initiatives already completed, the specific allocations will be set by the agreements reached under the Basin Management Action Plan (BMAP). This process has been successfully used in several adopted BMAPs and has demonstrated the flexibility that remains after setting the initial reductions for stormwater-related allocations (LA and WLA_{sw}) at identical levels.

   The laws of Florida form the underlying basis for the initial equal allocations. In particular, Section 403.067(6)(b) of Florida Statutes, states in part that:

Ms. Susan C. Moore

Maintenance Environmental Coordinator
Florida Department of Transportation

August 18, 2009
Page Two

"Allocations may also be made to individual basins and sources or as a whole to all basins and sources or categories of sources of inflow to the water body or water body segments. An initial allocation of allowable pollutant loads among point and nonpoint sources may be developed as part of the total maximum daily load. However, in such cases, the detailed allocation to specific point sources and specific categories of nonpoint sources shall be established in the basin management action plan…"

Additionally, each of the draft TMDL reports contains language in the NPDES Stormwater Discharges section in chapter 6 of the reports (repeated below) to address the issue of allocation between the WLA for stormwater and the LA portions of the TMDL.

"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."

3. In some of the TMDLs within the Source Assessment Chapter (Chapter 4), tables are provided for the calculation of loads to the system. These loads are not utilized within the TMDL but rather for information purposes on the potential contribution of various land use types. While the total load assigned to Highways was generally zero based upon zero area being assigned to that category, the EMC values listed in the table appear high. This will be important when the time comes for development of the allocation distribution. Between December 2004 and October 2007 roadway runoff water quality data were collected by Johnson Engineering for FDOT District 1 at four locations within District 1. Ten events were sampled for each of the four locations, with samples collected at both the inflows and outflows of existing stormwater treatment ponds. All collection, transfer, and handling procedures were conducted in accordance with FDEP Standard Operating Procedures and samples were analyzed by certified labs. Average values for TN and TP at the pond inflows were determined to be 1.17 mg/l and 0.158 mg/l, respectively. [It is perhaps noteworthy to observe that the highest average TN and TP values were measured at the first site sampled (i.e., samples collected between December 2004 and November 2005) which is also the site with the lowest percentage of impervious area.] Given the changes to roadway management practices that FDOT has undertaken over the past several years and the rigorous quality control used in these studies compared with the older studies, we believe that the numbers presented by Johnson Engineering are more representative than some of the standard EMC values being utilized. [This comment applies to all nutrient and DO TMDL documents reviewed where loading tables were provided].

Response: A copy of the Johnson Engineering Study report was not included with the comments we received. If FDOT could provide the report to Mr. Eric Livingston (Bureau Chief for the Bureau of Watershed Restoration), it will be reviewed for incorporation into the stormwater database and use in estimation of transportation event mean concentrations (EMCs).

SPECIFIC COMMENTS
The following are specific comments that relate to the individual TMDL documents reviewed.

Ms. Susan C. Moore
Maintenance Environmental Coordinator
Florida Department of Transportation

August 18, 2009

Page Ten

HILLSBOROUGH RIVER
Trout Creek, Channelized Stream, Big Ditch and Two-Hole Branch (WBIDs 1455, 1483, 1469, and 1489): DO/Nutrients

1. The nutrient targets established for TN are far below the levels that should be set for these systems. The TN targets are set at 0.463 mg/L (although there is some confusion within the document as to what the true level utilized in the final reductions is). Adjacent waterbodies where numeric nutrient criteria were set, i.e. freshwater streams, the TN targets were as high as 1.73 mg/L (Mustang Ranch, Tampa Bypass Canal).

   Response: A combination of the calibrated WAMView and WASP was used to simulate the assimilative capacity and then set site-specific targets of Chla, and TN for Trout Creek. As presented in the draft TMDLs report at pages 66, 70, and 73, the median and average TN targets for Trout Creek were estimated to be 0.453 mg/L and 0.614 mg/L, respectively. Moreover, the model simulated target (median) of TN corresponded to the median TN target (0.463 mg/L) obtained by the empirical relationship for Trout Creek. It should be noted that both methods were designed to meet the DO criteria at any time and any place on a daily basis. Therefore, given the consistency between the two independent methods as applied to Trout Creek, the Department considers that the target obtained from the empirical method is reliable for the Hillsborough River tributaries. More importantly, the TN target set up by both of these methods was considered as a site-specific target that may not be comparable to either a regional TN target or TN targets for nearby streams derived by less rigorous means.

   Additionally, care should be followed when comparing the TN target concentrations from one stream to another because dynamic hydrogeochemical processes are possibly different from one location to another. For example, one stream could respond quickly to DO depletion but not the other, and/or one system can be nutrient-limited but not the other. Without having detailed knowledge for each system, differences in the TN targets may reflect that one system has a greater assimilative capacity for TN than the other. More importantly, assimilative capacity of TN and TP, i.e., target concentrations, was determined as a result of the combined effects of BOTH TN and TP concentrations on biological communities (Chla) in a waterbody. Therefore, a simple comparison in TN target concentrations between waterbodies, while ignoring TP or other essential parameters, may be unreasonable.

2. Examination of the present status of the tables developed under the numeric nutrient criteria document released in June of 2009, identifies the 25th percentile for reference unimpacted stations for TN = 0.71 mg/L for this region of the State. The 75th percentile (which is the value typically used by EPA in developing targets from reference stations) is 1.41 mg/L. Florida has been looking at the 90th percentile as the potential value to set for reference conditions, this would give a TN target of 1.82 mg/L.

   Response: In the TMDL reports for the Hillsborough River tributaries, interpretation of the narrative nutrient criterion states:

Ms. Susan C. Moore
Maintenance Environmental Coordinator
Florida Department of Transportation

August 18, 2009
Page Eleven

> "The IWR's numeric Chla threshold for rivers and streams is used to represent levels at which an imbalance in flora or fauna is expected to occur. While the IWR provides a threshold for nutrient impairment for streams based on annual average Chla levels, these thresholds are not standards and need not be used as the nutrient-related water quality target for TMDLs. In fact, in recognition that the IWR thresholds were developed using statewide 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."

The Department recognized that a regional scale TN draft numeric criterion target may not best represent the level at which the flora and fauna become balanced. For example, Mill Creek (WBID 1542A), where percent anthropogenic land use was about 78.9% and percent DO exceedance was about 59.7% during the period of 2000-2007, was listed as impaired for DO and nutrients. In addition, the percent DO exceedance has increased over time since 1990, as shown in Figure 2.22 in the Mill Creek TMDL report. During the same period of observation, the median and average concentrations of TN in Mill Creek were observed to be 0.90 mg/L and 1.17 mg/L, respectively. **The 25th percentile of observed TN concentrations for this impaired waterbody was about 0.52 mg/L, much less than the regional value (0.71 mg/L) of the 25th percentile for reference unimpacted stations**. Therefore, it is the Department's position that a site-specific target should be utilized to better represent these unique stream conditions in the Hillsborough River system.

3. If more reasonable values were used for the targets the data would indicate a much smaller reduction or no reduction at all for this water body. Examination of the available data (only presented relative to the modeling results) showed TN annual average values around 1.0 mg/L which if more reasonable targets were utilized would not result in the need for reductions.

   Response: The use of calibrated models to develop TMDLs is a sound and scientific-based approach for those impaired waterbodies. The TN target was obtained from a two-step process: (1) whether to meet the DO criteria, and then (2) whether to satisfy site-specific Chla threshold. The median TN target of 0.465 mg/L for Big Ditch, Channelized Stream, and Two Hole Branch was set at a zero percent DO exceedance (on a daily basis, see Figure 5.21) and also satisfied the median Chla target of 1.07 ug/L (Figure 5.22). These values are comparable to those for Trout Creek (median Chla 1.22 ug/L), Mill Creek and Baker Creek (long-term average <2.0 ug/L).

4. It is clear that the model has some potential issues based upon the unreasonably low values of the "natural" TP and TN concentrations determined, the natural levels are as low as 0.1 to 0.3 mg/L. Prior to using the model for development of a TMDL it is important to make sure it is accurately simulating the watershed and receiving water conditions, the unrealistic projections for the "natural" TP and TN conditions is an indicator that something is wrong with the model, i.e. there are natural processes not being dealt with.

   Response: The model simulation for pristine conditions was only for reference purposes. All the proposed TMDLs for the Hillsborough River Basin tributaries were developed based on the calibrated model for existing conditions, not the natural conditions. The Department understands that concentrations of TN under the natural conditions could be questionable since there is no directly observed information available under these conditions.

Ms. Susan C. Moore
Maintenance Environmental Coordinator
Florida Department of Transportation

August 18, 2009
Page Twelve

The existing conditions were calibrated first, prior to establishment of natural conditions. Without "acceptable" calibration under the existing conditions, it is the Department's intention that model simulations for load reductions would not be pursued to develop the TMDLs.

According to a study conducted for the contribution of TN discharged from Crystal Springs to the lower Hillsborough River (SWFWMD, 1999), Crystal Springs, along with Trout Creek, Blackwater Creek, and Cypress Creek, contribute a significant amount (10-100 cfs) of flow to the Hillsborough River. If spring waters are a significant contributor to streams in this Hillsborough River Watershed, "truly" natural concentrations of TN in headwaters of the river might be expected to be similar to those in pristine spring waters. For Crystal Springs, nitrate concentrations measured by USGS in the early 1920s and late 1940s were about 0.1 mg/L and 0.2 mg/L, respectively (SWFWMD, 1999). Typical nitrate concentrations in Florida spring waters were also reported to be less than 0.2 mg/L in the early 1970s (FDEP, 2008). A report also indicated that the natural or background concentration of nitrate in the Florida aquifer has been shown to be less than 0.01 mg/L (SWFWMD, 2001). Based on literature review, a "truly" pristine TN value is most likely much less than 0.1 mg/L in spring waters in the Hillsborough River watershed. Collectively, the natural, pristine TN value that might occur for spring-dominant headwaters of the Hillsborough River does not seem much different from the natural, background TN value simulated by the model for the watershed.

5. Presently, the TMDL targets dissolved oxygen levels in the streams above 5.0 mg/L at all times and all places. This may not be a reasonable assumption as to the "natural" conditions of the system. There are many systems in Florida where dissolved oxygen conditions naturally drop below the 5.0 mg/L. The load conditions developed and the unrealistically low levels of "natural" TN and TP concentrations in the streams for the natural condition may indicate that the 5.0 mg/L target for all times is unreasonable. Some discussion at least should be provided relative to the natural DO conditions in the stream.

   Response: It is the Department's intention that DO in Florida streams meets the DO criteria of 5.0 mg/L at all times and all places, unless it can be shown that values below 5.0 mg/L are a result of pollution (not pollutants) or a naturally occurring condition. Again, DO time-variations for natural background conditions in the TMDL reports is for only information purposes, providing a guideline of the DO variation below which DO variation under the load reduction conditions (TMDL conditions) should be. As EPA recommended for the Hillsborough River tributaries' TMDLs reports, the DO excursion documented is only a 48 hour slight deviation which is well within the protective deviations allowed under EPA's biologically based DO stressor models and within model measurement error and therefore is not considered significant in assessing compliance with the DO criteria.

In closing, we appreciate your continuing active interest in the Total Maximum Daily Load program, and look forward to all the FDOT TMDL team members helping us to restore the designated uses in all of the affected watersheds.

Sincerely,

Jan Mandrup-Poulsen, Administrator
Watershed Evaluation and TMDL Section
Florida Department of Environmental Protection

ec: Marjorie Bixby/FDOT
Terry Hansen/FDEP
Charles Kovach/FDEP

Below are questions and concerns made by the Florida Department of Transportation with FDEP responses edited to include only waters in the Hillsborough River Basin (Trout Creek, Channelized Stream, Big Ditch, and Two Hole Branch).

August 18, 2009

Mr. Joshua Boan
Environmental Process/Natural Sciences Manager
Environmental Research Administrator
605 Suwannee Street, MS 37
Tallahassee, FL 32399

Re: FDOT Comments on Newly Released Draft TMDLs

Dear Mr. Boan:

The Department appreciates the time and effort you and your staff put into reviewing these draft TMDLs. We have made necessary edits to some draft TMDL reports as a result of your comments. Because of your efforts, these final TMDLs will be improved. To aid you in reviewing our responses, we have included your comments, followed by a response to each (in blue), in the order in which they were presented.

Please contact me at Jan.Mandrup-Poulsen@dep.state.fl.us, if you have any further questions.

Sincerely,

Jan Mandrup-Poulsen, Administrator
Watershed Evaluation and TMDL Section
Florida Department of Environmental Protection

ec: Marjorie Bixby/FDOT
John Abendroth

DISTRICT 1 COMMENTS

GENERAL COMMENTS

The following comments relate to multiple TMDLs where specific comments are provided below for each of the TMDL documents.

1. The figures that show the WBIDs and also identify the "FDOT Local Roads" are not an accurate depiction of the roadways that FDOT is responsible for. Please isolate out those roads that are part of FDOTs responsibility from those controlled by the Cities and Counties. In the alternative, simply identify roads as “Local Roads” in the legend.

   Response: Footnote will be added to all such figures to note that roads are for illustration purposes only and are not meant to be an accurate depiction of roadways for which FDOT is responsible.

2. The load reductions determined for the non-point sources, which include the WLA for the stormwater (under the MS4 permit) and the LA, have not been allocated but simply applied evenly between the WLA for Stormwater and the LA. Sufficient studies have not been completed to determine if an even distribution of the load reductions is justified, therefore some language acknowledging this should be put into both the TMDL documents and ultimately the rules to allow the ability to finalize (and therefore change the assigned reductions) under the BMAP. The concern exists that once the $WLA_{stormwater}$ percent reductions are put into the adopted TMDL document and the rule, the language in the MS4 permits would tie those reductions to the permit, and to not implement those reductions may put the permittees in violation. This also provides opportunities for third parties to challenge. [This comment applies to all TMDLs reviewed in which there was an WLA-MS4 allocation specified.]

   Response: In 2001, the Department submitted to the Governor and Legislature a document outlining the intended process for the allocation of loads under the TMDL Program. One key provision of the proposal was to level the “playing field,” such that once stakeholders had the opportunity to meet and discuss what steps needed to be taken and to get appropriate credit for those initiatives already completed, the specific allocations will be set by the agreements reached under the Basin Management Action Plan (BMAP). This process has been successfully used in several adopted BMAPs and has demonstrated the flexibility that remains after setting the initial reductions for stormwater-related allocations (LA and WLA_{sw}) at identical levels.

   The laws of Florida form the underlying basis for the initial equal allocations. In particular, Section 403.067(6)(b) of Florida Statutes, states in part that:

   “Allocations may also be made to individual basins and sources or as a whole to all basins and sources or categories of sources of inflow to the water body or water body segments. An initial allocation of allowable pollutant loads among point and nonpoint sources may be developed as part of the total maximum daily load. However, in such cases, the detailed allocation to specific point sources and specific categories of nonpoint sources shall be established in the basin management action plan…”

   Additionally, each of the draft TMDL reports contains language in the NPDES Stormwater Discharges section in chapter 6 of the reports (repeated below) to address the issue of allocation between the WLA for stormwater and the LA portions of the TMDL.

"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."

3. In some of the TMDLs within the Source Assessment Chapter (Chapter 4), tables are provided for the calculation of loads to the system. These loads are not utilized within the TMDL but rather for information purposes on the potential contribution of various land use types. While the total load assigned to Highways was generally zero based upon zero area being assigned to that category, the EMC values listed in the table appear high. This will be important when the time comes for development of the allocation distribution. Between December 2004 and October 2007 roadway runoff water quality data were collected by Johnson Engineering for FDOT District 1 at four locations within District 1. Ten events were sampled for each of the four locations, with samples collected at both the inflows and outflows of existing stormwater treatment ponds. All collection, transfer, and handling procedures were conducted in ccordance with FDEP Standard Operating Procedures, and samples were analyzed by certified labs. Average values for TN and TP at the pond inflows were determined to be 1.17 mg/l and 0.158 mg/l, respectively. [It is perhaps noteworthy to observe that the highest average TN and TP values were measured at the first site sampled (i.e., samples collected between December 2004 and November 2005) which is also the site with the lowest percentage of impervious area.] Given the changes to roadway management practices that FDOT has undertaken over the past several years and the rigorous quality control used in these studies compared with the older studies, we believe that the numbers presented by Johnson Engineering are more representative than some of the standard EMC values being utilized. [This comment applies to all nutrient and DO TMDL documents reviewed where loading tables were provided].

   Response: A copy of the Johnson Engineering Study report was not included with the comments we received. If FDOT could provide the report to Mr. Eric Livingston (Bureau Chief for the Bureau of Watershed Restoration) it will be reviewed for incorporation into the stormwater database and use in estimation of transportation event mean concentrations (EMCs).

SPECIFIC COMMENTS

The following are specific comments that relate to the individual TMDL documents reviewed.

HILLSBOROUGH RIVER

Channelized Stream (WBID 1483): DO/Nutrients

1. The nutrient targets established for TN are far below the levels that should be set for these systems. The TN targets are set at 0.463 mg/L (although there is some confusion within the document as to what the true level utilized in the final reductions is). Adjacent waterbodies where numeric nutrient criteria were set, i.e. freshwater streams, the TN targets were as high as 1.73 mg/L (Mustang Ranch, Tampa Bypass Canal).

   Response: A combination of the calibrated WAMView and WASP was used to simulate the assimilative capacity and then set site-specific targets of Chla and TN for Trout Creek. As presented in the draft TMDLs report at pages 66, 70, and 73, the median and average TN targets for Trout Creek were estimated to be 0.453 mg/L and 0.614 mg/L, respectively. Moreover, the model simulated target (median) of TN corresponded to the median TN target (0.463 mg/L) obtained by the empirical relationship for Trout Creek and Channelized

Stream. It should be noted that both methods were designed to meet the DO criteria at any time and any place on a daily basis. Therefore, given the consistency between the two independent methods as applied to Trout Creek, the Department considers that the target obtained from the empirical method is reliable for the Channelized Stream. More importantly, the TN target set up by both of these methods was considered as a site-specific target that may not be comparable to either a regional TN target or TN targets for nearby streams derived by less rigorous means.

Additionally, care should be followed when comparing the TN target concentrations from one stream to another because dynamic hydrogeochemical processes are possibly different from one location to another. For example, one stream could respond quickly to DO depletion but not the other, and/or one system can be nutrient-limited but not the other. Without having detailed knowledge for each system, differences in the TN targets may reflect that one system has a greater assimilative capacity for TN than the other. More importantly, assimilative capacity of TN and TP, i.e., target concentrations, was determined as a result of the combined effects of BOTH TN and TP concentrations on biological communities (Chla) in a waterbody. Therefore, a simple comparison in TN target concentrations between waterbodies, while ignoring TP or other essential parameters, may be unreasonable.

2. Examination of the present status of the tables developed under the numeric nutrient criteria document released in June of 2009, identifies the 25th percentile for reference unimpacted stations for TN = 0.71 mg/L for this region of the State. The 75th percentile (which is the value typically used by EPA in developing targets from reference stations) is 1.41 mg/L. Florida has been looking at the 90th percentile as the potential value to set for reference conditions, this would give a TN target of 1.82 mg/L.

   Response: In the TMDL reports for the Hillsborough River tributaries, interpretation of the narrative nutrient criterion states:

   "The IWR's numeric Chla threshold for rivers and streams is used to represent levels at which an imbalance in flora or fauna is expected to occur. While the IWR provides a threshold for nutrient impairment for streams based on annual average Chla levels, these thresholds are not standards and need not be used as the nutrient-related water quality target for TMDLs. In fact, in recognition that the IWR thresholds were developed using statewide 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."

   The Department recognized that a regional scale TN draft numeric criterion target may not best represent the level at which the flora and fauna become balanced. For example, Mill Creek (WBID 1542A), where percent anthropogenic land use was about 78.9% and percent DO exceedance was about 59.7% during the period of 2000-2007, was listed as impaired for DO and nutrients. In addition, the percent DO exceedance has increased over time since 1990, as shown in Figure 2.22 in the Mill Creek TMDL report. During the same period of observation, the median and average concentrations of TN in Mill Creek were observed to be 0.90 mg/L and 1.17 mg/L, respectively. **The 25th percentile of observed TN concentrations for this impaired waterbody was about 0.52 mg/L, much less than the regional value (0.71 mg/L) of the 25th percentile for reference unimpacted stations**. Therefore, it is the Department's position that a site-specific target should be utilized to better represent these unique stream conditions in the Hillsborough River system.

3. If more reasonable values were used for the targets the data would indicate a much smaller reduction or no reduction at all for this water body. Examination of the available data (only presented relative to the modeling results) showed TN annual average values around 1.0 mg/L which if more reasonable targets were utilized would not result in the need for reductions.

   Response: The use of calibrated models to develop TMDLs is a sound and scientific-based approach for those impaired waterbodies. The TN target was obtained from a two-step process: (1) whether to meet the DO criteria, and then (2) whether to satisfy site-specific Chla threshold. The median TN target of 0.465 mg/L for Channelized Stream was set at a zero percent DO exceedance (on a daily basis, see Figure 5.21) and also satisfied the median Chla target of 1.07 ug/L (Figure 5.22). These values are comparable to those for Trout Creek (median Chla 1.22 ug/L), Mill Creek and Baker Creek (long-term average <2.0 ug/L).

4. It is clear that the model has some potential issues based upon the unreasonably low values of the "natural" TP and TN concentrations determined, the natural levels are as low as 0.1 to 0.3 mg/L. Prior to using the model for development of a TMDL it is important to make sure it is accurately simulating the watershed and receiving water conditions, the unrealistic projections for the "natural" TP and TN conditions is an indicator that something is wrong with the model, i.e. there are natural processes not being dealt with.

   Response: The model simulation for pristine conditions was only for reference purposes. All the proposed TMDLs for the Hillsborough River Basin tributaries were developed based on the calibrated model for existing conditions, not the natural conditions. However, the natural conditions were utilized for setting a baseline that TMDLs must be above. The Department understands that concentrations of TN under the natural conditions could be questionable since there is no directly observed information available under these conditions.

   The existing conditions were calibrated first, prior to establishment of natural conditions. Without “acceptable” calibration under the existing conditions, it is the Department’s intention that model simulations for load reductions would not be pursued to develop the TMDLs.

   According to a study conducted for the contribution of TN discharged from Crystal Springs to the lower Hillsborough River (SWFWMD, 1999), Crystal Springs, along with Trout Creek, Blackwater Creek, and Cypress Creek, contribute a significant amount (10-100 cfs) of flow to the Hillsborough River. If spring waters are a significant contributor to streams in this Hillsborough River Watershed, “truly” natural concentrations of TN in headwaters of the river might be expected to be similar to those in pristine spring waters. For Crystal Springs, nitrate concentrations measured by USGS in the early 1920s and late 1940s were about 0.1 mg/L and 0.2 mg/L, respectively (SWFWMD, 1999). Typical nitrate concentrations in Florida spring waters were also reported to be less than 0.2 mg/L in the early 1970s (FDEP, 2008). A report also indicated that the natural or background concentration of nitrate in the Florida aquifer has been shown to be less than 0.01 mg/L (SWFWMD, 2001). Based on literature review, a “truly” pristine TN value is most likely much less than 0.1 mg/L in spring waters in the Hillsborough River watershed. Collectively, the natural, pristine TN value that might occur for spring-dominant headwaters of the Hillsborough River does not seem much different from the natural, background TN value simulated by the model for the watershed.

5. Presently, the TMDL targets dissolved oxygen levels in the streams above 5.0 mg/L at all times and all places. This may not be a reasonable assumption as to the "natural" conditions of the system. There are many systems in Florida where dissolved oxygen conditions naturally drop below the 5.0 mg/L. The load conditions developed and the unrealistically low levels of "natural" TN and TP concentrations in the streams for the natural condition may indicate that the 5.0 mg/L target for all times is unreasonable. Some discussion at least should be provided relative to the natural DO conditions in the stream.

   Response: It is the Department's intention that DO in Florida streams meets the DO criteria of 5.0 mg/L at all times and all places, unless it can be shown that values below 5.0 mg/L are a result of pollution (not pollutants) or a naturally occurring condition. Again, DO time-variations for natural background conditions in the TMDL reports is for only information purposes, providing a guideline of the DO variation below which DO variation under the load reduction conditions (TMDL conditions) should be. As EPA recommended for the Hillsborough River tributaries' TMDLs reports, the DO excursion documented is only a 48 hour slight deviation which is well within the protective deviations allowed under EPA's biologically based DO stressor models and within model measurement error and therefore is not considered significant in assessing compliance with the DO criteria.

DISTRICT 2 COMMENTS

GENERAL COMMENTS

The following comments relate to multiple TMDLs where specific comments are provided below for each of the TMDL documents.

1. It appears that the nutrient load assessments for the transportation category (Chapter 4) are based upon values presented in Harper (2007) (i.e., 1.64 mg/l TN and 0.22 mg/l TP). Harper's numbers are determined by averaging the average results from eleven different datasets from studies conducted between 1975 and 2005. Each study was given equal weight in the averaging procedure regardless of the number of events sampled and the methodologies used. Between December 2004 and October 2007 roadway runoff water quality data were collected by Johnson Engineering for FDOT District 1 at four locations within District 1. Ten events were sampled for each of the four locations, with samples collected at both the inflows and outflows of existing stormwater treatment ponds. All collection, transfer, and handling procedures were conducted in accordance with FDEP Standard Operating Procedures, and samples were analyzed by certified labs. Average values for TN and TP ***at the pond inflows*** were determined to be 1.17 mg/l and 0.158 mg/l, respectively. [It is perhaps noteworthy to observe that the highest average TN and TP values were measured at the first site sampled (i.e., samples collected between December 2004 and November 2005) which is also the site with the lowest percentage of impervious area.] Given the changes to roadway management practices that FDOT has undertaken over the past several years and the rigorous quality control used in these studies compared with the older studies, we believe that the numbers presented by Johnson Engineering are more representative than Harper's numbers of present day TN and TP loading conditions. [This comment applies to all nutrient and DO TMDL documents reviewed. This included WBIDs 2410, 2389, 2203, 2213P,2265A, 2460, 2589, 2578.]

   Response: A copy of the Johnson Engineering Study report was not included with the comments we received. If FDOT could provide the report to Mr. Eric Livingston (Bureau Chief for the Bureau of Watershed Restoration) it will be reviewed for incorporation into the stormwater database and use in estimation of transportation event mean concentrations (EMCs).

1. The load reductions determined for the non-point sources, which include the WLA for the stormwater (under the MS4 permit) and the LA, have not been allocated but simply applied evenly between the WLA for Stormwater and the LA. Sufficient studies have not been completed to determine if an even distribution of the load reductions is justified, therefore some language acknowledging this (within the TMDL and ultimately within the Rule) should be put into both the TMDL documents and ultimately the rules to allow the ability to finalize (and therefore change the assigned reductions) under the BMAP. [This comment applies to all TMDLs reviewed in which there was an WLA-MS4 allocation specified.]

   Response: In 2001, the Department submitted to the Governor and Legislature a document outlining the intended process for the allocation of loads under the TMDL Program. One key provision of the proposal was to level the "playing field," such that once stakeholders had the opportunity to meet and discuss what steps needed to be taken and to get appropriate credit for those initiatives already completed, the specific allocations will be set by the agreements reached under the Basin Management Action Plan (BMAP). This process has been successfully used in several adopted BMAPs and has demonstrated the flexibility that remains after setting the initial reductions for stormwater-related allocations (LA and WLA_{sw}) at identical levels.

The laws of Florida form the underlying basis for the initial equal allocations. In particular, Section 403.067(6)(b) of Florida Statutes, states in part that:

"Allocations may also be made to individual basins and sources or as a whole to all basins and sources or categories of sources of inflow to the water body or water body segments. An initial allocation of allowable pollutant loads among point and nonpoint sources may be developed as part of the total maximum daily load. However, in such cases, the detailed allocation to specific point sources and specific categories of nonpoint sources shall be established in the basin management action plan…"

Additionally, each of the draft TMDL reports contains language in the NPDES Stormwater Discharges section in chapter 6 of the reports (repeated below) to address the issue of allocation between the WLA for stormwater and the LA portions of the TMDL.

"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."

SPECIFIC COMMENTS
The following are specific comments referenced to the individual TMDL documents reviewed.

DISTRICT 5 COMMENTS

GENERAL COMMENTS
The following comments relate to multiple TMDLs where specific comments are provided below for each of the TMDL documents.

1. The figures that show the WBIDs and also identify the "FDOT Local Roads" are not an accurate depiction of the roadways that FDOT is responsible for. Please isolate out those roads that are part of FDOTs responsibility from those controlled by the Cities and Counties.

   Response: Please specify which figures in the TMDL reports that include aforementioned WBIDs have the "FDOT Local Roads"? This term does not seem to appear in any of the figures in these TMDL reports. However, if we learn of such an instance, a footnote will be added to all such figures to note that roads are for illustration purposes only and are not meant to be an accurate depiction of roadways for which FDOT is responsible.

The load reductions determined for the non-point sources, which include the WLA for the stormwater (under the MS4 permit) and the LA, have not been allocated but simply applied evenly between the WLA for Stormwater and the LA. Sufficient studies have not have not been presented or have not been completed to determine if an even distribution of the load reductions is justified, therefore some language acknowledging this (within the TMDL and ultimately within the Rule) should be put into both the TMDL documents and ultimately the rules to allow the ability to finalize (and therefore change the assigned reductions) under the BMAP. [WBIDS 2964A, 2964, 2893F, 2893E, 2893D, 2893C and 2962]

Response: In 2001, the Department submitted to the Governor and Legislature a document outlining the intended process for the allocation of loads under the TMDL Program. One key provision of the proposal was to level the "playing field," such that once stakeholders had the opportunity to meet and discuss what steps needed to be taken and to get appropriate credit for those initiatives already completed, the specific allocations will be set by the agreements reached under the Basin Management Action Plan (BMAP). This process has been successfully used in several adopted BMAPs and has demonstrated the flexibility that remains after setting the initial reductions for stormwater-related allocations (LA and WLA_{sw}) at identical levels.

The laws of Florida form the underlying basis for the initial equal allocations. In particular, Section 403.067(6)(b) of Florida Statutes, states in part that:

"Allocations may also be made to individual basins and sources or as a whole to all basins and sources or categories of sources of inflow to the water body or water body segments. An initial allocation of allowable pollutant loads among point and nonpoint sources may be developed as part of the total maximum daily load. However, in such cases, the detailed allocation to specific point sources and specific categories of nonpoint sources shall be established in the basin management action plan…"

Additionally, each of the draft TMDL reports contains language in the NPDES Stormwater Discharges section in chapter 6 of the reports (repeated below) to address the issue of allocation between the WLA for stormwater and the LA portions of the TMDL.

"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."

SPECIFIC COMMENTS

The following are specific comments that relate to the individual TMDL documents reviewed.

DISTRICT 7 COMMENTS

GENERAL COMMENTS

The following comments relate to multiple TMDLs where specific comments are provided below for each of the TMDL documents.

1. The figures that show the WBIDs and also identify the "FDOT Local Roads" are not an accurate depiction of the roadways that FDOT is responsible for. Please isolate out those roads that are part of FDOTs responsibility from those controlled by the Cities and Counties. In the alternative, simply identify roads as "Local Roads" in the legend.

   Response: Footnote will be added to all such figures to note that roads are for illustration purposes only and are not meant to be an accurate depiction of roadways for which FDOT is responsible.

2. The load reductions determined for the non-point sources, which include the WLA for the stormwater (under the MS4 permit) and the LA, have not been allocated but simply applied evenly between the WLA for Stormwater and the LA. Sufficient studies have not been completed to determine if an even distribution of the load reductions is justified, therefore some language acknowledging this should be put into both the TMDL documents and ultimately the rules to allow the ability to finalize (and therefore change the assigned

reductions) under the BMAP. The concern exists that once the $WLA_{stormwater}$ percent reductions are put into the adopted TMDL document and the rule, the language in the MS4 permits would tie those reductions to the permit, and to not implement those reductions may put the permittees in violation. This also provides opportunities for third parties to challenge. [This comment applies to all TMDLs reviewed in which there was an WLA-MS4 allocation specified.]

Response: In 2001, the Department submitted to the Governor and Legislature a document outlining the intended process for the allocation of loads under the TMDL Program. One key provision of the proposal was to level the "playing field," such that once stakeholders had the opportunity to meet and discuss what steps needed to be taken and to get appropriate credit for those initiatives already completed, the specific allocations will be set by the agreements reached under the Basin Management Action Plan (BMAP). This process has been successfully used in several adopted BMAPs and has demonstrated the flexibility that remains after setting the initial reductions for stormwater-related allocations (LA and WLA_{sw}) at identical levels.

The laws of Florida form the underlying basis for the initial equal allocations. In particular, Section 403.067(6)(b) of Florida Statutes, states in part that:

"Allocations may also be made to individual basins and sources or as a whole to all basins and sources or categories of sources of inflow to the water body or water body segments. An initial allocation of allowable pollutant loads among point and nonpoint sources may be developed as part of the total maximum daily load. However, in such cases, the detailed allocation to specific point sources and specific categories of nonpoint sources shall be established in the basin management action plan…"

Additionally, each of the draft TMDL reports contains language in the NPDES Stormwater Discharges section in chapter 6 of the reports (repeated below) to address the issue of allocation between the WLA for stormwater and the LA portions of the TMDL.

"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."

3. In some of the TMDLs within the Source Assessment Chapter (Chapter 4), tables are provided for the calculation of loads to the system. These loads are not utilized within the TMDL but rather for information purposes on the potential contribution of various land use types. While the total load assigned to Highways was generally zero based upon zero area being assigned to that category, the EMC values listed in the table appear high. This will be important when the time comes for development of the allocation distribution. Between December 2004 and October 2007 roadway runoff water quality data were collected by Johnson Engineering for FDOT District 1 at four locations within District 1. Ten events were sampled for each of the four locations, with samples collected at both the inflows and outflows of existing stormwater treatment ponds. All collection, transfer, and handling procedures were conducted in accordance with FDEP Standard Operating Procedures, and samples were analyzed by certified labs. Average values for TN and TP at the pond inflows were determined to be 1.17 mg/l and 0.158 mg/l, respectively. [It is perhaps noteworthy to observe that the highest average TN and TP values were measured at the first site sampled (i.e., samples collected between December 2004 and November 2005) which is also the site with the lowest percentage of impervious area.] Given the changes to roadway management

practices that FDOT has undertaken over the past several years and the rigorous quality control used in these studies compared with the older studies, we believe that the numbers presented by Johnson Engineering are more representative than some of the standard EMC values being utilized. [This comment applies to all nutrient and DO TMDL documents reviewed where loading tables were provided].

Response: A copy of the Johnson Engineering Study report was not included with the comments we received. If FDOT could provide the report to Mr. Eric Livingston (Bureau Chief for the Bureau of Watershed Restoration) it will be reviewed for incorporation into the stormwater database and use in estimation of transportation event mean concentrations (EMCs).

SPECIFIC COMMENTS

The following are specific comments that relate to the individual TMDL documents reviewed.

HILLSBOROUGH RIVER

Trout Creek, Channelized Stream, Big Ditch and Two-Hole Branch (WBIDs 1455, 1483, 1469, and 1489): DO/Nutrients

1. The nutrient targets established for TN are far below the levels that should be set for these systems. The TN targets are set at 0.463 mg/L (although there is some confusion within the document as to what the true level utilized in the final reductions is). Adjacent waterbodies where numeric nutrient criteria were set, i.e. freshwater streams, the TN targets were as high as 1.73 mg/L (Mustang Ranch, Tampa Bypass Canal).

   Response: A combination of the calibrated WAMView and WASP was used to simulate the assimilative capacity and then set site-specific targets of Chla, and TN for Trout Creek. As presented in the draft TMDLs report at pages 66, 70, and 73, the median and average TN targets for Trout Creek were estimated to be 0.453 mg/L and 0.614 mg/L, respectively. Moreover, the model simulated target (median) of TN corresponded to the median TN target (0.463 mg/L) obtained by the empirical relationship for Trout Creek. It should be noted that both methods were designed to meet the DO criteria at any time and any place on a daily basis. Therefore, given the consistency between the two independent methods as applied to Trout Creek, the Department considers that the target obtained from the empirical method is reliable for the Hillsborough River tributaries. More importantly, the TN target set up by both of these methods was considered as a site-specific target that may not be comparable to either a regional TN target or TN targets for nearby streams derived by less rigorous means.

   Additionally, care should be followed when comparing the TN target concentrations from one stream to another because dynamic hydrogeochemical processes are possibly different from one location to another. For example, one stream could respond quickly to DO depletion but not the other, and/or one system can be nutrient-limited but not the other. Without having detailed knowledge for each system, differences in the TN targets may reflect that one system has a greater assimilative capacity for TN than the other. More importantly, assimilative capacity of TN and TP, i.e., target concentrations, was determined as a result of the combined effects of BOTH TN and TP concentrations on biological communities (Chla) in a waterbody. Therefore, a simple comparison in TN target concentrations between waterbodies, while ignoring TP or other essential parameters, may be unreasonable.

2. Examination of the present status of the tables developed under the numeric nutrient criteria document released in June of 2009, identifies the 25th percentile for reference unimpacted stations for TN = 0.71 mg/L for this region of the State. The 75th percentile (which is the value typically used by EPA in developing targets from reference stations) is 1.41 mg/L. Florida has been looking at the 90th percentile as the potential value to set for reference conditions, this would give a TN target of 1.82 mg/L.

   Response: In the TMDL reports for the Hillsborough River tributaries, interpretation of the narrative nutrient criterion states:

   > "The IWR's numeric Chla threshold for rivers and streams is used to represent levels at which an imbalance in flora or fauna is expected to occur. While the IWR provides a threshold for nutrient impairment for streams based on annual average Chla levels, these thresholds are not standards and need not be used as the nutrient-related water quality target for TMDLs. In fact, in recognition that the IWR thresholds were developed using statewide 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."

   The Department recognized that a regional scale TN draft numeric criterion target may not best represent the level at which the flora and fauna become balanced. For example, Mill Creek (WBID 1542A), where percent anthropogenic land use was about 78.9% and percent DO exceedance was about 59.7% during the period of 2000-2007, was listed as impaired for DO and nutrients. In addition, the percent DO exceedance has increased over time since 1990, as shown in Figure 2.22 in the Mill Creek TMDL report. During the same period of observation, the median and average concentrations of TN in Mill Creek were observed to be 0.90 mg/L and 1.17 mg/L, respectively. **The 25th percentile of observed TN concentrations for this impaired waterbody was about 0.52 mg/L, much less than the regional value (0.71 mg/L) of the 25th percentile for reference unimpacted stations**. Therefore, it is the Department's position that a site-specific target should be utilized to better represent these unique stream conditions in the Hillsborough River system.

3. If more reasonable values were used for the targets the data would indicate a much smaller reduction or no reduction at all for this water body. Examination of the available data (only presented relative to the modeling results) showed TN annual average values around 1.0 mg/L which if more reasonable targets were utilized would not result in the need for reductions.

   Response: The use of calibrated models to develop TMDLs is a sound and scientific-based approach for those impaired waterbodies. The TN target was obtained from a two-step process: (1) whether to meet the DO criteria, and then (2) whether to satisfy site-specific Chla threshold. The median TN target of 0.465 mg/L for Big Ditch, Channelized Stream, and Two Hole Branch was set at a zero percent DO exceedance (on a daily basis, see Figure 5.21) and also satisfied the median Chla target of 1.07 ug/L (Figure 5.22). These values are comparable to those for Trout Creek (median Chla 1.22 ug/L), Mill Creek and Baker Creek (long-term average <2.0 ug/L).

4. It is clear that the model has some potential issues based upon the unreasonably low values of the "natural" TP and TN concentrations determined, the natural levels are as low as 0.1 to 0.3 mg/L. Prior to using the model for development of a TMDL it is important to make sure it is accurately simulating the watershed and receiving water conditions, the unrealistic

projections for the "natural" TP and TN conditions is an indicator that something is wrong with the model, i.e. there are natural processes not being dealt with.

Response: The model simulation for pristine conditions was only for reference purposes. All the proposed TMDLs for the Hillsborough River Basin tributaries were developed based on the calibrated model for existing conditions, not the natural conditions. The Department understands that concentrations of TN under the natural conditions could be questionable since there is no directly observed information available under these conditions.

The existing conditions were calibrated first, prior to establishment of natural conditions. Without "acceptable" calibration under the existing conditions, it is the Department's intention that model simulations for load reductions would not be pursued to develop the TMDLs.

According to a study conducted for the contribution of TN discharged from Crystal Springs to the lower Hillsborough River (SWFWMD, 1999), Crystal Springs, along with Trout Creek, Blackwater Creek, and Cypress Creek, contribute a significant amount (10-100 cfs) of flow to the Hillsborough River. If spring waters are a significant contributor to streams in this Hillsborough River Watershed, "truly" natural concentrations of TN in headwaters of the river might be expected to be similar to those in pristine spring waters. For Crystal Springs, nitrate concentrations measured by USGS in the early 1920s and late 1940s were about 0.1 mg/L and 0.2 mg/L, respectively (SWFWMD, 1999). Typical nitrate concentrations in Florida spring waters were also reported to be less than 0.2 mg/L in the early 1970s (FDEP, 2008). A report also indicated that the natural or background concentration of nitrate in the Florida aquifer has been shown to be less than 0.01 mg/L (SWFWMD, 2001). Based on literature review, a "truly" pristine TN value is most likely much less than 0.1 mg/L in spring waters in the Hillsborough River watershed. Collectively, the natural, pristine TN value that might occur for spring-dominant headwaters of the Hillsborough River does not seem much different from the natural, background TN value simulated by the model for the watershed.

5. Presently, the TMDL targets dissolved oxygen levels in the streams above 5.0 mg/L at all times and all places. This may not be a reasonable assumption as to the "natural" conditions of the system. There are many systems in Florida where dissolved oxygen conditions naturally drop below the 5.0 mg/L. The load conditions developed and the unrealistically low levels of "natural" TN and TP concentrations in the streams for the natural condition may indicate that the 5.0 mg/L target for all times is unreasonable. Some discussion at least should be provided relative to the natural DO conditions in the stream.

   Response: It is the Department's intention that DO in Florida streams meets the DO criteria of 5.0 mg/L at all times and all places, unless it can be shown that values below 5.0 mg/L are a result of pollution (not pollutants) or a naturally occurring condition. Again, DO time-variations for natural background conditions in the TMDL reports is for only information purposes, providing a guideline of the DO variation below which DO variation under the load reduction conditions (TMDL conditions) should be. As EPA recommended for the Hillsborough River tributaries' TMDLs reports, the DO excursion documented is only a 48 hour slight deviation which is well within the protective deviations allowed under EPA's biologically based DO stressor models and within model measurement error and therefore is not considered significant in assessing compliance with the DO criteria.

Below are questions and concerns made by Polk County with FDEP responses edited to include only waters in the Hillsborough River Basin (Trout Creek, Channelized Stream, Big Ditch, and Two Hole Branch).

Florida Department of Environmental Protection

Bob Martinez Center
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Charlie Crist
Governor

Jeff Kottkamp
Lt. Governor

Michael W. Sole
Secretary

September 1, 2009

Mr. Jeffrey F. Spence
Natural Resources Division Director
Polk County Environmental Resources
1011 Jim Keene Boulevard
Winter Haven, FL 33880

Dear Mr. Spence:

The Department appreciates the time and effort you and your staff put into reviewing these draft TMDLs. Because of your efforts, these final TMDLs will be improved. To aid you in reviewing our responses, we have included your comments, followed by a response to each (in blue), in the order in which they were presented. (Please recall that we had previously advised you that the draft TMDL for the North Prong of the Alafia River was not proposed for rulemaking, so your comments on that TMDL are not addressed in this letter.)

RE: Responses to Comments provided by Polk County on Draft the TMDL Report for Channelized Stream (WBID 1483)

Polk County provided the comments on the draft TMDL report for Channelized Stream (WBID 1483), expressing their concerns about the followings: (1) whether both TN and TP reductions are necessary, and (2) whether the County's MS4 which is limited to County Road 35-A and has negligible nutrient discharges is required to reduce their stormwater loads.

Comment 1: The empirical model shows a strong relationship between TN and Chl-a concentrations. However, while TN reduction goals may be well supported by the use of this empirical model, TP reductions do not and it is not clear why TP loads are requested to be reduced by the same percentage. TP natural background levels may be quite high as a result of this WBID's position in the Bone Valley ecoregion. Furthermore, the system is seemingly TN limited and thus likely remedied by reductions in TN concentrations alone. Therefore, Polk County is concerned that the TP reduction goals are both unrealistic and unnecessary.

Response: It is the Department's position that both TN and TP should be controlled for Channelized Stream unless otherwise specifically demonstrated. This is because (1) the assimilative capacity of a waterbody (stream, lake, estuary, or costal water) can be determined as a result of combined effects of BOTH TN and TP concentrations on biological communities in the waterbody, and (2) an uncontrolled nutrient (TN or TP) in upstream could also create more problems (i.e., eutrophication) in downstream or coastal waters. Nitrogen limitation in a fresh water system can be accelerated by controlling nitrogen alone, and eventually, may cause blooms of nitrogen-fixing blue green algae, as has been seen to occur in many fresh water systems. Therefore, to reduce eutrophication not only in Channelized Stream, but also downstream segments such as Hillsborough River and Tampa Bay, control of both TN and TP will be necessary.

Comment 2: Polk County's Municipal Separate Storm Sewer System (MS4) in this WBID is limited to County Road 35-A. The nutrient load from our MS4 is likely negligible when compared to all stormwater runoff generated in the WBID. An 80.9% reduction of TN and TP from our MS4 may be unattainable and the costs of attempting such reductions would be prohibitive. The County requests assurance from the FDEP that our MS4 is not, by default, everything that is not a point source and that we are held responsible only for that which is delivered through our MS4 outfalls.

"More Protection, Less Process"
www.dep.state.fl.us

Mr. Jeffrey F. Spence
Natural Resources Division Director
September 1, 2009
Page Two

Response: The Department understands that nutrient loads from the MS4 facilities in Polk County were directly neither measured nor estimated for the WLAs of stormwater discharges. Therefore, instead of a specific load allocation, "percent reduction" was used to express the WLAs for stormwater discharges. We believe the language contained in the TMDL rule for Channelized Stream [i.e., 62-304.610(12)(b), FAC] provides the assurance you are seeking, in that Polk County will only be obligated to address those anthropogenic loads "for sources contributing to exceedances of the criteria."
Furthermore, the draft TMDL report states in Chapter 6:

> "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 is also different than 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."

Additionally, the laws of Florida form the underlying basis for the initial equal allocations. In particular, Section 403.067(6)(b) of Florida Statutes, states in part that;

> "Allocations may also be made to individual basins and sources or as a whole to all basins and sources or categories of sources of inflow to the water body or water body segments. An initial allocation of allowable pollutant loads among point and nonpoint sources may be developed as part of the total maximum daily load. However, in such cases, the detailed allocation to specific point sources and specific categories of nonpoint sources shall be established in the basin management action plan..."

Each of the draft TMDL reports contains language in the NPDES Stormwater Discharges section in Chapter 6 of the reports (repeated below) to address the issue of allocation between the WLA for stormwater and the LA portions of the TMDL.

> "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."

In closing, I do appreciate Polk County's willingness to work with the Department in the manner you've expressed. We look forward to restoring your waters as part of the upcoming Basin Management Action Plan process.

Sincerely,

Jan Mandrup-Poulsen, Administrator
Watershed Evaluation and TMDL Section

ec: Curtis Porterfield
Terry Hansen
Charles Kovach
Kevin Petrus
Woo Jun Kang

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
(850) 245-8561
www2.dep.state.fl.us/water/