Final

Total Maximum Daily Load

for

Dissolved Oxygen

in

Long Branch Creek (WBID 1627)

November 2012
In compliance with the provisions of the Federal Clean Water Act, 33 U.S.C §1251 et. seq., as amended by the Water Quality Act of 1987, P.L. 400-4, the U.S. Environmental Protection Agency is hereby establishing this Total Maximum Daily Load (TMDL) for dissolved oxygen in Long Branch Creek (WBID 1627). Subsequent actions must be consistent with this TMDL.

/s/ James D. Giattina, Director
Water Protection Division

11/09/2012
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<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-MAP</td>
<td>Basin Management Action Plan</td>
</tr>
<tr>
<td>BMP</td>
<td>Best Management Practices</td>
</tr>
<tr>
<td>BOD</td>
<td>Biochemical Oxygen Demand</td>
</tr>
<tr>
<td>CFR</td>
<td>Code of Federal Regulations</td>
</tr>
<tr>
<td>CFS</td>
<td>Cubic Feet per Second</td>
</tr>
<tr>
<td>CO₂</td>
<td>Carbon Dioxide</td>
</tr>
<tr>
<td>DO</td>
<td>Dissolved Oxygen</td>
</tr>
<tr>
<td>EMC</td>
<td>Event Mean Concentration</td>
</tr>
<tr>
<td>FAC</td>
<td>Florida Administrative Code</td>
</tr>
<tr>
<td>FDEP</td>
<td>Florida Department of Environmental Protection</td>
</tr>
<tr>
<td>FLUCCS</td>
<td>Florida Land Use Cover Classification System</td>
</tr>
<tr>
<td>FS</td>
<td>Florida Statutes</td>
</tr>
<tr>
<td>GIS</td>
<td>Geographic Information System</td>
</tr>
<tr>
<td>HSPF</td>
<td>Hydrologic Simulation Program Fortan</td>
</tr>
<tr>
<td>HUC</td>
<td>Hydrologic Unit Code</td>
</tr>
<tr>
<td>IWR</td>
<td>Impaired Surface Waters Rule</td>
</tr>
<tr>
<td>KM²</td>
<td>Square Kilometers</td>
</tr>
<tr>
<td>L</td>
<td>Liters</td>
</tr>
<tr>
<td>L/FT³</td>
<td>Liters per Cubic Foot</td>
</tr>
<tr>
<td>LA</td>
<td>Load Allocation</td>
</tr>
<tr>
<td>LB/YR</td>
<td>Pounds per year</td>
</tr>
<tr>
<td>LSPC</td>
<td>Loading Simulation Program C++</td>
</tr>
<tr>
<td>MGD</td>
<td>Million Gallons per Day</td>
</tr>
<tr>
<td>MG/L</td>
<td>Milligram per liter</td>
</tr>
<tr>
<td>ML</td>
<td>Milliliters</td>
</tr>
<tr>
<td>MOS</td>
<td>Margin of Safety</td>
</tr>
<tr>
<td>MS4</td>
<td>Municipal Separate Storm Sewer Systems</td>
</tr>
<tr>
<td>NASS</td>
<td>National Agriculture Statistics Service</td>
</tr>
<tr>
<td>NH₄</td>
<td>Ammonia Nitrogen</td>
</tr>
<tr>
<td>NHD</td>
<td>National Hydrography Data</td>
</tr>
<tr>
<td>NO₂</td>
<td>Nitrite</td>
</tr>
<tr>
<td>NO₃</td>
<td>Nitrate</td>
</tr>
<tr>
<td>NPDES</td>
<td>National Pollutant Discharge Elimination System</td>
</tr>
<tr>
<td>OBS</td>
<td>Observations</td>
</tr>
</tbody>
</table>
OSTD  Onsite Treatment and Disposal System
SWFWMD  Southwest Florida Water Management District
TKN  Total Kjeldahl Nitrogen
TMDL  Total Maximum Daily Load
TN  Total Nitrogen
TOC  Total Organic Carbon
TP  Total Phosphorus
USEPA  United States Environmental Protection Agency
USGS  United States Geological Survey
WASP  Water Quality Analysis Simulation Program
WBID  Water Body Identification
WLA  Waste Load Allocation
WQS  Water Quality Standards
WMD  Water Management District
WWTP  Waste Water Treatment Plant
SUMMARY SHEET
Total Maximum Daily Load (TMDL)

1998 303(d) Listed Waterbody for TMDL addressed in this report:

<table>
<thead>
<tr>
<th>WBID</th>
<th>Segment Name</th>
<th>Class and Waterbody Type</th>
<th>Major River Basin</th>
<th>HUC</th>
<th>County</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>1627</td>
<td>Long Branch</td>
<td>Class III freshwater</td>
<td>Tampa Bay Basin</td>
<td>03100206</td>
<td>Pinellas</td>
<td>Florida</td>
</tr>
</tbody>
</table>

TMDL Endpoints/Targets:
Dissolved Oxygen and Nutrients

TMDL Technical Approach:
The TMDL allocations for dissolved oxygen were determined by analyzing the effects of BOD, TN, and TP loads on DO concentrations in Long Branch Creek WBID 1627. An LSPC model was used to predict both current and natural pollutant loadings and stream flows, and a WASP Eutrophication model was used to evaluate the in-stream impacts of these pollutant loads. Load reduction scenarios were evaluated to determine which loads would allow WBID 1627 to meet water quality standards.

TMDL Waste Load and Load Allocation

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Current Condition</th>
<th>TMDL Condition</th>
<th>MS4</th>
<th>LA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Facility WLA (kg/yr)</td>
<td>MS4/LA (kg/yr)</td>
<td>Percent Reduction</td>
<td>Percent Reduction</td>
</tr>
<tr>
<td>Total Nitrogen</td>
<td>NA</td>
<td>2,507</td>
<td>342</td>
<td>86</td>
</tr>
<tr>
<td>Total Phosphorus</td>
<td>NA</td>
<td>364</td>
<td>19</td>
<td>95</td>
</tr>
<tr>
<td>BOD</td>
<td>NA</td>
<td>14,407</td>
<td>717</td>
<td>95</td>
</tr>
</tbody>
</table>

Endangered Species Present (Yes or Blank):

USEPA Lead TMDL (USEPA or Blank): USEPA

TMDL Considers Point Source, Non-point Source, or Both: Both

Major NPDES Discharges to surface waters addressed in USEPA TMDL:

<table>
<thead>
<tr>
<th>Permit</th>
<th>Permittee</th>
<th>County</th>
<th>Permit Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLS000005</td>
<td>Pinellas County, FDOT District 7, co-permittees</td>
<td>Pinellas</td>
<td>Phase I MS4</td>
</tr>
</tbody>
</table>
1. Introduction

Section 303(d) of the Clean Water Act requires each state to list those waters within its boundaries for which technology based effluent limitations are not stringent enough to protect any water quality standard applicable to such waters. Listed waters are prioritized with respect to designated use classifications and the severity of pollution. In accordance with this prioritization, states are required to develop Total Maximum Daily Loads (TMDLs) for those water bodies that are not meeting water quality standards. The TMDL process establishes the allowable loadings of pollutants or other quantifiable parameters for a waterbody based on the relationship between pollution sources and in-stream water quality conditions, so that states can establish water quality based controls to reduce pollution from both point and nonpoint sources and restore and maintain the quality of their water resources (USEPA, 1991).

The Florida Department of Environmental Protection (FDEP) developed a statewide, watershed-based approach to water resource management. Under the watershed management approach, water resources are managed on the basis of natural boundaries, such as river basins, rather than political boundaries. The watershed management approach is the framework FDEP uses for implementing TMDLs. The state’s 52 basins are divided into five groups and water quality is assessed in each group on a rotating five-year cycle. FDEP also established five water management districts (WMD) responsible for managing ground and surface water supplies in the counties encompassing the districts. Long Branch Creek is located in the Tampa Bay Basin and is a Group 1 waterbody managed by the Southwest Florida Water Management District (SWFWMD).

For the purpose of planning and management, the WMDs divided the district into planning units defined as either an individual primary tributary basin or a group of adjacent primary tributary basins with similar characteristics. These planning units contain smaller, hydrological based units called drainage basins, which are further divided by FDEP into “water segments”. A water segment usually contains only one unique waterbody type (stream, lake, canal, etc.) and is about five square miles. Unique numbers or waterbody identification (WBIDs) numbers are assigned to each water segment. This TMDL report addresses WBID 1627, which encompasses the freshwater portion of Long Branch Creek. This WBID is located within the Coastal Old Tampa Bay Planning Unit. The geographic location of the WBID is shown in Figure 1.
2. Problem Definition

To determine the status of surface water quality in Florida, three categories of data – chemistry data, biological data, and fish consumption advisories – were evaluated to determine potential impairments. The level of impairment is defined in the Identification of Impaired Surface Waters Rule (IWR), Section 62-303 of the Florida Administrative Code (FAC). The IWR is FDEP’s methodology for determining whether waters should be included on the state’s planning list and verified list. Potential impairments are determined by assessing whether a waterbody meets the criteria for inclusion on the planning list. Once a waterbody is on the planning list, additional data and information are collected and examined to determine if the water should be included on the verified list. The IWR defines the thresholds for determining if waters should be placed on the state’s planning and verified lists. Following IWR methodology, FDEP verified the dissolved oxygen impairment in WBID 1627 of Long Branch Creek.
The TMDL addressed in this document is being established pursuant to commitments made by the United States Environmental Protection Agency (USEPA) in the 1998 Consent Decree in the Florida TMDL lawsuit (Florida Wildlife Federation, et al. v. Carol Browner, et al., Civil Action No. 4: 98CV356-WS, 1998). That Consent Decree established a schedule for TMDL development for waters listed on Florida’s USEPA approved 1998 section 303(d) list. The 1998 section 303(d) list identified numerous WBIDs in the Tampa Bay Basin as not meeting WQS. After assessing all readily available water quality data, USEPA is responsible for developing a TMDL to address dissolved oxygen in WBID 1627 of Long Branch Creek.

3. Watershed Description

Long Branch Creek is a small stream that drains a highly urbanized watershed in central Pinellas County. The Florida Department of Environmental Protection (FDEP) has divided the Long Branch Creek watershed into three WBIDs: a freshwater segment designated WBID 1627; a small lake (Swan Lake) designated WBID 1627A, and a marine segment designated WBID 1627B (see Figure 1). The free-flowing, freshwater segment of the Long Branch Creek watershed covers an area of approximately 1,290 acres (2 square miles). Near the headwaters of the Long Branch is Swan Lake, a small lake surrounded by residential homes and a significant contributor of flow to the stream. The main channel is approximately 3.5 miles in length and flows northeast through a tidal segment (WBID 1627B) and then into Old Tampa Bay. Additional information about Long Branch Creek is available in the Tampa Bay Group 1 Basin Status Report (FDEP, 2003).

In order to identify possible pollutant sources in the watershed, the latest land use coverage was obtained from FDEP and the SWFWMD. Land use data are based on 2009 land cover features categorized according to the Florida Land Use and Cover Classification System (FLUCCS). Table 1, Figure 2 and Figure 3 show that land use in the Long Branch Creek watershed is predominantly developed, with approximately 87 percent classified as urban or residential uses. Another eight percent of the watershed area is used for transportation, communication, or utilities, while open water and wetlands constitute about two percent each. Very little forest- less than one percent- remains in the watershed. Agriculture is not a widespread use, also representing less than one percent of the overall area. Since there are no permitted wastewater or industrial facilities located in the Long Branch Creek watershed, and since the watershed is highly developed, stormwater runoff from urban and suburban areas is considered to be the major contributor of the pollutants that cause the dissolved oxygen impairment.
Table 1 Landuse distribution in WBID 1627 (Long Branch Creek).

<table>
<thead>
<tr>
<th>WBID 1997</th>
<th>Urban, Residential &amp; Built-Up</th>
<th>Agriculture</th>
<th>Rangeland</th>
<th>Forest</th>
<th>Water</th>
<th>Wetlands</th>
<th>Barren Land</th>
<th>Transportation, Communication &amp; Utilities</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLUCCS Code Level 1 Series¹</td>
<td>1000²</td>
<td>2000</td>
<td>3000³</td>
<td>4000</td>
<td>5000</td>
<td>6000</td>
<td>7000</td>
<td>8000</td>
<td></td>
</tr>
<tr>
<td>acres</td>
<td>1506.1</td>
<td>1.4</td>
<td>0</td>
<td>23.1</td>
<td>41.5</td>
<td>33.4</td>
<td>0</td>
<td>131.9</td>
<td>1737.4</td>
</tr>
<tr>
<td>percent</td>
<td>87</td>
<td>0.1</td>
<td>0</td>
<td>1.3</td>
<td>2.4</td>
<td>1.9</td>
<td>0</td>
<td>7.6</td>
<td>100%</td>
</tr>
</tbody>
</table>

1. Land use data are based on 2009 land cover features categorized according to the SWFWMD’s modified Florida Land Use and Cover Classification System (FLUCCS). The features were photointerpreted from 2009 color infrared and digital aerial photographs at the 1:8,000 scale. Areas in the table represent the drainage area used in the modeling analysis, not the entire extent of the watershed.

2. The urban/residential and built-up category includes commercial, industrial, extractive, institutional, and recreational uses.

3. The rangeland category includes dry prairies, shrub and brushland and mixed rangeland.

Figure 2. Current (2009) landuse in the Long Branch Creek Watershed.
Figure 3. Land use in the Long Branch Creek watershed.
4. Water Quality Standards/TMDL Targets

WBID 1627 of Long Branch Creek is a Class III Freshwater stream. The designated uses of Class III waters include recreation, and propagation and maintenance of a healthy, well-balanced population of fish and wildlife. The water quality criteria for protection of Class III waters are established by the State of Florida in the Florida Administrative Code (FAC), Section 62-302.530. The individual criteria should be considered in conjunction with other provisions in water quality standards that apply to all waters, including Section 62-302.500 FAC [Surface Waters: Minimum Criteria, General Criteria], unless alternative or more stringent criteria are specified in FAC Section 62-302.530. In addition, unless otherwise stated, all criteria express the maximum not to be exceeded at any time. The specific criteria addressed in this TMDL document are provided in the following section.

4.1. Nutrients Criteria:

The State of Florida has a narrative water quality criterion for nutrients that applies to Classes I, II, and III (including fresh and marine waters) and states that:

“In no case shall nutrient concentrations of a body of water be altered so as to cause an imbalance in natural populations of aquatic flora or fauna.” [Section 62.302.530 (48)(b) FAC]

The state also has an additional narrative water quality criterion for nutrients that applies to all classes of water and states that:

“The discharge of nutrients shall continue to be limited as needed to prevent violations of other standards contained in this chapter. Man-induced nutrient enrichment (total nitrogen or total phosphorus) shall be considered degradation in relation to the provisions of Sections 62-302.300, 62-302.700, and 62-4.242, FAC.” [see Section 62.302.530 (48)(a) FAC]

Because the State of Florida does not yet have numeric criteria for nutrients, chlorophyll and DO levels are commonly used to indicate whether nutrients are present in excessive amounts.

4.2. Dissolved Oxygen Criteria:

The water quality criteria for dissolved oxygen in Class III Freshwaters is as follows:

“Shall not be less than 5.0 mg/L. Normal daily and seasonal fluctuations above these levels shall be maintained.” [FAC 62-302.530 (31)]

FDEP has conducted a study to support development of revised DO criteria for freshwaters. These revisions have not yet been adopted by the state, or submitted to EPA for review, and therefore, the applicable criterion is the one referenced above. Should any new or revised criteria for DO in Florida streams become applicable for CWA purposes, this waterbody may be re-assessed and the TMDL may be revised.
4.3. **Biochemical Oxygen Demand Criteria:**

The applicable water quality criteria for biochemical oxygen demand is a narrative related to the impact on dissolved oxygen:

“Biochemical Oxygen Demand (BOD) shall not be increased to exceed values which would cause dissolved oxygen to be depressed below the limit established for each class and, in no case, shall it be great enough to produce nuisance conditions.” [FAC 62-302.530 (11)]

4.4. **Natural Conditions**

In addition to the standards for nutrients, DO, and BOD described above, Florida’s standards include provisions that address waterbodies which do not meet the standards due to natural background conditions.

Florida’s water quality standards provide the following definition of natural background:

“Natural Background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody or on historical pre-alteration data. [FAC 62-302.200(16)]

Florida’s water quality standards also provide that:

“Pollution which causes or contributes to new violations of water quality standards or to continuation of existing violations is harmful to the waters of this State and shall not be allowed. Waters having water quality below the criteria established for them shall be protected and enhanced. However, the Department shall not strive to abate natural conditions.” [FAC 62-302.300(15)]

5. **Water Quality Assessment**

WBID 1627 of Long Branch Creek was listed on Florida’s 1998 303(d) list for not attaining its designated uses due to dissolved oxygen. Although this impairment has been verified by FDEP, EPA conducted a water quality assessment to review current water quality data for WBID 1627. The data were obtained from Version 44 of FDEP’s IWR database, and the primary constituents evaluated were: dissolved oxygen, biochemical oxygen demand, chlorophyll-α, and nutrients. The IWR database contains data from various sources within the state of Florida, including the Water Management Districts and counties.
5.1. Water Quality Data

The tables and figures below present the station locations and time series data for dissolved oxygen, biochemical oxygen demand, total nitrogen, total phosphorus, and chlorophyll-\(a\) observations in Long Branch Creek. Summary statistics for the water quality data are provided within each figure. The original data are included in the Administrative Record for this report, and are also available upon request.

5.1.1. WBID 1627: Long Branch Creek

Table 2 identifies monitoring stations located in WBID 1627 and lists the time period over which water quality measurements were made at each location during the assessment period for IWR Version 44. Figure 4 illustrates where these monitoring stations are located.

<table>
<thead>
<tr>
<th>Station</th>
<th>Station Name</th>
<th>First Date</th>
<th>Last Date</th>
<th>No. Obs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>21FLPDEM22-05</td>
<td>Longbranch Creek</td>
<td>8/6/2003</td>
<td>9/23/2008</td>
<td>543</td>
</tr>
<tr>
<td>21FLPDEM22-07</td>
<td>Longbranch Creek</td>
<td>8/6/2003</td>
<td>6/25/2008</td>
<td>429</td>
</tr>
<tr>
<td>21FLPDEM22-08</td>
<td>Longbranch Creek</td>
<td>8/6/2003</td>
<td>9/23/2008</td>
<td>540</td>
</tr>
<tr>
<td>21FLPDEM22-12</td>
<td>Longbranch Creek</td>
<td>10/28/2008</td>
<td>3/21/2011</td>
<td>230</td>
</tr>
<tr>
<td>21FLPDEM22-14</td>
<td>Longbranch Creek</td>
<td>10/28/2008</td>
<td>3/21/2011</td>
<td>205</td>
</tr>
<tr>
<td>21FLPDEM22-15</td>
<td>Longbranch Creek</td>
<td>10/28/2008</td>
<td>1/26/2011</td>
<td>126</td>
</tr>
</tbody>
</table>

No. Obs. = Number of observations (various parameters) in IWR 44 current assessment period.
Dissolved Oxygen

There are several factors that affect the concentration of dissolved oxygen in a waterbody. Oxygen can be introduced by wind, diffusion, photosynthesis, and additions of higher DO water (e.g. from tributaries). DO concentrations are lowered by processes that use up oxygen from the water, such as respiration and decomposition, and by additions of water with lower DO (e.g. swamp or groundwater). Natural DO levels are a function of water temperature, water depth and velocity, as well as the relative contributions of groundwater. However, the natural DO regime may be impacted by pollutants such as nutrients and oxygen-demanding substances. Replenishment of oxygen levels may be inhibited if excessive growth of aquatic plants above the water surface blocks sunlight from reaching submerged vegetation, reducing their ability to photosynthesize. Decomposition of organic matter, such as dead plants and animals, also uses up DO from the water.

Nutrient levels affect DO concentrations directly and indirectly. The process of nitrification, in which bacteria convert ammonia-nitrogen to nitrate-nitrogen, directly consumes oxygen from the water. Indirect effects of excessive nutrient loading involve over-stimulation of aquatic plant growth, which leads to exacerbated diurnal swings in DO, and decomposition of the algal biomass after it dies and settles to the bottom, a process that consumes oxygen.

Figure 5 provides a time series plot of measured DO concentrations in Long Branch Creek. There were 11 monitoring stations that included a total of 193 observations of which 146 (76 percent) fell below the water quality standard of 5 mg/l DO. The minimum value was 0.34 mg/l, the maximum was 12.84 mg/l and the average was 3.58 mg/l.
Biochemical Oxygen Demand

BOD is a measure of the amount of oxygen used by bacteria as they stabilize organic matter. Figure 6 provides a time series plot for the measured BOD concentrations in the freshwater segment of Long Branch Creek. There were 7 monitoring stations used in the assessment that included a total of 25 observations. The minimum value was 1.0 mg/l, the maximum was 5.0 mg/l and the average was 2.18 mg/l.
Nutrients

Excessive nutrients in a waterbody can lead to overgrowth of algae and other aquatic plants such as phytoplankton, periphyton and macrophytes. This process can deplete oxygen in the water, adversely affecting aquatic life and potentially restricting recreational uses. For the nutrient assessment, monitoring data for total nitrogen, total phosphorus and chlorophyll-a are presented. The current criteria for nutrients are narrative. The purpose of the nutrient assessment is to present the range, variability and average conditions for the WBID.

Total Nitrogen

Total nitrogen (TN) is comprised of nitrate (NO3), nitrite (NO2), organic nitrogen and ammonia nitrogen (NH4). Figure 7 provides a time series plot for the measured TN concentrations in Long Branch Creek. There were 10 monitoring stations used in the assessment that included a total of 168 observations. The minimum value was 0.12 mg/l, the maximum was 4.33 mg/l and the average was 0.98 mg/l. By comparing paired measurements of ammonia, nitrate, and organic nitrogen, it was determined that the majority of total nitrogen in Long Branch Creek is organic in nature. Although the fractions vary significantly, on average, only about 5 to 10 percent of total nitrogen is ammonia-nitrogen, while about 10 to 15 percent is nitrate-nitrogen.
Total Phosphorus

In natural waters, total phosphorus exists in either soluble or particulate forms. Dissolved phosphorus includes inorganic and organic forms, while particulate phosphorus is made up of living and dead plankton, and adsorbed, amorphous, and precipitated forms. Inorganic forms of phosphorus include orthophosphate and polyphosphates, though polyphosphates are unstable and convert to orthophosphate over time. Orthophosphate is both stable and reactive, making it the form most used by plants. Excessive phosphorus can lead to overgrowth of algae and aquatic plants, the decomposition of which uses up oxygen from the water. Figure 8 provides a time series plot for the measured total phosphorus concentrations in Long Branch Creek. There were 10 monitoring stations used in the assessment that included a total of 149 observations. The minimum value was 0.02 mg/l, the maximum was 0.82 mg/l and the average was 0.14 mg/l. A comparison of paired measurements of total phosphorus and dissolved orthophosphate showed that a majority of total phosphorus in Long Branch Creek-averaging just below 70 percent- is comprised of orthophosphorus. Dissolved orthophosphorus is the form that is most readily available for uptake by aquatic plants.
Chlorophyll-a

Chlorophyll is the green pigment in plants that allows them to create energy from light. In a water sample, chlorophyll is indicative of the presence of algae, and chlorophyll-\(a\) is a measure of the active portion of total chlorophyll. Corrected chlorophyll refers to chlorophyll-\(a\) measurements that are corrected for the presence of pheophytin, a natural degradation product of chlorophyll that can interfere with analysis because it has an absorption peak in the same spectral region.

Figure 9 provides a time series plot for corrected chlorophyll-\(a\) concentrations in Long Branch Creek. There were 10 monitoring stations used in the assessment that included a total of 138 observations. The minimum value was 1.00 µg/l, the maximum was 42.9 µg/l and the average was 6.25 µg/l. Although there are several instances of elevated chlorophyll concentrations, the data do not suggest a chronic overgrowth of phytoplankton algae. However, it is important to interpret the data with the understanding that measuring chlorophyll concentrations in a water sample only captures phytoplankton, the free-floating algae, and will not capture other types such as attached algae (periphyton), algae growing on bottom sediments (benthic), and other aquatic plants (macrophytes).
Stream Flow

Stream flow is an important factor affecting water quality, especially insofar as it determines the available loading capacity for pollutants such as nutrients and bacteria. Flow conditions also influence DO concentrations more directly. Typically, higher flows are associated with higher DO levels, since the increased flow leads to greater turbulence and aeration. The USGS has a gauging station located on the main stem of Long Branch Creek: Gage 02307780, Long Branch near Pinellas Park, FL (see Figure 4). The data show that stream flow in Long Branch Creek is variable, reaching over 100 cubic feet per second (cfs) during storm events but staying below 11 cfs approximately 95 percent of the time (Figure 10).
5.2. Summary of Data Assessments

DO in WBID 1627 of Long Branch Creek has a wide range in concentration and is frequently below the Class III freshwater criterion of 5 mg/l, even at different times of the year. Although most of the chlorophyll-a measurements in Long Branch Creek are relatively low, there are some instances of elevated concentrations. The nutrient data show that the majority of TN is organic in nature, while the majority of phosphorus is in the readily available form of orthophosphate. Common sources of organic nitrogen are plant matter and animal wastes, including septic systems and sewer lines. Based on this information, and the presence of potential point and nonpoint sources of relevant pollutants, TMDLs for DO are being proposed for WBID 1627.

6. Source and Load Assessment

An important part of the TMDL analysis is the identification of source categories, source subcategories, or individual sources of pollutants in the watershed and the amount of loading contributed by each of these sources. Sources are broadly classified as either point or nonpoint sources. Nutrients can enter surface waters from both point and nonpoint sources.

6.1. Point Sources

A point source is defined as a discernable, confined, and discrete conveyance from which pollutants are or may be discharged to surface waters. Point source discharges of industrial wastewater and treated sanitary wastewater must be authorized by National Pollutant Discharge Elimination System (NPDES) permits. NPDES permitted discharges include continuous discharges such as wastewater treatment facilities as well as some stormwater...
driven sources such as municipal separate stormwater sewer systems (MS4s), certain industrial facilities, and construction sites over one acre.

6.1.1. **Wastewater/Industrial Permitted Facilities**

A TMDL wasteload allocation (WLA) is given to wastewater and industrial NPDES permitted facilities discharging to surface waters within an impaired watershed. There are no NPDES permitted facilities with direct, surface water discharges within the Long Branch Creek watershed.

6.1.2. **Stormwater Permitted Facilities/MS4s**

The 1987 amendments to the Clean Water Act designated certain stormwater discharges as point sources requiring NPDES stormwater permits. The regulated activities involve Municipal Separate Storm Sewer Systems (MS4s), construction sites over one acre, and specific industrial operations. Although these types of stormwater discharges are now considered point sources with respect to permitting and TMDLs, they behave similarly to nonpoint sources in that they are driven by rainfall-runoff processes leading to the intermittent discharge of pollutants from land use activities in response to storms.

According to 40 CFR 122.26(b)(8), an MS4 is “a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):

(i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law)...including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the Clean Water Act that discharges into waters of the United States;

(ii) Designed or used for collecting or conveying storm water;

(iii) Which is not a combined sewer; and

(iv) Which is not part of a Publicly Owned Treatment Works.”

MS4s may discharge nutrients and other pollutants to waterbodies in response to storm events. In 1990, USEPA developed rules establishing Phase I of the NPDES stormwater program, designed to prevent harmful pollutants washed into MS4s by stormwater runoff, or dumped directly into them, from being delivered to local waterbodies. Phase I of the program required operators of “medium” and “large” MS4s (generally serving populations of 100,000 or more) to implement a stormwater management program as a means of controlling polluted discharges. Approved stormwater management programs for medium and large MS4s are required to address a variety of water quality related issues including roadway runoff management, municipal owned operations, and hazardous waste treatment, etc.
Because the master drainage systems of most local governments in Florida are interconnected, USEPA implemented Phase I of the MS4 permitting program on a countywide basis, which brings in all cities, Chapter 298 urban water control districts, and the Florida Department of Transportation throughout the 15 counties meeting the population criteria.

Phase II of the rule extends coverage of the NPDES stormwater program to certain “small” MS4s. Small MS4s are defined as any MS4 that is not a medium or large MS4 covered by Phase I of the NPDES stormwater program. Only a select subset of small MS4s, referred to as “regulated small MS4s”, requires an NPDES stormwater permit. Regulated small MS4s are defined as all small MS4s located in “urbanized areas” as defined by the Bureau of the Census, and those small MS4s located outside of “urbanized areas” that are designated by NPDES permitting authorities.

In October 2000, USEPA authorized FDEP to implement the NPDES stormwater program in all areas of Florida except Indian tribal lands. FDEP’s authority to administer the NPDES program is set forth in Section 403.0885, Florida Statutes (FS). The three major components of NPDES stormwater regulations are:

- MS4 permits that are issued to entities that own and operate master stormwater systems, primarily local governments. Permittees are required to implement comprehensive stormwater management programs designed to reduce the discharge of pollutants from the MS4 to the maximum extent practicable.

- Stormwater associated with industrial activities, which is regulated primarily by a multisector general permit that covers various types of industrial facilities. Regulated industrial facilities must obtain NPDES stormwater permit coverage and implement appropriate pollution prevention techniques to reduce contamination of stormwater.

- Construction activity general permits for projects that ultimately disturb one or more acres of land and which require the implementation of stormwater pollution prevention plans to provide for erosion and sediment control during construction.

Pinellas County, FDOT District 7 and other co-permittees are covered under Phase I MS4 permit FLS000005. The Long Branch watershed lies within the jurisdiction of this permit. Stormwater discharges conveyed through the storm sewer systems covered by this permit, and discharged anywhere within the Long Branch Creek watershed, are subject to the WLA of the TMDL.

6.2. Nonpoint Sources

Nonpoint sources of pollution are diffuse sources that cannot be identified as entering a waterbody through a discrete conveyance at a single location. For nutrients, these sources
include runoff of agricultural fields, golf courses, and lawns, septic tanks, and residential developments outside of MS4 areas. Nonpoint source pollution generally involves a buildup of pollutants on the land surface that wash off during rain events and as such, represent contributions from diffuse sources, rather than from a defined outlet. Potential nonpoint sources are commonly identified, and their loads estimated, based on land cover data. Most methods calculate nonpoint source loadings as the product of the water quality concentration and runoff water volume associated with certain land use practices. The mean concentration of pollutants in the runoff from a storm event is known as the Event Mean Concentration, or EMC.

6.2.1. Urban Areas

Urban areas include land uses such as residential, industrial, extractive and commercial. Land uses in this category typically have somewhat high total nitrogen event mean concentrations and average total phosphorus event mean concentrations. Nutrient loading from MS4 and non-MS4 urban areas is 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 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 outlined in Chapter 403 FS, was established as a technology-based program that relies upon the implementation of Best Management Practices (BMPs) that are designed to achieve a specific level of treatment (i.e., performance standards) as set forth in Chapter 62-40, FAC.

Florida’s stormwater program is unique in having a performance standard for older stormwater systems that were built before the implementation of the Stormwater Rule in 1982. This rule states: “the pollutant loading from older stormwater management systems shall be reduced as needed to restore or maintain the beneficial uses of water.” [FAC 62-40-.432(2)(c)]

Nonstructural and structural BMPs are an integral part of the State’s stormwater programs. Nonstructural BMPs, often referred to as “source controls”, are those that can be used to prevent the generation of nonpoint source pollutants or to limit their transport off-site. Typical nonstructural BMPs include public education, land use management, preservation of wetlands and floodplains, and minimization of impervious surfaces. Technology-based structural BMPs are used to mitigate the increased stormwater peak discharge rate, volume, and pollutant loadings that accompany urbanization.

Urban, residential, and commercial developments are expected to be the most significant source of nutrients and oxygen-demanding substances in the Long Branch Creek watershed. Land uses in this category comprise about 87 percent of the watershed area.
Onsite Sewage Treatment and Disposal Systems (Septic Tanks)

As stated above, leaking septic tanks or onsite sewage treatment and disposal systems (OSTDs) can contribute to nutrient loading in urban areas. Water from OSTDs is typically released to the ground through on-site, subsurface drain fields or boreholes that allow the water from the tank to percolate (usually into the surficial aquifers) and either transpire to the atmosphere through surface vegetation or add to the flow of shallow ground water. When properly sited, designed, constructed, maintained, and operated, OSTDs are a safe means of disposing of domestic waste. The effluent from a well-functioning OSTD receives natural biological treatment in the soil and is comparable to secondarily treated wastewater from a sewage treatment plant. When not functioning properly, OSTDs can be a source of nutrients, pathogens, and other pollutants to both ground water and surface water.

The state of Florida Department of Health publishes data on new septic tank installations and the number of septic tank repair permits issued for each county in Florida. Table 3 summarizes the cumulative number of septic systems installed in Pinellas County since the 1970 census and the total number of repair permits issued for the last ten fiscal years between 2001-02 and 2010-11 (FDOH, 2011). The data do not reflect septic tanks removed from service.

<table>
<thead>
<tr>
<th>County</th>
<th>Number of Septic Tanks (1970–2011)</th>
<th>Number of Repair Permits Issued (2001–2011)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pinellas</td>
<td>23,878</td>
<td>1,615</td>
</tr>
</tbody>
</table>

Note: Source: [http://www.doh.state.fl.us/environment/ostds/statistics/ostdsstatistics.htm](http://www.doh.state.fl.us/environment/ostds/statistics/ostdsstatistics.htm)

Given the prevalence of residential development in the watershed, and the high number of septic tanks in Pinellas County, it is possible that leaking septic systems are a relevant source of organic and nutrient loading in the Long Branch watershed. However, it is not clear what fraction of the residential developments in the watershed is served by septic systems, and what fraction of residences is connected to sewer lines.

6.2.2. Agriculture

Agricultural lands include improved and unimproved pasture, row and field crops, tree crops, nurseries, and specialty farms. Agricultural activities, including runoff of fertilizers or animal wastes from pasture and cropland and direct animal access to streams, can generate nutrient loading to streams. The highest total nitrogen and total phosphorus event mean concentrations are associated with agricultural land uses. Land use data and aerial coverage show that agriculture is not a significant use in the Long Branch Creek watershed, comprising only 0.1 percent of the landuse (Figure 3 and Table 1).

6.2.3. Rangeland

Rangeland includes herbaceous, scrub, disturbed scrub and coastal scrub areas. Event mean concentrations for rangeland are about average for total nitrogen and low for total phosphorus. None of the area in the Long Branch watershed is classified as rangeland.
6.2.4. **Upland Forests**

Upland forests include flatwoods, oak, various types of hardwoods, conifers and tree plantations. Event mean concentrations for upland forests are low for both total nitrogen and total phosphorus. Upland Forests cover only about 1.3 percent of the area in the Long Branch watershed.

6.2.5. **Water and Wetlands**

Water and wetlands have very low event mean concentrations and comprise about 4.3 percent of the land use in the Long Branch watershed.

6.2.6. **Barren Land**

Barren land includes beaches, borrow pits, disturbed lands and fill areas. Event mean concentrations for barren lands tend to be higher in total nitrogen. None of the Long Branch Creek watershed is classified as barren.

6.2.7. **Transportation, Communications and Utilities**

Transportation uses include airports, roads and railroads. Event mean concentrations for these types of uses are in the mid-range for total nitrogen and total phosphorus. This land use comprises a little less than eight percent of the watershed.

7. **Analytical Approach**

In the development of a TMDL there needs to be a method for relating current pollutant loadings to the observed water quality problem. Various methods that rely on physical and biological relationships can be used to establish the cause and effect relationship. These approaches could be: statistical (e.g. using a regression between cause and effect variables), empirical (i.e. based on observations not necessarily from the waterbody in question) or mechanistic (i.e. physically and/or stochastically-based).

Two mechanistic models were used in the development of this TMDL. The first model is a dynamic watershed model that predicts the quantity of water and pollutants associated with the rainfall-runoff process. The second model is an in-stream dynamic water quality model that integrates the loadings from the watershed model to predict water quality in the receiving waterbody.

The period of simulation that was considered in the development of this TMDL is October 1, 2003 to December 31, 2009, to coincide with the availability of required input data and calibration data. The models were used to predict time series for total nitrogen, total phosphorus, BOD, dissolved oxygen, and chlorophyll-a. The models were calibrated to current conditions and then used to predict improvements in water quality as function of reductions in loadings.
More details on the model application in the development of the Long Branch Creek TMDL are presented in Appendix A.

7.1. **Loading Simulation Program C++ (LSPC)**

The Loading Simulation Program C++ (LSPC) was used to represent the hydrological and water quality conditions in the Long Branch Creek watershed. LSPC is a comprehensive data management and modeling system that represents the loading, including both flow and water quality, emanating from non-point and point sources. It is also capable of simulating in-stream processes. LSPC can be used to predict flow, sediment, metals, nutrients, pesticides, and other conventional pollutants, as well as temperature and pH for pervious and impervious lands and water bodies. LSPC was configured to simulate the watershed as a series of hydrologically connected sub-watersheds.

For this TMDL, LSPC was used to predict runoff of water, total nitrogen, total phosphorus and BOD from the land surface using a daily time step. The flow predictions from the model were calibrated to measure flow data in the Long Branch watershed. Two modeling scenarios were used: one in which the model was set-up to simulate current conditions, and one that simulates natural conditions in the Long Branch Creek watershed. The predicted time series were used as boundary conditions for the receiving water model that was used to predict in-stream water quality for both scenarios.

7.2. **Water Quality Analysis Simulation Program (WASP)**

The Water Quality Analysis Simulation Program (WASP v7.5) is a dynamic compartment-modeling program for aquatic systems, including both the water column and the underlying benthos. The time-varying processes of advection, dispersion, point and diffuse mass loading and boundary exchange are represented in the basic program. The conventional pollutant model within the WASP framework is capable of predicting time-varying concentrations for chlorophyll-\(a\), dissolved oxygen, and nutrients (nitrogen, phosphorus) as function of loadings, flows, and environmental conditions.

For the Long Branch Creek TMDL, WASP was used to examine the effects of pollutants with potential impacts on DO, including BOD, TN, and TP. The WASP model was first linked to the predicted current conditions loadings from the LSPC model, and then calibrated to measured data. The WASP model was then linked to natural condition pollutant loadings from LSPC, and used to determine the load reductions that will maintain a natural DO regime in the waterbody.

7.3. **Scenarios**

Two modeling scenarios were developed and evaluated in this TMDL determination. These scenarios are described briefly below; a more detailed description of each scenario is provided in Appendix A.
7.3.1. Current Condition

The first scenario modeled with LSPC and WASP captures the current conditions of the watershed. The LSPC watershed model was parameterized using the most recent land use data and measured meteorological conditions from the simulation period to predict the existing loadings of nitrogen, phosphorus and BOD. The predicted water quality loadings and flow time series were passed on to the in-stream (WASP) water quality model, where algal, nitrogen, phosphorus, BOD and DO concentrations were predicted over time. The models (watershed and water quality) were calibrated to a six year period of time to take into account varying environmental, meteorological or hydrological conditions on water quality. The predicted existing condition annual average concentrations are presented in Table 4.

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Existing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Nitrogen (mg/L)</td>
<td>0.72</td>
</tr>
<tr>
<td>Total Phosphorus (mg/L)</td>
<td>0.07</td>
</tr>
<tr>
<td>BOD (mg/L)</td>
<td>3.5</td>
</tr>
<tr>
<td>DO (mg/L)</td>
<td>4.3</td>
</tr>
<tr>
<td>Chlorophyll a (ug/L)</td>
<td>5.7</td>
</tr>
</tbody>
</table>

The current condition simulation was used to estimate the existing loadings of TN, TP and BOD for Long Branch Creek (Table 5). These loadings were compared with the TMDL scenario to determine the percent reduction in nutrient loads that is needed to achieve water quality standards.

<table>
<thead>
<tr>
<th>WBID 1997</th>
<th>WLA (kg/yr)</th>
<th>LA (kg/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Nitrogen</td>
<td>NA</td>
<td>2,507</td>
</tr>
<tr>
<td>Total Phosphorus</td>
<td>NA</td>
<td>364</td>
</tr>
<tr>
<td>BOD</td>
<td>NA</td>
<td>14,407</td>
</tr>
</tbody>
</table>

7.3.2. Natural Condition

The second modeling scenario was developed to estimate what water quality conditions would exist naturally- i.e. if there were minimal to no impact from anthropogenic sources. There are no facilities permitted to discharge in the Long Branch Creek watershed. For the purpose of this analysis, any land use that is associated with man induced activities (urban, agriculture, transportation, barren lands and rangeland) was converted to its native undisturbed land use and the associated event mean concentration for nitrogen, phosphorus and BOD were used. For Long Branch Creek, all anthropogenic uses were simulated as forest. These natural condition loadings from the watershed model were passed onto the water quality model where natural water quality conditions were predicted (Table 6).
The purpose of the natural conditions scenario is to determine whether water quality standards could be achieved without abating the naturally occurring loads from the watershed. Simulation results show that the DO standard is not achievable under natural conditions. Therefore, the TMDL determination will set the allowable loads to the natural condition scenario. Table 7 provides the annual average load predictions for TN, TP, and BOD.

Figure 11 provides a time series of DO concentrations under natural conditions. The model predicts that DO concentration would be below the 5 mg/l criterion approximately 70 percent of the time, averaging 4.0 mg/l.
8. TMDL Determination

The TMDL for a given pollutant and waterbody is comprised of the sum of individual wasteload allocations (WLAs) for point sources, and load allocations (LAs) for both nonpoint sources and natural background levels. In addition, the TMDL must include a margin of safety (MOS), either implicitly or explicitly, to account for the uncertainty in the relationship between pollutant loads and the quality of the receiving waterbody. Conceptually, this definition is represented by the equation:

\[
TMDL = \sum WLAs + \sum LAs + MOS
\]

The TMDL is the total amount of pollutant that can be assimilated by the receiving waterbody and still achieve water quality standards and the waterbody’s designated use. In TMDL development, allowable loadings from all pollutant sources that cumulatively amount to no more than the TMDL must be set and thereby provide the basis to establish water quality-based controls. These TMDLs are expressed as annual mass loads, since the approach used to determine the TMDL targets relied on average annual loadings. The TMDLs targets were determined to be the conditions needed to restore and maintain a balanced aquatic system. Furthermore, it is important to consider nutrient loading over time, since nutrients can accumulate in waterbodies.

During the development of this TMDL, it was determined that the natural condition scenario (removal of all anthropogenic sources and landuses) does not meet the Florida standards for DO. The reductions prescribed in this TMDL reduce the current loadings to the natural condition. The allocations are provided in Table 8.

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Facility WLA (kg/yr)</th>
<th>MS4/LA (kg/yr)</th>
<th>TMDL Condition</th>
<th>MS4/LA (kg/yr)</th>
<th>MS4/LA (kg/yr)</th>
<th>Percent Reduction</th>
<th>Percent Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Nitrogen</td>
<td>NA</td>
<td>2,507</td>
<td>NA</td>
<td>342</td>
<td>NA</td>
<td>86</td>
<td>86</td>
</tr>
<tr>
<td>Total Phosphorus</td>
<td>NA</td>
<td>364</td>
<td>NA</td>
<td>19</td>
<td>NA</td>
<td>95</td>
<td>95</td>
</tr>
<tr>
<td>BOD</td>
<td>NA</td>
<td>14,407</td>
<td>NA</td>
<td>717</td>
<td>NA</td>
<td>95</td>
<td>95</td>
</tr>
</tbody>
</table>

8.1. Critical Conditions and Seasonal Variation

USEPA regulations at 40 CFR 130.7(c)(1) require TMDLs to take into account critical conditions for stream flow, loading, and water quality parameters. The critical condition is the combination of environmental factors creating the "worst case" scenario of water quality conditions in the waterbody. By achieving the water quality standards at critical conditions, it is expected that water quality standards should be achieved during all other times. Seasonal variation must also be considered to ensure that water quality standards will be met during all seasons of the year, and that the TMDLs account for any seasonal change in flow or pollutant...
discharges, and any applicable water quality criteria or designated uses that are expressed on a seasonal basis.

The critical condition for nonpoint source loadings and wet weather point source loadings is typically an extended dry period followed by a rainfall-runoff event. During the dry weather period, nutrients build up on the land surface, and are washed off by rainfall. The critical condition for continuous point source loading typically occurs during periods of low stream flow when dilution is minimized. Although loading of nonpoint source pollutants contributing to a nutrient impairment may occur during a runoff event, the expression of that nutrient impairment is more likely to occur during warmer months, and at times when the waterbody is poorly flushed. Because of the six year simulation period used in the model development, the model encompasses both critical and seasonal variations to determine the annual average allowable load.

8.2. Margin of Safety

The Margin of Safety accounts for uncertainty in the relationship between a pollutant load and the resultant conditions of the waterbody. There are two methods for incorporating an MOS into TMDLs (USEPA, 1991):

- Implicitly incorporate the MOS using conservative model assumptions to develop allocations
- Explicitly specify a portion of the total TMDL as the MOS and use the remainder for Allocations

The Long Branch Creek TMDL incorporates an implicit margin of safety by capping the TMDL loads to natural background conditions, with no anthropogenic inputs.

8.3. Waste Load Allocations

Only MS4s and NPDES facilities discharging directly into lake segments (or upstream tributaries of those segments) are assigned a WLA. The WLAs, if applicable, are expressed separately for continuous discharge facilities (e.g., WWTPs) and MS4 areas, as the former discharges during all weather conditions whereas the later discharges in response to storm events.

8.3.1. Wastewater/Industrial Permitted Facilities

There are no NPDES-permitted facilities with direct, surface water discharges within the Long Branch Creek watershed. Therefore, no WLA was allocated for such facilities.

8.3.2. Municipal Separate Storm Sewer System Permits

The WLA for MS4s are expressed in terms of percent reductions equivalent to the reductions required for nonpoint sources. Given the available data, it is not possible to estimate loadings coming exclusively from the MS4 areas. Although the aggregate wasteload allocations for
Stormwater discharges are expressed in numeric form, i.e., percent reduction, based on the information available today, it is infeasible to calculate numeric WLAs for individual stormwater outfalls because discharges from these sources can be highly intermittent, are usually characterized by very high flows occurring over relatively short time intervals, and carry a variety of pollutants whose nature and extent varies according to geography and local land use. For example, municipal sources such as those covered by this TMDL often include numerous individual outfalls spread over large areas. Water quality impacts, in turn, also depend on a wide range of factors, including the magnitude and duration of rainfall events, the time period between events, soil conditions, fraction of land that is impervious to rainfall, other land use activities, and the ratio of stormwater discharge to receiving water flow.

This TMDL assumes for the reasons stated above that it is infeasible to calculate numeric water quality-based effluent limitations for stormwater discharges. Therefore, in the absence of information presented to the permitting authority showing otherwise, this TMDL assumes that water quality-based effluent limitations for stormwater sources of nutrients derived from this TMDL can be expressed in narrative form (e.g., as best management practices), provided that: (1) the permitting authority explains in the permit fact sheet the reasons it expects the chosen BMPs to achieve the aggregate wasteload allocation for these storm water discharges; and (2) the state will perform ambient water quality monitoring for nutrients for the purpose of determining whether the BMPs in fact are achieving such aggregate wasteload allocation.

All Phase 1 MS4 permits issued in Florida include a re-opener clause allowing permit revisions for implementing TMDLs once they are formally adopted by rule. Florida may designate an area as a regulated Phase II MS4 in accordance with Rule 62-620.800, FAC. Florida’s Phase II MS4 Generic Permit has a “self-implementing” provision that requires MS4 permittees to update their stormwater management program as needed to meet their TMDL allocations once those TMDLs are adopted. Permitted MS4s will be responsible for reducing only the loads associated with stormwater outfalls which it owns, manages, or otherwise has responsible control. MS4s are not responsible for reducing other nonpoint source loads within its jurisdiction. All future MS4s permitted in the area are automatically prescribed a WLA equivalent to the percent reduction assigned to the LA.

Pinellas County, FDOT District 7 and other co-permittees are covered under Phase I MS4 permit FLS000005. The Long Branch watershed lies within the jurisdiction of this permit. Stormwater discharges conveyed through the storm sewer systems covered by this permit, and discharged anywhere within the Long Branch Creek watershed, are subject to the WLA of the TMDL. Permitted MS4s will be responsible for reducing only the loads associated with stormwater outfalls which it owns, manages, or otherwise has responsible control. MS4s are not responsible for reducing other nonpoint source loads within its jurisdiction. Best management practices for the MS4 service should be developed to meet the percent reduction targets in Table 8.
8.4. Load Allocations

The load allocation for nonpoint sources is expressed as the percent reduction in current loadings of BOD, TN and TP coming into Long Branch Creek that would be needed to meet the TMDL loads.

9. Recommendations/Implementation

This TMDL is based on mechanistic modeling of the dissolved oxygen and eutrophication processes using available meteorologic data, hydrologic data, stream geometry, water chemistry data and the evidence of low reaeration, high detrital loading, strong photosynthetic activity, and SOD. The lack of SOD measurements, reaeration measurements, aquatic macrophyte and periphyton measurements introduces uncertainty into this TMDL. Collection of these additional data will help reduce uncertainty and better assess the contribution of potential sources, the timing of any water quality exceedances, and necessary reductions.

The initial step in implementing a TMDL is to more specifically locate pollutant source(s) in the watershed. FDEP employs the Basin Management Action Plan (B-MAP) as the mechanism for developing strategies to accomplish the specified load reductions. Components of a B-MAP are:

- Allocations among stakeholders
- Listing of specific activities to achieve reductions
- Project initiation and completion timeliness
- Identification of funding opportunities
- Agreements
- Local ordinances
- Local water quality standards and permits
- Follow-up monitoring

Since the TMDL analysis indicates that Long Branch Creek WBID 1627 could not meet the applicable DO standard, even under natural pollutant loadings, EPA encourages the development of a site-specific water quality standard.
10. References


