

NAPLES BAY

Surface Water Improvement  
& Management Plan



JANUARY 2007

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## **EXECUTIVE SUMMARY**

### **Overview**

In recognition of the need to place additional emphasis on the restoration, protection and management of the surface water resources of the State, the Florida Legislature, through the Surface Water Improvement and Management (SWIM) Act of 1987, directed the State's water management districts to "design and implement plans and programs for the improvement and management of surface water" (Section 373.451, Florida Statutes). The SWIM legislation requires the water management districts to protect the ecological, aesthetic, recreational, and economic value of the State's surface water bodies, keeping in mind that water quality degradation is frequently caused by point and non-point source pollution, and that degraded water quality can cause both direct and indirect losses of aquatic habitats.

The South Florida Water Management District (SFWMD) ranked Naples Bay as a Tier 2 waterbody on the SFWMD priority list approved in 2001. In 2003, the development of a SWIM plan for Naples Bay was authorized by the SFWMD Governing Board.

In preparation for development of the Naples Bay SWIM Plan, a Naples Bay SWIM Reconnaissance Report was authorized in 2005. The objective of the Reconnaissance Report was to identify sources of existing data, identify gaps in existing data, and identify related programs within the Study Area. The intent of the report was to provide a meaningful resource for the development of the Naples Bay SWIM Plan.

To develop this Naples Bay SWIM Plan, the Reconnaissance Report was used as the primary resource by a team of SFWMD staff members and an outside consultant to develop a draft Plan. Input on the draft Plan was solicited for, and provided by government and agency stakeholders and other interested parties, through a workshop held in the vicinity of Naples Bay. This document represents the culmination of that effort.

### **Naples Bay Watershed Summary**

The Naples Bay Watershed (NBW) encompasses 120 square miles of drainage area within the Big Cypress Basin. The NBW, as defined here by the SFWMD, comprises 32 sub-basins. The NBW is wholly contained within Collier County and is also wholly encompassed by the western Big Cypress Basin (BCB) watershed. The western BCB watershed itself encompasses all of western Collier County in Southwest Florida, and small sections of Southern Lee, and Hendry Counties. It drains an approximately 1,200 square-mile area through a large network of man-made canals and natural sloughs.

The Naples Bay Watershed is bounded by the Gulf of Mexico to the west and partially by Immokalee Road to the north. Its easternmost extent is along Everglades Boulevard, with a southeastern boundary crossing near the I-75-CR 951 junction, and terminating at the Gulf of Mexico within the northwest periphery of the Rookery Bay Reserve.

The major hydrologic feature in the NBW is Naples Bay, a relatively narrow and shallow estuary ranging in width from 100 to 1500 feet, and in depth from 1 to 23 feet. It is formed

by the confluence of the Gordon River and other small tributaries that empty into the Gulf of Mexico through Gordon Pass. Dollar Bay, the southern lobe of the Naples Bay system south of Gordon Pass is connected to Rookery Bay and the Marco River further south by a shallow waterway with a dredged channel. Though Naples Bay is the single largest feature in the NBW, canals and other drainage barriers and conveyances have altered the historic patterns in the Naples Bay Watershed such that the Watershed is now best described in terms of these features.

## **Conditions Leading to the Need for Restoration and Protection**

The results of 60 years of canal drainage and urban development activities have reduced water clarity, increased concentrations of contaminants and nutrients, increases in freshwater and reduced dissolved oxygen levels in the NBW. The Watershed now collects surface water input from approximately 120 square miles, over a ten-fold increase from the historic drainage condition. Extensive areas of mangroves and salt marsh have been replaced by canals, seawalls and bulkheads. Development activities in the watershed have altered the volume, quality, timing and mixing characteristics of freshwater flows reaching Naples Bay.

Natural tributaries, Gordon River, Rock Creek, and Haldeman Creek, have been altered by urban infrastructure which has significantly changed the historic flowways to Naples Bay and impacted its biology. Seasonal influxes of freshwater from the Golden Gate Canal system have altered the natural salinity regime of the Bay, resulting in declines in seagrass beds, and harmful impacts to all levels of flora and fauna in the aquatic ecosystem.

In October 2002, FDEP published an updated impaired waters master list showing seven waterbody identifications (WBIDs) or waterbody segments occurring on either the Planning or Verified List in the NBW. WBIDs on the planning list will undergo Impaired Water Rule assessments to ascertain if Total Maximum Daily Loads (TMDLs) are needed and receive a new listing in the fall of 2007 after further monitoring is conducted. The projected year for TMDL development of all necessary WBIDs in the Naples Bay Basin is 2008.

## **Overall Management Strategy**

The basic strategy of restoring, protecting and managing the surface water resources of the Naples Bay Watershed is through the use of a prioritized, objective, applied, sustainable, ecosystem or watershed approach with periodic public review and input.

The Naples Bay SWIM plan is organized around a system of goals, initiatives, strategies and action steps. In this system, the *Goals* are broad-based and identify objectives of SFWMD, stated above. *Initiatives* are general categories that have been used to divide the plan into distinct subject areas developed by SFWMD staff. *Strategies* are more detailed descriptions of the underlying work proposed to achieve results. They identify the approaches and methods that will be used to implement the initiatives. *Action Steps* represent specific activities under each strategy suggested to reach project delivery. Each *Action Step* includes a schedule for completion and an estimate of the funding requirements needed to accomplish the *Action Step*. These *Action Steps*, as well as the *Strategies* and *Initiatives* referenced above, are not mutually exclusive, and may be undertaken concurrently or sequentially.

The Naples Bay SWIM Plan focuses on the following four primary initiatives:

**Initiative 1 – Water Quality**

This initiative consists of two distinct but interrelated strategies: Water quality and flow monitoring; and water quality modeling.

**Initiative 2 – Stormwater Quantity**

The vastly expanded drainage area in the NBW has resulted in the discharge of large quantities of fresh stormwater runoff into Naples Bay. This initiative focuses on identifying inflows from canals and stormwater conduits, including non-point discharges, and on mechanisms to reduce these excess flows and restore more natural timing and quantity of freshwater inflows to the Bay.

**Initiative 3 – Watershed Master Planning and Implementation**

Watershed master planning is an evaluation of the existing stormwater management infrastructure and practices in the geographic area and identification of problem areas, with detailed remedial actions derived using hydrologic models simulating responses on volumes and timing of flow rates under a range of climatic conditions.

Implementation is the practical application of the information gained from master planning. For SFWMD, implementation includes assisting local governments in coordinating their plan implementation and construction of those projects through a prioritized stormwater retrofit program. The dual focus is on areas built prior to adoption of stormwater management regulations (1984), and areas with identified impaired waters. A key tool for implementation is solicitation of available federal and state funding and identification of other partnering opportunities.

**Initiative 4 – Habitat Assessment, Protection and Restoration**

This initiative consists of strategies to develop maps to identify areas for habitat protection and restoration in the NBW. Additional data collection efforts for parameters such as benthic organism diversity, submerged aquatic vegetation distribution, and shellfish areas will be evaluated and implemented as necessary.

Through the results of continuing data collection and analysis, opportunities for habitat restoration will be evaluated, mapped and planned for implementation in the NBW.

In its mandate to address broad ecosystem needs, the Naples Bay SWIM Plan attempts to accomplish comprehensive protection strategies within the NBW and introduce sustainable restoration strategies for resources or resource areas that are proven to be degraded. The intent is to also provide cooperative funding for projects addressing long-term waterbody protection and restoration.

A number of strategies and associated action steps were developed to fulfill these initiatives. The strategies for each initiative are listed as follows:

**Water Quality Initiative**

- Strategy: Evaluate the Existing Water Quality Monitoring Network to Determine Its Ability to Detect Change
- Strategy: Hydrologic and Hydrodynamic Water Quality Modeling

**Water Quantity Initiative**

- Strategy: Improve the Timing of Freshwater Flows into Naples Bay

**Watershed Master Planning and Implementation**

- Strategy: Evaluate Existing Stormwater Master Plans
- Strategy: Assist in the Development of Local Stormwater Master Plans and Implementation Schedules
- Strategy: Partner with Local Governments to Implement Stormwater Master Plans

**Habitat Assessment, Protection and Restoration Initiative**

- Strategy: Implement Habitat Assessment, Protection and Restoration

The successful implementation of this plan is going to require staff resources and dedicated funding along with financial commitment by local governments in the watershed. To accomplish all of the action steps in this ambitious endeavor, it is estimated that full implementation of the NBW SWIM Plan will cost \$126.3 million over the next five years with \$6.31M of dedicated funding. The following table shows the dedicated funding estimates by initiative.

Dedicated Funding Estimates

Initiative	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
Water Quality	\$75K	\$90K	\$75K	\$75K	\$75K
Water Quantity	\$25K	\$60K	\$30K	\$25K	\$25K
Watershed Master Planning and Implementation	\$1,050K	\$1,150K	\$1,120K	\$1,120K	\$1,120K
Habitat Assessment, Protection, and Restoration	\$50K	\$50K	\$30K	\$30K	\$30K
<b>Totals</b>	<b>\$1,200K</b>	<b>\$1,350K</b>	<b>\$1,255K</b>	<b>\$1,250K</b>	<b>\$1,250K</b>

The estimated funding for the NBW SWIM Plan implementation from the local governments is identified in the tables below based on the local governments' five year capital improvement plans.

Funding Estimates for “Scheduled” Projects

Initiative	BCB	Collier County	Naples
Water Quality		\$5.5M	
Water Quantity	\$6.7M	\$1M	
Watershed Master Planning and Implementation		\$81.1M	\$0.1M
Habitat Assessment, Protection, and Restoration		\$2M	\$0.1M
<b>Totals</b>	<b><u>\$6.7M</u></b>	<b><u>\$89.6M</u></b>	<b><u>\$0.2M</u></b>

Funding Estimates for “Planned” Projects

Initiative	BCB	Collier County	Naples	CS & WCD
Water Quality	\$0.1M		\$0.45M	
Water Quantity	\$8.2M			
Watershed Master Planning and Implementation		\$1.5M	\$12.69M	\$0.32M
Habitat Assessment, Protection, and Restoration		\$0.25M		
<b>Totals</b>	<b><u>\$8.3M</u></b>	<b><u>\$1.8M</u></b>	<b><u>\$13.1M</u></b>	<b><u>\$0.3M</u></b>

This plan is a living document that will be updated periodically, especially to reflect findings and recommendations of the Southwest Florida Feasibility Study as it appropriately relates to the Naples Bay watershed and its water quality improvements. Further updates are also anticipated as TMDLs are developed by FDEP.

## **INTRODUCTION**

### **The SWIM Act**

In recognition of the need to place additional emphasis on the restoration, protection and management of the surface water resources of the State, the Florida Legislature, through the Surface Water Improvement and Management (SWIM) Act of 1987, directed the State's water management districts to "design and implement plans and programs for the improvement and management of surface water" (Section 373.451, Florida Statutes). The SWIM legislation requires the water management districts to protect the ecological, aesthetic, recreational, and economic value of the State's surface water bodies, keeping in mind that water quality degradation is frequently caused by point and non-point source pollution, and that degraded water quality can cause both direct and indirect losses of aquatic habitats.

Under the SWIM Act, water management districts prioritize water bodies based on their need for protection and/or restoration. This prioritization process is carried out in cooperation with the Florida Department of Environmental Protection (FDEP), the Department of Agriculture and Consumer Services (DACCS), the Department of Community Affairs (DCA), and local governments.

Following the selection of the priority water bodies, and in accordance with the SWIM Act, a SWIM Plan may be drafted, reviewed and approved before State SWIM funds can be spent on restoration, protection or management activities. Legislative appropriations provided to the Water Management Districts (WMDs) for surface water improvements and management activities are available for detailed planning, and plan and program implementation.

The South Florida Water Management District (SFWMD) ranked Naples Bay as a Tier 2 waterbody on the SFWMD priority list approved in 2001. In 2003, the development of a SWIM plan for Naples Bay was authorized by the SFWMD Governing Board.

### **Naples Bay Plan Evolution**

Naples Bay and its watershed have been heavily altered by drainage, agriculture and urban development. As a result, Bay water clarity and other water quality, freshwater inflows, surface water levels, and natural habitats in the watershed are much different from their historic conditions. The Bay historically received drainage from a 10 square mile area. With the construction of the Golden Gate Canal system in the 1960's, it now receives surface water input from approximately 120 square miles. Extensive areas of mangroves and salt marsh have been replaced by dredged canals, seawalls and bulkheads. Development activities in the watershed have altered the volume, quality, timing and mixing characteristics of freshwater flows reaching Naples Bay.

Both the excessive drainage and potential negative impacts from current and anticipated growth in the watershed have highlighted the need for a dedicated program to address surface water quality and estuary habitat degradation issues in the Bay. In addition, two water bodies that drain to the Bay, the Gordon River Canal (WBID 3258D) and Henderson Creek Canal (WBID 3259E), are listed on the FDEP 303(d) Updated Master List (October 2002) and

March 2003 amended verified list as not having sufficient water quality to meet their designated uses. For verified water bodies, FDEP will develop and adopt TMDLs and “reasonable and equitable load allocations” among point and nonpoint sources, with input from stakeholders. FDEP establishes TMDLs for water bodies or water segments verified as impaired, using computer modeling to estimate nonpoint source loadings and establish the water body’s assimilative capacity.

In preparation for development of the Naples Bay SWIM Plan, a Naples Bay SWIM Reconnaissance Report was authorized in 2005. The objective of the Reconnaissance Report was to identify sources of existing data, identify gaps in existing data, and identify related programs within the Study Area. The intent of the Reconnaissance Report was to provide a meaningful resource for the development of the Naples Bay SWIM Plan. SFWMD solicited participation in the project from government agency representatives and conducted a half-day working group meeting in March 2005. The purpose of the workshop was to identify available information, data, and their sources, that should be included in the Reconnaissance Report. A second half-day working group meeting was held June 1, 2005 to review and receive comments on a draft of the Reconnaissance Report.

The Reconnaissance Report, completed in February 2006 by Debra Childs Woithe, Inc., and Sherry Brandt-Williams, Ph.D., is a compilation and summary of information provided by both the workshop participants and the authors. Data, reports, documents and information about ongoing programs in the Naples Bay Watershed were identified and included in the Reconnaissance Report.

To develop this Naples Bay SWIM Plan, the Reconnaissance Report was used as the primary resource by a team of SFWMD staff members and an outside consultant to develop a draft Plan. Input on the draft Plan was solicited for, and provided by, government and agency stakeholders (Appendix I) and other interested parties through a workshop held in the vicinity of Naples Bay. This document represents the culmination of that effort.

## **Acknowledgements**

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Tim Liebermann, Senior GIS Analyst  
Ananta Nath, P.E., D. WRE, Chief Consulting Engineer  
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## **SECTION A. DESCRIPTION OF THE WATER BODY SYSTEM**

### **A.1. Big Cypress Basin**

The Florida State Legislature, upon enacting the Water Resources Act in 1972, divided the state into five regional districts defined along natural river basin boundaries. Further definition of water management roles resulted in the establishment of two basin boards within the South Florida Water Management District (SFWMD). The basins were named the Okeechobee Basin and the Big Cypress Basin.

The western Big Cypress Basin (BCB) watershed (Figure 1) drains an approximately 1,200 square-mile area through a large network of man-made canals and natural sloughs. The Naples Bay Watershed is wholly encompassed by the western BCB; necessitating a description and historical understanding of the BCB within the Naples Bay Watershed Plan.

The western BCB watershed encompasses all of western Collier County in Southwest Florida, and small sections of Southern Lee and Hendry Counties. It is a vast assemblage of ecosystems including wet prairies, pine and cabbage palm flatwoods, hardwood hammocks and tidal marshes. Historic flowways in the region followed the natural drainage emanating from the Immokalee highlands through a series of strands, sloughs and more broadly as surfacewater sheetflow to the tidal passes of the Gulf of Mexico. The sloughs, strands and wet prairies also carry freshwater surface flow to the Ten Thousand Island Estuaries, south of the Naples Bay Watershed. The expansion of urban development and agriculture over the last 50 years has resulted in drastic changes to the historic water flow patterns.

In 1977, the Big Cypress Basin Board was created to evaluate the water resources of the Basin, develop water management plans, and address the broad objectives of conservation, preservation and enhancement of the water resources of the region. In 1979, an agreement was entered into between Collier County, SFWMD and the BCB Board which transferred operation and maintenance responsibilities of 20 water control structures to the Basin. An agreement in 1986 extended the Basin's role to cover the entire primary drainage system in Collier County. In accordance with this agreement, 106 miles of primary canal segments were adopted in phases as "works of the Basin." The Basin Board presently has responsibility for operation, maintenance, and providing planning and capital improvements for 169 miles of primary canals and 46 water control structures. Further details on the activities of the BCB can be found on the SFWMD website at <http://www.sfwmd.gov>.

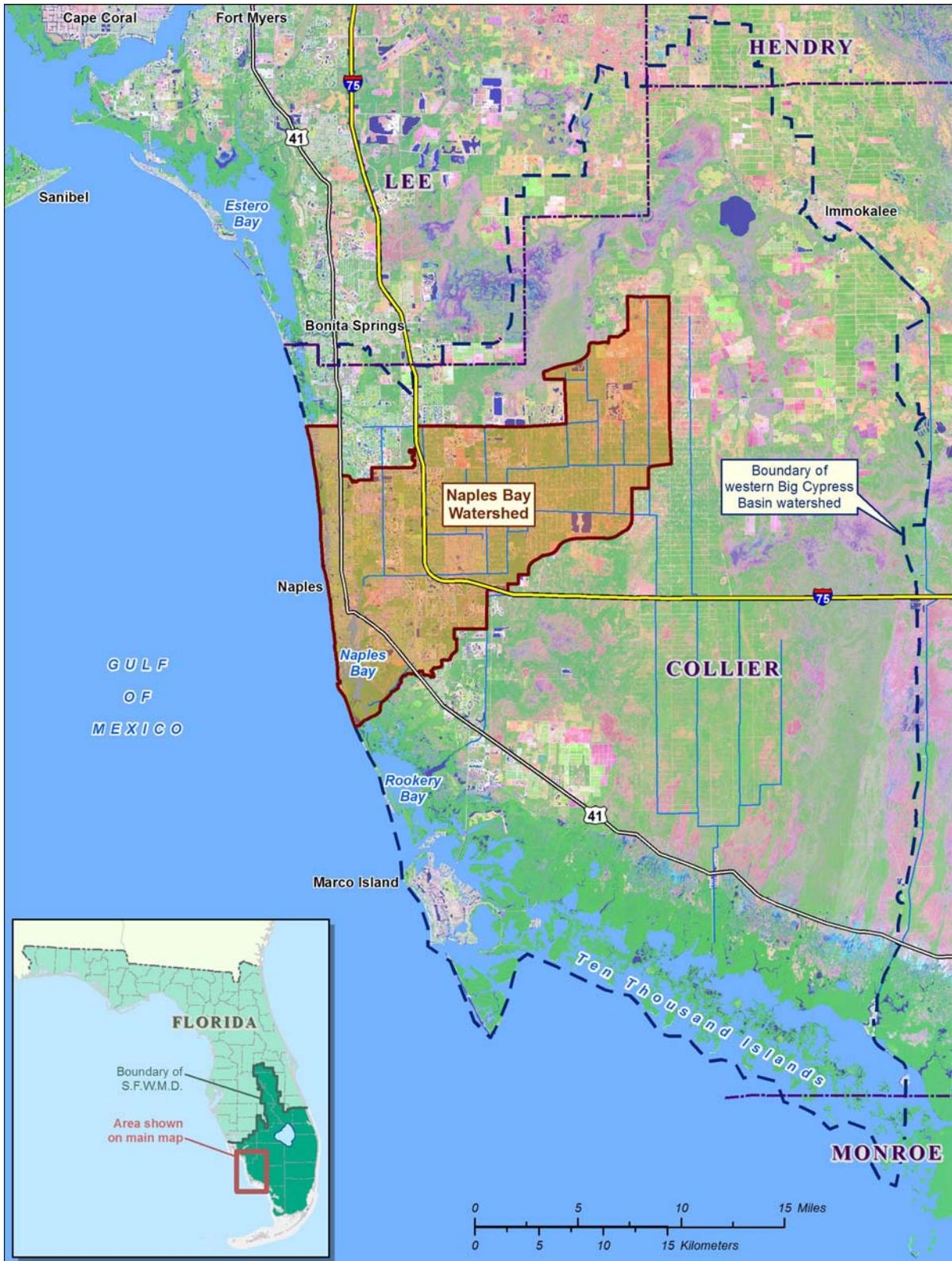


Figure 1. The western Big Cypress Basin (BCB) and Naples Bay Watershed (NBW)

## **A.2. Naples Bay Watershed**

### **A.2.1. Introduction**

The Naples Bay Watershed (NBW) encompasses 120 square miles of drainage area within the Big Cypress Basin. The NBW, as defined here by the SFWMD, comprises 32 sub-basins (Figure 2). The NBW is wholly contained within Collier County.

The NBW is bounded by the Gulf of Mexico to the west and partially by Immokalee Road to the north. Its easternmost extent is along Everglades Boulevard, with a southeastern boundary crossing near the I-75-CR 951 junction, and terminating at the Gulf of Mexico within the northwest periphery of the Rookery Bay Reserve.

The major hydrologic feature in the NBW is Naples Bay, a relatively narrow and shallow estuary ranging in width from 100 to 1,500 feet, and in depth from 1 to 23 feet. It is formed by the confluence of the Gordon River and other small tributaries that empty into the Gulf of Mexico through Gordon Pass. Dollar Bay, the southern lobe of the Naples Bay system south of Gordon Pass, is connected to Rookery Bay and the Marco River further south by a shallow waterway with a dredged channel. Though Naples Bay is the single largest feature in the NBW, canals and other drainage barriers and conveyances have altered the historic patterns in the Naples Bay Watershed such that the Watershed is now best described in terms of these features.

The Golden Gate system of canals tends to be aligned along section and half section boundaries in north-south or east-west patterns (Figure 3). There are eleven major canals within the Naples Bay Watershed including: Golden Gate Main Canal; Orange Tree Canal; Corkscrew Canal; Curry Canal; Cypress Canal; CR 951 Canal; Green Canal; Harvey Canal; I-75 Canal; and Airport Road Canal. Other dredged canals within the City of Naples and unincorporated urban sections of Collier County, such as the Lely Canal and Haldeman Creek Canal, provide significant stormwater input to Naples Bay. Detailed descriptions of the canals can be found in the Reconnaissance Report.

In general, ground elevation increases gradually from Naples Bay and the coast toward the northeast portion of the Watershed. The lowest areas of the Naples Bay Watershed are the mangrove forests and the Bay at sea-level in the Watershed's southwest corner. The highest elevations in the Watershed are approximately 20 ft NGVD (National Geodetic Vertical Datum) in the far northeastern corner near Immokalee Road. The majority of the Watershed has elevations of 10 ft or less with a slow rise to the northeast.

The early Naples Bay Watershed was characterized by surfacewater sheetflow, with historic vegetation communities corresponding with the Watershed's flat topography. The vast majority of the Watershed (75%) was covered with mesic or hydric flatwoods. Cypress and other swamp forests were primarily in the eastern portion of the Watershed and covered less than 10% each. Xeric hammock communities were near the coast along the coastal ridge now occupied by US 41. Mangrove swamps fringed the coast and much of Naples Bay. Freshwater lakes were largely absent from the landscape.



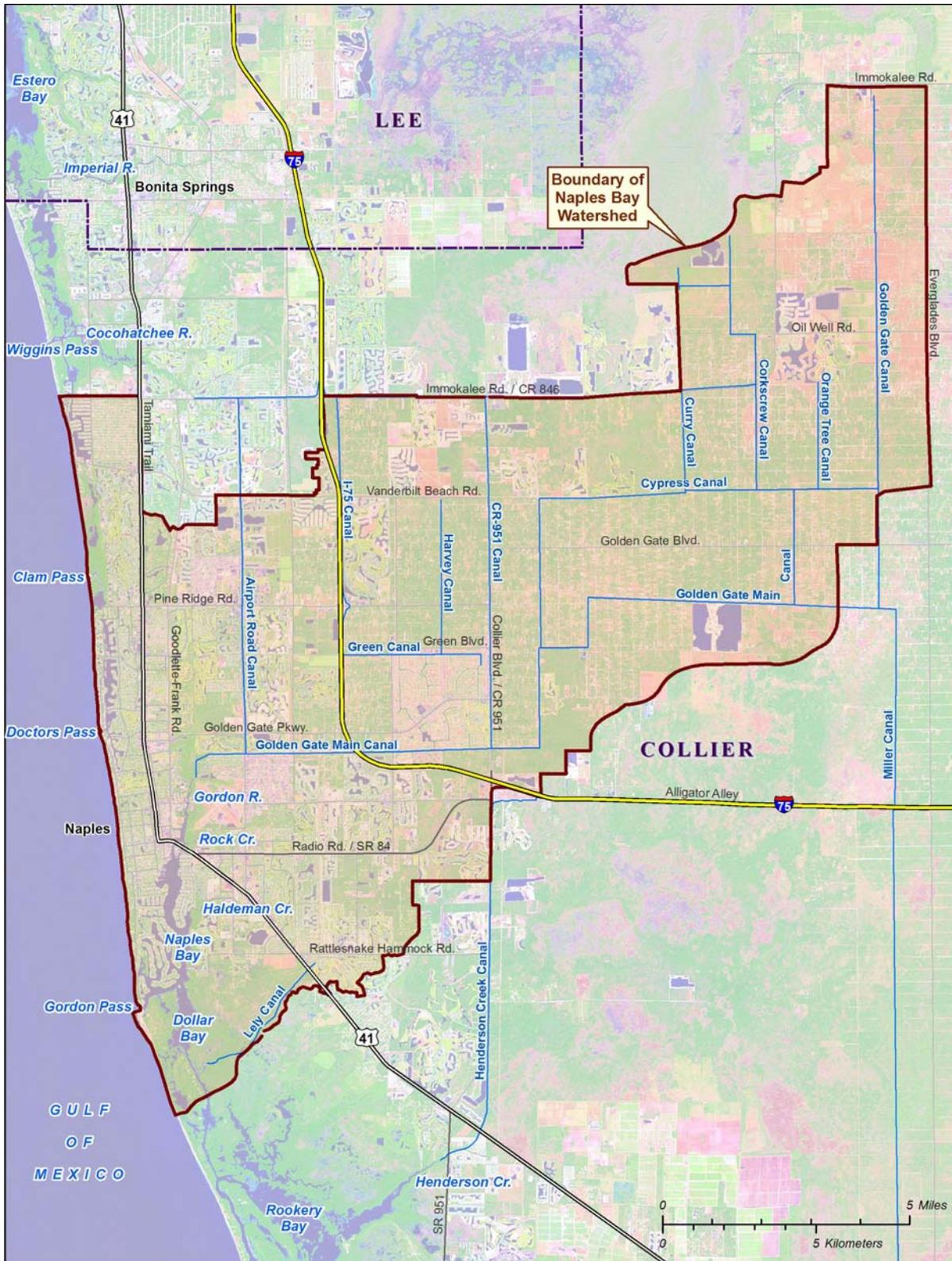


Figure 3. The Naples Bay Watershed Canal System

### **A.2.2. Historical Uses**

The first permanent settlers were John and Madison Weeks, taking residence along the Gordon River in 1876. In 1886, over 3,000 acres between the Gulf of Mexico and what came to be known as Naples Bay were purchased by a group of Tallahassee businessmen calling themselves the Naples Town Improvement Company. They built a T-shaped pier 600 ft into the Gulf of Mexico that allowed large ships to dock easily. Naples became known as a winter resort, with social life revolving around the Naples Hotel. Despite the “resort” moniker, the area remained isolated, sparsely settled and in a relatively natural state.

In 1927, the Tamiami Trail, built to connect Miami with Tampa, was completed into Naples and the first tourists began to arrive. The Collier County population was about 1,200 and Naples had less than 400 residents.

The building of Tamiami Trail was the first major impediment to surfacewater sheetflow in this area (Baum 1973, Tebeau 1957). Major alteration of Naples Bay itself began in 1930, when a protected channel, 3 ft deep and 40 ft wide, was dredged from Naples Bay to Marco Island. In 1940, the federal government completed the channel, 6 ft deep and 70 ft wide, from the southern boundary of Naples to the Big Marco Pass, a total of 10 miles. In 1945, the channel was relocated east of Hurricane Pass due to storm damage.

In the 1950s, Port Royal and Aqualine Shores were the first developments to dredge canals and create waterfront property, and by 1960 the City of Naples population count was almost 5,000. Construction of the City of Naples drainage system began in the 1940s in “Old Naples”, with additional construction in the 1950s and 1960s as Ridge Lakes and Coquina Sands subdivisions were built. Drainage systems were added for the Moorings, Port Royal and Royal Harbor in the late 1960s and early 1970s. During the same time period, many small lakes were constructed to deal with drainage issues, further altering the natural system in an area where lakes were notably absent.

Also in the 1960s, the Gulf American Corporation (GAC) began development of 113,000 acres of pine and cypress forests in the county's interior – Golden Gate Estates. GAC dug 180 miles of canals, some of them 19 ft deep, and built 800 miles of roads. Historic drainage of this mostly undeveloped area was south through the Faka Union Canal. The northern section of Golden Gates Estates was developed, with drainage entering the Gordon River through the Golden Gate Main Canal. This effectively increased the original Naples Bay watershed from about 10 to over 100 square miles. Subsistence farming, vegetable row cropping and beef cattle ranching historically existed within the Naples Bay Watershed, but have been largely supplanted by residential development. In 2004, only 9% of the land area consisted of agriculture and rangeland.

### **A.2.3. Current Uses**

Through the 1980s and 1990s, Collier County’s population continued to rise at a near exponential rate, passing the quarter million mark in 2000. Collier County planning staff estimated the peak season population of Collier County at 441,915 in 2005. The Naples Bay

Watershed itself is essentially fully developed, predominantly consisting of residential and commercial uses.

Tourism and real estate are among the major industries in the Watershed. As of 2000, there were approximately 50 commercial farms in Collier County with a total of approximately 25,000 head of cattle. There was an additional 30,000 acres of citrus. Thus, citrus, beef cattle and vegetable crops are still viable industries in greater Collier County though not in the NBW itself.

The NBW is surrounded by or partially contains several major conservation areas, and additional acquisitions are proposed. As of 2004, the existing and proposed conservation lands and easements within the Watershed total 3,440 acres, approximately 3% of the Watershed. There are 45 SFWMD Conservation Easements acquired through the regulatory permitting process, totaling 950 acres and less than 1% of NBW. Other than for Naples Municipal Airport, the SFWMD Conservation Easements are primarily associated with residential developments and golf courses.

#### **A.2.4. Conditions leading to the need for restoration and protection**

The results of 60 years of canal drainage and urban development activities have reduced water clarity, increased concentrations of contaminants and nutrients, increased fresh water discharge and reduced dissolved oxygen levels in the NBW. The Watershed now collects surfacewater input from approximately 120 square miles, a more than ten-fold increase over the historic drainage area. Extensive areas of mangroves and salt marsh have been replaced by canals, seawalls and bulkheads. Development activities in the watershed have altered the volume, quality, timing and mixing characteristics of freshwater flows reaching Naples Bay.

Natural tributaries: Gordon River, Rock Creek, and Haldeman Creek, have been altered by urban infrastructure which has significantly changed the historic flowways to Naples Bay and impacted its biology. Seasonal influxes of freshwater from the Golden Gate Canal system have altered the natural salinity regime of the Bay, resulting in declines in seagrass beds, and harmful impacts to all levels of flora and fauna in the aquatic ecosystem (Tebeau 1957, Baum 1973, Naples Bay Study 1979, City of Naples Engineering Division 1996, Collier County Comprehensive Planning Section 2000).

### **A.3. Hydrology**

The majority of Naples Bay is less than 5 ft deep with a navigational channel between 7 and 14 ft deep. The finger canals on the western side of the Bay are the system's deepest components.

Substrates in the Bay and its canals are muddy, permeable sediments. Certain areas also have high organic content. Several dredged channels are maintained and marked for navigation throughout the Plan Area. A dredged channel through Gordon Pass extends to the north end of Naples Bay, and south through Dollar Bay to Marco Island. Doctor's Pass allows access to Venetian Bay from the Gulf of Mexico. There are several marine facilities, including marinas, boat ramps, hotels, resorts, and other establishments within the Plan Area.

Tidal exchange occurs through Gordon Pass near the southern end of the Bay. Average daily tide range at Gordon Pass is 2.1 ft. Salinities in Naples Bay vary both seasonally (wet/dry season) and daily (incoming/outgoing tides).

Average salinities at the US 41 Bridge range from 0 to 10 practical salinity units (PSU) in the wet season and occasionally approach 35 PSU (the salinity of the open Gulf) in the dry season. Salinity at the Gulf of Mexico near Gordon Pass is typically 35 PSU. The largest range in daily salinity is most often seen in the area of Naples Bay off Bayview Park. Low salinity surface layers move into this area during outgoing tides. Incoming tides force the low salinity waters north and inhibit the discharge of tributaries like Haldeman Creek.

Stratification problems appear to have increased with both the increased freshwater flow and with the construction of deep, dead end canals. Stratification is less of a problem in the lower Bay where horizontal mixing from tidal currents is greater (Simpson et al. 1979).

### **A.3.1. Water Quality**

Under Section 303(d) of the Clean Water Act, each state must prepare a list of waters that are not of sufficient quality to meet their designated uses and to establish Total Maximum Daily Loads (TMDLs) for those waters on a prioritized schedule. These lists are required to be submitted to EPA for review and approval every April of even-numbered years, that is, every 2 years. It is those water bodies in the NBW that appear on the 303(d) List that will automatically receive the highest priority for establishment of TMDLs (total maximum daily loads) for restoration and protection (Table 1). Details on the TMDL process are provided in Section D.

The 303(d) List is based primarily on the state's 1996 305(b) Water Quality Assessment Report, which uses a watershed approach to evaluate surfacewater, groundwater, and wetlands. In 1998, EPA approved Florida's 1998 303(d) Impaired Waters List, which was based on existing, readily available data or best professional judgment. In 1999, the Florida Watershed Restoration Act, Section 403.067, F.S. was enacted by the Florida Legislature. This law requires FDEP to adopt by rule, a scientific methodology for analyzing environmental data and determining whether a water body is impaired or healthy. All water bodies on the 1998 303(d) List are required to be either 1) verified as impaired, 2) de-listed as they are meeting water quality standards, or 3) placed on a planning list if insufficient data exists (Category 3). FDEP's 2002 update to Florida's 1998 303(d) Impaired Waters List for Group 1 Basins was adopted August 2002 by FDEP Secretarial order and submitted to EPA October 2002. The verified list and de-list lists were amended by FDEP Secretarial order March 2003. The 2002 update was developed in accordance with EPA guidelines for Integrated Water Quality Monitoring and Assessment Reports.

TMDLs establish the maximum amount of pollutants a water body can assimilate without exceeding water quality standards. The Florida Watershed Restoration Act, Chapter 99-223, Laws of Florida, addresses processes for refining the list and for calculating and allocating TMDLs. According to EPA guidelines, waters expected to attain and maintain applicable water quality standards through other Federal, State, or Local requirements do not need to be

included on the 303(d) list. ([www.dep.state.fl.us/water](http://www.dep.state.fl.us/water), Eric Livingston, FDEP, personal communication). SFWMD and FDEP will be working closely on Best Management Practices (BMPs) and data modeling pertaining to both SWIM and TMDLs.

The Naples Bay Basin is a Group 1 Basin in FDEP’s South District, and is in the Southwest Coast Planning Unit of the Everglades West Coast Basin. Planning units comprise a group of smaller assessment units referred to as WBIDs, for water body identification. Nine of the 41 WBIDs in the Southwest Coast Planning Unit occur within the Naples Bay Basin. Other WBIDs have boundaries that overlap the Naples Bay Basin, though their water body and watershed are not considered to be within the Basin (see Section 3 of the Reconnaissance Report, for further discussion of basin and sub-basin delineation). All information from those FDEP 303(d) lists for relevant WBIDs is provided in Appendix A-1 of the Reconnaissance Report.

The status of each WBID that occurs on either the Planning or Verified List in the Naples Bay Basin is summarized in Table 1. According to information provided in the 303(d) lists, the primary parameter of concern is dissolved oxygen (DO). Two water bodies, the Gordon River Canal (WBID 3258D) and Henderson Creek Canal (WBID 3259E), are verified impaired due to low DO. Biological oxygen demand (BOD) is the causative pollutant in these WBIDs. Note that the Henderson Creek WBID is mis-named. The WBID is not related to Henderson Creek, but rather is a portion of the Golden Gate Canal System.

WBIDS on the planning list will undergo Impaired Water Rule assessments to ascertain if TMDLs are needed and receive a new listing in the fall of 2007 after further monitoring is conducted. The projected year for TMDL development of all necessary WBIDs in the Naples Bay Basin is 2008.

**Table 1. FDEP 303(d) Waterbodies Status (compiled from the Updated Master List (October 2002), and the Amended Verified and De-lists Lists (March 2003) for the Naples Bay Watershed**

WBID	Water Body Name	Proposed Status	Parameter	Priority
3259C	Gordon River	Planning List	DO	Low
		Planning List	Total Coliforms	Low
3258 D	Gordon River Canal	Verified List	DO	Medium
3259 E	Henderson Creek Canal	Verified List	DO	Medium
3259 F	Golden Gate Canal	Planning List	DO	
3259 G	Naples Bay	Planning List	Nutrients (chlorophyll)	Low
3259 G	Naples Bay	Planning List	DO	Low
3259H	Henderson Creek Canal	Planning List	DO	

Over the past 35 years, research, monitoring, studies, and plans have been done to address water quality, hydrology, and ecosystems in the area. One of the earliest studies, the “Naples Bay Study” completed in 1979, identified problems affecting Naples Bay. Many other organizations, both governmental and citizen-based, have focused their efforts on studying, restoring and managing the system. The Comprehensive Everglades Restoration Plan

(CERP) has undertaken comprehensive restoration and preservation of water resources in Central and South Florida, and includes the NBW within its study area as part of the Southwest Florida Feasibility Study. Some of the CERP actions taken that are applicable to the NBW include development of program management plans for feasibility studies, compilation and evaluation of water quality data, and water quality strategy development by a Water Quality Sub-team.

The Water Quality Sub-Team produced the report, “Compilation, Evaluation and Archiving of Existing Water Quality Data for Southwest Florida” (Tetra Tech and Janicki 2004), that identified a ‘preferred’ Access dataset containing about 2 million records. SFWMD identified and improved some problems with the database (Darren Rumbold, SFWMD personal communication). Some data gaps have been addressed and future sampling plans have been discussed as a cooperative effort among the City of Naples, Collier County, FDEP, and SFWMD staff. Figure 4 shows the location of water quality sampling sites within the NBW.

Additional strategies and recommendations of the Water Quality Sub-committee are described in the report “Evaluation of Naples Bay Water Quality and Hydrologic Data” (Taylor Engineering, Inc. 2005), completed June 2005. Though some of the sampling recommendations are currently being implemented, there still seem to be perceived gaps in water quality data in the Watershed. For example, some of the data needs for hydrodynamic modeling require either diel (overnight) sampling or event-specific (rainfall events) samples which are not currently being collected.

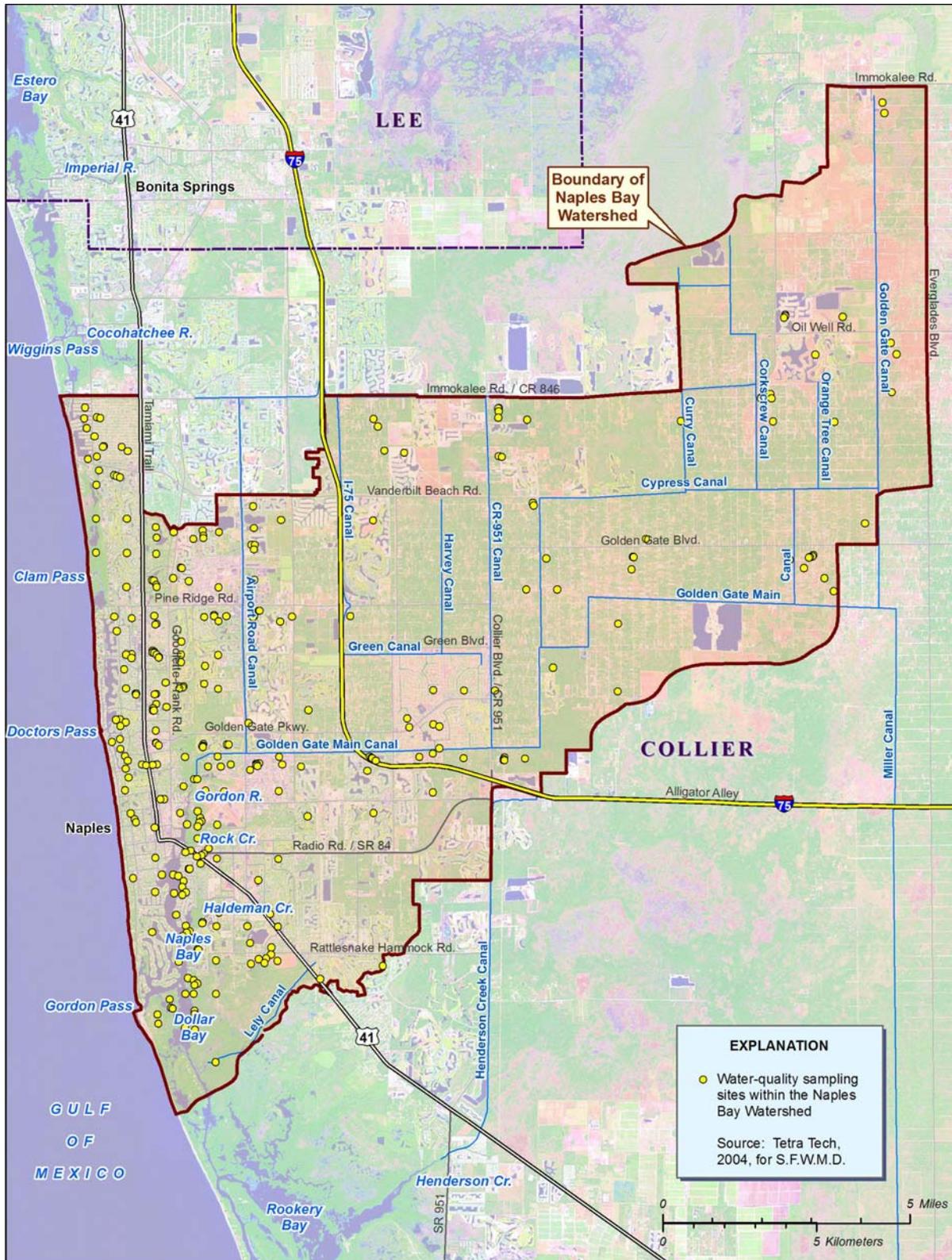


Figure 4. NBW Surface Water Quality Monitoring Sites

#### **A.4. Land Acquisition**

The acquisition of environmentally sensitive land to preserve and protect water resources is an important ongoing initiative that is primarily conducted by local governments. However, SFWMD has acquired 45 conservation easements through the regulation permitting process throughout the Watershed and will continue to acquire conservation easements as opportunities arise. Together they total 950 acres. SFWMD also acquired three access easements (ingress/egress) located in the southern portion of the Watershed. The largest of these is the Lely Canal and its structure. There is another easement at the Golden Gate Canal and a very small parcel along I-75 between Green Boulevard and Golden Gate Parkway.

SFWMD supports public agencies in their efforts to provide appropriate protection and public access to the conservation lands in the Watershed. Conservation Collier has purchased portions of two multi-parcel projects, and solicitations for purchase are ongoing. Other conservation acquisition activities within the Watershed include several potential purchases along the Gordon River. Conservation Collier will partner with County Stormwater and Transportation Departments on these purchases. Farther south, also along the Gordon River, the program has completed acquisitions which will help connect with others to create an envisioned Gordon River Greenway. The Greenway will extend from Golden Gate Parkway on the north to the Gordon River Bridge and US 41 to the south. The acquisition of the Fleishman property and the 50 acre Gordon River Water Quality Park will also contribute toward the preservation of sensitive land in the Naples Bay corridor.

#### **A.5. Water Supply**

The principle source of potable drinking water in the NBW is the surficial aquifer. It is recharged primarily by rainfall. Most of this formation is underlain by the Tamiami Formation, a relatively thin, highly permeable layer with the top exposed by the water table in many areas. The Hawthorne Formation lies beneath the Tamiami Aquifer and is a brackish water source. The Floridan Aquifer lies beneath the Hawthorn formation and extends out into the coastal shelf. The top of this formation is about 700 ft below sea level at the coast.

Although water supply is generally outside of the scope of the Naples Bay SWIM Plan, there are concerns about the cumulative impacts of groundwater withdrawals on wetland areas and wetland health. There may also be opportunities to resolve stormwater quantity issues through the coordination of efforts to redirect and/or hold back stormwater from direct discharge to surfacewaters. Such efforts will serve to enhance aquifer recharge.

#### **A.6. Completed or Pending Naples Bay Watershed Studies**

A variety of studies and plans have been done that address water quality, hydrology, and ecosystems in the Naples Bay Watershed. The Reconnaissance Report provides a detailed summary of each of the listed studies, as well as a compendium of other studies and plans of interest.

## **A.7. Current Restoration or Protection Projects**

Over the last three decades, SFWMD in cooperation with the local governments and some private developers, has implemented several watershed restoration projects to benefit the surfacewater inflow to Naples Bay. The network of water control structures originally constructed in the Golden Gate Canal system by the Gulf American Corporation had very little operational flexibility and was ineffective in achieving the desired levels of service of water management for a rapidly urbanizing watershed. Fifteen fixed crest weirs in the Golden Gate canal and its tributaries have been reconstructed with manually or electrically operable gates to regulate water levels and outflows. Four of these structures are also equipped with backpumping stations to capture outflows during the early part of the dry season.

The Big Cypress Basin Board directs the preparation of plans for conservation, preservation and development of water resources, and assists other public entities' efforts in managing water resources in the Basin. The BCB operates under a five-year plan (BCB-SFWMD 2006) that identifies capital infrastructure improvement projects relevant to the NBW. These projects are summarized in Appendix IV.

The Southwest Florida Feasibility Study (SWFFS) is a component of the Comprehensive Everglades Restoration Plan (CERP) that affects all of Southwest Florida. The SWFFS was initiated to address additional water resource issues (needs, problems, and opportunities) within Southwest Florida, including the NBW, that were not being addressed directly by CERP. The study scope includes utilizing the Watershed Management Model (WMM) to estimate pollutant loads. The output of the WMM is a spreadsheet of estimated loads that will include the NBW tributaries in addition to other Southwest Florida basins. In addition, the study will evaluate the benefits of various opportunities for restoration in the NBW. The Gordon River restoration project along the Gordon River, Rock Creek, and the Goodlette-Frank ditches, the removal of spoil berms to improve water exchange with mangroves, and the construction of stormwater treatment systems to improve surfacewater quality are some of the projects being evaluated.

Local governments have numerous stormwater or surfacewater restoration projects that are currently being implemented or are planned for implementation in the NBW (Appendix IV). Beginning with the 2004 Florida legislative session, the Community Budget Issue Request (CBIR) program mandated that local governments seeking legislative funding assistance for projects must have been reviewed by FDEP under its statutory authority in Section 403.885, F.S.

During the 2006 legislative session, the legislature substantially amended Section 403.885, F.S., the statute that generally guides water project funding. The revisions made in Section 73 of SB 888, now Chapter 2006-230, Laws of Florida, removes most of the qualifying criteria formerly in the law. In addition to previous guidance, all water projects must protect public health and the environment; and implement a state, local or regional plan related to water quality protection. Complete details on the legislative requirements on the water project funding can be found at

[http://www.dep.state.fl.us/water/waterprojectfunding/2007/wpf\\_2007\\_main.htm](http://www.dep.state.fl.us/water/waterprojectfunding/2007/wpf_2007_main.htm).

Some of these projects are being funded under the District's Naples Bay Initiative. Under this initiative, cost share partners identify and jointly prioritize projects for funding. Funding is then sought from the Florida legislature by the District to further advance implementation of Naples Bay water quality improvement projects.

## SECTION B. LAND USES AND REGULATED ACTIVITIES WITHIN THE NAPLES BAY WATERSHED

### B.1. Land Use and Land Cover

#### Current

Based on 2004 land use data and maps reported in the Naples Bay Reconnaissance Report, the predominant land uses in the NBW are urban and suburban development, comprising 44% of the Watershed. Wetlands and wetland forests comprise 18% of the Watershed. There are still approximately 15,000 acres of upland forest, comprising 15% of the land area. Agricultural and rangeland comprise 9.5% of the land area, followed by open space and recreational lands (7.6%). Table 2 shows the acreage and percentages of land use/land cover. Detailed GIS overlay maps of land cover, wetland vegetation cover, future land uses in the 100-year floodplain, and others are found in the NBW Reconnaissance Report, cited previously.

**Table 2. Major Categories of Land Use and Land Cover in the NBW for 2004**

Land Use/Land Cover Category	Current (2004)	
	Acreage	%
Urban and Suburban	45,577	44
Agriculture/Rangeland	9,785	9.5
Recreational and open land	7,872	7.6
Upland forest	15,539	15
Wetlands and wetland forest	18,667	18
Open Water	4,938	4.8
Other lands	448	1.1
Totals	102,826	100%

#### Future

Future land use/land cover estimates for 2025 were developed from Collier County future plans, other GIS data, and local expert knowledge. As shown in Table 3, virtually all of the available agricultural/rangeland and upland forest in 2004 will be converted to urban and suburban land uses, representing 70% of the land. Current government protection provisions effectively prohibit future development in wetlands, thus the percentage (18%) of wetland cover in 2025 remains unchanged.

**Table 3. Major Categories of Land Use and Land Cover in the NBW for 2025**

Land Use/Land Cover Category	Future (2025)	
	Acreage	%
Urban and Suburban	71,430	70
Agriculture/Rangeland	975	>1
Recreational and open land	5880	6
Upland forest	893	1
Wetlands and wetland forest	18,667	18
Open Water	4,938	4.8
Other lands	43	>1
Totals	102,826	100%

### **B.2. Point Sources of Pollution**

In October 2000, the U.S. Environmental Protection Agency (EPA) authorized FDEP to implement the National Pollutant Discharge Elimination System (NPDES) stormwater permitting program in the State of Florida (with the exception of Tribal lands). The program regulates point source discharges of stormwater runoff from urban as well as certain industrial facilities. The operators of regulated industrial facilities must obtain an NPDES stormwater permit and implement appropriate pollution prevention techniques to reduce contamination of stormwater runoff.

There are a number of domestic and industrial wastewater facilities in the NBW with NPDES permits to discharge to surface waters. The volume of discharge to surface waters from these facilities compared to their permitted capacities varies, with some facilities discharging to surface water only during wet weather conditions and others discharging to surface waters exclusively. A list of these facilities is given in Appendix II.

The State of Florida also issues the Multi-Sector Generic Permit (MSGP) for Stormwater Discharge Associated with Industrial Activity. Most regulated facilities in the state are eligible for coverage under the MSGP. There are currently 24 MSGP permittees in the NBW (Appendix III).

Designated large and medium municipal separate storm sewer systems, or MS4s, are publicly-owned conveyances or systems of conveyances (i.e. ditches, curbs, catch basins, underground pipes) that are designed for the discharge of stormwater to surface waters of the state. An MS4 can drain and be operated by, municipalities, counties, drainage districts, colleges, military bases, or prisons, to name a few examples. These facilities were previously required by EPA to obtain NPDES permits prior to delegation to the state. In the state of Florida, Phase II permitting was completed in 2003, and the permitted program should be implemented by 2008. FDEP's authority to administer the NPDES program is set forth in Section 403.0885, Florida Statutes (F.S.).

Collier County received an NPDES Phase II Stormwater Permit for its stormwater collection system July 28, 2003 (Permit #FLR04E037). Conditions of the permit require the County to have a stormwater quality program that reasonably attempts to prevent pollution from

entering the stormwater collection system. According to FDEP, the City of Naples also has an NPDES MS4 permit (permit #FLR04E080, [http://www.dep.state.fl.us/water/stormwater/npdes/MS4\\_1.htm](http://www.dep.state.fl.us/water/stormwater/npdes/MS4_1.htm)).

### **B.3. Non-point Sources of Pollution**

Non-point sources of pollution in the Watershed, which can degrade ground and surface water quality, include stormwater runoff or leaching of pollutants into groundwater from agriculture, and urban/suburban land uses, atmospheric deposition, and septic tanks. Septic tanks, or Onsite Sewage Treatment and Disposal Systems (OSTDS), are prevalent in some areas of the Watershed and have been identified as a potential source of nutrients (nitrogen and phosphorus), pathogens and other pollutants that can pose a threat to public health. Surface waters can be adversely affected directly by system drainfields washed away by floodwaters or via runoff from areas where system failures result in ponding of untreated or inadequately treated wastewater on the ground. Surface waters can be adversely affected indirectly through seepage of groundwaters contaminated by system discharges. From the period 2000-2005, the Florida Department of Health reported 801 OSTDS repair permits (<http://www.doh.state.fl.us/environment/ostds/statistics/repairs.htm>) and 5,320 new installation permits in Collier County (<http://www.doh.state.fl.us/environment/ostds/statistics/NewInstallations.htm>).

## **SECTION C. GOALS, INITIATIVES, AND STRATEGIES FOR RESTORATION OR PROTECTION**

The Water Resource Implementation Rule (Ch 62-40, F.A.C.) calls for Water Management Districts to implement protection measures as appropriate to enhance or preserve surface water resources.

Specifically, 62-40.425 *F.A.C.* Watershed Management states:

- (1) A comprehensive watershed approach provides an important tool for managing the cumulative impacts of human activities. Where possible, the Department and Districts shall promote a watershed management approach for addressing water quality, water supply, natural systems, and floodplain management and flood protection issues, and shall encourage the development of comprehensive watershed management plans.
- (2) It shall be a goal of watershed management programs to protect, preserve and restore the quality, quantity, and environmental values of surface and ground water resources; to prevent existing environmental, water quantity, and water quality problems from becoming worse; to reduce existing flooding problems; improve existing water quality; promote and protect the availability of sufficient water for all existing and future reasonable-beneficial uses and natural systems, and preserve or restore natural systems.
- (3) As part of SWIM plans or other watershed management plans, programs, or rules, the Department, water management districts, Department of Agriculture and Consumer Services, and local governments are encouraged to implement protection measures as appropriate to enhance or preserve surface water resources. Protection measures shall be based on scientific evaluations of targeted surface waters and the need for enhancement or preservation of these surface water resources. Protection measures shall include a combination of nonstructural pollution prevention best management practices and structural best management practices.

Specific Authority 373.026(7), 373.036(1)(d), 373.043, 373.171 FS. Law Implemented 373.023, 373.026, 373.036(1)(d), 373.171, 373.1961, 373.223, 373.418, 373.451, 373.453, 403.064, 403.067, 403.0891 FS. History—New 5-7-05.

Water management goals and objectives of the Naples Bay SWIM plan include the following:

- Protect and improve surface water quality
- Preserve and restore, where appropriate, native ecosystems along with their water resource related functions
- Maintain the integrity and functions of water resources and related natural systems
- Improve degraded water resources and related natural systems to a more natural functionality

The mission of the NBW Plan is thus to preserve and protect the estuarine ecosystem in Naples Bay and the contributing drainage area consistent with the goals of the South Florida Water Management District. The mission will be accomplished through the use of a

prioritized, objective, sustainable, ecosystem or watershed approach with periodic public review and input. Through prioritization, projects will be chosen which are most likely to result in protection and/or restoration. Sustainable restoration and enhancement techniques alone or in combination will minimize the public's financial and material liability toward the management and operation of these systems. An ecosystem-watershed and inter-watershed approach will take into consideration the cause and effects of the problem within its land- and water-based context and establish successful applications for enhancement or restoration.

The Naples Bay SWIM plan is organized around a system of goals, initiatives, strategies and action steps. In this system, the *Goals* are broad-based and identify objectives of SFWMD, stated above. *Initiatives* are general categories that have been used to divide the plan into distinct subject areas developed by SFWMD staff. *Strategies* are more detailed descriptions of the underlying work proposed to achieve results. They identify the approaches and methods that will be used to implement the initiatives. *Action Steps* represent specific activities under each strategy suggested to reach project delivery. Each *Action Step* includes a schedule for completion and an estimate of the funding requirements needed to accomplish the *Action Step*. These *Action Steps*, as well as the *Strategies* and *Initiatives* referenced above, are not mutually exclusive, and may be undertaken concurrently or sequentially.

The Naples Bay SWIM Plan focuses on the following four primary initiatives:

#### Initiative 1 – Water Quality

This initiative consists of two distinct but interrelated strategies: Water quality and flow monitoring, and water quality modeling.

#### Initiative 2 – Stormwater Quantity

The vastly expanded drainage area in the NBW has resulted in the discharge of large quantities of stormwater runoff into Naples Bay. This initiative focuses on identifying inflows from canals and stormwater conduits, including non-point discharges, and on mechanisms to reduce these excess flows and restore more natural timing and quantity of freshwater inflows to the Bay.

#### Initiative 3 – Watershed Master Planning and Implementation

Watershed master planning is an evaluation of the existing stormwater management infrastructure and practices in the geographic area and identification of problem areas, with detailed remedial actions derived using hydrologic models simulating responses on volumes and timing of flow rates under a range of climatic conditions.

Implementation is the practical application of the information gained from master planning. For SFWMD, implementation includes assisting local governments in coordinating their plan implementation and construction of those projects through a prioritized stormwater retrofit program. The dual focus is on areas built prior to adoption of stormwater management regulations (1984) and areas with identified impaired waters. A key tool for implementation is solicitation of available federal and state funding and identification of other partnering opportunities.

#### Initiative 4 – Habitat Assessment, Protection and Restoration

This initiative consists of strategies to develop maps to identify areas for habitat protection and restoration in the NBW. Additional data collection efforts for parameters such as benthic organism diversity, submerged aquatic vegetation distribution, and shellfish areas will be evaluated and implemented as necessary.

Through the results of continuing data collection and analysis, opportunities for habitat restoration will be evaluated, mapped and planned for implementation in the NBW.

In its mandate to address broad ecosystem needs, the Naples Bay SWIM Plan attempts to accomplish comprehensive protection strategies within the NBW and introduce sustainable restoration strategies for resources or resource areas that are proven to be degraded. The intent is to also provide cooperative funding for projects addressing long term waterbody protection and restoration.

### **C.1. Water Quality Initiative**

#### **C.1.1. Strategy: Evaluate the Existing Water Quality Monitoring Network to Determine Its Ability to Detect Change**

Naples Bay and its tributaries have been extensively monitored for water quality for the last 35 years. Canal flow is well mapped and changes in volume monitored. The existing water quality monitoring programs consist of ambient monitoring to generally characterize water quality in the NBW and identify water quality problems and trends.

The aim of this strategy is to ensure the provision of useful information for assessing water quality relative to state water quality standards, and verifying remedial actions that are statistically robust. It is critical that the NBW monitoring system have the power to detect improvements anticipated from load reductions and that meaningful flow/load reductions using models can be estimated.

##### **C.1.1.1. Action Steps:**

1. The SWFFS ACCESS database has been evaluated for use in assessing current condition, trends, and water quality model setup and calibration for Naples Bay (Taylor Engineering, Inc. 2005). However, the statistical power of this database, as well as other data from the existing monitoring program, will be evaluated to determine its ability to detect change and provide monitoring optimization. The statistical results from the data analysis will be used to determine the utility of existing available data, as well as identify the gaps in data that are necessary to support hydrodynamic model development. Care will be taken to ensure that revisions to the water quality sampling program will not be duplicative of existing efforts by agencies, and the monitoring program will be compatible with existing sampling networks of FDEP, Collier County, City of Naples and via CERP.

Special consideration will be given to the collection of event-specific monitoring data, as necessary to calibrate water quality models. Storm event sampling and diurnal sampling may be a gap. If so, directed monitoring of these events will be considered.

Specific bacteria event sampling may be considered since the highest concentrations of bacteria occur in association with high runoff and stream flows caused by rainfall. Continuous sampling of parameters, such as dissolved oxygen, will be considered.

2. Review and update SFWMD water quality database to reflect current SFWMD, FDEP, County and City of Naples sampling stations and integrate to a conforming data layer accessible to the GIS platforms of all agencies. This will allow display of monitoring station locations, as well as spatial analysis and display of data. Ideally, a GIS layer with a unique identification for each station could be joined to a comprehensive water quality/water quantity database. It would be useful to differentiate stations that are currently monitored versus historic stations.
3. Once the sampling and monitoring assessment is completed, implementation will be coordinated with other agencies.

### **C.1.2. Strategy: Hydrologic and Hydrodynamic Water Quality Modeling**

Hydrologic model development and water quality analyses are required to refine alternative plan formulation. Cost-effectiveness and incremental cost analysis will be used to compare different outputs resulting from the various levels of expenditures.

These models will be capable of characterizing non-point pollutant loads from the tributary basins discharging to Naples Bay and their transport and fate in the estuarine system. The magnitudes of point-source discharges from tributary pollution sources will also be estimated in the watershed modeling process. Output from the models will assist in describing interrelationships between physical, chemical and biological processes in the estuary; determining the nutrient and pollutant assimilative capacity of the estuary; prioritizing areas for water quality remediation; and developing conservation protection strategies.

#### **C.1.2.1. Action Step:**

1. Assist in pollutant loading model development and testing. Contractors are currently working on applying the Water Management Model (WMM) as part of the SWFFS. SFWMD will provide assistance on an as-needed basis as model development and testing proceeds.

Once the model has been calibrated and validated, an alternatives analysis of potential management practices and projects to support the objective of reducing nutrient and sediment loadings and implementing cost-effective BMPs may be conducted. Finally, models will be used to run various scenarios. Model output results will be reviewed and

both point and non-point pollution sources (i.e. waste water effluent, septic leachate) and effects in particular areas of the NBW, such as shellfish harvest areas, will be quantified. The SWIM plan will be updated to recommend specific actions to solve problems and meet watershed goals. Areas of good to excellent water quality will also be identified and may be recommended for conservation purposes.

## **C.2. Stormwater Quantity Initiative**

### **C.2.1. Strategy: Improve the Timing of Freshwater Flows into Naples Bay**

The excessive amount of stormwater entering Naples Bay, particularly from the Golden Gate Main Canal has a detrimental effect on both the ecology and water quality of Naples Bay. Restoring the more natural timing and quantity of releases of freshwater would help reduce the adverse impacts of current practices.

Since fluctuations in salinity are closely associated with excess freshwater flows, it is appropriate that modeling of salinity be conducted within the context of water quantity. A model is required to determine or quantify “excess flows” and to estimate the effects of diversion on salinity, residence time, and other variables.

#### **C.2.1.1. Action Steps:**

1. Assess feasibility of development of a salinity model for the NBW. Useful resources include the USGS Estero Bay salinity patterns mapping (USGS 2003). Maps show seasonal variability, rivers of significance, and hydrologic barriers. Empirical salinity data collected within Naples Bay could be used to develop and/or verify salinity modeling efforts.

Development of this salinity model needs to be coordinated with the BCB, since model development is listed in the BCB 2006-2010 five-year plan.

2. Develop and operate a salinity model to identify spatial and temporal salinity distribution patterns in the Bay.
3. Examine the efficacy of aquifer storage and recovery (ASR) wells, canal re-routing and stormwater recycling to reduce freshwater discharge and increase recharge, and achieve discharge flow timing improvements. This should include evaluating the transport of excess flows out of the Watershed to restore historic flow regimes.
4. Consider rulemaking efforts to increase onsite retention of stormwater.

## **C.3. Watershed Master Planning and Implementation Initiative**

There is a general lack of storage and pretreatment of stormwater throughout the NBW as a result of many areas adjacent to Naples Bay being developed prior to the existence of stormwater management system regulations. In addition, there is rapid development in the

pre-platted area of NGGE, yet there is limited land use and land development control in this area of the watershed.

### **C.3.1. Strategy: Evaluate Existing Stormwater Master Plans**

Stormwater master planning is primarily a local government responsibility. Stormwater master planning for many areas of the watershed has been performed by the City of Naples and Collier County, but the master plans are in various states of currency and may need to be updated or expanded to address the entire Plan Area. The impact of the area's recent rapid growth on the master plans also needs to be assessed.

A more recent critical element for master plans to address is the comprehensive watershed plan elements per the EPA Guidance for 319 (h) funding assistance to enable local governments to efficiently pursue this federal funding source. The elements are:

- a. An identification of the causes and sources or groups of similar sources that will need to be controlled to achieve the load reductions estimated in this watershed-based plan.
- b. An estimate of the load reductions expected for the management measures described under paragraph (c) below.
- c. A description of the NPS management measures that will need to be implemented to achieve the load reductions estimated under paragraph (b) above and an identification (using a map or a description) of the critical areas in which those measures will be needed to implement this plan.
- d. An estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon to implement this plan.
- e. An information/education component that will be used to enhance public understanding of the project and encourage their early and continued participation in selecting, designing, and implementing the selected NPS management measures.
- f. A schedule for implementing the NPS management measures identified in this plan that is reasonably expeditious.
- g. A description of interim, measurable milestones for determining whether NPS management measures or other control actions are being implemented.
- h. A set of criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made toward attaining water quality standards and, if not, the criteria for determining whether this watershed-based plan needs to be revised or, if a NPS TMDL has been established, and whether the NPS TMDL needs to be revised.
- i. A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established under item (h) immediately above.

#### **C.3.1.1. Action Steps:**

1. Examine coverage of stormwater plans. A comprehensive listing of completed and pending watershed master plans will be prepared, along with the status of completion

- or implementation of each study. Identify capital improvement plans and existing stormwater network maintenance programs.
2. Evaluate existing stormwater plans for flood abatement, water quality improvement, and regional adequacy.

### **C.3.2. Strategy: Assist in the Development of Local Stormwater Master Plans and Implementation Schedules**

Local plans will serve as the implementation schedule for retrofit and maintenance initiatives. District models may be used to assess and predict the effects of proposed management strategies.

#### **C.3.2.1. Action Step:**

1. SFWMD will assist local governments in the development or updating of master plans that will address water quality improvements. This assistance may include activities such as facilitation, planning, cost-sharing, and technical design or review. A particular consideration will be given to North Golden Gate Estates if it does not have a master plan for stormwater management.

### **C.3.3. Strategy: Partner with Local Governments to Implement Stormwater Master Plans**

The purpose of this strategy is to provide assistance to local governments through such means as cost-share funding, technical assistance, legislative initiatives, mapping, and other services provided directly by or contracted through SFWMD.

#### **C.3.3.1. Action Steps:**

1. Continue to coordinate an inter-agency NBW Stormwater Management Group.
2. SFWMD will provide technical assistance to local governments based on a prioritized schedule of projects developed by the NBW Stormwater Management Group.
3. Coordinate with local government land acquisition plans for stormwater retrofit opportunities that encourage recharge and recycling of stormwater runoff, where appropriate.
4. Assist local governments seeking federal and state funding for land acquisition, design, and construction of regional stormwater retrofit projects for water quality treatment.
5. Where feasible, encourage and cost-share with local governments to install alternative stormwater treatment mechanisms using low impact design principles.

## **C.4. Habitat Assessment, Protection and Restoration Initiative**

### **C.4.1. Strategy: Provide Habitat Assessment, Protection and Restoration**

There is a perceived loss of beneficial uses in Naples Bay by the public (i.e. recreation, boating, fishing, etc.). There have clearly been losses of historic shellfish (oyster) areas and submerged aquatic vegetation. To protect and preserve the remaining habitats and resources in the NBW it is essential that management decisions be based on sound scientific information. Similarly, benthic habitat data and detailed maps of the natural areas in the NBW are lacking. The lack of an adequate water quality assessment tool for Naples Bay limits the ability to assess the best projects to implement. This issue is being addressed in the water quality initiative.

With complete inventories of both natural and disturbed habitats in the watershed impacts to the system can truly be quantified and specific biological targets set. These biological targets can then form the basis for efforts to enhance or restore the function of adjacent degraded areas through selective habitat enhancement programs and projects.

#### **C.4.1.1. Action Steps:**

1. Develop maps of available habitat (potential areas for restoration) based on evaluations of existing work.
2. SFWMD will support efforts to develop effective strategies with clear targets for habitat protection and, where appropriate, enhancement and restoration.
3. SFWMD will facilitate habitat restoration initiatives in cooperation with and through cost-sharing with local governments and other agencies. These projects may include disturbed habitat enhancement, exotic vegetation control, shoreline revegetation and stabilization, and saltmarsh and benthic habitat restoration and enhancement.

## **SECTION D. MEASURES NEEDED TO MANAGE AND MAINTAIN NAPLES BAY**

This section is provided to describe and discuss the process by which SFWMD will support FDEP in the establishment of TMDLs in the NBW as required by Chapter 62-40.432 F.A.C. Over 160 water bodies within the jurisdictional boundaries of SFWMD have been included in the 1998 or subsequent §303(d) Lists of Impaired Waters and require the development of Total Maximum Daily Loads (TMDLs). SFWMD faces a number of challenges in managing its responsibilities of the overall TMDL process in the complex South Florida natural and political environments (Goforth et al. 2006).

### **D.1. Background**

Section 303(d) of the Clean Water Act (CWA) requires states to submit lists of surface waters that do not meet applicable water quality standards (impaired waters) after implementation of technology-based effluent limitations, and establish Total Maximum Daily Loads (TMDLs) for these waters on a prioritized schedule. TMDLs establish the maximum amount of a pollutant that a water body can assimilate without causing exceedances of water quality standards. As such, development of TMDLs is an important step toward restoring our waters to their designated uses. To achieve the water quality benefits intended by the CWA, it is critical that TMDLs, once developed, be implemented as soon as possible. Hundreds of waterbodies in Florida have been determined to be impaired and each will require one or more TMDLs. Statewide, the cost of implementing TMDLs has been estimated at between \$1 and \$5 billion, with the higher number more likely. Florida DEP has the state lead in this effort, and in some basins, US EPA works in concert with DEP to establish the TMDL. DEP develops TMDLs for waters that have “verified” water quality impairments, verified through Florida’s Impaired Waters Rule methodology. EPA develops TMDLs for 1998 303(d) list waters for which DEP had insufficient data to support evaluation.

The 303(d) List is based primarily on the state’s 1996 305(b) Water Quality Assessment Report (“305(b) report”), which uses a watershed approach to evaluate the state’s surface waters, ground waters, and wetlands. All existing and readily available water quality related data (chemical, physical, and biological) and information were assembled and evaluated in the development of the 305(b) report, including, but not limited to, data in EPA’s STORage and RETrieval (STORET) database, the Statewide Biological Database (biological assessments), and fish consumption advisory information. To obtain more recent data, staff in the DEP’s Division of Water Resource Management met with staff from the state’s five Water Management Districts, solicited information from DEP and district staff, and received input from the public. All readily available data and information were used in the development of the 303(d) List. EPA guidelines specify waters need not be included if other federal, state or local requirements have or are expected to result in the attainment and maintenance of applicable water quality standards.

## **D.2. How The List Is To Be Used**

Chapter 99-223, Laws of Florida, sets forth the process by which the 303(d) list is refined through more detailed water quality assessments. However, this law has not received formal approval from EPA. The state and EPA differ in methodologies for determination of “impairment.” Through a court-mandated consent decree, EPA must set TMDLs for the water bodies on the 1998 303(d) list regardless of scientific assessment methods outlined in Ch 99-223, FAC. This law also establishes the means for developing and adopting TMDLs, allocating pollutant loadings among contributing sources, developing pollution reduction strategies referred to as Basin Management Action Plans (BMAPs) and implementing BMAPs and monitoring results.

Implementation of TMDLs refers to any combination of regulatory, non-regulatory, or incentive-based actions that attain the necessary reduction in pollutant loading. Non-regulatory or incentive-based actions may include development and implementation of Best Management Practices (BMPs), pollution prevention activities, and habitat preservation or restoration. Regulatory actions may include issuance or revision of wastewater, stormwater, or environmental resource permits to include permit conditions consistent with the TMDL and BMAP requirements. These permit conditions may be numeric effluent limitations or, for technology-based programs, requirements to use a combination of structural and non-structural BMPs needed to achieve the necessary pollutant load reduction.

## **D.3. The Watershed Management Program**

TMDLs will be developed, allocated and implemented through a watershed-based approach that addresses the state’s 52 major hydrologic basins in five groups; those groups having a corresponding twelve basins within the jurisdiction of SFWMD. Over the next few years, SFWMD will be providing technical and other support to DEP in adopting the TMDLs, allocating pollutant loadings among contributing sources and implementing pollution reduction strategies in south Florida. The intent is to provide as much support as practical, but SFWMD resource limitations will ultimately determine the level of support. In basins where SFWMD has on-going water quality programs, a greater opportunity exists for a higher level of support than in those basins without active projects. A summary of the potential opportunities for this coordination is presented in Table 4.

**Table 4. Opportunities for SFWMD TMDL Involvement**

DEP or Other Agencies	SFWMD Possible Involvement
<b>Phase 1 – Preliminary Evaluation of Water Quality</b>	
DEP conducts an initial water quality assessment in the basin involving close coordination with local stakeholders	Assist in identifying major issues of concern in the basin Timely upload of SFWMD data to STORET database Assist in identifying local data providers
DEP develops a strategic monitoring plan	Assist in identifying data gaps Comment on strategic monitoring plan
DEP develops a preliminary Basin Status Report that includes a list of potentially impaired waters	Comment on preliminary Basin Status Report
<b>Phase 2 – Strategic Monitoring and Assessment to verify water quality impairment</b>	
DEP, in cooperation with local monitoring entities and WMDs, conducts strategic monitoring to meet priority information needs	Collect additional data if identified via strategic monitoring plan Timely upload of SFWMD and other data to STORET
DEP conducts integrated monitoring assessment using EPA guidance	Comment on integrated monitoring assessment in a timely manner
DEP revises planning list and a draft verified list of impaired waters for public comment	Comment on revised planning list and draft verified list in a timely manner
DEP develops a Basin Assessment Report	Comment on Basin Assessment Report in a timely manner
<b>Phase 3 – Development and Adoption of TMDLs</b>	
DEP will develop and adopt TMDLs and <i>"reasonable and equitable load allocations"</i> among point and nonpoint sources for water bodies or segments on the adopted verified list of impaired waters, with input from stakeholders. DEP establishes TMDLs for water bodies or water segments verified as impaired, using computer modeling to estimate nonpoint source loadings and establish the water body's assimilative capacity	Comment on model framework, including model requirements, parameters to be modeled, model endpoints, design run scenarios, and preliminary allocations in a timely manner Identify other stakeholders that should be involved in the process
DEP will communicate to the public the science used in the TMDL process	Assist in communication of the science used in the TMDL process to the public
DEP will host public workshops for rule adoption of TMDLs and allocations	Attend public workshops for rule adoption of TMDLs and allocations
<b>Phase 4 – Development of Basin Management Action Plan to Achieve the TMDL</b>	
DEP will invite parties potentially affected by TMDLs to participate in discussions on allocations and implementation strategies	Participate in discussions on allocations and implementation strategies Assisting to identify existing and proposed management activities Identify other parties potentially affected

DEP or Other Agencies	SFWMD Possible Involvement
<b>Phase 4 (cont.) – Development of Basin Management Action Plan to Achieve the TMDL</b>	
DEP will work with WMDs, DACS, and other agencies to provide technical resources and assistance to stakeholder group and help identify potential funding mechanisms available to achieve load reductions	Provide technical resources and assistance to stakeholder group and help identify potential funding mechanisms available to achieve load reductions
Affected stakeholders will work with DEP and other affected agencies to reach consensus on load reduction allocations and strategies, leading to development of a BMAP to achieve established TMDLs	Review and comment on load reduction allocations and strategies developed by DEP in a timely manner Assist in development of the Basin Management Action Plan (BMAP)
DEP will make the BMAP available for public review and comment	Comment on BMAP in a timely manner Assist in disseminating the BMAP for public review and comment Participate in public meetings Revise existing district surface water management and ERP rules and regulations where necessary
DEP will incorporate the BMAP into existing management plans where feasible	Assist in identifying existing management plans Assist in incorporating BMAP into existing management plans
<b>Phase 5 – Implementation of the BMAP and Monitoring of Results</b>	
DEP will coordinate the implementation of TMDLs, as directed by the Florida Watershed Restoration Act, which may be carried out through nonregulatory and existing regulatory water quality protection programs	Assist in implementation of TMDLs through appropriate WMD regulatory and nonregulatory programs Assist in identifying nonregulatory water quality protection programs
DACs to take the lead in ensuring that allocations to agricultural nonpoint sources are met, and will work with farmers in the basin to develop and facilitate BMP implementation, including assistance in obtaining funding	Assist DACs and DEP where appropriate in development and implementation of BMPs
Other regional and state agencies will assist in implementation as provided in the BMAP	Assist in implementation as provided in the BMAP
Local entities will implement local government NPDES stormwater programs, local restoration projects, private sector partnerships, BMPs, etc., as provided in the BMAPs	Provide updates to DEP on those local programs and projects for which SFWMD has oversight or involvement

#### **D.4. SFWMD's Role in the TMDL Verification Process**

**Information Sharing** is a critical first step in working with DEP to develop meaningful TMDLs. The best available data and information regarding hydrology, hydraulics, and water quality data for South Florida is not necessarily in DEP's *Florida STORET Database*. Portions of the best available data reside within the District's files, databases and GIS coverages, and some is kept in City and County data and mapping repositories. It is only through effective and focused communications, with subsequent coordination, that these data will be incorporated in the *Florida STORET Database* and then included in the development of State and Federal TMDLs. Establish how the District will share information, validate TMDL models and confirm pollutant load allocations.

**Reviewing Models and Assessments** that are being developed by DEP will be essential to accepting subsequent TMDLs. The combination of the comparatively short compliance period of the EPA Consent Decree and manpower constraints that exist within DEP have produced compressed timeframes. The "first cycle" TMDLs are based upon models that are being challenged by regulated communities and third party interests alike. DEP's acceptance of these models must be carefully considered with respect to long term management implications, both financially and politically.

**Reviewing Pollutant Loads and Allocations** will be critical given the high cost of designing and implementing capital projects to reduce annual stormwater pollutant loads. It is essential that the District and the communities with impaired water bodies make all reasonable efforts to review the assessments, modeling, conclusions and allocations contained within State and Federal TMDLs and provide comments to DEP prior to their final adoption. The identification and proper handling of statistical outliers are particularly important because of their influence on loads and allocations if they are not removed. It is difficult, if not impossible, to change inaccurate load allocations once they have been adopted.

**It is Imperative to Differentiate the Responsibilities for Load Reductions** between generators (those stakeholders that generate and discharge pollutant loads that are generated by land development and land uses which includes the District and local communities) and conveyors (the District and some local communities who operate regional flood controls and canals that transport pollutant loads within the region).

**Development of Basin Management Action Plans (BMAPs)** that are fair and equitable is a very significant challenge to be faced by SFWMD. The District must recognize and embrace the duality of BMAP development and implementation as it is responsible for the conveyance issues in works of SFWMD. Surface water management and ERP regulations for new development may need to be changed to reflect negotiated requirements of the BMAP. SFWMD will play a central role where appropriate in the planning, coordinating, scheduling and funding of cooperative projects that will form the foundation for the subsequent implementation of the BMAPs.

## SECTION E. SCHEDULE AND FUNDING REQUIREMENTS FOR RESTORATION AND PROTECTION

Using the “Strategies for Restoration or Protection” to accomplish the Initiatives and Strategies set forth in Section C, the following schedule and dedicated funding requirements have been devised. This is augmented by the local government funding presented in Appendix IV which identifies an estimated \$96.5M for scheduled projects and \$23.5M for planned projects based on the local government capital improvement plans.

In addition to this schedule, periodic program review will be undertaken by SFWMD to evaluate the outcome of ongoing and completed projects and Action Steps within each Initiative. The intent of this review is to identify opportunities to refine and enhance the SWIM Plan. As a living document, the periodic updates will also reflect findings and recommendations of the Southwest Florida Feasibility Study as it appropriately relates to the Naples Bay watershed and its water quality improvements, and reflect changes associated with TMDLs that are developed by DEP.

### Water Quality Initiative (C.1.)

**Strategy: Evaluate the Existing Water Quality Monitoring Network to Determine Its Ability to Detect Change (C.1.1.)**

#### Schedule & Funding

Action Step	Time Frame (months)	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
1-Provide monitoring optimization methodology	6	\$50K				
2-Review and update water quality database	6	\$25K				
3-Implement optimized monitoring program	48		\$75K	\$75K	\$75K	\$75K
	Totals	\$75K	\$75K	\$75K	\$75K	\$75K

**Strategy: Hydrologic and Hydrodynamic Water Quality Modeling (C.1.2.)**

#### Schedule & Funding

Action Step	Time Frame (months)	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
1-Assist in pollutant loading model development & testing	48		\$15K			
	Totals	\$0K	\$15K	\$0K	\$0K	\$0K

**Stormwater Quantity Initiative (C.2.)**

**Strategy: Improve the timing of freshwater flows into Naples Bay (C.2.1.)**

**Schedule & Funding**

Action Step	Time Frame (months)	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
1-Assess feasibility of developing a salinity model	24	\$25K				
2-Develop and operate a salinity model	12		\$30K			
3-Evaluate aquifer storage and recovery (ASR) wells, canal re-routing and stormwater recycling	24		\$30K	\$30K		
4-Consider rulemaking efforts	24				\$25K	\$25K
Totals		\$25K	\$60K	\$30K	\$25K	\$25K

**Watershed Master Planning and Implementation Initiative (C.3.)**

**Strategy: Evaluate existing stormwater master plans (C.3.1.)**

**Schedule & Funding**

Action Step	Time Frame (months)	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
1-Examine coverage of stormwater plans	12	\$30K				
2-Evaluate existing plans for flood abatement and water quality improvement	12		\$30K			
Totals		\$30K	\$30K	\$0K	\$0K	\$0K

**Strategy: Assist in the development of local stormwater master plans and implementation schedules (C.3.2.)**

**Schedule & Funding**

Action Step	Time Frame (months)	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
1-Assist in the development of master plans	36		\$100K	\$100K	\$100K	\$100K
Totals		\$0K	\$100K	\$100K	\$100K	\$100K

**Strategy: Partner with local governments to implement stormwater master plans (C.3.3.)**

**Schedule & Funding**

Action Step	Time Frame (months)	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
1-Coordinate an NBW stormwater management group	60	\$5K	\$5K	\$5K	\$5K	\$5K
2-Provide technical assistance to local governments	60	\$5K	\$5K	\$5K	\$5K	\$5K
3-Coordinate land acquisition plans for stormwater retrofit	60	\$5K	\$5K	\$5K	\$5K	\$15K
4-Assist local governments seeking funding	60	\$5K	\$5K	\$5K	\$5K	\$5K
5-Cost-share with local governments to implement improvements	48	\$1,000K	\$1,000K	\$1,000K	\$1,000K	\$1,000K
Totals		\$1,020K	\$1,020K	\$1,020K	\$1,020K	\$1,020K

**Habitat Assessment, Protection and Restoration Initiative (C.4.)**

**Strategy: Provide Habitat Assessment, Protection and Restoration (C.4.1.)**

**Schedule & Funding**

Action Step	Time Frame (months)	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
1-Develop maps of available habitat	12	\$50K				
2-Develop strategies for habitat protection	12		\$50K			
3-Facilitate habitat restoration initiatives	36			\$30K	\$30K	\$30K
Totals		\$50K	\$50K	\$30K	\$30K	\$30K

## **BIBLIOGRAPHY**

The following bibliography lists all references specifically cited in the preceding text. An extensive listing of reference sources for the NBW can be found in the Naples Bay Reconnaissance Report.

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## Appendix I. Governmental Units and Implementation Partners

SFWMD recognizes the importance of coordination with the many government agencies and other stakeholders that may be affected by, or have some jurisdiction over resources within the NBW SWIM planning area. Governmental units that have jurisdiction over Naples Bay and its drainage basin include Federal and State agencies and the SFWMD. The Watershed also lies entirely within Collier County and the boundaries of the Southwest Florida Regional Planning Council (SWFRPC). The City of Naples is located entirely within the Study Area, as is the Pelican Bay Municipal Service Taxing and Benefit Unit (MSTBU). The table below lists all agencies and stakeholders.

<b>Agencies and Stakeholders</b>	
<b>Federal</b>	
U.S. Army Corps of Engineers	U.S. Fish and Wildlife Service
U.S. Environmental Protection Agency	U.S. Forestry Service
U.S. Geologic Survey	Rookery Bay National Estuarine Research Reserve
National Oceanic & Atmospheric Administration	Natural Resources Conservation Service
<b>State</b>	
Florida Department of Environmental Protection	Department of Community Affairs
Public Service Commission	Department of Health
Department of Transportation	Department of Agriculture and Consumer Services
Florida Fish and Wildlife Conservation Commission	
<b>Regional</b>	
SFWMD	West Coast Inland Navigation District
Southwest Florida Regional Planning Council	
<b>Municipal</b>	
Collier County	
Naples	Immokalee
<b>Unincorporated Communities</b>	
Golden Gates Estates	
<b>Stakeholders</b>	
Conservancy of Southwest Florida	Gordon River Greenway
*Special Taxing Districts	Collier Mosquito Control Districts
Collier County Soil & Water Conservation District	Collier Audubon Society
BCB Coordination Team	Southwest Florida Water Quality Consortium
South Florida Ecosystem Restoration Task Force	Southwest Florida Watershed Council

\*Special Districts within the Study Area that are relevant to surface water improvement and management are listed on page 7 of the Reconnaissance Report.

**Appendix II. Surface water discharge facilities operating with a permit.**

<b>Name</b>	<b>Address</b>
<b>Domestic Wastewater</b>	
Collier County North Regional WRF	10500 Goodlette Frank Road
Collier County South Regional WRF	5600 Warren St
City of Naples WWTP I	1400 3rd Ave N
Port of the Islands-South	Off US 41 South of Naples
<b>Industrial Wastewater</b>	
<b>Concrete Batch Plants</b>	
Krehling Plant #12 (Prospect Ave.)	3728 Prospect Ave
Krehling Plant 1 North	1425 Wiggins Pass Rd E
Krehling Plant 2 East Plant	1555 East Tamiami Trail
Krehling Plant 6 Golden Gate	911 5th St SW
Krehling Plant 8 Shirley St	6100 Shirley St
Naples Ready Mix	4406 Progress Ave
Rinker Materials Corporation	4001 Isle of Capri Road
Schwab Ready Mix Inc	6300 Shirley Street
<b>Other Industrial</b>	
Boat Haven Facility (Naples Bay Project) – petroleum cleanup	1484 5th Ave S

**Appendix III. Facilities possessing multi-sector general permits.**

<b>Facility ID</b>	<b>Name</b>	<b>Address</b>
FLR05F628	Auto Village of Naples, Inc.	15575 Tamiami Trl E
FLR05F890	Bottling Group, LLC	1225 Industrial Blvd
FLR05F798	City of Naples Airport Authority	160 Aviation Dr N
FLR05B866	Collier County Landfill	3750 White Lake Blvd
FLR05E127	Federal Express Corp Imma	1483 Rail Head Blvd
FLR05E121	Fedex Express - Apfa	3885 Mercantile Ave
FLR05D109	Health Management Associates, Inc	200 Aviation Dr N
FLR05F531	J.D.'S Auto Ranch	1135 Auto Ranch Rd
FLR05G050	Marinemax Naples	1146 6th Ave S
FLR05B395	N County Regional WWTF	10500 Goodlette-Frank Road
FLR05F925	Naples	700 Industrial Blvd
FLR05F739	Naples Boat Club	891 10th St S
FLR05G115	Naples Landfill	3750 White Lakes Blvd
FLR05F387	Naples Marina & Boating Center	475 North Rd
FLR05B362	Naples Municipal	160 Aviation Dr N
FLR05B361	Naples Municipal Airport	160 Aviation Dr N
FLR05B356	Naples Municipal Airport	160 Aviation Dr N
FLR05B355	Naples Municipal Airport	160 Aviation Dr N
FLR05B354	Naples Municipal Airport	160 Aviation Dr N
FLR05C332	Pelican Bay Sewage Treat Plant	6200 Watergate Way
FLR05B397	S County Regional WWTF	5600 Warren St
FLR05A249	Schwab Ready Mix Inc	6300 Shirley Street
FLR05B868	Waste Management of Collier Co	4500 Exchange Ave
FLR05C009	Wiggins Pass Marina	13635 Vanderbilt Dr

**Appendix IV. BCB and Local Government Capital Improvement Project List**

One of the important roles that local government plays in maintaining water quality in the NBW is through the improvement and maintenance of stormwater water facilities, drainage easements, catch basins and other facilities under their jurisdiction. Ongoing capital improvement programs are costly, but necessary, and provide a good example of local governments’ commitment to good water quality. Listed below, by SWIM Plan *Initiative* and responsible entity (in alphabetical order), are the tentative 5-year capital improvement projects of local governments in the NBW. Projects listed include both those that have been identified, as well as those are actually scheduled to begin. The cost estimates for each project are cumulative total for the five-years beginning with FY 2007.

<b>Water Quality Initiative Projects</b>	<b>Entity</b>	<b>Cost Estimate for Identified Projects</b>	<b>Cost Estimate for Scheduled Projects</b>
Estuarine Hydrodynamic and Water Quality Model	BCB	\$100,000	
Gordon River Greenway Park	Collier County		\$5,500,000
Naples Bay Outfall Treatment Project—Naples City Campus Stormwater Sheet Flow	Naples	\$250,000	
NPDES Phase II Stormwater Public Education & Public Outreach Control Measure	Naples	\$200,000	
<b>Stormwater Quantity Initiative Projects</b>			
Golden Gate Canal/Henderson Creek Diversion Project	BCB		\$2,500,000
Golden Gate Weir #2 Retrofit	BCB		\$4,200,000
Golden Gate Weir #3 Relocation and Modification	BCB	\$2,500,000	
Golden Gate Weir #6 & #7 Retrofit	BCB	\$1,700,000	
Golden Gate Weir #5 Retrofit	BCB	\$2,000,000	

Golden Gate Canal ASR Phase I	BCB	\$2,000,000	
Gordon River Water Quality Park Phase II (ASR)	Collier County		\$1,000,000
<b>Watershed Master Planning and Implementation Projects</b>			
Gordon River Water Quality Park Phase I	Collier County		\$10,980,000
Gateway Triangle Stormwater Improvements	Collier County		\$6,000,000
Bayshore Drive and Thomasson Drive Stormwater Management Improvements	Collier County		\$555,300
Avalon School Drainage Project	Collier County		\$550,000
Fourteenth Street Outfall Improvements	Collier County		\$400,000
North Road and Gail Ditch Improvements	Collier County	\$1,200,000	
Poinciana Village Stormwater Improvements	Collier County		\$500,000
Riviera Golf Estates Fleur De Lis Lane Culvert Replacement	Collier County		\$150,000
Pine Ridge Area Drainage System	Collier County	\$300,000	
Lely Area Stormwater Improvement Project	Collier County		\$62,000,000
North Golden Gate Estates Flood Control ROMA	CS&WCD	\$320,000	
Naples Bay Basin Management Plan	Naples	\$450,000	
Beach Management Plan for Removal of Ten Stormwater Outfalls	Naples	\$380,000	
Lake Water Quality Management Plan	Naples	\$225,000	
Stormwater Drainage Inventory, Inspection & Evaluation	Naples	\$600,000	
Basin III Stormwater System Improvements	Naples	\$3,100,000	
Basin V Stormwater System Improvements	Naples	-	

Naples Bay  
Surface Water Improvement & Management Plan

January 11, 2007

Basin VI Water Quality & Flood Mitigation Improvements	Naples	\$200,000	
Naples Stormwater Master Plan Update	Naples		\$87,000
Detention Improvements at 13 <sup>th</sup> Street North Pond	Naples	\$44,850	
Pipe and Detention Improvements along 10 <sup>th</sup> Avenue North	Naples	\$412,620	
Detention Improvements at 15 <sup>th</sup> Avenue North Pond	Naples	\$29,900	
Weir Modifications Adjacent to Reach 03	Naples	\$22,975	
Broad Avenue South Linear Park and Filter Marsh	Naples	\$4,200,000	
Goodlette-Frank Road Water Quality Greenway	Naples	-	
Cove Pump Station Mangrove Filter Marsh	Naples	-	
Lake Park Neighborhood Stormwater Treatment System	Naples	\$2,200,000	
Spring Lake Stormwater Improvements	Naples	-	
Royal Harbor Concrete Swale Retrofits	Naples	\$828,000	
Lakes to Bay Goodlette-Frank Conservancy Filter Marsh System	Naples	-	
<b>Habitat Assessment, Protection and Restoration Projects</b>			
Conservation Collier Gordon River Greenway Exotic Removal	Collier County	\$250,000	
Australian Pine Exotic Removal Program	Collier County		\$2,000,000
Naples Bay Estuarine Population Survey	Naples		\$100,000
<b>TOTAL</b>		<b>\$23,513,350</b>	<b>\$96,522,300</b>