TMDL Report

Nutrient TMDL for Roberts Bay (WBID 1968D)

U.S. Environmental Protection Agency
Region 4

September 2005

Acknowledgments

EPA would like to acknowledge that the contents of this report and the total maximum daily load (TMDL) contained herein were developed by the Florida Department of Environmental Protection (FDEP). Many of the text and figures may not read as though EPA is the primary author for this reason, but EPA is officially proposing the TMDL for nutrient for Roberts Bay and soliciting comment. EPA is proposing this TMDL in order to meet consent decree requirements pursuant to the Consent Decree entered in the case of Florida Wildlife Federation, et al. v. Carol Browner, et al., Case No. 98-356-CIV-Stafford. EPA will accept comments on this proposed TMDL for 60 days in accordance with the public notice issued on September 30, 2005. Should EPA be unable to approve a TMDL established by FDEP for the 303(d) listed impairment addressed by this report, EPA will establish this TMDL in lieu of FDEP, after full review of public comment.

This study could not have been accomplished without significant contributions from staff in the Florida Department of Environmental Protection's (Department) Watershed Assessment Section.

Editorial assistance provided by Linda Lord.

Map production assistance provided by Barbara Donner.

For additional information on the watershed management approach and impaired waters in the Sarasota Bay, Peace River, and Myakka River Basin, contact

Tom Singleton
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: thomas.singleton@dep.state.fl.us
Phone: (850) 245-8561; Suncom: 205-8561
Fax: (850) 245-8434

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

Kevin Petrus
Florida Department of Environmental Protection
Bureau of Watershed Management
Watershed Assessment Section
2600 Blair Stone Road, Mail Station 3555
Tallahassee, FL 32399-2400
Email: kevin.petrus@dep.state.fl.us
Phone: (850) 245-8459; Suncom: 205-8459
Fax: (850) 245-8536

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Web sites

Florida Department of Environmental Protection, Bureau of Watershed Management

TMDL Program

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

Identification of Impaired Surface Waters Rule

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

STORET Program

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

2002 305(b) Report

http://www.dep.state.fl.us/water/docs/2002_305b.pdf

Criteria for Surface Water Quality Classifications

http://www.dep.state.fl.us/legal/rules/shared/62-302t.pdf

Basin Status Report for the Tampa Bay Basin

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

Water Quality Assessment Report for the Tampa Bay Basin

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

Allocation Technical Advisory Committee (ATAC) Report

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

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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/

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Chapter 1: INTRODUCTION

1.1 Purpose of Report

This report presents the Total Maximum Daily Load (TMDL) for total nitrogen to address the nutrient impairment for Roberts Bay, located in the Sarasota Bay Basin in the City of Sarasota, and part of the larger Sarasota Bay, Peace River, and Myakka River Basin Group. The estuary was verified as impaired for nutrients, based on exceedances of the historic chlorophyll *a* threshold, using the methodology described in the Identification of Impaired Surface Waters Rule (IWR), Chapter 62-303, Florida Administrative Code (F.A.C.). Roberts Bay was included on the Verified List of impaired waters for the Sarasota Bay, Peace River, and Myakka River Basin Group, that was adopted by Secretarial Order in June, 2005. The TMDL establishes the allowable loadings to Roberts Bay that would restore the waterbody so that it meets the applicable water quality standards for nutrients. 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 ambient water quality conditions.

1.2 Identification of the Waterbody

The Roberts Bay waterbody segment is located within the Sarasota Bay Basin, in northwest Sarasota County, Florida, bordering the southern side of the City of Sarasota **(Figure 1.1)**. Roberts Bay receives drainage from the urbanized Phillippi Creek Basin, the Matheny Creek Basin, and the area draining directly to the bay. The watershed area draining to Roberts Bay covers approximately 65 square miles. Roberts Bay is bounded by Sarasota Bay to the north and Little Sarasota Bay to its south. Big Sarasota Pass located in the southern portion of Sarasota Bay flushes bay water to the Gulf of Mexico. Extensive navigable canals and bayous on Siesta Key, located on the west side of Roberts Bay bring recreational boaters into this small, shallow bay that includes undeveloped islands and mangrove forests. The U.S. Environmental Protection Agency (EPA) designated the Sarasota Bay system including Roberts Bay as an Estuary of National Significance in 1988, and initiated the Sarasota Bay National Estuary Program (SBNEP) in 1989. The Florida Department of Environmental Protection (Department) has also designated the estuary as an Outstanding Florida Water (OFW). In 1995, the South Florida Water Management District (SWFWMD) placed Sarasota Bay on its Surface Water Improvement and Management (SWIM) Program list of priority waterbodies for protection or restoration.

Residential areas make up about half of the land use in the Roberts Bay watershed. The northwest part of the watershed is within the city limits of Sarasota. The most intensely developed areas of the watershed are west of Interstate 75, and development is continuing to move eastward. Other urban areas in the Sarasota Bay system near Roberts Bay include the Cities of Longboat Key and Bradenton to the north and the City of Venice to the south. In 2000, the population of the Sarasota County was 325,957. Additional information about the regions hydrology and geology are available in the Basin Status Report for the Sarasota Bay–Peace–Myakka Basin (Florida Department of Environmental Protection [Department], June 2003).

For assessment purposes, the Department divided the Sarasota Bay Basin into water assessment polygons with a unique **w**ater**b**ody **id**entification (WBID) number for each water segment or stream reach. Roberts Bay is designated WBID 1968D. **Figure 1.2** shows the watershed, as well as the locations of monitoring stations used to assess the bay's condition.

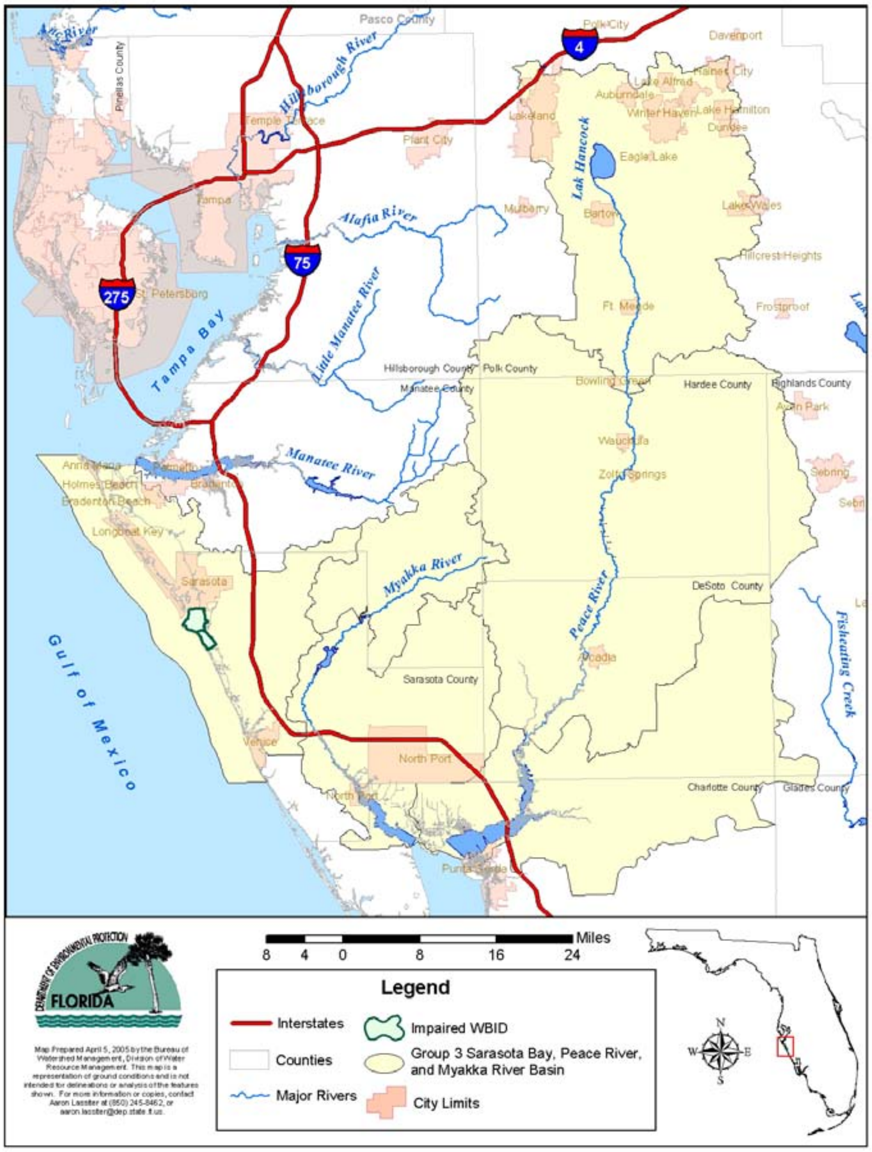

Figure 1.1. Location of Roberts Bay Water Segment, WBID 1968D, and Major Geopolitical Features in the Sarasota Bay, Peace River, and Myakka River Basin Group

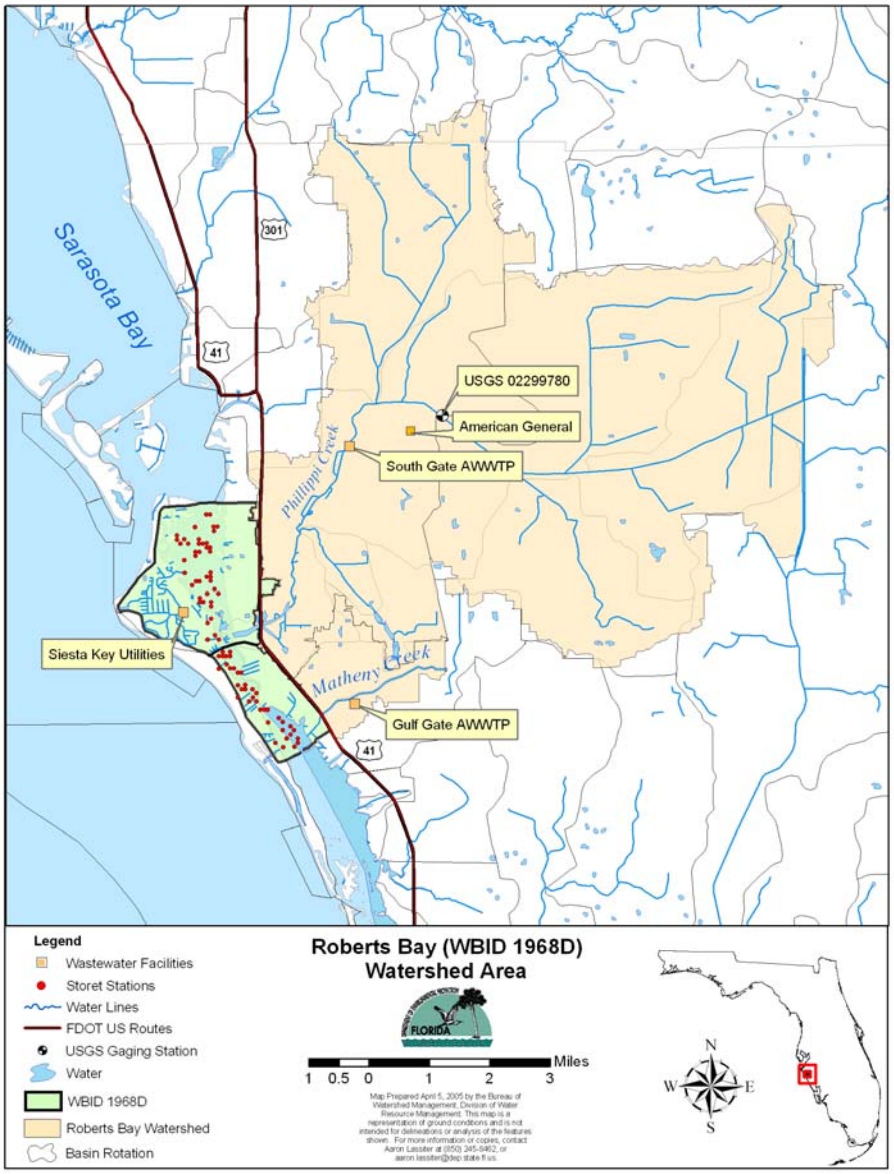

Figure 1.2. Roberts Bay Water Segment, Monitoring Locations, and Wastewater Facilities with Surface Water Discharges

1.3 Background

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

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

This TMDL Report will be followed by the development and implementation of a Basin Management Action Plan, or BMAP, to reduce the amount of nutrients that caused the verified impairment of Roberts Bay. These activities will depend heavily on the active participation of the Southwest Florida Water Management District (SWFWMD), local governments, local 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.

Chapter 2: DESCRIPTION OF WATER QUALITY PROBLEM

2.1 Statutory Requirements and Rulemaking History

Section 303(d) of the federal Clean Water Act requires states to submit to the U.S. Environmental Protection Agency (EPA) a list of surface waters that do not meet applicable water quality standards (impaired waters) and establish a TMDL for each pollutant causing the impairment 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.]); the list is amended annually to include updates for each basin statewide.

Florida's 1998 303(d) list included 84 waterbodies in the Sarasota Bay, Peace River, and Myakka River Basin Group. 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. (Identification of Impaired Surface Waters Rule, or IWR), in April 2001. 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 in Roberts Bay and verified the impairment for nutrients, based on exceedances of the historic chlorophyll *a* threshold value (**Table 2.1). Table 2.2** summarizes the data collected during the verification period (January 1, 1997, to June 30, 2004). The IWR methodology uses chlorophyll *a* measurements (a measure of algal biomass) to interpret Florida's narrative nutrient criterion. The IWR listing methodology provides two ways that an estuary can be listed for nutrient impairment. If the annual average chlorophyll *a* value exceeds the estuarine threshold of 11 micrograms per liter (ug/L) in any of the last three years of the verified period the segment is listed for nutrients. Additionally, if annual average values, during the verified period, have increased by more than 50% for at least 2 consecutive years over historical values, an estuarine segment is identified as impaired for nutrients. The bay was verified as impaired for nutrients because annual mean chlorophyll *a* values in the verified period were more than 50% above historic levels in two or more consecutive years. The bay annual average chlorophyll *a* values were more than 50% above the historic chlorophyll *a* value of 4.8 ug/L in 1997, 1998, 1999, 2001, 2003, and 2004 **(Figure 2.1).** The historic chlorophyll a value is based on the average of the annual average chlorophyll *a* values in the 1992 to 1996 period.

Table 2.1. Verified Impairment in Roberts Bay, WBID 1968D

Parameter Causing Impairment	Priority for TMDL Development	Projected Year for TMDL Development
Nutrients (Historic Chlorophyll *a*)	High	2004

Table 2.2. Summary of Chlorophyll a Data for Roberts Bay, WBID 1968D, January 1997 to June 2004

Parameter Causing Impairment	Total Number of Samples	Percent Chlorophyll a Samples > 11 ug/L	Minimum Concentration (ug/L)	Maximum Concentration (ug/L)
Chlorophyll *a*	439	20	1	48

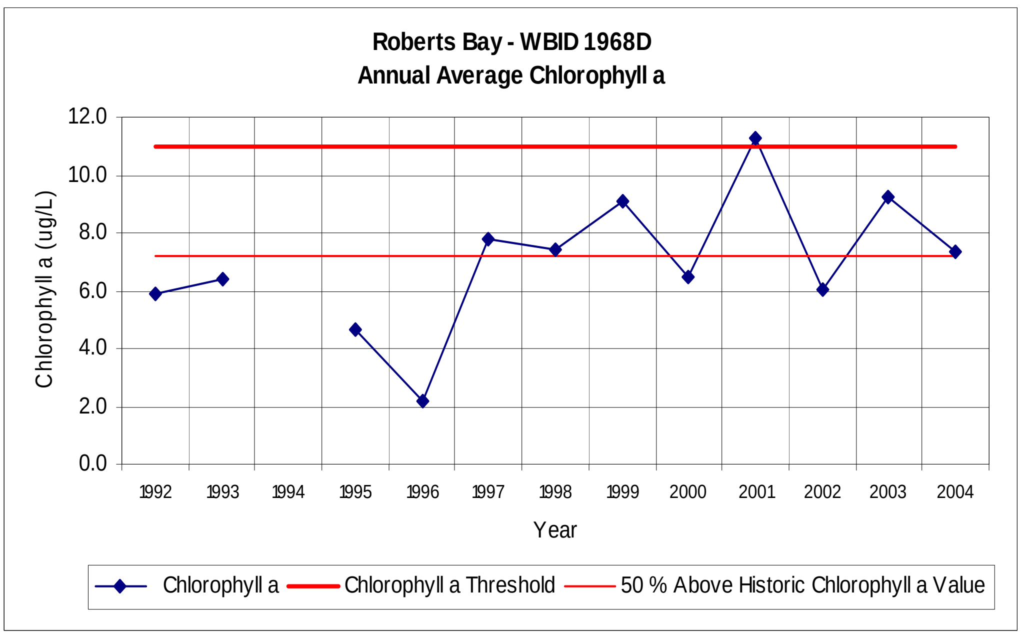

Figure 2.1. Chlorophyll a Annual Averages for Roberts Bay (1992 – 2004)

The verified impairments were based on data collected by the Mote Marine Lab and Sarasota County. Sampling was conducted at two fixed stations by Mote Marine Lab in 1992 and 1993. In 1995, Sarasota County Environmental Services began monthly randomized sampling in fixed grids located in Roberts Bay. **Appendix B** tabulates all available chlorophyll *a* data for the water segment collected from 1992 to 2004. **Appendix C** presents time series graphs of the individual chlorophyll *a* and total nitrogen results.

As part of the listing process, the Department attempts to identify the limiting nutrient or nutrients for the impaired waterbody. The limiting nutrient, generally nitrogen or phosphorus, is defined as the nutrient that limits plant growth when it is not available in sufficient quantities. A limiting nutrient is a chemical that is necessary for plant growth, but available in quantities smaller than those needed for algae, represented by chlorophyll *a*, and macrophytes to grow. Once the limiting nutrient in a waterbody is exhausted, algae stop growing. If more of the limiting nutrient is added, larger algal populations will result until nutrients or other environmental factors again limit their growth.

In Florida waterbodies, nitrogen and phosphorus are most often the limiting nutrients, and nitrogen is typically the limiting nutrient in most Florida estuaries. There is a general understanding in the marine scientific community that nitrogen is the principal cause of nutrient over-enrichment in coastal systems (National Research Council, 1993) and an analysis of the data from Roberts Bay supports this conclusion.

Determining the limiting nutrient in a waterbody can be accomplished by calculating the ratio of nitrogen to phosphorus in the waterbody, with water column ratios of total nitrogen (TN) to total phosphorus (TP) of less than 10 indicating nitrogen limitation. The median TN to TP ratio of each sampling event ratio during the verified period is 2.4, indicating that nitrogen is the limiting nutrient in the Roberts Bay estuary. Since nitrogen is the limiting nutrient, reductions in TN loadings would be expected to result in decreases in algal growth, expressed as chlorophyll a values.

Chapter 3. DESCRIPTION OF APPLICABLE WATER QUALITY STANDARDS AND TARGETS

3.1 Classification of the Waterbody and Criteria Applicable to the TMDL

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

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

The Roberts Bay water segment is a Class III marine 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 impairment addressed in this TMDL is the narrative nutrient criteria.

3.2 Applicable Water Quality Standards and Numeric Water Quality Targets

3.2.1 Interpretation of Narrative Nutrient Criterion

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

Roberts Bay was listed as impaired for nutrients because annual mean chlorophyll *a* values in the verified period were more than 50% above the historic chlorophyll a value of 4.8 ug/L in two or more consecutive years. The objective of the TMDL development is to reduce the annual average values to less than 50% above the historic value, therefore the chlorophyll a target for this TMDL is 7.2 ug/L.

Chapter 4: ASSESSMENT OF SOURCES

4.1 Types of Sources

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

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

To be consistent with Clean Water Act definitions, the term "point source" is used to describe traditional point sources (such as domestic and industrial wastewater discharges) and stormwater systems requiring an NPDES stormwater permit when allocating pollutant load reductions required by a TMDL. However, the methodologies used to estimate nonpoint source loads do not distinguish between NPDES stormwater discharges and non-NPDES stormwater discharges, and as such, this chapter does not make any distinction between the two types of stormwater.

4.2 Point Sources

4.2.1 NPDES Permitted Wastewater Facilities

There are three active permitted domestic wastewater treatment facilities and one inactive facility that discharge or have discharged nutrient loads and other wastewater constituents directly into the Roberts Bay watershed (**Figure 1.2**). Siesta Key Utilities Authority, Inc. (NPDES No. FL0025755) is a domestic wastewater treatment facility with an advanced wastewater treatment (AWT) system and a permitted discharge of 2.7 million gallons per day (mgd) annual average daily flow (AADF). Its outfall discharge is to Grand Canal at Discharge Location (D001), thence to Roberts Bay. South Gate (NPDES No. FL0032808) is an advanced wastewater treatment facility with a 1.36 MGD 12-Month Average Daily Flow. This facility discharges to Phillippi Creek, a class III waterbody, at Discharge Location (D-001) approximately 500 feet northwest of the facility, which then travels approximately 3 miles to Roberts Bay. Gulf Gate (NPDES No. FL0032816) is an advanced wastewater treatment facility with an existing 1.78 MGD AADF permitted discharge to Matheny Creek, a Class III waterbody, at Discharge Location (D001), approximately 3000 ft. west of the facility, thence flows approximately 2000 ft. before entering the Bay. The maximum allowable TN load that can be discharged to surface waters from the active facilities is 53,332 pounds/year (**Table 4.1)**. American General, previously known as Tameron Utilities, (permit number FL0028411) possessed a permit to discharge wastewater to the Roberts Bay watershed from January 1993 to October 1996, but is no longer operational.

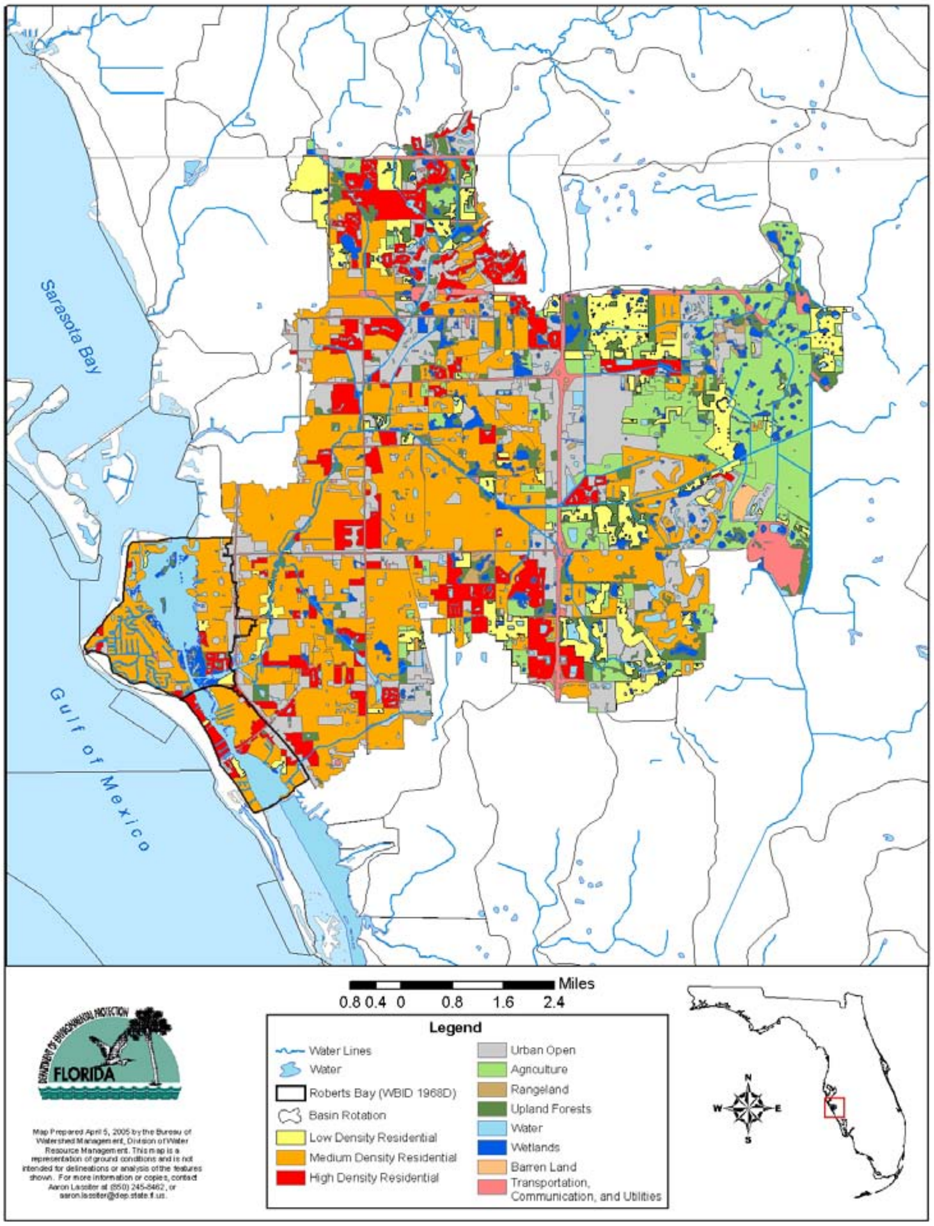

Figure 4.1. Principal Land Uses in the Roberts Bay Water Segment, WBID 1968D, in 1999

Table 4.1. Point Sources in the Roberts Bay Watershed, WBID 1968D

Facility	NPDES Permit	Discharge Point	Design Flow (MGD)	Permitted Flow (MGD)	Annual TN Effluent Limit (mg/L)	Maximum Annual TN Load (lbs/year)
Gulf Gate	FL0032816	Tributary to Roberts Bay	1.78	1.78	3.0	16,255
South Gate	FL0032808	Tributary to Roberts Bay	1.36	1.36	3.0	12,420
Siesta Key Utilities Authority, Inc.	FL0025755	Tributary to Roberts Bay	2.7	2.7	3.0	24,657

[1] Annual Load = Permitted Flow * TN Concentration * 8.34 pounds/gallon * 365 days/year

Estimating Point Source TN Loadings

TN loads were calculated for each of the four facilities that discharged into the Roberts Bay watershed during the period of 1992 to 2004. Loads were calculated by multiplying the TN monthly average concentrations by the corresponding flow, then by a conversion factor (8.34) to achieve a load in pounds/day. The TN load for each month was calculated by multiplying the TN load by the corresponding number of days in a given month. The sum of the TN load for each month of the year produced the annual TN load value.

Each facility had missing effluent discharge data, so a method was used to estimate the missing values. When data were missing for 1 to 3 months, the values previous to and after the missing value would be averaged to insert for the missing value. For four or more months of missing values, an average was taken using all the available data to fill in the data gaps.

The annual loading estimates for each facility are provided in **Appendix D.** Since 1997, the annual TN loading from the three active facilities has been between 40 to 78 percent of the maximum allowable annual load.

4.2.2 Municipal Separate Storm Sewer System Permittees

Municipal separate storm sewer systems (MS4s) may also 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 began in 2003. Regulated Phase II MS4s are defined in Section 62-624.800, F.A.C., and typically cover urbanized areas serving jurisdictions with a population of at least 10,000 or discharge into Class I or Class II waters, or Outstanding Florida Waters.

The stormwater collection systems in the Roberts Bay watershed, which are owned and operated by Sarasota County in conjunction with the Florida Department of Transportation, are covered by a Phase I MS4 Permit. Currently, no local governments in the watershed have applied for coverage under the Phase II NPDES MS4 permit.

The Roberts Bay water segment falls under the Sarasota County Phase I MS4 Permit (Number FLS000004). The City of Sarasota, and the Florida Department of Transportation District 1, are co-permittees with portion of their jurisdictions located within the segment.

4.3 Land Uses and Nonpoint Sources

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. Because the Roberts Bay watershed is primarily urban, wildlife and agricultural animals/livestock sources are not expected to contribute significantly to the TN load.

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. As of 2004, Sarasota County has a cumulative registry of 74,774 septic systems (Florida Department of Health Web site, 2005). This total does not reflect systems removed from service going back to 1970. The Department does not have information on the percentage of the population using septic systems in Sarasota County, nor does it have estimates of countywide failure rates to determine the daily discharge of wastewater from septic tanks.

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The nonpoint sources addressed in this report include loadings from atmospheric deposition, groundwater (which includes septic tank loadings), and surface runoff.

4.3.1 Land Uses

The spatial distribution and acreage of different land use categories were identified using the SWFWMD's 1999 land use coverage (scale 1:40,000) contained in the Department's geographic information system (GIS) library (Florida Department of Environmental Protection, 2004). The Roberts Bay watershed drains about 41,491 acres (65 square miles). Land use categories in the watershed were aggregated using the Level 1 1999 Florida Land Use and Cover Classification System (FLUCCS) and are tabulated in **Table 4.2**. The predominant land use in the watershed is urban and built-up, which comprises 67 percent of the area. The next largest land use is water and wetlands, which makes up 12 percent of the watershed area.

Table 4.2. Classification of Land Use Categories in the Roberts Bay Watershed

Code	Land Use	Acreage	Percentage of Total
1000	Urban Open	6,899	17
1100	Residential Low Density < 2 Dwelling Units/Acre	3,343	8
1200	Residential Med Density 2 - 5 Dwelling Units/Acre	13,398	32
1300	Residential High Density 6 or more Dwelling Units/Acre	4,013	10
2000	Agriculture	4,665	11
3000	Rangeland	295	1
4000	Upland Forests	2,423	6
5000	Water	2,933	7
6000	Wetlands	1,893	5
7000	Barren Land (Disturbed Land)	104	0
8000	Transportation, Communication and Utilities	1,523	4
Totals		**41,491**	**100**

4.3.2 Estimating Nonpoint Source Loadings

The nonpoint source loading of TN in the Roberts Bay watershed, between 1992 to 2004, were estimated for atmospheric deposition, stream baseflow, ground water seepage to the bay, septic systems, and surface water runoff. The following describes the methods used to develop the loading estimates.

Atmospheric Deposition

The rainfall and wet deposition nitrogen data, available at the National Atmospheric Deposition Program web site, for the Verna Well Field monitoring site (FL41) in northeast Sarasota County, were used to derive the deposition of TN directly onto the surface of Roberts Bay. Annual wet deposition rates for NH4 (KG/HA) and NO3 (KG/HA) were converted to TN = (14/62)*NH4 + (14/62)*NO3. To obtain a total deposition rate, Dry Precipitation was assumed to equal Wet Precipitation, therefore Total Deposition is equal to 2.0*Wet Deposition. The annual loading estimates are provided in **Appendix D**.

Baseflow

The annual baseflow flow and load were computed for each of the subbasins that drain to Roberts Bay (not including the bay itself) using the following methods. The flow duration curve for Phillippi Creek was determined from Phillippi Creek measured data and correlation with Walker Creek flows to cover the 1992-2004 period. The baseflow, identified using the lower 10^{th} percentile flow value was determined to be about 6.2 cfs at the Phillippi gage. This flow to drainage area ratio was then used to determine the flow at each of the other ungaged subbasins in the watershed.

The correlation of the natural log of TN with the natural log of flow measured at the Phillippi Creek gage was determined. The concentration of TN (at the lower 10^{th} percentile flow) times the flow yields the annual TN load. The annual loading estimates are provided in **Appendix D.**

Ground Water Seepage to Bay

The seepage flow has been measured in Roberts Bay at several sites as part of Florida State University Oceanography Research studies. An average flow value of 26 liters/square meter/day was used (Margaret Murray personal communication, 2005). Ground water nutrient data from 12 monitoring wells in the area were obtained from the Florida DEP Hydroport ground water database and used in the loading calculation. The annual loading estimates are provided in **Appendix D.**

Septic Systems

A total load generated for septic systems was calculated; however, the load estimate was not used in estimating the total annual TN loadings because the actual septic system load reaching surface water is included in the load estimated for baseflow and ground water seepage to the bay.

The number of septic systems in Sarasota County were provided in a GIS coverage by the County. The Department then assigned the septic systems from this coverage to each of the subbasins in the Roberts Bay watershed. The flow assigned to each septic tank was computed per the EPA TMDL manual, Protocol for Developing Pathogen TMDLs (EPA-841-R-00-002). This equates to 70 gal/capita/day* 2.6 capita/tank. The TN concentration discharged from septic tanks was determined from Table 3-7 of the EPA Onsite Wastewater Treatment Systems Manual (EPA/625/R-00/008). The median of the range of values presented in the manual was used to calculate the TN loading. The total load generated from septic systems in each subbasin are provided in **Table 4.3**.

Table 4.3. Septic System Load Estimates by Subbasin and Year

Septic Tanks	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Runoff to Roberts Bay N	1.438E+04	1.438E+04	1.438E+04	1.438E+04	1.438E+04	1.438E+04	1.438E+04	1.438E+04	1.438E+04	1.438E+04	1.438E+04	1.438E+04	1.438E+04
Runoff to Roberts Bay S	1.293E+04	1.293E+04	1.293E+04	1.293E+04	1.293E+04	1.293E+04	1.293E+04	1.293E+04	1.293E+04	1.293E+04	1.293E+04	1.293E+04	1.293E+04
Matheny Creek	1.673E+04	1.673E+04	1.673E+04	1.673E+04	1.673E+04	1.673E+04	1.673E+04	1.673E+04	1.673E+04	1.673E+04	1.673E+04	1.673E+04	1.673E+04
Phillippi Creek (gaged)	1.044E+05	1.044E+05	1.044E+05	1.044E+05	1.044E+05	1.044E+05	1.044E+05	1.044E+05	1.044E+05	1.044E+05	1.044E+05	1.044E+05	1.044E+05
Phillippi Creek (ungaged)	2.348E+05	2.348E+05	2.348E+05	2.348E+05	2.348E+05	2.348E+05	2.348E+05	2.348E+05	2.348E+05	2.348E+05	2.348E+05	2.348E+05	2.348E+05
Total Load	**3.833E+05**	**3.833E+05**	**3.833E+05**	**3.833E+05**	**3.833E+05**	**3.833E+05**	**3.833E+05**	**3.833E+05**	**3.833E+05**	**3.833E+05**	**3.833E+05**	**3.833E+05**	**3.833E+05**

Surface Water Runoff

A spreadsheet model using methods comparable to the Watershed Management Model was used to estimate the watershed surface water runoff associated with rainfall. The model is designed to estimate annual or seasonal pollutant loadings from a given watershed (User's Manual: Watershed Management Model, 1998).

The fundamental assumption of the model is that the amount of stormwater runoff from any given land use is in direct proportion to annual rainfall. The quantity of runoff is controlled by the fraction of the land use category that is characterized as impervious and the runoff coefficients of both pervious and impervious area. The governing equation is as follows:

(1) $R_L = [C_p + (C_I – C_p)\ IMP_L] * I$

Where:

R_L = total average annual surface runoff from land use L (inches/year),
IMP_L = fractional imperviousness of land use L,
I = long-term average annual precipitation (inches/year),
C_P = pervious area runoff coefficient, and
C_I = impervious area runoff coefficient.

The model estimates pollutant loadings based on nonpoint pollution loading factors (expressed as pounds/acre/year) that vary by land use and the percent imperviousness associated with each land use. The pollution loading factor, M_L, is computed for each land use L by the following equation:

(2) $M_L = EMC_L * R_L * K$

Where:

M_L = loading factor for land use L (pounds/acre/year),
EMC_L = event mean concentration of runoff from land use L (mg/L); EMC varies by land use and pollutant,
R_L = total average annual surface runoff from land use L computed from Equation (1) (inches/year), and
K = 0.2266, a unit conversion constant.

The data required for applying the model include the following:

- Area of all the land use categories and the area served by septic tanks,
- Percent impervious area of each land use category,
- EMC for each pollutant type and land use category,
- Percent EMC of each pollutant type that is in suspended form, and
- Annual precipitation.

Data Required for Estimating TN Loadings. To estimate TN loadings from the Roberts Bay watershed using the spreadsheet model, the following data were obtained:

A. Rain precipitation data were obtained from the National Atmospheric Deposition Program Verna Well Field monitoring site (Station FL41) located in northeastern Sarasota County. Annual total rainfall were used to estimate the surface water runoff load.

B. Areas of different land use categories were obtained by aggregating GIS land use coverage based on the simplified Level 1 code. The land use coverage was delineated for each of the following subbasins in the Roberts Bay watershed.

Phillippi Creek above the flow gage
Phillippi Creek below the flow gage
Matheny Creek
Direct Runoff to bay, North
Direct Runoff to bay, South

C. Percent impervious area of each land use category is a very important parameter in estimating surface runoff. Nonpoint pollution monitoring studies throughout the United States over the past 15 years have shown that annual per-acre discharges of urban stormwater pollution are positively related to the amount of imperviousness in land use (User's Manual: Watershed Management Model, 1998). Ideally, the *impervious area* is the area that does not retain water; therefore, 100 percent of the precipitation falling on the impervious area should become surface runoff. In practice, however, the runoff coefficient for impervious area typically ranges between 95 and 100 percent. Impervious runoff coefficients lower than this range were observed in the literature, but usually the number should not be lower than 80 percent.

For pervious area, the runoff coefficient usually ranges between 10 and 20 percent. However, values lower than this range were also observed (User's Manual: Watershed Management Model, 1998). In this report, the values for impervious and pervious runoff coefficients were obtained from the Watershed Management Model User's Manual (Camp Dresser McKee, 1998; Brown).

D. Local event mean concentrations (EMCs) of TN for different land use categories were obtained from the report, *Evaluation of Alternative Stormwater Regulations for Southwest Florida* (Harvey and Baker, 2003), and are presented in **Table 4.4**.

The annual TN load estimated from surface runoff for each of the five subbasins is provided in **Appendix D**.

The total annual TN loadings to the Roberts Bay watershed presented in **Appendix D** was computed by summing the point source loads and the nonpoint source loads calculated for atmospheric deposition, stream baseflow, ground water seepage to the bay, and surface water runoff. The total annual TN load to Roberts Bay varied from a low of approximately 550,000 pounds/year in 2000 to a high of almost 795,000 pounds/year in 1997.

Table 4.4. Land Use Runoff Concentrations (Event Mean Concentrations) in Southwest Florida

FLUCCS ID	Land Use	BOD (mg/L)	Total N (mg/L)	Total P (mg/L)
4000	Forest/rural open	1.23	1.09	0.046
1000-(1100+1200+1300)	Urban open	7.4	1.12	0.18
2000	Agriculture	3.8	2.32	0.344
1100	Low-density residential	4.3	1.64	0.191
1200	Medium-density residential	7.4	2.18	0.335
1300	High-density residential	11.0	2.42	0.49
8000	Communication and transportation	6.7	2.23	0.27
3000+7000	Rangeland	3.8	2.32	0.344
5000	Water	1.6	1.60	0.067
6000	Wetlands	2.63	1.01	0.09

[1] Source: Harper and Baker, 2003.

Chapter 5: DETERMINATION OF ASSIMILATIVE CAPACITY

5.1 Determination of Loading Capacity

The goal of the TMDL development process is to identify the maximum allowable TN loading to the Roberts Bay watershed, so that the bay will meet the nutrient water quality criteria and maintain its function and designated use as a Class III water. The Department initially attempted to determine the bay's assimilative capacity through a statistical comparison of nutrient loading estimates and chlorophyll *a* data, but these efforts were not successful (see the next section). Because a statistically significant relationship between loading and chlorophyll *a* levels was not found, the assimilative capacity for TN loading to the bay was based on the annual average load estimated for the 1992 to 1996 period, which is used to define the historic chlorophyll *a* value. Maintaining the TN loading at levels during this period is expected to prevent annual average chlorophyll *a* values from exceeding the target of 7.2 ug/L. Using this approach to develop the TMDL also provides a margin of safety (MOS) because the average annual chlorophyll a level was 4.8 ug/L in the 1992 to 1996 period. The annual average TN loading for this period is 679,090 pounds per year, as presented in **Figure 5.1**. The annual average load estimated for the verified period (1997 to 2004) is 683,219 pounds per year **(Figure 5.1)** and will need to be reduced by 0.6 percent to achieve the TMDL.

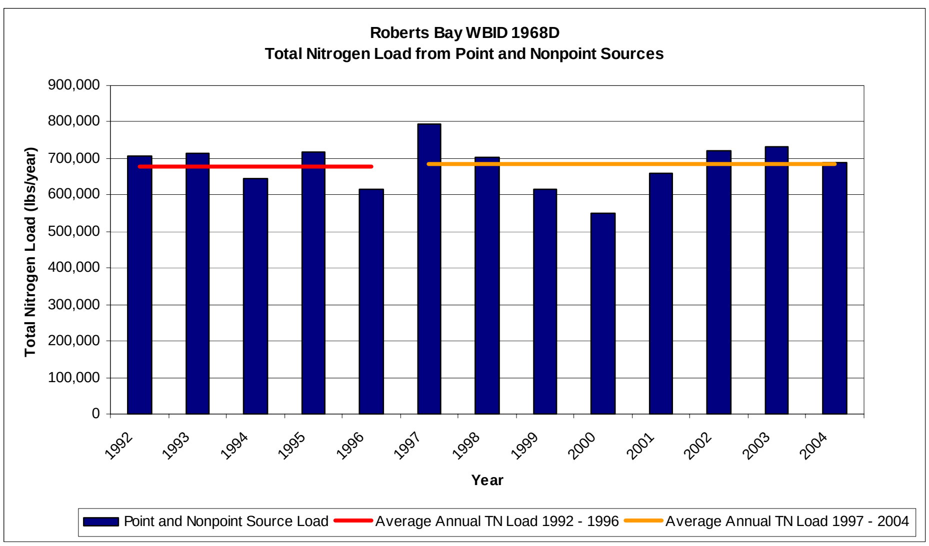

Figure 5.1. Annual Average Total Nitrogen Loads in the Roberts Bay Watershed

5.2 Attempts to Develop Empirical Relationships

Attempts were made to identify relationships between the watershed TN loading to Roberts Bay and the chlorophyll *a* values measured in the bay. No strong correlation between loadings and receiving water quality was found. This lack of a relationship is at least partially due to the limited information used to derive the loading estimates. There are limited flow and nitrogen concentration data available from Phillippi Creek and Matheny Creek to develop loading estimates from the watershed to the bay. The surface water runoff is calculated using a spreadsheet model which is designed to estimate annual pollutant loadings from a watershed. Relationships between TN loading and chlorophyll *a* levels may exist at less than annual time frames. Additionally, other factors such as water residence time in the bay, which has not yet been accounted for, can influence the growth of algae.

5.3 Current Restoration and Management Projects

Sarasota County has initiated the Phillippi Creek Septic System Replacement Program (PCSSRP) to abandon septic systems and improve wastewater treatment/disposal by connecting approximately 14,000 homes and businesses to central sewer in the Phillippi Creek watershed. These parcels represent approximately 3 MGD of wastewater flows. Design and construction of sewer systems is being performed in eight phases. Several phases are either in design or being bid for construction at this time. Approximately 8,170 or 58% of the septic tanks will be removed by 2007, and the remaining 42% are anticipated to be removed by 2012. Approximately 1,500 septic tanks have been removed to date.

5.4 Critical Conditions

The Roberts Bay TMDL was based on annual average conditions rather than critical/seasonal conditions because of the following:

a) The methodology used to determine assimilative capacity does not lend itself very well to short-term assessments,

b) The net change in overall primary productivity, which is better addressed on an annual basis, is generally a better indicator of an imbalance in flora or fauna, and

c) The methodology used to determine impairment is based on an annual average and requires data from all four quarters of a calendar year.

Chapter 6: DETERMINATION OF THE TMDL

6.1 Expression and Allocation of the TMDL

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

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

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

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

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

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

This approach is consistent with federal regulations (40 CFR § 130.2[I]), which state that TMDLs can be expressed in terms of mass per time (e.g., pounds per day), toxicity, or **other appropriate measure**. The TMDL for Roberts Bay is expressed in terms of pounds/year and percent reduction, and represents the maximum annual TN load the estuary can assimilate to maintain chlorophyll a annual averages below the threshold of 7.2 ug/L **(Table 6.1).**

Table 6.1. TMDL Components for Roberts Bay Watershed, WBID 1968D

Parameter	WLA		LA (lbs/year)	MOS (lbs/year	TMDL (lbs/year)	Percent Reduction[2]
	Wastewater[1] (lbs/year)	NPDES Stormwater (percent reduction)				
TN	53,332	8.4	625,758	Implicit	679,090	0.6

[1] The allowable annual load is the sum of the permitted point source loads shown in Table 4.1.
[2] Represents the reduction needed in the total existing load to meet the TMDL.

6.2 Load Allocation

The LA was determined by subtracting the WLA from the total maximum load allowed. The estimated allowable TN loading was the annual average of the sum of point source loads and nonpoint source loads for the 1992 to 1996 period. The total maximum allowable loading was calculated to be 679,090 pounds/year. Subtracting the WLA of 53,332 pounds/year gives a LA of 625,758 pounds/year. The existing annual average total load for the 1997 to 2004 period is 683,219. Therefore to meet the LA, the nonpoint source loading will need to be reduced by 8.4 percent ((683,219 pounds/year – 625,758 pounds/year) / 683,219 pounds/year) * 100.

6.3 Wasteload Allocation

6.3.1 NPDES Wastewater Discharges

The final WLA was established according to recommendations in *A Report to the Governor and the Legislature on the Allocation of Total Maximum Daily Loads in Florida* (Florida Department of Environmental Protection, February 1, 2001). Because the three facilities have made significant reductions in their permitted discharge (see **Section 4.2.1**) and have provided treatment beyond technology-based effluent treatment levels for TN, each facility was given their current maximum permittable load (based on permit concentration and flow limitations). The three domestic facilities are advanced wastewater treatment plants (AWTP), having effluent limits that are greater than the technology-based treatment levels for domestic wastewater facilities (secondary treatment). To allocate the maximum permitted load to each facility and still meet the TMDL limit, the nonpoint source load allocation was reduced to offset the allowable point source load increase. The WLA was determined by summing the permitted annual TN load for each facility as was shown in **Figure 4.1**.

6.3.2 NPDES Stormwater Discharges

As noted in Chapter 4, loadings from stormwater discharges permitted under the NPDES stormwater program are placed in the WLA, rather than the LA. Since it is difficult to quantify the load from this source, the allocation is expressed as a percent reduction. Since the nonpoint source component of the TMDL needs to be reduced by 8.4 percent, this percent reduction is applied to the NPDES stormwater WLA. This includes loads from MS4s. It should be noted that any MS4 permittee is only responsible for reducing the loads associated with stormwater outfalls that it owns or otherwise has responsible control over, and it is not responsible for reducing other nonpoint source loads in its jurisdiction.

6.4 Margin of Safety

Consistent with the recommendations of the Allocation Technical Advisory Committee Report (Florida Department of Environmental Protection, February 1, 2001), an implicit margin of safety (MOS) was used in the development of this TMDL. An implicit MOS was provided by the conservative decision associated with the TMDL development approach, which established the TMDL at a load that is expected to maintain the annual average chlorophyll *a* value below the chlorophyll a target of 7.2 μg/L. The TMDL is based on the estimated TN load during the historic baseline period when the annual average chlorophyll a values were less than 7.2 ug/L.

Chapter 7: NEXT STEPS: IMPLEMENTATION PLAN DEVELOPMENT AND BEYOND

7.1 Basin Management Action Plan

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

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

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APPENDICES

Appendix A: Background Information on Federal and State Stormwater Programs

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

The rule requires the state's water management districts (WMDs) to establish stormwater pollutant load reduction goals (PLRGs) and adopt them as part of a SWIM plan, other watershed plan, or rule. Stormwater PLRGs are a major component of the load allocation part of a TMDL. To date, stormwater PLRGs have been established for Tampa Bay, Lake Thonotosassa, the Winter Haven Chain of Lakes, the Everglades, Lake Okeechobee, and Lake Apopka. No PLRG has been developed for Newnans Lake at the time this study was conducted.

In 1987, the U.S. Congress established Section 402(p) as part of the federal Clean Water Act Reauthorization. This section of the law amended the scope of the federal NPDES stormwater permitting program to designate certain stormwater discharges as "point sources" of pollution. These stormwater discharges include certain discharges that are associated with industrial activities designated by specific Standard Industrial Classification (SIC) codes, construction sites disturbing 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 has implemented Phase 1 of the MS4 permitting program on a countywide basis, which brings in all cities (incorporated areas), Chapter 298 urban water control districts, and the Florida Department of Transportation throughout the fifteen counties meeting the population criteria.

An important difference between the federal and state stormwater permitting programs is that the federal program covers both new and existing discharges, while the state program focuses on new discharges. Additionally, Phase 2 of the NPDES Program will expand the need for these permits to construction sites between one and five acres, and to local governments with as few as 10,000 people. These revised rules require that these additional activities obtain permits by 2003. While these urban stormwater discharges are now technically referred to as "point sources" for the purpose of regulation, they are still diffuse sources of pollution that cannot be easily collected and treated by a central treatment facility similar to other point sources of pollution, such as domestic and industrial wastewater discharges. The Department recently accepted delegation from the EPA for the stormwater part of the NPDES Program. It should be noted that most MS4 permits issued in Florida include a re-opener clause that allows permit revisions to implement TMDLs once they are formally adopted by rule.

Appendix B: Chlorophyll *a* Raw Data

WBID	Station	Time	Date	Parameter	Result
1968D	21FLMML 271529082320400	1307	2/4/1992	CHLA	2.2
1968D	21FLMML 271716082324500	1402	2/4/1992	CHLA	2.1
1968D	21FLMML 271803082323400	1415	2/4/1992	CHLA	4.9
1968D	21FLMML 271529082320400	930	5/12/1992	CHLA	4.9
1968D	21FLMML 271716082324500	1025	5/12/1992	CHLA	4.7
1968D	21FLMML 271803082323400	1045	5/12/1992	CHLA	4.5
1968D	21FLMML 271529082320400	1032	8/11/1992	CHLA	10.2
1968D	21FLMML 271716082324500	1140	8/11/1992	CHLA	11.9
1968D	21FLMML 271803082323400	1212	8/11/1992	CHLA	8.5
1968D	21FLMML 271529082320400	1216	11/10/1992	CHLA	8.7
1968D	21FLMML 271716082324500	1335	11/10/1992	CHLA	4.5
1968D	21FLMML 271803082323400	1355	11/10/1992	CHLA	3.9
1968D	21FLMML 271529082320400	1302	2/9/1993	CHLA	5
1968D	21FLMML 271716082324500	1422	2/9/1993	CHLA	1.5
1968D	21FLMML 271803082323400	1452	2/9/1993	CHLA	2.6
1968D	21FLMML 271529082320400	1022	5/4/1993	CHLA	3.5
1968D	21FLMML 271716082324500	1122	5/4/1993	CHLA	3.7
1968D	21FLMML 271803082323400	1141	5/4/1993	CHLA	3.5
1968D	21FLMML 271529082320400	1223	8/3/1993	CHLA	13.9
1968D	21FLMML 271716082324500	1334	8/3/1993	CHLA	12.3
1968D	21FLMML 271803082323400	1352	8/3/1993	CHLA	5.8
1968D	21FLMML 271529082320400	1325	11/2/1993	CHLA	5.2
1968D	21FLMML 271716082324500	1445	11/2/1993	CHLA	5.8
1968D	21FLMML 271803082323400	1500	11/2/1993	CHLA	13.6
1968D	21FLSARA950125-13-5	1230	1/25/1995	CHLA	1
1968D	21FLSARA950125-13-4	1300	1/25/1995	CHLA	1
1968D	21FLSARA950125-13-3	1330	1/25/1995	CHLA	1
1968D	21FLSARA950125-13-2	1345	1/25/1995	CHLA	1
1968D	21FLSARA950125-13-1	1400	1/25/1995	CHLA	1
1968D	21FLSARA950214-13-5	1115	2/14/1995	CHLA	1
1968D	21FLSARA950214-13-4	1230	2/14/1995	CHLA	1
1968D	21FLSARA950214-13-3	1300	2/14/1995	CHLA	1
1968D	21FLSARA950214-13-2	1325	2/14/1995	CHLA	1
1968D	21FLSARA950214-13-1	1350	2/14/1995	CHLA	1.1
1968D	21FLSARA950314-13-5	1305	3/14/1995	CHLA	1.1
1968D	21FLSARA950314-13-4	1325	3/14/1995	CHLA	1.6
1968D	21FLSARA950314-13-3	1340	3/14/1995	CHLA	1.6
1968D	21FLSARA950314-13-2	1350	3/14/1995	CHLA	1
1968D	21FLSARA950314-13-1	1400	3/14/1995	CHLA	1
1968D	21FLSARA950419-13-4	1220	4/19/1995	CHLA	4.8
1968D	21FLSARA950419-13-5	1240	4/19/1995	CHLA	4.3
1968D	21FLSARA950419-13-3	1300	4/19/1995	CHLA	4.3
1968D	21FLSARA950419-13-2	1350	4/19/1995	CHLA	2.7
1968D	21FLSARA950419-13-1	1410	4/19/1995	CHLA	1.6

WBID	Station	Time	Date	Parameter	Result
1968D	21FLSARA950516-13-5	1310	5/16/1995	CHLA	4.3
1968D	21FLSARA950516-13-3	1335	5/16/1995	CHLA	2.7
1968D	21FLSARA950516-13-2	1345	5/16/1995	CHLA	2.7
1968D	21FLSARA950516-13-1	1410	5/16/1995	CHLA	3.2
1968D	21FLSARA950620-13-5	1235	6/20/1995	CHLA	7.5
1968D	21FLSARA950620-13-4	1255	6/20/1995	CHLA	8
1968D	21FLSARA950620-13-3	1320	6/20/1995	CHLA	6.9
1968D	21FLSARA950620-13-2	1345	6/20/1995	CHLA	6.9
1968D	21FLSARA950620-13-1	1400	6/20/1995	CHLA	3.2
1968D	21FLSARA950711-13-5	1305	7/11/1995	CHLA	3.2
1968D	21FLSARA950711-13-4	1330	7/11/1995	CHLA	3.2
1968D	21FLSARA950711-13-3	1345	7/11/1995	CHLA	2.7
1968D	21FLSARA950711-13-2	1400	7/11/1995	CHLA	3.7
1968D	21FLSARA950711-13-1	1415	7/11/1995	CHLA	2.1
1968D	21FLSARA950828-13-4	1200	8/28/1995	CHLA	13.9
1968D	21FLSARA950828-13-5	1225	8/28/1995	CHLA	19.2
1968D	21FLSARA950828-13-3	1320	8/28/1995	CHLA	11.2
1968D	21FLSARA950828-13-2	1345	8/28/1995	CHLA	9.1
1968D	21FLSARA950828-13-1	1400	8/28/1995	CHLA	10.1
1968D	21FLSARA950919-13-5	1115	9/19/1995	CHLA	12.3
1968D	21FLSARA950919-13-4	1135	9/19/1995	CHLA	11.2
1968D	21FLSARA950919-13-3	1155	9/19/1995	CHLA	9.1
1968D	21FLSARA950919-13-2	1220	9/19/1995	CHLA	9.1
1968D	21FLSARA950919-13-1	1235	9/19/1995	CHLA	9.1
1968D	21FLSARA951016-13-5	1150	10/16/1995	CHLA	7.5
1968D	21FLSARA951016-13-4	1220	10/16/1995	CHLA	6.9
1968D	21FLSARA951016-13-3	1240	10/16/1995	CHLA	4
1968D	21FLSARA951016-13-2	1300	10/16/1995	CHLA	4.8
1968D	21FLSARA951016-13-1	1325	10/16/1995	CHLA	5.3
1968D	21FLSARA951114-13-5	1130	11/14/1995	CHLA	2.7
1968D	21FLSARA951114-13-4	1150	11/14/1995	CHLA	1.6
1968D	21FLSARA951114-13-3	1210	11/14/1995	CHLA	1.6
1968D	21FLSARA951114-13-2	1230	11/14/1995	CHLA	1.6
1968D	21FLSARA951114-13-1	1245	11/14/1995	CHLA	1.6
1968D	21FLSARA951211-13-5	1150	12/11/1995	CHLA	6.4
1968D	21FLSARA951211-13-4	1215	12/11/1995	CHLA	4.3
1968D	21FLSARA951211-13-3	1245	12/11/1995	CHLA	9.1
1968D	21FLSARA951211-13-2	1305	12/11/1995	CHLA	5.9
1968D	21FLSARA951211-13-1	1330	12/11/1995	CHLA	4.8
1968D	21FLSARA960123-13-5	1230	1/23/1996	CHLA	1.1
1968D	21FLSARA960123-13-4	1255	1/23/1996	CHLA	2.7
1968D	21FLSARA960123-13-3	1330	1/23/1996	CHLA	2.7
1968D	21FLSARA960123-13-2	1345	1/23/1996	CHLA	1
1968D	21FLSARA960123-13-1	1400	1/23/1996	CHLA	1.1
1968D	21FLSARA960214-13-5	1135	2/14/1996	CHLA	1.1
1968D	21FLSARA960214-13-4	1155	2/14/1996	CHLA	1.1
1968D	21FLSARA960214-13-3	1220	2/14/1996	CHLA	1.1

WBID	Station	Time	Date	Parameter	Result
1968D	21FLSARA960214-13-2	1250	2/14/1996	CHLA	1
1968D	21FLSARA960214-13-1	1305	2/14/1996	CHLA	1
1968D	21FLSARA960321-13-5	1130	3/21/1996	CHLA	1.1
1968D	21FLSARA960321-13-4	1205	3/21/1996	CHLA	1.1
1968D	21FLSARA960321-13-3	1220	3/21/1996	CHLA	1
1968D	21FLSARA960321-13-2	1245	3/21/1996	CHLA	1
1968D	21FLSARA960321-13-1	1305	3/21/1996	CHLA	1.6
1968D	21FLSARA960408-13-1	940	4/8/1996	CHLA	1
1968D	21FLSARA960408-13-2	1000	4/8/1996	CHLA	1
1968D	21FLSARA960408-13-3	1020	4/8/1996	CHLA	1
1968D	21FLSARA960408-13-4	1035	4/8/1996	CHLA	2.1
1968D	21FLSARA960408-13-5	1050	4/8/1996	CHLA	3.2
1968D	21FLSARA960510-13-5	1030	5/10/1996	CHLA	2.1
1968D	21FLSARA960510-13-3	1100	5/10/1996	CHLA	2.7
1968D	21FLSARA960510-13-2	1120	5/10/1996	CHLA	1.6
1968D	21FLSARA960510-13-1	1135	5/10/1996	CHLA	1.1
1968D	21FLSARA960619-13-5	1125	6/19/1996	CHLA	5.8
1968D	21FLSARA960619-13-4	1140	6/19/1996	CHLA	6.5
1968D	21FLSARA960619-13-3	1150	6/19/1996	CHLA	4.8
1968D	21FLSARA960619-13-2	1215	6/19/1996	CHLA	2.7
1968D	21FLSARA960619-13-1	1230	6/19/1996	CHLA	2.1
1968D	21FLSARA960716-13-5	1110	7/16/1996	CHLA	4.8
1968D	21FLSARA960716-13-4	1145	7/16/1996	CHLA	5.1
1968D	21FLSARA960716-13-3	1215	7/16/1996	CHLA	2.7
1968D	21FLSARA960716-13-2	1230	7/16/1996	CHLA	1.6
1968D	21FLSARA960716-13-1	1245	7/16/1996	CHLA	2.7
1968D	21FLSARA960820-13-5	1130	8/20/1996	CHLA	5.3
1968D	21FLSARA960820-13-4	1145	8/20/1996	CHLA	4.3
1968D	21FLSARA960820-13-3	1215	8/20/1996	CHLA	4.8
1968D	21FLSARA960820-13-2	1230	8/20/1996	CHLA	5.3
1968D	21FLSARA960820-13-1	1245	8/20/1996	CHLA	6.9
1968D	21FLSARA960926-13-5	1125	9/26/1996	CHLA	1.1
1968D	21FLSARA960926-13-4	1210	9/26/1996	CHLA	1.6
1968D	21FLSARA960926-13-3	1235	9/26/1996	CHLA	1.6
1968D	21FLSARA960926-13-2	1250	9/26/1996	CHLA	2.1
1968D	21FLSARA960926-13-1	1305	9/26/1996	CHLA	1
1968D	21FLSARA961024-13-5	1140	10/24/1996	CHLA	1.1
1968D	21FLSARA961024-13-4	1210	10/24/1996	CHLA	1
1968D	21FLSARA961024-13-3	1235	10/24/1996	CHLA	1.1
1968D	21FLSARA961024-13-2	1255	10/24/1996	CHLA	1.1
1968D	21FLSARA961024-13-1	1320	10/24/1996	CHLA	1.6
1968D	21FLSARA961119-13-5	1105	11/19/1996	CHLA	1.1
1968D	21FLSARA961119-13-4	1120	11/19/1996	CHLA	1
1968D	21FLSARA961119-13-3	1135	11/19/1996	CHLA	1.1
1968D	21FLSARA961119-13-2	1150	11/19/1996	CHLA	1.1
1968D	21FLSARA961119-13-1	1205	11/19/1996	CHLA	1.6
1968D	21FLSARA961210-13-5	1230	12/10/1996	CHLA	1

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1968D	21FLSARA961210-13-4	1250	12/10/1996	CHLA	1.1
1968D	21FLSARA961210-13-3	1310	12/10/1996	CHLA	3.2
1968D	21FLSARA961210-13-2	1320	12/10/1996	CHLA	1.1
1968D	21FLSARA961210-13-1	1330	12/10/1996	CHLA	2.7
1968D	21FLSARA970109-13-5	1100	1/9/1997	CHLA	2.7
1968D	21FLSARA970109-13-4	1115	1/9/1997	CHLA	2.7
1968D	21FLSARA970109-13-3	1140	1/9/1997	CHLA	2.7
1968D	21FLSARA970109-13-2	1150	1/9/1997	CHLA	1.6
1968D	21FLSARA970109-13-2	1150	1/9/1997	CHLA	1.6
1968D	21FLSARA970109-13-1	1200	1/9/1997	CHLA	1.6
1968D	21FLSARA970109-13-1	1200	1/9/1997	CHLA	1.6
1968D	21FLSARA970210-13-5	1140	2/10/1997	CHLA	4.8
1968D	21FLSARA970210-13-4	1155	2/10/1997	CHLA	2.7
1968D	21FLSARA970210-13-3	1210	2/10/1997	CHLA	3.2
1968D	21FLSARA970210-13-2	1245	2/10/1997	CHLA	1.1
1968D	21FLSARA970210-13-1	1305	2/10/1997	CHLA	2.1
1968D	21FLSARA970311-13-5	1120	3/11/1997	CHLA	3.2
1968D	21FLSARA970311-13-4	1200	3/11/1997	CHLA	7.5
1968D	21FLSARA970311-13-3	1215	3/11/1997	CHLA	1.1
1968D	21FLSARA970311-13-2	1230	3/11/1997	CHLA	1.6
1968D	21FLSARA970311-13-1	1245	3/11/1997	CHLA	1
1968D	21FLSARA13-1-04	1010	4/23/1997	CHLAC	1.6
1968D	21FLSARA13-2-04	1040	4/23/1997	CHLAC	2.1
1968D	21FLSARA13-3-04	1105	4/23/1997	CHLAC	3.2
1968D	21FLSARA13-4-04	1125	4/23/1997	CHLAC	2.1
1968D	21FLSARA13-5-04	1150	4/23/1997	CHLAC	2.1
1968D	21FLSARA970519-13-5	1130	5/19/1997	CHLA	3.7
1968D	21FLSARA970519-13-3	1200	5/19/1997	CHLA	3.7
1968D	21FLSARA970519-13-2	1220	5/19/1997	CHLA	1.6
1968D	21FLSARA970519-13-1	1235	5/19/1997	CHLA	2.1
1968D	21FLSARA970618-13-5	1120	6/18/1997	CHLA	35.2
1968D	21FLSARA970618-13-4	1130	6/18/1997	CHLA	17.6
1968D	21FLSARA970618-13-3	1145	6/18/1997	CHLA	19.2
1968D	21FLSARA970618-13-2	1200	6/18/1997	CHLA	21
1968D	21FLSARA970618-13-1	1220	6/18/1997	CHLA	39.2
1968D	21FLSARA970715-13-5	1105	7/15/1997	CHLA	4.4
1968D	21FLSARA970715-13-4	1115	7/15/1997	CHLA	4.8
1968D	21FLSARA970715-13-3	1130	7/15/1997	CHLA	5.2
1968D	21FLSARA970715-13-2	1145	7/15/1997	CHLA	7
1968D	21FLSARA970715-13-1	1200	7/15/1997	CHLA	4.4
1968D	21FLSARA970818-13-1	1000	8/18/1997	CHLA	4.2
1968D	21FLSARA970818-13-2	1020	8/18/1997	CHLA	5.6
1968D	21FLSARA970818-13-3	1040	8/18/1997	CHLA	6.8
1968D	21FLSARA970818-13-4	1110	8/18/1997	CHLA	5.7
1968D	21FLSARA970818-13-5	1130	8/18/1997	CHLA	4.6
1968D	21FLSARA970916-13-5	1105	9/16/1997	CHLA	16.4
1968D	21FLSARA970916-13-4	1120	9/16/1997	CHLA	14.5

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1968D	21FLSARA970916-13-3	1135	9/16/1997	CHLA	14.6
1968D	21FLSARA970916-13-2	1145	9/16/1997	CHLA	8.1
1968D	21FLSARA970916-13-1	1200	9/16/1997	CHLA	10.1
1968D	21FLSARA971008-13-5	1055	10/8/1997	CHLA	11.5
1968D	21FLSARA971008-13-4	1110	10/8/1997	CHLA	14.1
1968D	21FLSARA971008-13-3	1125	10/8/1997	CHLA	11.3
1968D	21FLSARA971008-13-2	1140	10/8/1997	CHLA	14.3
1968D	21FLSARA971008-13-1	1200	10/8/1997	CHLA	11.6
1968D	21FLSARA971111-13-5	1045	11/11/1997	CHLA	2.3
1968D	21FLSARA971111-13-4	1100	11/11/1997	CHLA	2.1
1968D	21FLSARA971111-13-3	1110	11/11/1997	CHLA	3.2
1968D	21FLSARA971111-13-2	1130	11/11/1997	CHLA	3.2
1968D	21FLSARA971111-13-1	1140	11/11/1997	CHLA	1.6
1968D	21FLSARA971210-13-5	1135	12/10/1997	CHLA	7.9
1968D	21FLSARA971210-13-4	1145	12/10/1997	CHLA	26.2
1968D	21FLSARA971210-13-3	1205	12/10/1997	CHLA	12.3
1968D	21FLSARA971210-13-2	1215	12/10/1997	CHLA	11.5
1968D	21FLSARA971210-13-1	1230	12/10/1997	CHLA	10.5
1968D	21FLSARA980225-13-5	1215	2/25/1998	CHLAC	10.2
1968D	21FLSARA980225-13-4	1236	2/25/1998	CHLAC	9.9
1968D	21FLSARA980225-13-3	1255	2/25/1998	CHLAC	12.2
1968D	21FLSARA980225-13-2	1322	2/25/1998	CHLAC	7.9
1968D	21FLSARA980225-13-1	1345	2/25/1998	CHLAC	6
1968D	21FLSARA980317-13-5	1227	3/17/1998	CHLAC	3.3
1968D	21FLSARA980317-13-4	1250	3/17/1998	CHLAC	2.3
1968D	21FLSARA980317-13-3	1311	3/17/1998	CHLAC	3.1
1968D	21FLSARA980317-13-2	1338	3/17/1998	CHLAC	3
1968D	21FLSARA980317-13-1	1356	3/17/1998	CHLAC	2.3
1968D	21FLSARA980414-13-5	1224	4/14/1998	CHLAC	3.1
1968D	21FLSARA980414-13-4	1249	4/14/1998	CHLAC	4.8
1968D	21FLSARA980414-13-3	1312	4/14/1998	CHLAC	4.8
1968D	21FLSARA980414-13-2	1340	4/14/1998	CHLAC	5.6
1968D	21FLSARA980414-13-1	1401	4/14/1998	CHLAC	5.3
1968D	21FLSARA980415-16-2	1352	4/15/1998	CHLAC	3.1
1968D	21FLSARA980505-13-5	1152	5/5/1998	CHLAC	5
1968D	21FLSARA980505-13-4	1209	5/5/1998	CHLAC	4.1
1968D	21FLSARA980505-13-3	1231	5/5/1998	CHLAC	6.8
1968D	21FLSARA980505-13-2	1252	5/5/1998	CHLAC	8.1
1968D	21FLSARA980505-13-1	1308	5/5/1998	CHLAC	9.6
1968D	21FLSARA980610-13-5	1149	6/10/1998	CHLAC	9.4
1968D	21FLSARA980610-13-4	1211	6/10/1998	CHLAC	6.6
1968D	21FLSARA980610-13-3	1235	6/10/1998	CHLAC	5.4
1968D	21FLSARA980610-13-2	1255	6/10/1998	CHLAC	3.1
1968D	21FLSARA980610-13-1	1315	6/10/1998	CHLAC	3.7
1968D	21FLSARA980715-13-5	1154	7/15/1998	CHLAC	10.3
1968D	21FLSARA980715-13-4	1209	7/15/1998	CHLAC	14.7
1968D	21FLSARA980715-13-3	1241	7/15/1998	CHLAC	13.3

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1968D	21FLSARA980715-13-2	1300	7/15/1998	CHLAC	11.4
1968D	21FLSARA980715-13-1	1319	7/15/1998	CHLAC	10
1968D	21FLSARA980826-13-5	1158	8/26/1998	CHLAC	6.7
1968D	21FLSARA980826-13-4	1220	8/26/1998	CHLAC	9
1968D	21FLSARA980826-13-3	1300	8/26/1998	CHLAC	10.8
1968D	21FLSARA980826-13-2	1324	8/26/1998	CHLAC	5.1
1968D	21FLSARA980826-13-1	1347	8/26/1998	CHLAC	7.1
1968D	21FLSARA980916-13-5	1211	9/16/1998	CHLAC	14.7
1968D	21FLSARA980916-13-4	1238	9/16/1998	CHLAC	14.9
1968D	21FLSARA980916-13-3	1305	9/16/1998	CHLAC	12.3
1968D	21FLSARA980916-13-2	1329	9/16/1998	CHLAC	10.2
1968D	21FLSARA980916-13-1	1352	9/16/1998	CHLAC	15.7
1968D	21FLSARA981014-13-5	1211	10/14/1998	CHLAC	11.8
1968D	21FLSARA981014-13-4	1227	10/14/1998	CHLAC	5.3
1968D	21FLSARA981014-13-3	1252	10/14/1998	CHLAC	10.9
1968D	21FLSARA981014-13-2	1314	10/14/1998	CHLAC	10.3
1968D	21FLSARA981014-13-1	1329	10/14/1998	CHLAC	6.7
1968D	21FLSARA13-5-11	1157	11/18/1998	CHLAC	6.3
1968D	21FLSARA13-4-11	1216	11/18/1998	CHLAC	6
1968D	21FLSARA13-3-11	1240	11/18/1998	CHLAC	6.5
1968D	21FLSARA13-2-11	1343	11/18/1998	CHLAC	6.3
1968D	21FLSARA13-1-11	1358	11/18/1998	CHLAC	5.1
1968D	21FLSARA13-5-12	1144	12/9/1998	CHLAC	5.6
1968D	21FLSARA13-4-12	1208	12/9/1998	CHLAC	4.9
1968D	21FLSARA13-3-12	1227	12/9/1998	CHLAC	11.7
1968D	21FLSARA13-2-12	1247	12/9/1998	CHLAC	3.5
1968D	21FLSARA13-1-12	1302	12/9/1998	CHLAC	3.7
1968D	21FLSARA13-5-01	1149	1/7/1999	CHLAC	1
1968D	21FLSARA13-4-01	1222	1/7/1999	CHLAC	1.1
1968D	21FLSARA13-3-01	1241	1/7/1999	CHLAC	1.8
1968D	21FLSARA13-2-01	1302	1/7/1999	CHLAC	1.1
1968D	21FLSARA13-1-01	1316	1/7/1999	CHLAC	2
1968D	21FLSARA13-5-02	1155	2/10/1999	CHLAC	5.3
1968D	21FLSARA13-4-02	1217	2/10/1999	CHLAC	4.4
1968D	21FLSARA13-3-02	1240	2/10/1999	CHLAC	7.8
1968D	21FLSARA13-2-02	1309	2/10/1999	CHLAC	5.7
1968D	21FLSARA13-1-02	1337	2/10/1999	CHLAC	4.5
1968D	21FLSARA13-5-03	1210	3/10/1999	CHLAC	2.3
1968D	21FLSARA13-4-03	1243	3/10/1999	CHLAC	2.5
1968D	21FLSARA13-3-03	1305	3/10/1999	CHLAC	2.7
1968D	21FLSARA13-2-03	1330	3/10/1999	CHLAC	2.5
1968D	21FLSARA13-1-03	1350	3/10/1999	CHLAC	2.9
1968D	21FLSARA13-5-04	1201	4/14/1999	CHLAC	6.8
1968D	21FLSARA13-4-04	1238	4/14/1999	CHLAC	5.7
1968D	21FLSARA13-3-04	1256	4/14/1999	CHLAC	5.8
1968D	21FLSARA13-2-04	1321	4/14/1999	CHLAC	5.5
1968D	21FLSARA13-1-04	1340	4/14/1999	CHLAC	5.3

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1968D	21FLSARA13-5-05	1148	5/12/1999	CHLAC	8.2
1968D	21FLSARA13-3-05	1226	5/12/1999	CHLAC	12
1968D	21FLSARA13-2-05	1247	5/12/1999	CHLAC	11.8
1968D	21FLSARA13-1-05	1306	5/12/1999	CHLAC	8.7
1968D	21FLSARA13-5-06	1212	6/16/1999	CHLAC	7.9
1968D	21FLSARA13-4-06	1229	6/16/1999	CHLAC	6.7
1968D	21FLSARA13-3-06	1251	6/16/1999	CHLAC	8.4
1968D	21FLSARA13-2-06	1316	6/16/1999	CHLAC	5.6
1968D	21FLSARA13-1-06	1333	6/16/1999	CHLAC	2.9
1968D	21FLSARA13-1-07	1029	7/21/1999	CHLAC	6.4
1968D	21FLSARA13-2-07	1048	7/21/1999	CHLAC	11.3
1968D	21FLSARA13-3-07	1107	7/21/1999	CHLAC	9.5
1968D	21FLSARA13-4-07	1130	7/21/1999	CHLAC	10.4
1968D	21FLSARA13-5-07	1144	7/21/1999	CHLAC	6.5
1968D	21FLSARA13-5-08	1208	8/10/1999	CHLAC	35.6
1968D	21FLSARA13-4-08	1228	8/10/1999	CHLAC	20.4
1968D	21FLSARA13-3-08	1331	8/10/1999	CHLAC	19.6
1968D	21FLSARA13-2-08	1350	8/10/1999	CHLAC	28.6
1968D	21FLSARA13-1-08	1406	8/10/1999	CHLAC	23.9
1968D	21FLSARA13-5-09	1227	9/28/1999	CHLAC	19.6
1968D	21FLSARA13-4-09	1247	9/28/1999	CHLAC	21
1968D	21FLSARA13-3-09	1312	9/28/1999	CHLAC	25.5
1968D	21FLSARA13-2-09	1344	9/28/1999	CHLAC	23.6
1968D	21FLSARA13-1-09	1358	9/28/1999	CHLAC	21.2
1968D	21FLSARA13-5-10	1152	10/20/1999	CHLAC	10.9
1968D	21FLSARA13-4-10	1229	10/20/1999	CHLAC	11.4
1968D	21FLSARA13-3-10	1247	10/20/1999	CHLAC	12
1968D	21FLSARA13-2-10	1308	10/20/1999	CHLAC	13
1968D	21FLSARA13-1-10	1325	10/20/1999	CHLAC	7
1968D	21FLSARA13-5-11	1211	11/10/1999	CHLAC	6
1968D	21FLSARA13-4-11	1237	11/10/1999	CHLAC	4.2
1968D	21FLSARA13-3-11	1257	11/10/1999	CHLAC	5.6
1968D	21FLSARA13-2-11	1323	11/10/1999	CHLAC	5.3
1968D	21FLSARA13-1-11	1347	11/10/1999	CHLAC	5.6
1968D	21FLSARA13-5-12	1205	12/15/1999	CHLAC	2
1968D	21FLSARA13-4-12	1300	12/15/1999	CHLAC	6.5
1968D	21FLSARA13-3-12	1326	12/15/1999	CHLAC	10.6
1968D	21FLSARA13-2-12	1348	12/15/1999	CHLAC	2.4
1968D	21FLSARA13-1-12	1403	12/15/1999	CHLAC	2.1
1968D	21FLSARA13-5-01	1225	1/12/2000	CHLAC	6.9
1968D	21FLSARA13-4-01	1313	1/12/2000	CHLAC	3.9
1968D	21FLSARA13-3-01	1337	1/12/2000	CHLAC	2.9
1968D	21FLSARA13-2-01	1358	1/12/2000	CHLAC	2.3
1968D	21FLSARA13-1-01	1412	1/12/2000	CHLAC	2.4
1968D	21FLSARA13-5-02	1211	2/16/2000	CHLAC	1.9
1968D	21FLSARA13-4-02	1246	2/16/2000	CHLAC	1.8
1968D	21FLSARA13-3-02	1322	2/16/2000	CHLAC	1

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1968D	21FLSARA13-2-02	1344	2/16/2000	CHLAC	1.7
1968D	21FLSARA13-1-02	1403	2/16/2000	CHLAC	1
1968D	21FLSARA13-5-03	1245	3/15/2000	CHLAC	2.9
1968D	21FLSARA13-4-03	1305	3/15/2000	CHLAC	3.2
1968D	21FLSARA13-3-03	1326	3/15/2000	CHLAC	3.3
1968D	21FLSARA13-2-03	1354	3/15/2000	CHLAC	5.4
1968D	21FLSARA13-1-03	1408	3/15/2000	CHLAC	3.6
1968D	21FLSARA13-5-04	1211	4/12/2000	CHLAC	4.5
1968D	21FLSARA13-4-04	1248	4/12/2000	CHLAC	3.5
1968D	21FLSARA13-3-04	1305	4/12/2000	CHLAC	3.5
1968D	21FLSARA13-2-04	1329	4/12/2000	CHLAC	4.2
1968D	21FLSARA13-1-04	1346	4/12/2000	CHLAC	3.5
1968D	21FLSARA13-5-05	1158	5/10/2000	CHLAC	3.9
1968D	21FLSARA13-3-05	1248	5/10/2000	CHLAC	5.1
1968D	21FLSARA13-2-05	1309	5/10/2000	CHLAC	5
1968D	21FLSARA13-1-05	1323	5/10/2000	CHLAC	3.6
1968D	21FLSARA13-5-06	1219	6/14/2000	CHLAC	6.8
1968D	21FLSARA13-4-06	1237	6/14/2000	CHLAC	6.5
1968D	21FLSARA13-3-06	1255	6/14/2000	CHLAC	4
1968D	21FLSARA13-2-06	1320	6/14/2000	CHLAC	5.2
1968D	21FLSARA13-1-06	1336	6/14/2000	CHLAC	7
1968D	21FLSARA13-5-07	1225	7/18/2000	CHLAC	11.3
1968D	21FLSARA13-4-07	1305	7/18/2000	CHLAC	10.6
1968D	21FLSARA13-3-07	1336	7/18/2000	CHLAC	12.9
1968D	21FLSARA13-2-07	1412	7/18/2000	CHLAC	7
1968D	21FLSARA13-1-07	1430	7/18/2000	CHLAC	2.6
1968D	21FLSARA13-5-08	1206	8/8/2000	CHLAC	11.5
1968D	21FLSARA13-4-08	1246	8/8/2000	CHLAC	10.2
1968D	21FLSARA13-3-08	1331	8/8/2000	CHLAC	12
1968D	21FLSARA13-2-08	1408	8/8/2000	CHLAC	20
1968D	21FLSARA13-1-08	1441	8/8/2000	CHLAC	9.2
1968D	21FLSARA13-5-09	1214	9/20/2000	CHLAC	26.4
1968D	21FLSARA13-4-09	1251	9/20/2000	CHLAC	19
1968D	21FLSARA13-3-09	1325	9/20/2000	CHLAC	21.4
1968D	21FLSARA13-2-09	1402	9/20/2000	CHLAC	22.1
1968D	21FLSARA13-1-09	1427	9/20/2000	CHLAC	25.4
1968D	21FLSARA13-5-10	1202	10/17/2000	CHLAC	6.5
1968D	21FLSARA13-4-10	1256	10/17/2000	CHLAC	2.7
1968D	21FLSARA13-3-10	1328	10/17/2000	CHLAC	3.6
1968D	21FLSARA13-2-10	1402	10/17/2000	CHLAC	5.5
1968D	21FLSARA13-1-10	1427	10/17/2000	CHLAC	4.3
1968D	21FLSARA13-5-11	1201	11/14/2000	CHLAC	4
1968D	21FLSARA13-4-11	1317	11/14/2000	CHLAC	2.7
1968D	21FLSARA13-3-11	1342	11/14/2000	CHLAC	3.7
1968D	21FLSARA13-2-11	1413	11/14/2000	CHLAC	4.9
1968D	21FLSARA13-1-11	1440	11/14/2000	CHLAC	4.4
1968D	21FLSARA13-5-12	1151	12/5/2000	CHLAC	1

WBID	Station	Time	Date	Parameter	Result
1968D	21FLSARA13-4-12	1222	12/5/2000	CHLAC	1.3
1968D	21FLSARA13-3-12	1253	12/5/2000	CHLAC	3.8
1968D	21FLSARA13-2-12	1322	12/5/2000	CHLAC	2.1
1968D	21FLSARA13-1-12	1346	12/5/2000	CHLAC	1.5
1968D	21FLSARA13-5-01	1239	1/16/2001	CHLAC	1.7
1968D	21FLSARA13-4-01	1313	1/16/2001	CHLAC	1
1968D	21FLSARA13-3-01	1344	1/16/2001	CHLAC	1
1968D	21FLSARA13-2-01	1415	1/16/2001	CHLAC	1
1968D	21FLSARA13-1-01	1443	1/16/2001	CHLAC	1.2
1968D	21FLSARA13-5-02	1212	2/21/2001	CHLAC	4.7
1968D	21FLSARA13-4-02	1240	2/21/2001	CHLAC	3.8
1968D	21FLSARA13-3-02	1302	2/21/2001	CHLAC	2.2
1968D	21FLSARA13-2-02	1332	2/21/2001	CHLAC	2.1
1968D	21FLSARA13-1-02	1352	2/21/2001	CHLAC	2
1968D	21FLSARA13-5-03	1219	3/22/2001	CHLAC	1.9
1968D	21FLSARA13-4-03	1314	3/22/2001	CHLAC	2.1
1968D	21FLSARA13-3-03	1331	3/22/2001	CHLAC	2.5
1968D	21FLSARA13-2-03	1352	3/22/2001	CHLAC	2.9
1968D	21FLSARA13-1-03	1408	3/22/2001	CHLAC	5.2
1968D	21FLSARA13-5-04	1215	4/25/2001	CHLAC	3
1968D	21FLSARA13-4-04	1236	4/25/2001	CHLAC	3.6
1968D	21FLSARA13-3-04	1254	4/25/2001	CHLAC	4.8
1968D	21FLSARA13-2-04	1317	4/25/2001	CHLAC	4.5
1968D	21FLSARA13-1-04	1333	4/25/2001	CHLAC	4.9
1968D	21FLSARA13-5-05	1147	5/16/2001	CHLAC	2.2
1968D	21FLSARA13-3-05	1225	5/16/2001	CHLAC	2.8
1968D	21FLSARA13-2-05	1246	5/16/2001	CHLAC	5.1
1968D	21FLSARA13-1-05	1304	5/16/2001	CHLAC	3.1
1968D	21FLSARA13-1-06	1032	6/5/2001	CHLAC	7.1
1968D	21FLSARA13-2-06	1105	6/5/2001	CHLAC	11.8
1968D	21FLSARA13-3-06	1133	6/5/2001	CHLAC	7.5
1968D	21FLSARA13-4-06	1153	6/5/2001	CHLAC	8
1968D	21FLSARA13-5-06	1213	6/5/2001	CHLAC	3.9
1968D	21FLSARA13-5-07	1203	7/26/2001	CHLAC	45.5
1968D	21FLSARA13-4-07	1219	7/26/2001	CHLAC	43.2
1968D	21FLSARA13-3-07	1242	7/26/2001	CHLAC	21.9
1968D	21FLSARA13-2-07	1303	7/26/2001	CHLAC	21.6
1968D	21FLSARA13-1-07	1325	7/26/2001	CHLAC	46.6
1968D	21FLSARA13-5-08	1212	8/15/2001	CHLAC	31.55
1968D	21FLSARA13-4-08	1227	8/15/2001	CHLAC	31.59
1968D	21FLSARA13-3-08	1251	8/15/2001	CHLAC	34.9
1968D	21FLSARA13-2-08	1312	8/15/2001	CHLAC	27.78
1968D	21FLSARA13-1-08	1329	8/15/2001	CHLAC	19.1
1968D	21FLSARA13-5-09	1158	9/20/2001	CHLAC	40.7
1968D	21FLSARA13-4-09	1219	9/20/2001	CHLAC	34.2
1968D	21FLSARA13-3-09	1239	9/20/2001	CHLAC	39.35
1968D	21FLSARA13-2-09	1306	9/20/2001	CHLAC	35.6

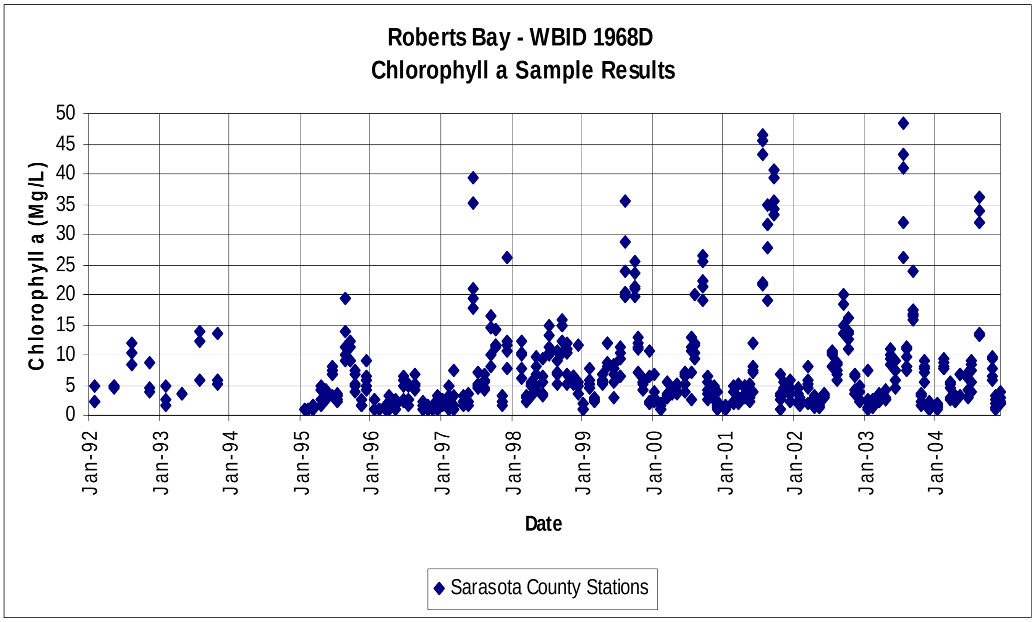
WBID	Station	Time	Date	Parameter	Result
1968D	21FLSARA13-1-09	1328	9/20/2001	CHLAC	33.23
1968D	21FLSARA13-5-10	1154	10/24/2001	CHLAC	6.62
1968D	21FLSARA13-4-10	1213	10/24/2001	CHLAC	1.01
1968D	21FLSARA13-3-10	1242	10/24/2001	CHLAC	2.69
1968D	21FLSARA13-2-10	1305	10/24/2001	CHLAC	3.55
1968D	21FLSARA13-1-10	1317	10/24/2001	CHLAC	3.31
1968D	21FLSARA13-5-11	1146	11/14/2001	CHLAC	5.58
1968D	21FLSARA13-4-11	1207	11/14/2001	CHLAC	4.01
1968D	21FLSARA13-3-11	1225	11/14/2001	CHLAC	4.55
1968D	21FLSARA13-2-11	1250	11/14/2001	CHLAC	4.11
1968D	21FLSARA13-1-11	1305	11/14/2001	CHLAC	3.42
1968D	21FLSARA13-5-12	1222	12/12/2001	CHLAC	3.41
1968D	21FLSARA13-4-12	1238	12/12/2001	CHLAC	5.8
1968D	21FLSARA13-3-12	1304	12/12/2001	CHLAC	4.52
1968D	21FLSARA13-2-12	1327	12/12/2001	CHLAC	3.65
1968D	21FLSARA13-1-12	1340	12/12/2001	CHLAC	2.33
1968D	21FLSARA13-5-01	1228	1/23/2002	CHLAC	2.17
1968D	21FLSARA13-4-01	1251	1/23/2002	CHLAC	4.41
1968D	21FLSARA13-3-01	1310	1/23/2002	CHLAC	4.4
1968D	21FLSARA13-2-01	1332	1/23/2002	CHLAC	1.79
1968D	21FLSARA13-1-01	1346	1/23/2002	CHLAC	3.67
1968D	21FLSARA13-5-02	1247	2/5/2002	CHLAC	2.14
1968D	21FLSARA13-4-02	1304	2/5/2002	CHLAC	2.23
1968D	21FLSARA13-3-02	1323	2/5/2002	CHLAC	1.75
1968D	21FLSARA13-2-02	1348	2/5/2002	CHLAC	2.76
1968D	21FLSARA13-1-02	1405	2/5/2002	CHLAC	2.59
1968D	21FLSARA13-1-03	1125	3/19/2002	CHLAC	1.96
1968D	21FLSARA13-2-03	1141	3/19/2002	CHLAC	4.36
1968D	21FLSARA13-3-03	1204	3/19/2002	CHLAC	5.06
1968D	21FLSARA13-4-03	1219	3/19/2002	CHLAC	5.9
1968D	21FLSARA13-5-03	1238	3/19/2002	CHLAC	7.91
1968D	21FLSARA13-1-04	1131	4/16/2002	CHLAC	1.4
1968D	21FLSARA13-2-04	1153	4/16/2002	CHLAC	2.5
1968D	21FLSARA13-3-04	1218	4/16/2002	CHLAC	2.89
1968D	21FLSARA13-4-04	1237	4/16/2002	CHLAC	3.22
1968D	21FLSARA13-5-04	1301	4/16/2002	CHLAC	3.16
1968D	21FLSARA13-1-05	1141	5/15/2002	CHLAC	1.43
1968D	21FLSARA13-2-05	1153	5/15/2002	CHLAC	1.18
1968D	21FLSARA13-3-05	1211	5/15/2002	CHLAC	1.55
1968D	21FLSARA13-5-05	1244	5/15/2002	CHLAC	1.73
1968D	21FLSARA13-1-06	1119	6/12/2002	CHLAC	3.28
1968D	21FLSARA13-2-06	1138	6/12/2002	CHLAC	3.07
1968D	21FLSARA13-3-06	1200	6/12/2002	CHLAC	3.56
1968D	21FLSARA13-4-06	1216	6/12/2002	CHLAC	3.04
1968D	21FLSARA13-5-06	1235	6/12/2002	CHLAC	3.44
1968D	21FLSARA13-5-07	1201	7/17/2002	CHLAC	8.15
1968D	21FLSARA13-4-07	1215	7/17/2002	CHLAC	8.05

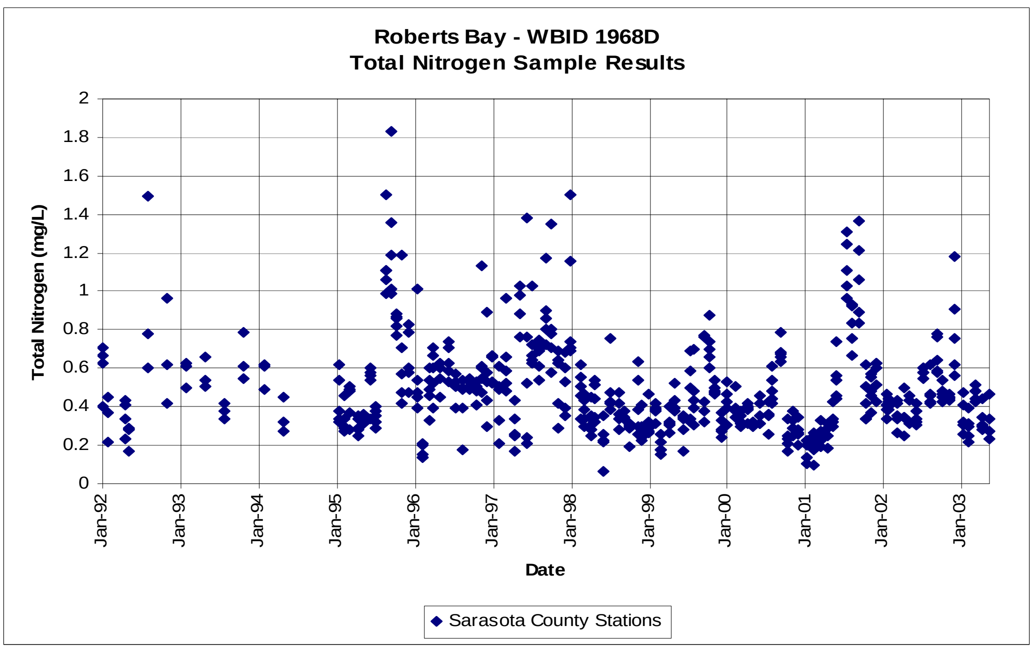
WBID	Station	Time	Date	Parameter	Result
1968D	21FLSARA13-3-07	1236	7/17/2002	CHLAC	10.26
1968D	21FLSARA13-2-07	1254	7/17/2002	CHLAC	9.97
1968D	21FLSARA13-1-07	1313	7/17/2002	CHLAC	10.64
1968D	21FLSARA13-5-08	1147	8/14/2002	CHLAC	6.67
1968D	21FLSARA13-4-08	1202	8/14/2002	CHLAC	5.91
1968D	21FLSARA13-3-08	1230	8/14/2002	CHLAC	8.6
1968D	21FLSARA13-2-08	1246	8/14/2002	CHLAC	7.26
1968D	21FLSARA13-1-08	1301	8/14/2002	CHLAC	8.26
1968D	21FLSARA13-5-09	1132	9/18/2002	CHLAC	18.33
1968D	21FLSARA13-4-09	1154	9/18/2002	CHLAC	14.79
1968D	21FLSARA13-3-09	1211	9/18/2002	CHLAC	20.16
1968D	21FLSARA13-2-09	1232	9/18/2002	CHLAC	13.39
1968D	21FLSARA13-1-09	1248	9/18/2002	CHLAC	13.46
1968D	21FLSARA13-5-10	1153	10/16/2002	CHLAC	13.99
1968D	21FLSARA13-4-10	1220	10/16/2002	CHLAC	10.88
1968D	21FLSARA13-3-10	1240	10/16/2002	CHLAC	12.44
1968D	21FLSARA13-2-10	1300	10/16/2002	CHLAC	16.06
1968D	21FLSARA13-1-10	1322	10/16/2002	CHLAC	13.67
1968D	21FLSARA13-5-11	1209	11/14/2002	CHLAC	3.62
1968D	21FLSARA13-4-11	1230	11/14/2002	CHLAC	3.5
1968D	21FLSARA13-3-11	1246	11/14/2002	CHLAC	4.35
1968D	21FLSARA13-2-11	1306	11/14/2002	CHLAC	6.68
1968D	21FLSARA13-1-11	1322	11/14/2002	CHLAC	6.36
1968D	21FLSARA13-5-12	1153	12/11/2002	CHLAC	2.3
1968D	21FLSARA13-4-12	1215	12/11/2002	CHLAC	2.29
1968D	21FLSARA13-3-12	1237	12/11/2002	CHLAC	4.86
1968D	21FLSARA13-2-12	1255	12/11/2002	CHLAC	3.8
1968D	21FLSARA13-1-12	1307	12/11/2002	CHLAC	2.64
1968D	21FLSARA13-5-01	1209	1/22/2003	CHLAC	2.3
1968D	21FLSARA13-4-01	1247	1/22/2003	CHLAC	2.42
1968D	21FLSARA13-3-01	1320	1/22/2003	CHLAC	7.31
1968D	21FLSARA13-2-01	1343	1/22/2003	CHLAC	1.13
1968D	21FLSARA13-1-01	1410	1/22/2003	CHLAC	1
1968D	21FLSARA13-5-02	1213	2/12/2003	CHLAC	1.68
1968D	21FLSARA13-4-02	1234	2/12/2003	CHLAC	2.51
1968D	21FLSARA13-3-02	1255	2/12/2003	CHLAC	1.41
1968D	21FLSARA13-2-02	1349	2/12/2003	CHLAC	1.68
1968D	21FLSARA13-1-02	1408	2/12/2003	CHLAC	1.61
1968D	21FLSARA13-5-03	1211	3/19/2003	CHLAC	3.57
1968D	21FLSARA13-4-03	1230	3/19/2003	CHLAC	2.22
1968D	21FLSARA13-3-03	1251	3/19/2003	CHLAC	2.77
1968D	21FLSARA13-2-03	1313	3/19/2003	CHLAC	3.37
1968D	21FLSARA13-1-03	1327	3/19/2003	CHLAC	2.67
1968D	21FLSARA13-5-04	1155	4/22/2003	CHLAC	4.05
1968D	21FLSARA13-4-04	1215	4/22/2003	CHLAC	2.61
1968D	21FLSARA13-3-04	1234	4/22/2003	CHLAC	2.66
1968D	21FLSARA13-2-04	1256	4/22/2003	CHLAC	2.59

WBID	Station	Time	Date	Parameter	Result
1968D	21FLSARA13-1-04	1315	4/22/2003	CHLAC	2.81
1968D	21FLSARA13-5-05	1210	5/20/2003	CHLAC	8.5
1968D	21FLSARA13-3-05	1249	5/20/2003	CHLAC	10.98
1968D	21FLSARA13-2-05	1311	5/20/2003	CHLAC	9.33
1968D	21FLSARA13-1-05	1324	5/20/2003	CHLAC	10.12
1968D	21FLSARA13-5-06	1226	6/10/2003	CHLAC	7.47
1968D	21FLSARA13-4-06	1300	6/10/2003	CHLAC	9.02
1968D	21FLSARA13-3-06	1314	6/10/2003	CHLAC	7.47
1968D	21FLSARA13-2-06	1334	6/10/2003	CHLAC	5.91
1968D	21FLSARA13-1-06	1354	6/10/2003	CHLAC	4.65
1968D	21FLSARA13-5-07	1140	7/22/2003	CHLAC	26.11
1968D	21FLSARA13-4-07	1204	7/22/2003	CHLAC	41.05
1968D	21FLSARA13-3-07	1221	7/22/2003	CHLAC	48.42
1968D	21FLSARA13-2-07	1235	7/22/2003	CHLAC	43.12
1968D	21FLSARA13-1-07	1250	7/22/2003	CHLAC	31.78
1968D	21FLSARA13-3-08	1214	8/12/2003	CHLAC	9.76
1968D	21FLSARA13-5-08	1215	8/12/2003	CHLAC	11.28
1968D	21FLSARA13-4-08	1231	8/12/2003	CHLAC	7.46
1968D	21FLSARA13-2-08	1328	8/12/2003	CHLAC	8.09
1968D	21FLSARA13-1-08	1343	8/12/2003	CHLAC	10.96
1968D	21FLSARA13-5-09	1244	9/16/2003	CHLAC	16.72
1968D	21FLSARA13-4-09	1308	9/16/2003	CHLAC	16.4
1968D	21FLSARA13-3-09	1338	9/16/2003	CHLAC	23.73
1968D	21FLSARA13-2-09	1401	9/16/2003	CHLAC	17.34
1968D	21FLSARA13-1-09	1416	9/16/2003	CHLAC	15.72
1968D	21FLSARA13-1-10	947	10/21/2003	CHLAC	3.58
1968D	21FLSARA13-2-10	1014	10/21/2003	CHLAC	1.71
1968D	21FLSARA13-3-10	1045	10/21/2003	CHLAC	3.2
1968D	21FLSARA13-4-10	1114	10/21/2003	CHLAC	3.48
1968D	21FLSARA13-5-10	1135	10/21/2003	CHLAC	2.32
1968D	21FLSARA13-5-11	1230	11/11/2003	CHLAC	7.64
1968D	21FLSARA13-4-11	1251	11/11/2003	CHLAC	5.57
1968D	21FLSARA13-3-11	1308	11/11/2003	CHLAC	9.02
1968D	21FLSARA13-2-11	1344	11/11/2003	CHLAC	7.12
1968D	21FLSARA13-1-11	1359	11/11/2003	CHLAC	7.97
1968D	21FLSARA13-5-12	1201	12/9/2003	CHLAC	1.15
1968D	21FLSARA13-4-12	1228	12/9/2003	CHLAC	1.18
1968D	21FLSARA13-3-12	1253	12/9/2003	CHLAC	2.23
1968D	21FLSARA13-2-12	1320	12/9/2003	CHLAC	1
1968D	21FLSARA13-1-12	1337	12/9/2003	CHLAC	1
1968D	21FLSARA13-5-01	1218	1/13/2004	CHLAC	1.51
1968D	21FLSARA13-4-01	1239	1/13/2004	CHLAC	1.71
1968D	21FLSARA13-3-01	1304	1/13/2004	CHLAC	1.81
1968D	21FLSARA13-2-01	1325	1/13/2004	CHLAC	1.09
1968D	21FLSARA13-1-01	1343	1/13/2004	CHLAC	1.32
1968D	21FLSARA13-5-02	1236	2/17/2004	CHLAC	8.05
1968D	21FLSARA13-4-02	1258	2/17/2004	CHLAC	7.69

WBID	Station	Time	Date	Parameter	Result
1968D	21FLSARA13-3-02	1331	2/17/2004	CHLAC	8.62
1968D	21FLSARA13-2-02	1409	2/17/2004	CHLAC	9.45
1968D	21FLSARA13-1-02	1428	2/17/2004	CHLAC	7.9
1968D	21FLSARA13-5-03	1219	3/23/2004	CHLAC	2.9
1968D	21FLSARA13-4-03	1256	3/23/2004	CHLAC	4.5
1968D	21FLSARA13-3-03	1313	3/23/2004	CHLAC	5.4
1968D	21FLSARA13-2-03	1346	3/23/2004	CHLAC	5.3
1968D	21FLSARA13-1-03	1404	3/23/2004	CHLAC	2.5
1968D	21FLSARA13-5-04	1131	4/13/2004	CHLAC	3.2
1968D	21FLSARA13-4-04	1152	4/13/2004	CHLAC	2.9
1968D	21FLSARA13-3-04	1208	4/13/2004	CHLAC	3.1
1968D	21FLSARA13-2-04	1229	4/13/2004	CHLAC	2.5
1968D	21FLSARA13-1-04	1243	4/13/2004	CHLAC	2.2
1968D	21FLSARA13-5-05	1217	5/11/2004	CHLAC	6.7
1968D	21FLSARA13-3-05	1256	5/11/2004	CHLAC	6.7
1968D	21FLSARA13-2-05	1318	5/11/2004	CHLAC	3.2
1968D	21FLSARA13-1-05	1334	5/11/2004	CHLAC	3.1
1968D	21FLSARA13-5-06	1238	6/22/2004	CHLAC	6.2
1968D	21FLSARA13-4-06	1259	6/22/2004	CHLAC	7.1
1968D	21FLSARA13-3-06	1316	6/22/2004	CHLAC	6.1
1968D	21FLSARA13-2-06	1339	6/22/2004	CHLAC	4.3
1968D	21FLSARA13-1-06	1357	6/22/2004	CHLAC	2.8
1968D	21FLSARA13-5-07	1153	7/13/2004	CHLAC	8.40
1968D	21FLSARA13-4-07	1206	7/13/2004	CHLAC	5.40
1968D	21FLSARA13-3-07	1225	7/13/2004	CHLAC	8.90
1968D	21FLSARA13-2-07	1251	7/13/2004	CHLAC	7.40
1968D	21FLSARA13-1-07	1305	7/13/2004	CHLAC	4.00
1968D	21FLSARA13-5-08	1202	8/17/2004	CHLAC	36.1
1968D	21FLSARA13-4-08	1220	8/17/2004	CHLAC	33.9
1968D	21FLSARA13-3-08	1255	8/17/2004	CHLAC	31.9
1968D	21FLSARA13-2-08	1314	8/17/2004	CHLAC	13.4
1968D	21FLSARA13-1-08	1331	8/17/2004	CHLAC	13.3
1968D	21FLSARA13-5-10	1157	10/28/2004	CHLAC	6.4
1968D	21FLSARA13-4-10	1221	10/28/2004	CHLAC	5.8
1968D	21FLSARA13-3-10	1243	10/28/2004	CHLAC	9.7
1968D	21FLSARA13-2-10	1305	10/28/2004	CHLAC	9.3
1968D	21FLSARA13-1-10	1324	10/28/2004	CHLAC	7.7
1968D	21FLSARA13-1-11	1023	11/10/2004	CHLAC	3.1
1968D	21FLSARA13-2-11	1059	11/10/2004	CHLAC	2.7
1968D	21FLSARA13-3-11	1123	11/10/2004	CHLAC	2
1968D	21FLSARA13-4-11	1142	11/10/2004	CHLAC	1.4
1968D	21FLSARA13-5-11	1204	11/10/2004	CHLAC	1
1968D	21FLSARA13-5-12	1439	12/7/2004	CHLAC	1.9
1968D	21FLSARA13-4-12	1455	12/7/2004	CHLAC	3.8
1968D	21FLSARA13-3-12	1515	12/7/2004	CHLAC	2.1
1968D	21FLSARA13-2-12	1530	12/7/2004	CHLAC	2
1968D	21FLSARA13-1-12	1539	12/7/2004	CHLAC	2.8

Appendix C: Chlorophyll a and Total Nitrogen Graphs of Sample Results





Appendix D: Total Nitrogen Loading Estimates by Source (pounds/year)

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Point Sources													
FL0025755 Siesta Key Util-Island Circle	9.83E+03	1.07E+04	9.77E+03	9.64E+03	9.06E+03	7.97E+03	9.33E+03	7.81E+03	8.35E+03	7.74E+03	7.56E+03	7.60E+03	6.84E+03
FL1132816 FL Cities Water Co-Gulf Gate	8.64E+03	1.04E+04	9.83E+03	1.27E+04	8.96E+03	8.70E+03	1.13E+04	1.27E+04	1.51E+04	2.06E+04	1.17E+04	8.17E+03	1.05E+04
FL0032808 FL Cities Water-South Gate	6.89E+03	7.18E+03	7.01E+03	6.08E+03	5.97E+03	6.05E+03	5.99E+03	5.43E+03	9.30E+03	1.31E+04	8.77E+03	7.55E+03	3.94E+03
FL0042811 American Commonwealth	0.00E+00	2.83E+04	4.61E+02	6.54E+02	2.83E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total Point Source Load	2.54E+04	5.66E+04	2.71E+04	2.90E+04	2.68E+04	2.27E+04	2.66E+04	2.59E+04	3.28E+04	4.15E+04	2.80E+04	2.33E+04	2.13E+04
Nonpoint Sources													
Atmospheric Deposition	1.28E+04	1.54E+04	1.25E+04	1.30E+04	1.11E+04	1.15E+04	1.37E+04	1.03E+04	1.04E+04	1.24E+04	1.25E+04	1.34E+04	1.07E+04
Baseflow													
Runoff to Roberts Bay N	1.61E+03	1.61E+03	1.61E+03	1.61E+03	1.61E+03	1.61E+03	1.61E+03	1.61E+03	1.61E+03	1.61E+03	1.61E+03	1.61E+03	1.61E+03
Runoff to Roberts Bay S	6.89E+02	6.89E+02	6.89E+02	6.89E+02	6.89E+02	6.89E+02	6.89E+02	6.89E+02	6.89E+02	6.89E+02	6.89E+02	6.89E+02	6.89E+02
Matheny Creek	9.88E+02	9.88E+02	9.88E+02	9.88E+02	9.88E+02	9.88E+02	9.88E+02	9.88E+02	9.88E+02	9.88E+02	9.88E+02	9.88E+02	9.88E+02
Phillippi Creek (gaged)	1.16E+04	1.16E+04	1.16E+04	1.16E+04	1.16E+04	1.16E+04	1.16E+04	1.16E+04	1.16E+04	1.16E+04	1.16E+04	1.16E+04	1.16E+04
Phillippi Creek (ungaged)	8.96E+03	8.96E+03	8.96E+03	8.96E+03	8.96E+03	8.96E+03	8.96E+03	8.96E+03	8.96E+03	8.96E+03	8.96E+03	8.96E+03	8.96E+03
Total Baseflow	2.38E+04	2.38E+04	2.38E+04	2.38E+04	2.38E+04	2.38E+04	2.38E+04	2.38E+04	2.38E+04	2.38E+04	2.38E+04	2.38E+04	2.38E+04
Groundwater Seepage to Bay	2.13E+05	2.13E+05	2.13E+05	2.13E+05	2.13E+05	2.13E+05	2.13E+05	2.13E+05	2.13E+05	2.13E+05	2.13E+05	2.13E+05	2.13E+05
Surface Water Runoff													
Runoff to Roberts Bay N	3.88E+04	3.64E+04	3.33E+04	3.96E+04	3.06E+04	4.72E+04	3.86E+04	3.10E+04	2.43E+04	3.32E+04	4.00E+04	4.15E+04	3.78E+04
Runoff to Roberts Bay S	1.89E+04	1.77E+04	1.63E+04	1.93E+04	1.49E+04	2.30E+04	1.88E+04	1.51E+04	1.19E+04	1.62E+04	1.95E+04	2.02E+04	1.84E+04
Matheny Creek	1.88E+04	1.76E+04	1.61E+04	1.91E+04	1.48E+04	2.28E+04	1.86E+04	1.50E+04	1.18E+04	1.60E+04	1.94E+04	2.00E+04	1.83E+04
Phillippi Creek (gaged)	1.87E+05	1.75E+05	1.60E+05	1.91E+05	1.47E+05	2.27E+05	1.86E+05	1.49E+05	1.17E+05	1.60E+05	1.93E+05	2.00E+05	1.82E+05
Phillippi Creek (ungaged)	1.67E+05	1.57E+05	1.44E+05	1.71E+05	1.32E+05	2.04E+05	1.66E+05	1.34E+05	1.05E+05	1.43E+05	1.73E+05	1.79E+05	1.63E+05
Total Surface Water Runoff	4.31E+05	4.04E+05	3.70E+05	4.39E+05	3.40E+05	5.24E+05	4.28E+05	3.44E+05	2.70E+05	3.68E+05	4.44E+05	4.60E+05	4.20E+05
Total Nonpoint Source Load	6.80E+05	6.56E+05	6.19E+05	6.89E+05	5.87E+05	7.72E+05	6.78E+05	5.90E+05	5.17E+05	6.17E+05	6.93E+05	7.10E+05	6.67E+05
Total Point and Nonpoint Source Load	7.05E+05	7.12E+05	6.46E+05	7.18E+05	6.14E+05	7.94E+05	7.05E+05	6.16E+05	5.50E+05	6.58E+05	7.21E+05	7.33E+05	6.88E+05